AN EXPLORATION OF INDIRECT HUMAN COSTS ASSOCIATED WITH INFORMATION SYSTEMS ADOPTION

A Thesis Submitted for the Degree of Doctor of Philosophy

By

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Abstract

One of the dilemmas that information systems (IS) decision-makers encounter is the identification of the often hidden costs associated with IS adoption, particularly since most of them are reported to be external to the traditional IS budget. The review of the IS literature has identified that much effort to date has focused on the identification and measurement of direct costs, and that much less attention has been paid to indirect costs. One of the main problems reported in the literature associated with looking at indirect costs is that they are intangible and difficult to quantify, and there is evidence suggesting that these indirect costs are rarely completely budgeted for, and thus deserve a much closer consideration by decision-makers. This research investigates this view, arguing that one element of indirect costs, that is, indirect human costs (IHCs), is underestimated and little understood.

The author argues that it is not possible to estimate or evaluate IHCs without first identifying all their components, yet there is an absence of models that show *how* such costs are *allocated* for IS adoption. This underpins the necessity of the present research. Proposed here is a framework of nine sequential phases for accommodating indirect human costs. In addition to this, 1) three conjectures, 2) cost taxonomy and 3) an interrelationship-mapping cost driver model of IHCs, are proposed based on the literature analysis and underpinning the conceptual phases of the framework. To test the conjectures and validate the models proposed, a case research strategy using case settings were carried out in the private sector. Empirical findings validates the models proposed and reveal that indirect human costs are perceived as costs associated with IS adoption, nevertheless not included in the evaluation process or investment proposals. However, during the empirical research, new cost factors and drivers emerged, which resulted in modifications being made to the previously proposed conceptual models. In doing so, it provides investment decision-makers with novel frames of reference and an extensive list of IHCs that can be used during both the IS budget proposals and the evaluation process of the IS investment.

Keyword: Indirect Cost, Indirect Human Cost, Cost Allocation, Cost Factors, Cost Taxonomy, Cost Drivers and Cost Driver Mappings.

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Declarations

I declare that, to the best of my knowledge, no portion of the work referred to in this thesis has been submitted in support of an application for another degree, or qualification to any other university, or institute of learning.

The thesis conforms to the British Standard BS 4821: 1990, the 'British Standard Recommendations for the Presentations of the Thesis and Dissertations', and follows the Harvard referencing system.

Souad Mohamed Ayfrah

Publications

This dissertation gives an account of the research undertaken by the author. Some of the material contained herein has been presented in the form of the following publications:

Published Papers

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Mohamed, S. (2003) Mapping Indirect Human Costs to their Drivers. *Proceedings of the 8th Annual Conference of UK Academy for Information Systems.* Warwick University, UK. 9th-11th April 2003, [CD Proceedings].

Mohamed, S. (2003) Socio-Organisational Dilemma: Indirect Management Human Costs. *Proceedings of the 8th International Conference on Human Aspects of Advanced Manufacturing.* Rome, Italy. 26th – 30th May 2003, pp.189-195.

Mohamed, S., and Brodie, J. (2003) Strategic Planning for IS Adoption: Critical Indirect Human Costs. Proceedings of the 10th *International Conferences on Human-Compute Interaction.* Crete, Greece. 22nd – 27th Jun 2003, pp.197-198.

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CHAPTER

1

Introduction

Research in the last decade indicates that a significant number of Information Systems are external to the traditional IS budget. This situation exemplifies the need to identify and to improve awareness of the *true* costs related to IS projects. A review of the normative literature of IS evaluation, with a general focus on IS costs revealed that there is a pressing need for those adopting information systems to better identify the potential indirect costs associated with the adoption of IS. The following research investigates this position, arguing that one element of indirect costs, that is, indirect human costs (IHCs), is often underestimated and little understood. The dissertation focuses on the indirect human costs associated with the adoption of Information Technology/Systems, identifies the need to account for the soft components (e.g. human costs) of IS in the evaluation processes and investment budget proposals, and discusses the empirical findings within the given contexts. This chapter introduces the focus of interest of the thesis. It presents the interrelationship between information technology (IT) and information systems (IS), and discusses how the "soft" side of IS is often ignored in the evaluation process, especially that related to the human and organisational context. It further discusses the need for developing a frame of reference for identifying, assigning and minimising indirect human costs. The aim, objectives and an overview of the context of each chapter in the present thesis is provided here.

1.2 Information Technology and Information Systems

Information systems (IS) and information technology (IT) are very much interrelated: IT is considered a fundamental part of computerised information systems and both terms are often used interchangeably.

One of the most common definitions of information systems is:

> "*a system that uses information technology to capture, transmit, store, retrieve, manipulate, or display information used in one or more business process*".
> (Alter, 1996: p2)

and Information technology is defined as:

> *"the hardware and the software that make information system possible".*
> (Alter, 1996: p2)

Information technology mainly refers to technology-dependant resources, such as computer software, hardware, data and storage technology, which provide a range of shared IT resources for an organisation. An information system is a much broader system, encompassing a complete scope of business processes that include human interaction. Laudon and Laudon (2001) note that an information system can be illustrated technically as a collection of "interrelated components" that process, store, collect, retrieve and deliver information to support decision-making and management in an organisation. Thus, in the context of this thesis, IS is perceived as a socio-technical system; a combination of people and a computerised system that functions to produce information and meet the requirements of an organisation. Information produced by IS is considered an essential resource by most organisations. The information could be produced internally (via an internal computerised database) or externally (through another organisation, and then transmitted electronically by communication networks).

1.3 Information System Evaluation and Abandonment of Soft Components

Evaluation of IS has become vital, as investments in this sector are increasingly consuming vast sums of money (Willcocks and Lester, 1999). There is a

considerable amount of money spent on IS and the use of technology to support core business functions (Irani *et al.,* 2000), yet not all the anticipated benefits are achieved. Seddon *et al.* (2002) and Remenyi *et al.* (2000) confirm that, currently, a major part of a firm's annual expenditure is on IT, so evaluation of all IT expenditures is important, and IT managers come under great pressure to justify their investment. Having evaluated their IT investments, Remenyi *et al.* (2000) also believe that organisations will learn from their experience for future investments.

Ben-Menachem and Gelbard (2002) report that IT is a large and strategic part of the overall corporate budget, and that CFOs and CEOs are no longer tolerating the inability of their IT divisions to justify their expenses. Researchers have frequently reported that evaluating IT investments is a tremendously difficult, and has become more demanding over time (Remenyi *et al.*, 2000; Willcocks and Lester, 1994; Farbey *et al.,* 1993). Small and Chen (1995) consider that organisations do want to evaluate IS investment more accurately, but are unable to do so. Ballantine *et al.* (1999) report that one of the problems facing IT/IS evaluators is the identification and quantification of relevant costs. Furthermore, Irani (2002) reports that the identification and management of investment-related costs – namely direct and indirect costs – are one of the problems associated with IS evaluation. Irani (2002) reports that indirect costs escalate out of control, and are categorised as human and organisational.

The immediate and foremost constraint, apparent in normative literature, to staying within budget in IS projects seems to be the inability to include or the disregard of the soft side of IT/IS. During the evaluation process of IS, the soft side is often ignored, especially in the human and organisational context, as these are difficult to identify. Researches have argued that human aspects must always be considered in the deployment of IS (e.g. Berghout, 1997; Bride *et al.*, 1994). When evaluating an information system, in addition to the financial factors, a variety of social factors (e.g. teamwork, decision-making, group decision-making, stress, and training) should be addressed too. It is argued here that, since an organisation is a social system as much as it is a technical/economic system, taking these aspects and their impacts into account during the evaluation process will help managers to be aware of the social impacts of IS and account for any resulting costs (direct and indirect). In addition, it

will greatly contribute to carrying out an effective evaluation procedure, and facilitating an effective working environment (e.g. stress-free, friendly, etc.). For example, Remenyi *et al.* (1996) states that one of the more common mistakes with an information system is the "stretching too far" of the technological skills of the staff of the IS department. Remenyi *et al.* (1996) believes that it is essential to pay as much attention to the aptitude and the attitude of individuals as to their training. Effective evaluation means an effective evaluation procedure, which Hopwood (1983) defines as that which comprehensively takes in to account the perspectives of individual stakeholders and interest groups. Furthermore, he believes that effective evaluation should scrutinize the mechanisms of representation of the different interests.

Another example that demonstrates the impact of human factors in IS is illustrated by the impact these factors have on decision-making in IS. Berghout (1997) has stated that decision-making is a human process in which both individual and social aspects contribute to and affect the final decision. Individual features are fundamentally derived from psychological characteristics such as motivation, personality and anticipation, depending on options and the objectives needing to be achieved. When decision-making is a group process it brings about the involvement of social aspects, which can lead to the conflict of groups with the corporation.

To add value to an organisation, the evaluation must be carried out comprehensively and precisely. It must take into account all the tangible/financial and intangible/non-financial aspects that may influence the system's success. Recognising the human issues/costs that effect IS in a work context will enable organisations to be aware of them and always to endeavour to include them in all stages of the system life-cycle. Walsham (1993) believe that evaluation of IS should include the political and social context within which the system is functional. Earl (1992) and Roos (1993) both stated that one of the main reasons for the failure of IT projects was the lack of human considerations/human resources elements.

Furthermore, organisations must be aware of the true costs associated with the deployment of IS, as this will aid them to prepare a realistic financial plan for their costs, and hence enable them to be cost-effective and to stay within budget. Irani

(1999) proposed that the justification for information systems is essentially complex because of the range of indirect costs associated with their deployment. While all the direct costs are financially based, the intangibility of indirect human costs make them very difficult to quantify (discussed in more detail in Chapter 2). Hence, in most cases, merely the financially tangible indirect costs are accounted for in the justification processes. Irani *et al.* (1997) noted that, increasingly, many organisations are admitting to their inability to justify their investment in IT/IS due to the type of costs associated with its implementation. They propose that this is due to the dependency of most of the organisational budgeting processes on financially centred appraisal techniques as a vital part of the decision-making process. As IS is a classic long-term capital investment, organisations use several capital budgeting techniques to evaluate their investment in IS.

Willcocks and Lester (1994) and Bacon (1994) report that financially-based methods are nearly always used for IT/IS evaluations. Similarly, Lefley and Sarkis (1997) note that the investment justification approaches deployed by management are usually dependant on traditional appraisal techniques, which are limited in accommodating indirect costs associated with IS adoption: these techniques are discussed in more detail in Chapter 2.

As an organisation is a confederation of individuals, IT/IS managers need to have a comprehensive understanding of the social/soft issues that might occur within the context of the information system, in particular those that would affect an individual at the workplace in general, and especially those that are cost related. Many human related costs are mentioned in the context of evaluation in IS literature; however, they are not categorised or said to be critical or influential at any stage of the system/project life-cycle. Identifying these costs, categorizing them and identifying their impacts will facilitate the development of evaluation in IS as a social process, and could minimise their impact on the overall budget. Moreover, there is no clear consensus or approach for measuring these costs, which, as cited in the literature, can significantly hinder the progress of an organisation in the IS practice.

In an attempt to explore the indirect costs within the adoption of information systems, and in particular those that are human related, this dissertation explores the

extent to which indirect human costs are considered in all the stages of the cycle of evaluation of information systems. This will help in gaining a better understanding of the indirect costs associated with IS adoption, leading decision-makers to prepare more accurate financial plans, budget estimates, and budget allocation for their IT/IS capital investments. It will also aid evaluators in developing techniques/approaches that take these costs into account during their IT/IS investment evaluation processes.

1.4 Importance of the Research and Potential Outcomes

The framework and frame of reference proposed as an outcome of this study facilitates:

- The identification of potential areas of indirect human costs and savings,
- Better estimates the expected costs, the appropriate allocation of these costs within the IS budget, and their accommodation in the evaluation process and investment budget proposals of IS.

Moreover, identifying and keeping records of the indirect costs of information systems throughout the whole project and/or system life-cycle will enable budget managers to prepare a more truthful financial plan for their cash flow and allocate their budget accurately. Organisations will be able to reduce significantly, or at least better manage and control, the indirect costs associated with the system, enabling projects to remain within budget.

The identification of the drivers of the cost factors will facilitate the recognition of their influence on both the individual and the organisation, leading to a better understanding of the indirect human cost factors, and enabling practitioners to investigate them further. In addition, it will highlight the contextual factors that affect most of the resulting costs, revealing the awareness of managers to the importance of the human dimensions that affect the strategic consideration of such costs in the process. The ultimate aim is to assist managers to identify opportunities to improve the operation of an organisation, and to enhance its effectiveness in delivering services. This, in turn, will allow the effective evaluation of costs – taking into consideration the driving factors and their impacts – and, more importantly,

identifying ways of monitoring the costs (e.g. identifying performance measures). Decision-makers and managers will be offered a frame of reference when considering the evaluation of indirect human costs and so must take proactive roles in their monitoring.

1.5 Research Aim and Objectives

1.5.1 Research Aim

The rationale of the present research is based on findings in the literature that indirect costs *are not accounted for in the IS evaluation process or IS budget*; they are nevertheless taken out of the organisational overheads and budgets of other departments (Khalfan and Gough, 2002; Waterhouse, 1995; Hogbin and Thomas, 1994; Willcocks and Lester, 1993; Hochstrasser, 1992). The view is that many projects run over budget, leading to project failure (Ezingeard *et al.*, 1999; Irani, 1998; Lyytinen, 1998; Lederer and Prasad, 1995; Beam, 1994; Roos, 1993). Hence, there is a need to identify these indirect costs, to include them in the justification process throughout the life-cycle of the project; otherwise, decision-makers may not know what the knock-on costs associated with IS projects are and, as a result, omit them in the IS budget. Therefore, to account for and understand the main indirect human costs better, a frame of reference needs to be developed. Thus the aim of this dissertation is:

> *To identify and develop a novel frame of reference for the identification and management of indirect human costs that can be considered when preparing budget proposals and evaluating information systems.*

By identifying all the costs factors and accommodating them, decision-makers may be better informed of where the costs occur within the organisation, more able to evaluate the IS investment, and, it is argued, through identifying their drivers, will subsequently be able to minimise the resulting cost and thus control them more effectively.

1.5.2 Research Objectives

In addressing the aim, the study has several objectives, based on literature analysis and empirical enquiry of costs associated with IT/IS:

- Develop and validate a framework that proposes sequential phases to facilitate the inclusion of indirect human costs in budget proposals and evaluation processes of information systems.
- Develop and validate a taxonomy of indirect human cost factors associated with IS adoption.
- Develop and validate an interrelationship/network model for mapping the indirect human cost factors to their main drivers.
- Propose and verify conjectures that underpin the theoretical models (IHCs framework, IHCs taxonomy and the interrelation-mapping model) proposed.
- Present conclusions and offer a novel contribution.

1.6 Thesis Structure

The structure of the present research is based on a framework of background theory, focal theory, data theory and contribution suggested by Phillips and Pugh (1994). The background theory is presented in Chapter 2, setting the scene by means of a literature review of IS investment evaluation, and through the critique of the existing models for IT/IS costs. Focal theory is put forward in Chapter 3 via the conceptual models and conjectures proposed in the literature. Data theory, that is, the justification of the research stance used, the validity of the methodology followed, and the data collection and the units of analysis used to accomplish the research aim, are described in Chapters 4 and Chapter 5. The novel contribution of this research to the discipline is discussed in Chapters 6 and 7. The following section summarises the content of each of the chapters constituting this thesis.

1.6.1 Chapter 1: Introduction

This chapter introduces the main area of research, providing a background to the research domain and its importance. Essentially the area of information systems evaluation is introduced and the need to include the soft component of IS in the evaluation process is discussed. Thereafter, the aims and objectives are explained, and the structure of the thesis, along with brief overviews of each chapter presented.

1.6.2 Chapter 2: Context of Information Systems Costs

The purpose of this chapter is to provide a critical and a detailed examination of the evaluation of costs associated with IS adoption throughout the life-cycle of the systems. In doing so, this chapter highlights a void in the literature in identifying and assessing indirect human costs, and the need to look more closely at their identification and appropriate allocation within an IS project, and the planning and cost management within IS evaluation. It further reviews the literature, discussing the inability to identify IT/IS indirect costs as a fundamental factor to the failure of IS projects. The chapter also discusses the limitations of the techniques used in the evaluation of IS and particularly when it comes to evaluating the soft components of IS such indirect cost.

1.6.3 Chapter 3: Information Systems Indirect Human Costs

Having identified that indirect human costs that are associated with IS adoption, as an area infrequently addressed in the normative IS evaluation literature, this chapter critically reviews the indirect human costs that have been cited. On the basis of the literature review it proposes a framework for accommodating indirect human costs in the justification process for IS, while taking into consideration their hidden nature. This framework suggests steps to be followed in identifying and monitoring indirect human costs. Based on the suggested framework, three conjectures are proposed. Furthermore, this chapter proposes:

1) taxonomy of the *identified* cost factors, *allocating* them to the appropriate IS divisions within an organisation;

2) a cost factor-driver interrelationship-mapping model that facilitates the mapping of the cost factors to their 'root causes'.

It is suggested that the proposed taxonomy and driver model facilitate the *identification*, *allocation* and "*mapping of the main root causes*" of the indirect human costs associated with IS adoption, and can be used as a frame of reference, providing significant information to control ends.

1.6.4 Chapter 4: Research Methodology

The focus of this chapter is to describe the methodology used to carry out the present research. It justifies the philosophical assumptions underlying the research method used, and discusses alternative viable research strategies. It presents a detailed case study protocol and units of analysis that are developed to examine the empirical data. The research design is presented in figure 4.1, illustrating the framework followed in carrying out the research methodology.

1.6.5 Chapter 5: Case Studies and Empirical Analysis

This chapter presents and analyses the empirical data collected from the interviews conducted in the four organisations used in the case studies. The data collected are used to test the MEFM taxonomy and the interrelationship IHCs driver-mapping model proposed in Chapter 3. This chapter provides background information on each of the organisations studied. Data are then analysed using the units of analysis developed based on the required data.

1.6.6 Chapter 6: A Frame of Reference for Identifying and Managing IHCs

This chapter discusses the results obtained from the four research case studies. Based on the empirical evidence collected, this chapter revises the three conjectures, the conceptual indirect human costs taxonomy and the driver model proposed in Chapter 3. The MEFM taxonomy is extended to include seventeen newly identified costs, and the driver model to include four more drivers. This provides the required frame of reference for identifying, assigning, estimating, and "recognizing the root cause" of indirect human costs, accomplishing the aim of the research.

1.6.7 Chapter 7: Conclusions and Recommendations for Future Research

This chapter provides a summary of the research, and presents the main contributions to the field of IT/IS. In addition, the ways in which the background and focal theories differ as a result of empirical work, the challenges encountered and the limitations of the study are discussed. Potential areas of further research are also outlined.

CHAPTER

2

Context of Information Systems Costs Identification

This chapter provides a detailed review of the evaluation of costs associated with IS adoption throughout the information systems life-cycle. It commences by briefly discussing the importance of evaluation and, in particular, the justification of costs associated with IS. The chapter then provides an overview of the techniques widely used in the evaluation of direct costs, namely Cost Benefit Analysis (CBA), Return on Investment (ROI), Pay Back (PB), Discount Cash Flow (DCF) and Accounting Rate of Return (ARR), and highlights the advantages and drawbacks of these approaches. The chapter reviews the literature, discussing the inability to identify IT/IS indirect costs as a contributing factor to the failure of IS projects. Subsequently, it takes a closer look at indirect costs, providing an overview of current research and highlighting a void in the literature regarding the identification of indirect costs. It is argued that one element of indirect costs, namely indirect human costs, has received little attention, and is poorly understood. Then, the chapter looks at the importance of allocating indirect costs, while considering their hidden nature.

2.1 Importance of Evaluation as a Management Process

Willcocks (1992) and Farbey *et al.* (1993) identify evaluation as way of determining, via quantitative and/or qualitative means, the worth of IT to the organisation; their view of "worth" is intrinsically linked to the meaning of success and failure. Likewise, Ballantine and Stray (1999) define evaluation as:

> "*the process of establishing, by quantitative and/or qualitative means, the worth of an IT/IS capital investment*".
>
> (Ballantine and Stray, 1999: p89)

Farbey *et al.* (1993) and Willcocks and Lester (1999) argue that, as investments in IT/IS escalate, the justification of these investments becomes ever more important. Giaglis (1999) believes that, due to the large investments in IS, evaluation is important for organisations to justify the dedication of large percentages of their capital to IS investment. Irani and Love (2002) list the following as some of the reasons for appraising IT/IS investments:

- Acts as a control mechanism over expenditure
- Enables selection of a project when different ones are proposed
- Enables ranking of projects according to organisational priorities
- Enables managers to justify their investment
- Offers a framework that could facilitate organisational learning.

Similarly, Remenyi *et al.* (1996) claim that evaluation is essential for the success of an information system, as it is important to assess problems before attempting to resolve them. As Farbey *et al.* (1993) note, evaluation offers benchmarks to be achieved in economic, operational and organisational terms. It is a process that can be used as an assessment of achievements and attainments during IS adoption. Furthermore, it provides a mutual ground for decision-makers to construct a formal evaluation, and to provide appropriate responses that are suited to the organisation. In other words, decision-makers will base their decisions on common ground, rather than proposing decisions that are based on their own individual perceptions.

Niederman *et al.* (1991) emphasise the necessity of IS evaluation as a process to detect concerns about aspects such as cost justification or effectiveness measurement. In doing so, it can be ensured that the evaluation process facilitates organisational learning, and that problems can be addressed before they occur; i.e. evaluation facilitates proactive management, as opposed to reactive management. Al-Yaseen *et al.* (2003) note that lessons learned from the evaluation of a system should be used to evaluate new systems, and they report that one of the key causes of dissatisfaction with new systems is that organisations tend not to recall the causes of termination of the old systems.

Ward *et al.* (1996) states that the evaluation of investments in IS are not regularly or accurately carried out. Likewise, Jones and Hughes (2001) declare that, in practice, IS evaluation has not been given a high level of importance in organisations and is frequently ignored. Results of the case study by Jones and Hughes (2001) indicate that any approach to IS evaluation is considered by non-IS managers as the liability of IS management. Nonetheless, the authors are unsure that IS management is competent in IS justification or IS benefit evaluation and uncertain that they have to be exclusively responsible. Research reveals that various organisations have no management processes to control and measure the accomplishment of the required results, nor do they have processes to determine what benefits have actually been attained (Willcocks & Lester, 1999; Ballantine *et al.*, 1999). Farbey *et al.* (1993) conclude that poor evaluation is dangerous, as it may have a great impact on the organisation and its personnel. Accordingly, Farbey *et al.* (1993) believe that poor evaluation may be deceptive, may lead to inappropriate decisions, and can even cause profitable investments to be rejected in their early stages. Love *et al.* (2000b) consider that poor IT decision-making can result in financial losses, which can transform into a loss in competitiveness. In addition, conducting any process of assessment that does not attempt to measure and evaluate all those aspects that add value or costs to the system under review could result in inappropriate decisions being made. Jones and Hughes (2001) note that IS/IT professionals and managers have come to perceive the evaluation of information technology projects as a critical issue. Despite the increasing expenditure on IT/IS projects, there is anxiety that they are not providing the expected values and benefits.

However, Bannister (2001) and Khalifa *et al.* (2000) report that evaluations in the UK public sectors are neglected. Al-Yaseen *et al.* (2003) report that more than 250 UK organisations do not have a way to depict whether their IT projects were successes or failures.

Farbey *et al.* (1999) and Willcocks and Lester (1996) note that, even when evaluation is carried out, it is mainly carried out at the project proposal level or during the post-implementation review. However, even with this type of evaluation, Al-Yaseen *et al.* (2004) report that there is not much research supporting its implementation. Thus, there is no identification of costs *throughout* the life-cycle of the project. Although one can learn from the process, identifying costs that exceed the preliminary estimate at the post-evaluation stage is, however, not helpful for the organisation, as it is too late to control the monies that have already been spent. Willcocks (1992) establish that there is little effort made to associate evaluations across the life-cycle, or to use experience from previous evaluations.

Seddon *et al*'s (2002) survey of IT managers in medium to large organisations in Europe and the US, report that many firms do not conduct rigorous evaluations of all their IT investments. Jones and Hughes (2001) conclude that there is a lack of "will" to undertake evaluation; some of the IS practitioners and stakeholders in their case study organisations stated that formal evaluation methods were of insignificant value, while other interviewees viewed the evaluation process as complex and difficult to accomplish. In addition, Price Waterhouse reported in 1995 that the costs of developing a system and operating it are not actually fully acknowledged prior to the investment (Price Waterhouse, 1995). Willcocks (1992) suggests an integrative approach to evaluation throughout the IS life-cycle.

Irani *et al.* (2000) report that, as management personnel do not have a framework to evaluate their IT investments, they have a tendency to be narrow-minded when it comes to IT investment decisions. Irani *et al.* (2000) conclude that managers still do not fully understand IT cost portfolios. Their research suggests that, during the investment decision-making process, evaluators account for the upper estimates for costs and the

lower estimates for benefits, except that this still does not solve the problem of running over budget with IT projects. Many academics (Galal *et al*, 2000; Farbey *et al.*, 1999; Willcocks and Lester, 1991) argue that evaluation should be a continuous process throughout the project, using continual assessment to *identify* IS costs throughout the project life-cycle.

Evaluation of a system is part of the broader capital budgeting process (Irani and Love, 2002), with most capital budgeting procedures being based on financially orientated appraisal techniques, as a fundamental component of their decision-making processes. Irani *et al.* (1998) report that these lead to organisations being unable to justify their IT/IS investment, due to the nature of the costs and benefits linked to their adoption. Evaluating the effectiveness of IT/IS investments has been a focal management issue for many years, with researchers (Willcocks and Lester, 1994; Bacon, 1994) believing that knowledge of all the costs involved is essential. Bannister (1999) states that most of the research on costs found in the IS literature is concerned with observable cost (e.g. hardware and software costs); in other words, direct costs that occur in IS budgets. Hence, it would appear essential to identify all the costs associated with developing IT/IS prior to any attempts to evaluate them. Subsequently, evaluation techniques should be developed that will account for all the associated costs, regardless of their nature and their occurrence in the IS project's life-cycle. A major problem that evaluators face is the non-financial, intangible nature of indirect costs.

The following section takes a closer look at the assessment of IS costs, and how they may be a contributing factor to IS failure.

2.2 Relationship of Cost and IS Failure

Gunasekaran *et al.* (2003) report that companies in all sectors have recently been investigating ways to reduce costs. Cost is one of the most influential elements of the IT/IS budget process, with it increasingly being a contributory factor in the failure of IT/IS projects. Despite the continuous increment in spending on IT/IS, Remenyi (1999) cites various examples of IT/IS failure. It must be recognised, however, that there is no

consensus regarding the meaning of the word "failure", as its definition depends on the position and perspective of whoever is looking at the impact of the project. Remenyi (1999) concludes that failure is not only costly in economic terms, but that it negatively affects the morale of IS staff and also the performance of the organisation.

Beam (1994) claims that one way of measuring a project's success/failure is to assess whether the project is completed within budget and on time. Similarly, Lyytinen (1998) identifies budget blowouts and schedule overruns as a component of a process failure, which is one of the common constructs of failure. Khalifa *et al.* (2000) believe that projects being over budget and schedules being delayed are two of the main factors that decision-makers need to be aware of during the life-cycle of the IT/IS project. Ooi and Soh (2003) note that budget overruns can be a result of the incorrect estimation of time and/or inaccurate allocation of resource costs. Remenyi (1999) argues that there are many examples of successful projects that did not meet these two criteria (within budget, on time). An additional problem is not whether they are within budget, but that many terminate before even reaching the implementation stage. For example, Lederer and Prasad (1995) state that many projects are cancelled every year as a result of becoming over budget in the planning stages.

Likewise, in the Standish Group Report in 1995, it was reported that, in the United States alone, 31.1% of projects terminate before they are completed, with a total cost of $81 billion. Moreover, they report that only 52.7% of projects are completed; with the mean final cost 89% above the initially estimated cost however, only 42% of the originally proposed features and functions are achieved. Thus, project budgets are clearly not being prepared accurately, and/or are not being allocated appropriately, leading to cost overruns.

According to Jones (1994), the average cancelled project in the US was a year late and, at the cancellation point, had consumed 200% of its allocated budget. Giaglis (1999) notes that, due to the large capital investment that the majority of organisations spend on IT, IS failure can turn into huge financial losses. For such failure to be minimised, an

understanding of the factors leading to failure is clearly needed as an initial step. Ezingeard *et al.* (1999) and Irani (1998) offer empirical support for the view that many projects run over budget due to the management not fully understanding the associated cost portfolio. Mahaney and Lederer (1999) believe that the success and failure of IS should not be assessed as a "dichotomous" variable, as a project that is 5% over budget is much less of a failure than another project that is 150% over budget. Thus, the more a project is over budget, the more it can be said to have failed.

Many researchers (e.g. Willcocks and Lester, 1999; Jones and Hughes, 2000) believe that, as there is increasing pressure on organisations to enhance the efficiency and effectiveness of their IT/IS, significant expenditure by organisations on IT/IS will persist. George (1999) states that the efficiency perspective centres on the operations of the system itself, while the effectiveness perspective centres on how well the use of the technology delivers the requirements of the organization. Thus, the effectiveness of the system's application by the users will influence the efficiency of the system's processes.

Worldwide expenditure on IT is vast. For example, Seddon *et al.* (2002) reveal that total worldwide expenditure on IT went beyond one trillion US dollars per annum in 2001, and that it is increasing at about 10% per annum, compound. Moreover, the World Information Technology Services Alliance (2000) predicts that the total information and communication industry will reach US$3 trillion by 2004. However, Standish Group report in 2000 that, in 1998, 28% of projects were failing at a cost of $75 billion; in the year 2000 the cost of failure was $65,000. More recently, Goodwin (2003) report an IT project failure between the Co-operative Group and ICL, as a result of which losses of £11 million were claimed. Clearly, these IS projects have major problems, and managers need to find ways of identifying, managing and controlling these project costs.

Remenyi *et al.* (2000) note that many decision-makers believe that the total cost of IS is too high; nevertheless, many IS managers in organisations are not even sure what it is in IS that is costing them so much (Bannister, 1999). To help managers identify costs, many practitioners and academics (e.g. Mohamed and Irani, 2002; Ryan and Harrison, 2000;

Anandarajan and Wen, 1999; Kusters and Renkema, 1996; Remenyi *et al.*, 1996; Dier and Moony, 1994) have developed various classifications of IS/IT costs, as summarised in the Table 2.1 below.

Reference	Cost Taxonomies
Dier and Mooney (1994)	**Initial/Ongoing Costs:** These costs are identified and assigned during the system's life-cycle. However, they tend to be retrospective, which makes their consideration during ex-ante evaluation difficult. Yet, as legacy systems and enterprise solutions become more integrated, such cost taxonomies warrant closer consideration in terms of identifying their respective cost elements.
Kusters and Renkema, (1996)	**Financial/Non-Financial Activities:** These costs are classified according to the activities causing them, thus emphasizing a causal relationship. Hence, they are reactive in nature.
Remenyi *et al.* (1996)	**Initial Investment/Ongoing Costs:** These are based around the costs relating to the development of an information system infrastructure (initial investment) and operation of the infrastructure (ongoing cost).
Anandarajan and Wen (1999)	**Development/Hidden Costs:** Costs related to purchase, installation, training, and testing the system.
Ryan and Harrison (2000)	**Social Subsystem Costs:** Those costs that reflect the changes in the social subsystem brought about by new IT.
Irani and Love (2001)	**Direct/Indirect: Human and Organizational:** The direct cost element is assigned to the information technology component, whereas the indirect element relates to the effect of the information systems on the organization and the people.
Mohamed and Irani (2002)	**IS cost divisions – Management, Employee, Finance and Maintenance:** This cost taxonomy identifies a set of cost factors and subsystems that impact on the organisation.
David *et al.* (2002)	**Acquisition/Administration: Control and Operation Costs:** The model identifies a set of cost factors that constitute the Total Cost of Ownership of information technology.

Table 2.1: Summary of Cost Classification Models: Adapted From Ghoneim et al., 2003

However, Ghoneim *et al.* (2003) note that most of these cost taxonomies are deficient, as their categorizations do not give a realistic view of the total cost of the system, except those that include direct and indirect cost (Remenyi *et al.*, 1996; Irani and Love, 2001;

Mohamed and Irani, 2002). For example, in Kusters *et al.*'s (1996) classification of costs as financial and non-financial, the non-financial activities are not really accounted for; they are used by managers only to predict prospective problems that may occur. Thus, indirect activities such as resistance to change would not induce cost and cannot be easily calculated.

Similarly, Willcocks and Lester (1999) note that many chief executives are concerned about IS expenditure, and are increasingly frustrated by the failure to find appropriate means to evaluate its effects. Most of the research on costs found in the IS literature is concerned with direct costs, in other words costs that occur in IS budgets (Bannister, 1999). Irani *et al.* (1997) list the following as examples of direct costs: environmental operating costs, initial hardware cost, security costs, system development costs, maintenance costs. These costs can be linked directly to what is used throughout the life-cycle of the system. Irani *et al.* (2000) define direct costs to be

> *"those that can be attributed to the implementation and operation of new technology".*
>
> (Irani *et al.* 2000: p1146)

Direct costs are not the only costs that are associated with the adoption of IS. It has been commonly reported that 30–50% of IS costs are external to the traditional IS budget (Hogbin and Thomas, 1994; Willcocks and Lester, 1993; Hochstrasser, 1992; Keen, 1991). For example, hotel costs for IS staff attending training initially occur as external to the IS department's budget. Nevertheless, they are actually taken from the IS budget when the IS staff travel to training courses. A survey carried out by Lockwood and Sobol (1989) reveal that only a few organisations have a comprehension of their entire IS costs. Willcocks and Lester (1993) note that, in one large manufacturing company, IS department user and training costs were 29% of the entire project cost; however, they were hidden in other departments and hence not be accounted for within the IS budget.

Remenyi *et al.* (1996) define hidden costs to be those ambiguous costs that may occur in other departments as an outcome of the adoption of a new system. Clearly, there is a need to look more carefully at these. There is evidence (Hogbin and Thomas, 1994; Willcocks

and Lester, 1993; Hochstrasser, 1992; Keen, 1991) that, although these indirect costs are not accounted for in the IS budget, they are taken out of the organisational overhead or the budgets of other departments.

Direct costs are considered to be easy to identify and relatively simple to measure, while indirect costs are hidden and not easily measured. Organisations may not be basing their evaluation on the *true* costs associated with the investment. True costs are defined as:

> *"All the costs that are incurred throughout the life-cycle of the system, regardless of their nature (direct costs, indirect costs, tangible, and intangible, financial and non-financial)".*
>
> (Mohamed *et al.*, 2002)

Clearly, there is a great need to recognise the *true* costs associated with IS projects, in order to improve awareness of the actual costs of these projects. Organisations, and particularly decision-makers, need to be aware of all the costs associated with the deployment of IS, as this will aid them in preparing realistic financial plans for their cash flow, and hence remaining within budget. If organisations are not aware of all the costs associated with their adoption of IS, the implication is that they will be unable to prepare realistic budgets for their projects and to stay within those budgets.

Irani (1999) proposes that one of the reasons why the justification for IS is essentially complex is due to the range of indirect costs associated with IS deployment. Such indirect costs include integration time, employee training, experimenting and delay times. These are the indirect costs associated with the development of the system; however, they are not readily identified, as they may appear outside the IT/IS budget. Since traditional appraisal techniques do not accommodate these costs, the indirect costs then become the centre of attention for IS management and evaluators, which is why it is important that they are identified and included in the evaluation procedures.

The following section details and discusses these more traditional techniques, before attention is turned to the more difficult area of the evaluation of indirect costs.

2.3 Limitations of Inheriting the Use of Traditional Techniques

There are many traditional types of appraisal techniques that are utilised to assess investments in IT/IS, including Payback, Accounting Rate of Return, Return On Investment, Residual Income, Discount Cash Flow and Net Present Value (Stefanou. 2000; Ballantine and Stray, 1999; Willcocks and Lester, 1994). Detailed descriptions of these techniques can be found in Farbey *et al.* (1993), and Smithson and Hirschheim (1998). Lefley and Sarkis (1997) note that managers mainly use the traditional appraisal techniques for investment justification processes, which are not helpful for strategic decision-making. Love and Irani (2001) note that these techniques mainly depend on accountancy frameworks, and are particularly designed to assess the financial impact of investments by setting direct IT associated costs against quantifiable benefits.

Irani *et al.* (1997) present a taxonomy proposing a review of characteristics for both traditional and non-traditional appraisal techniques. Although it is naturally the case that all have their advantages and disadvantages, as with any technique or approach, nevertheless these traditional appraisal techniques have numerous limitations associated with them in accommodating costs of IS. Remenyi *et al.* (2000) state that there are many other non-traditional techniques that address the limitations of the traditional appraisal techniques; however, they are not commonly used. They further suggest that this lack of use implies that their application is limited, due to their complex and biased nature. Nonetheless, some traditional appraisal techniques have been criticised on a number of grounds regarding their accommodation of all the costs associated with IT/IS investment evaluation.

Jones and Hughes (2001) carried out a case study in the public sector, and report that all the interviewees recognised that the IS monitoring review and assessment process was essential in discovering issues of concern and problems to be raised. In addition, the interviewees had a high level of awareness of the traditional mechanistic approach; nonetheless, formal evaluations were not deployed. Thus, evaluation procedures did not exist in the case study. Jones and Hughes (2001) also report that there is presently

dissatisfaction with traditional IS evaluation processes, as they fail to satisfy the concerns of senior management in organisations. Irani and Love (2001) report that many academics and managers disapprove of the use of traditional appraisal techniques, as a generic instrument, for evaluating all the implications of all kinds of capital budgeting investments. Nevertheless, Lefley (1994) and Ballantine and Stray (1999, 1998), although claiming that these approaches are unsuitable, report their widespread adoption, as a key criterion for organisations conducting their evaluation is a financial criterion. Irani (2002) believes that it hinders long-term, strategically essential projects that typically offer intangible and non-financial benefits. Irani and Love (2002) present a taxonomy of appraisal techniques (categorised according to their individual characteristics), which may address some of the limitations mentioned above. Nonetheless, they suggest that the lack of use of the proposed strategic, analytical and integrated appraisal techniques could be due to their complexity, subjectivity and high dependency on resources for selection and application.

Adler (2000) believes that investment proposals are often perceived through an exceptionally restricted decision-making process, being examined only from the perspective of the investing IS department. In addition, the benefits that emerge outside that particular department/division are, in most cases, repeatedly ignored/unseen. Hence, cross-functional and cross-departmental benefits remain unidentified. It is also argued that the non-discount cash flow technique is a principal, short-term focus (Adler, 2000). Moreover, the payback and Net Present Value (NPV) techniques fundamentally require very short payback times in recovering direct costs. Therefore, indirect costs and intangible non-financial benefits are not considered, and a project may be perceived as a failure if it does not accomplish the required tangible payback period. Anandarajan and Wen (1999) report that traditional techniques such as NPV and Internal Rate of Return (IRR) do not incorporate hidden costs associated with new IT projects, and thus they are only for simple "cost saving" and not for justification of complicated projects. Adler (2000) points out a further limitation of traditional appraisal techniques, within the assumption that the present competitive position will continue unchanged, even if the investment is not undertaken. This assumption is incorrect, as competitive advantage

could only continue if the quality, cost, flexibility and originality features presented by one's competitors persist unaltered.

Hirschheim and Smithson (1998) believe that most evaluations carried out by IS professionals focus on the technical aspects of the system, rather than the social or business aspects. Similarly, Pennington and Wheeler (1998) and Griffith (1994) state that traditional appraisal techniques exclude "softer" project variables, such as culture, attitude and political influence, even though these factors might well be important variables. Furthermore, most managers will only be interested in taking decisions that are beneficial on a personal level. Returns of investment (ROI) and Residual Income (RI)do not accommodate projects that require long lead times; hence, managers who use approaches such as ROI, RI or payback might reject projects that require long operation timing, as they may not be there to benefit from the long-term investment (e.g. if they move to another job).

Irani *et al.* (1999, 1997) states that each appraisal technique has its own set of specific shortcomings, and believe that traditional appraisal techniques are unable to recognise and quantify the indirect costs linked to IT/IS function. Likewise, Serafeimidis and Smithson (2000) believe that traditional methods are inclined to overlook components of IT system users, focusing instead on the technical side and direct cost. However, Primrose (1991) believes that the concept of intangible factors applies to benefits and not to costs, adding that when a cost has been identified, it can be estimated. It could be argued that the difficulty does not lie in any inability to estimate them, but instead that organisations actually fail to identify their existence.

Kaplan (1986) argues that factors that are considered to be limitations of traditional appraisal techniques are actually limitations associated with the user, not the technique itself. For example, the difficulty of accounting for non-financial benefits is perceived as a lack of imagination in financial analysis rather than a limitation within the traditional evaluation techniques. Kaye *et al.* (1995) suggests that justification techniques fail to account for various structural issues, such as implications of staff training and morale, as

they do not account for the continual cost of training and cost in terms of time taken to train others (for example, personnel). Even if, as Kaplan (1986) suggests, decision-makers take structural issues into account, Kaye *et al.* (1995) deem that there is no distinct way to provide a quantifiable measure that would be appropriate to the short-term accounting prospective, as managers feel that it is necessary to present hard facts and figures.

Mende *et al.* (1994) suggest that non-financial benefits could be evaluated based on qualitative methods. They argue that, although these methods may identify related factors, such as enhanced customer service, they fail to use hard measurement techniques. Activity-based costing assigns costs to activities depending on their utilization of resources, and allocates costs depending on the necessary activities; nonetheless, Armstrong (2002) notes that, in the process of exploring activities that associate cost to products and processes and the replacement by cost drivers, compromise between precision and manageability is involved. Thus, some indirect costs are excluded from the cost-group linked with a practical set of cost drivers.

Irani and Love (2002) suggest that the inability of traditional appraisal techniques to account for IT/IS related indirect costs might be a causal factor in the slow uptake of IT/IS. Similarly, Small and Chen (1995) believe that the inadequacy of traditional appraisal techniques for IT/IS investments may result in organisations not investing in some IT/IS projects, or preceding budgetary processes with creative accounting (minimizing costs, maximizing savings). Gunasekaran *et al.* (2003) suggest that one of the reasons why new costing systems and approaches are required is that traditional costing systems do not offer adequate non-financial information, as they are mainly dominated by financial categorization.

Bannister and Remenyi (2000) report that many decision-makers rely on "gut feelings" and similar non-formal/rigorous approaches when making decisions to invest in projects, as a result of the inadequacies related to the traditional appraisal techniques. Not investing in IT/IS projects at all may mean placing the organisation at a competitive

disadvantage. On the other hand, investing as an "act-of-faith", without investigating a project's feasibility, or using creative accounting, could drive the project beyond its budget, and lead to the overestimation of benefits and the escalation of costs. The outcome of each action may well influence the long-term growth of the organisation

The qualitative dimension that includes indirect costs can be accounted for with some traditional techniques by modifying the payback period. However, whatever the nature of the criticisms of the appraisal techniques, it can be seen that *few* adequately address indirect costs. It is perhaps not difficult to understand why efforts have hitherto focused on the evaluation of direct costs; they are both easier to identify and more straightforward to measure. However, it is the evaluation of the indirect costs, rather than the direct costs, which is more problematic, as can be seen from the following section.

2.4 Evaluation of Indirect Costs

Indirect costs may not be directly quantifiable in financial terms, and can be highly intangible. As a result, many IS managers in organisations are facing the difficulty of not being able to identify and manage these costs (Bannister *et al.*, 2001). Currie and Irani (1999) and Al-Yassen *et al.* (2003) reveal that management dedicate only minimal attention to the less clear, or hidden, indirect costs. Hence, in most cases, only financially tangible direct costs are accounted for in justification processes. Hochstrasser (1992) states that the total cost of IT/IS projects is undervalued, and that one of the difficulties in identifying indirect costs is that they are not explicitly reported as contributions to the cost of the project. Furthermore, Keen (1991) and Strassmann (1990) have also revealed from case studies that, as a result of hidden costs, initially proposed project costs are actually exceeded by a factor of between four and seven.

Willcocks (1992) report that, although indirect costs (human and organisational) amounted to more than double the equipment costs, only 20% were included in the initial feasibility evaluation. More recently, Jones and Hughes (2001) report that, although the IS account managers claim that IS implementation and operation is "monitored" and evaluated in terms of broad cost, indirect costs (e.g. staffing costs) are

not considered. Likewise, Khalfan and Gough (2002) note that, when investigating outsourcing in the Kuwaiti private sectors, IT managers identified hidden costs and excessive charges made by IT vendors for items whose costs were not accounted for in the initial contract. Furthermore, Irani (2002) reports that, in companies' cost-benefit analysis, the costs originally identified were restricted to the financially quantifiable and "visible", i.e. direct costs. Nevertheless, the same companies perceived IS as leading to "chaos" once the indirect costs of the system were identified, as they were spiralling out of control. The case study reported by Irani (2002) confirmed that indirect project costs were more significant than the corresponding direct project costs, and that the identification and analysis of these indirect costs was retrospective.

Brynjolfsson and Yang (1997) report that indirect costs have a vast influence on the total cost of any IT/IS projects. Slater (1998) notes that intangible or hidden and underestimated costs are a foremost concern amongst Enterprise Resources Planning (ERP) specialists. They also deem that the underestimation of the time it takes to implement an ERP system is very frequent in ERP projects, and costs such as personnel training and software integration testing can be a significant load on the budget of supportive activities. In addition, Dier and Mooney (1994) note that indirect costs symbolise more than 80% of the total lifetime IT/IS project costs. Indirect costs, however, are varied and numerous. In order to help identify and discuss these indirect costs, Irani *et al.* (1997) provide a useful categorization, proposing that indirect costs could be categorised into indirect human costs (time of employee, staff turnover, management time, etc.) and organisational costs (losses in productivity, organisational restructuring, etc.). Considering these, Irani *et al.* (1997) argue that these categorizations may enable organisations to avoid some of the complications that they may meet during the justification of the investment. Moreover, they suggest that taking these into account would enable companies to manage and control their expenditure better. Irani (2002) also confirm empirically that indirect costs can be categorised as having human and organisational dimensions.

There is clearly a need to look more closely at such costs; as Roos (1993) declares one of the main reasons leading to the failure of IT projects is the lack of consideration of human resource elements. Although a categorization such as that empirically confirmed by Irani *et al.* (1997) is a welcome step towards the evaluation of indirect human costs and their management, there is a growing need to identify and classify indirect costs further, particularly the indirect human costs that are associated with IS.

2.4.1 Indirect Human Costs

Having reviewed the normative literature on IS costs, it is argued that one element of indirect costs, that is, indirect human costs, is poorly understood, and hence not accounted for in the evaluation process. As discussed earlier, it is not possible to estimate or evaluate indirect costs without first identifying them. As Primrose (1991) state, the difficulty does not lie in an inability to estimate these costs; instead, the main problem is that organisations actually fail to identify their existence in the first place. The researcher wholeheartedly supports this view, and it underpins the necessity for the present research.

Hochstrasser (1992) report that indirect human and organisational costs could be up to four times greater than direct costs. One of the main human indirect costs he identified is employees' time. For example, management utilises a great deal of time integrating a new system into current work practices. Further examples of indirect human costs that are usually underestimated are staff turnover and rises in salaries. As a result of employees being trained in new skills, and their awareness of their new marketable skills, organisations are either forced to raise their salaries or to spend further money on training new employees.

Furthermore, Willcocks (1992) declares that human and organisational costs were revealed to lie in training, management and staff time, extra staff; staff turnover, losses in productivity, and organisational restructuring during changeover, and believes that these costs are rarely fully budgeted for in IT investments proposals. Wood (2004) reports that, in the US, it is estimated by the IT Training Association that there are 10

million IT workers, and each costs their corporations more than $2,000 per year on training, i.e. more than a $20 billion dollar market. Furthermore, Wood (2004) notes that, in most cases, the justification for this spending is not more than the inattentive statement that, "yes, employees really like training".

Although many indirect human costs have been identified to date, this does not mean that this list is exhaustive. There is also the possibility that, although many have been identified, their impact on either individuals or the organisation as a whole is not fully recognised or understood. Wheatley (1997) anticipates that IT-related human and organisational costs are set to increase. Willcocks and Lester (1993) deem that human and organisational costs are among the main complexities associated with IT/IS project investment assessment. The importance of such indirect human costs on the success of IS development is confirmed by Irani *et al.* (2001) and Mohamed (2003), who report a case study highlighting the important role played by human and organisational factors during the evaluation and technology management process, which exemplifies the need for the inclusion of an evaluation criterion.

Love *et al.* (2000) reveal the importance of the indirect human costs, and confirm that "management time" is one of the most significant indirect human costs. Thus, indirect human costs need more attention, particularly in the IT decision-making arena. Love and Irani (2001) conclude that, if management wish to maximise benefits and control their IT expenditure, then they need to position themselves to be able to identify indirect costs. Similarly, Ghoniem *et al.* (2003) declare that the interaction between the implementation of new technologies and systems affects organisations and personnel, and that these interactions result in a group of indirect human and organisational costs, which in turn influence the overall success of any system.

As discussed earlier, it is not possible to estimate or evaluate indirect costs without first identifying and allocating them. The following section explores the necessity of cost allocation and its impact on the organisation.

2.5 Exploring Cost Occurrence

Powell (1992) believes that it is necessary to identify and place costs and benefits in order to enable an organisation to function in any kind of defocused or devolved budgetary condition. Dirks and Van Lent (1997) deem that cost allocation is required for several reasons, including third party reimbursement, financial reporting, status, and minimising organisational problems and inaccurate decision-making. Moreover, Dirks and Van Lent (1997) state that cost allocation is an essential part of an organisation's budget system, and is critical for an organisation's performance evaluation system. Bannister *et al.* (2001) assert that, as managers' awareness of different costs increase, they face the difficulty of *identifying* and managing these costs, thus making IT costing difficult.

Dirks and Van Lent (1997) focus on the performance evaluation of the IS managers and on the decisions influencing cost allocation. Cost allocation is said to supply information about the managers' performance, despite the manager having full control. The costs are informative regarding the managers' actions. In other words, the costs may provide the evaluators with unknown information, which could be valuable in evaluating managerial performance (Dirks and Van Lent, 1997). Snyder and Davenport (1997) suggest that allocating indirect costs results in improved managerial control, in terms of decision-making and understanding the total costs of a system or service. Furthermore, Gupta and Galloway (2003) state that wider and more realistic "views of cost" are needed to enable managers to base their strategic decisions on more precise information.

Reviewing the literature of information systems costs, it appears that cost allocation could provide significant information for control ends. Furthermore, it is necessary to understand the implication of these costs for the organisation, and whether they can be quantified in any way. Hence, in an endeavour to identify and appropriately assign the cost of IT/IS investments that could be used throughout the evaluation process, a framework for accommodating indirect human costs is proposed in the following chapter in figure 3.1.

2.6 Summary and Conclusions

Research in the last decade has reported that a significant number of IS costs are external to the traditional IS budget. This chapter has presented a critical review of the importance of evaluation as a management process, in addition to discussing the literature associated with IS evaluation with a general focus on cost, and thus direct and indirect costs that impact on IS investment. Although one of the problems associated with looking at indirect costs is that they are intangible and difficult to quantify, there is nonetheless evidence in the normative IS literature to suggest that these indirect costs account for much of the IS budget (although they are seldom completely budgeted for), and thus deserve much closer consideration.

This chapter has highlighted the need to look more closely at the identification of indirect human costs, arguing that this is an area of evaluation of information systems that has received little attention. Justification put forward for the adoption of information systems has centred mainly on the direct costs, with measurements of the success or failure of projects relying on techniques such as cost/benefit analysis or return on investment. Through reviewing the literature, it appears that these traditional appraisal techniques are unable to accommodate the dimension of indirect costs. This is due to most of the existing traditional appraisal techniques being based on financial accountancy approaches, which cannot take into account the full cost implications of the information systems investments. While not disputing that such techniques are useful, it is argued that, with the growing need to provide greater transparency with regard to the effectiveness of IS systems in relation to their often enormous cost, it is now timely to widen the scope of evaluation and take greater account of indirect human costs. This may mean that the repertoire of traditional appraisal techniques will need to be expanded to estimate these indirect costs. First, however, it is essential to *identify* the components of these costs, *allocate* them appropriately within the organisation and *manage* them through identifying their *drivers* or "root causes", and *estimate* these indirect costs and thus *control* them through identifying *performance measures* of their drivers. In so doing, decision-makers will be offered a frame of reference for considering the evaluation of indirect human costs.

CHAPTER

3

Information Systems Indirect Human Costs

As Chapter two has illustrated, one of the dilemmas that evaluators of IS investments encounter is the identification and management of complex hidden indirect costs; indirect human costs being identified as one example. This Chapter focuses on the indirect human costs associated with IS adoption, as this is considered to be an area that has been addressed infrequently in the normative IS evaluation literature. The Chapter critically reviews the identified indirect human costs that are usually not included in IS evaluation processes, proposes root causes of the cost factors and allocates them within the proposed taxonomy to the appropriate organisational IS divisions. The author proposes and discusses a framework for accommodating indirect human cost, while considering their hidden nature. Based on the first five stages of the framework three conjectures are presented, which identify that the difficulty in identifying indirect human costs does not lie in an inability to estimate cost alone, but instead that organisations fail to identify their existence in the first place due to their hidden nature. Furthermore, the author proposes that indirect human costs can be classified into the MEFM[1] taxonomy, and that their main root causes are "Training", "Introduction of new system" and "Staff turnover". It is suggested that the proposed MEFM taxonomy and IIHCDM[2] model facilitate the identification, allocation, management and control of the indirect human costs associated with IS adoption and can be used as a frame of reference providing significant information to control ends.

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[1] MEFM refers to the Management, Employee, Finance and Maintenance Divisions of an organisation
[2] IIHCDM refers to the Interrelationship Indirect Human Cost Driver fuzzy mapping model

3.1 Introduction

Based on the literature review in Chapter 2, a theoretical framework is proposed for **I**dentifying, **A**llocating, **M**anaging and **C**ontrolling indirect human costs (IAMC). The framework suggests nine steps to be followed by decision-makers and evaluators of IS in order to reduce costs and enable their inclusion in the evaluation process and budget proposals. The author reviews the indirect human cost factors cited in the literature and thereafter adopting the IAMC framework, proposes to *classify* the indirect human costs into the Management, Employee, Financial and Maintenance MEFM taxonomy. The MEFM taxonomy categorises the indirect human cost factors and allocates them to their appropriate information systems' divisions. Espousing the "cost factors" of the (MEFM) taxonomy, the author proposes an interrelationship mapping model of the drivers of indirect human costs. The proposed conceptual model incorporates the main root causes of indirect human cost and their components (i.e. cost factors) which are associated with IS adoption. Identification and subsequent *mapping* of these indirect human costs to their drivers is discussed in light of the impact that these costs have on both the individual and the organisation.

3.2 Framework for Accommodating IS Indirect Human Costs

In analysing the normative literature of information systems, it appears that there is no current framework for identifying indirect costs, or how they can be included in the evaluation process. In an attempt to *identify* the cost of IT/IS investments that could be used throughout the evaluation process and budget allocations the following framework is proposed (see figure 3.1).

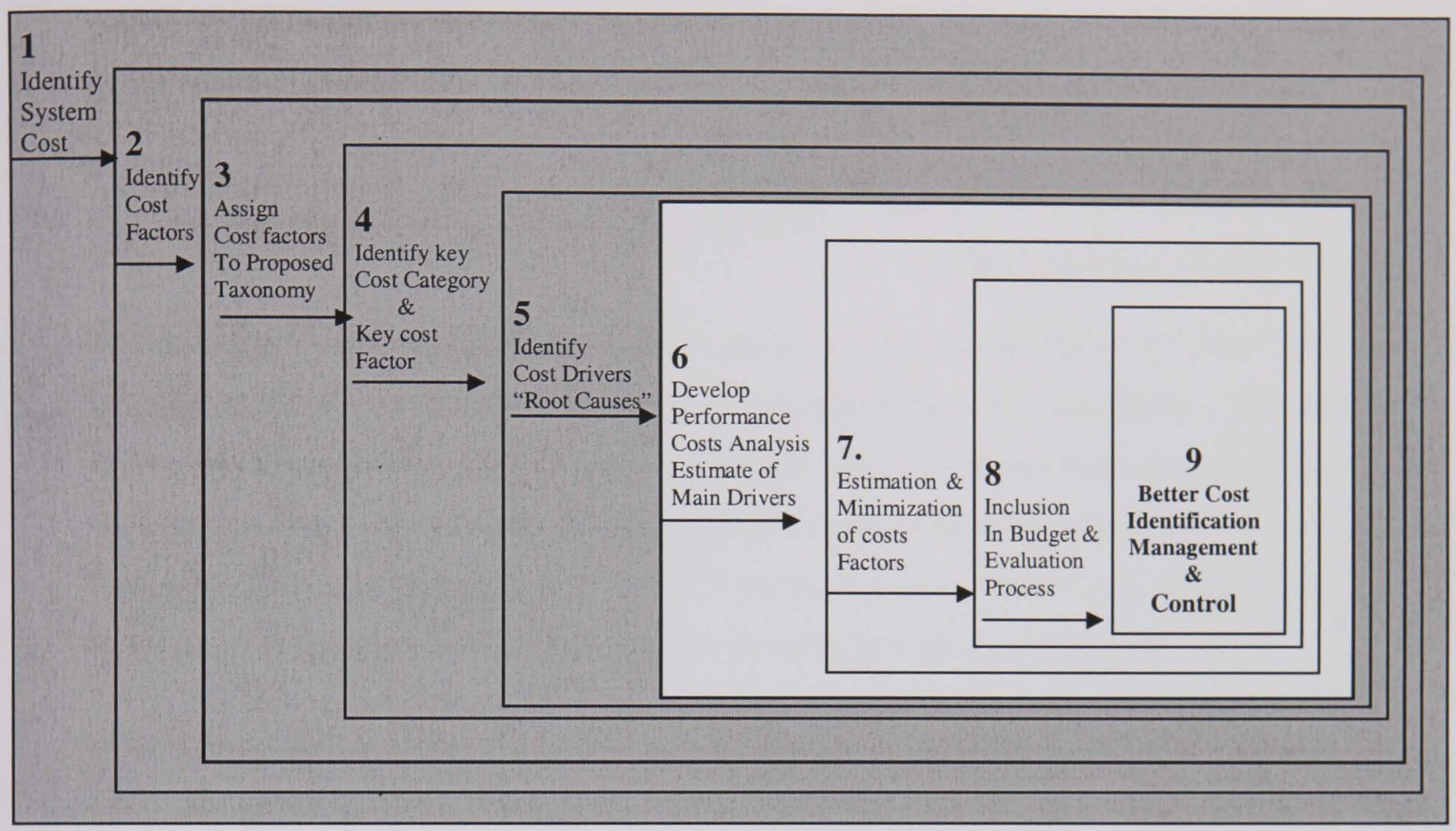

Figure 3.1: Framework for Identifying, Allocating, Managing and Controlling Indirect Human Costs

The "Framework for Identifying, Allocating, Managing and Controlling Indirect Human Costs" proposes that it is essential to initially *identify* (phases 1, 2 and 4) the cost of the system, and its subsystems, that is, to identify *each of the cost factors* and also, more importantly, *how* the identified costs are actually a cost to the organisation. It is necessary to understand the implication of these costs for the organisation, and whether they can be *classified* in any way. For example, once staff turnover (cost factor) is identified as in indirect human cost factor (system's cost) to the organisation, all the "staff turnover" sub-costs (e.g. new recruitment, loss of productivity, employees going to competitors) are to be identified and their impact on the organisation to be evaluated.

Once the costs have been recognised, the author suggests that then to identify a relationship among these costs and hence attempt to classify them (phase 3), thus facilitating the *allocation* of the identified costs to their appropriate divisions within the organisation. In order to enhance understanding of these indirect human costs, and hence

enable decision-makers to manage them more successfully, the author also deems that it is necessary to identify their *drivers* "root causes" (phase 5). Cost drivers are defined as:

> *"those element costs and 'root causes' that have consequently resulted in the unidentified indirect costs/ indirect human costs".*
>
> (Mohamed *et al.*2002b: p5)

For example, "staff turnover" is the root cause for "loss of productivity" and "new recruitment costs", and thus it is their driver. It is argued that this identification of such drivers will facilitate the identification of potential areas of indirect human costs where savings may be achieved, while also identifying the performance measures of the drivers (phase 6). Once a performance costs analysis estimate of main drivers is developed, cost managers can minimise and estimate the cost of the resulting cost factors (phase 7).

Having identified and classified these indirect human costs, decision-makers may then have the opportunity to incorporate them into their budget plans and evaluation processes (phase 7–8). It seems plausible to suggest that if such costs could be appropriately identified, and evaluated at various stages throughout the life-cycle of a project, decision-makers could more accurately predict the financial and human cost of the systems that they deploy, and thus better identify, manage and control their IHCs (phase 9). While equally plausible alternatives to this model are possible, it offers an effective way to accommodate indirect human costs, which can then be more easily dealt with by project managers/evaluators. Nevertheless, it is appreciated that the contribution of stages 6–9 (areas depicted in white of the framework) is restricted to a theoretical level, because of the constraint of the time allocated to the present research.

Adopting the IAMC framework (figure 3.1) suggested, the author proposes to classify the indirect human costs into the Management, Employee, and Financial and Maintenance (MEFM) taxonomy.

3.3 Novel Taxonomy of Indirect Human Cost

Gerlach *et al.* (2002) note that most IT costs are considered as overheads, and that overhead costs are either utilised improperly by IT departments, or charged evenly to all business units, despite the individual expenditure. It is essential to identify and allocate cost inherent in the system. In an endeavour to identify the *true* costs of IT/IS investments that could be used throughout the evaluation process, the author reviewed the indirect human cost factors (stage 2 of IAMC) that are cited in the literature as factors that have frequently not been accommodated in the evaluation process. Stage 3 of the IAMC framework suggests allocating the identified indirect human costs to their appropriate divisions. Therefore, the author has *identified* main departmental divisions (see figure 3.2 below), as "*system* indirect human *costs*", as recommended by stage 1 of the IAMC framework (figure 3.1) proposed in section 3.2.

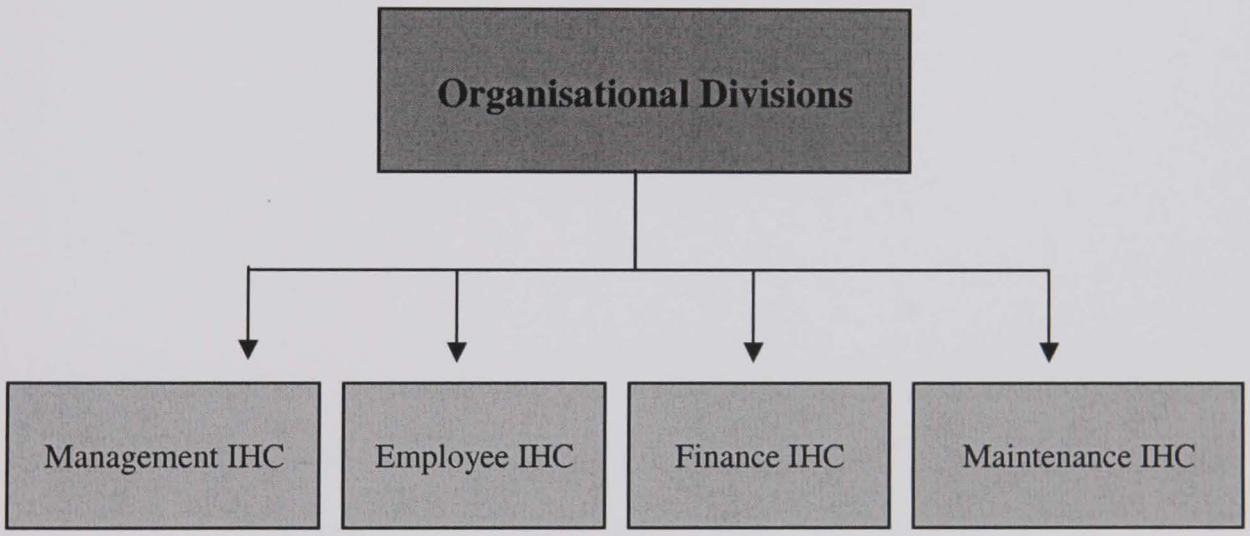

Figure 3.2: Categories of Indirect Human Costs Associated with IS Adoption

Based on the literature analysis, indirect human costs are classified into four categories, namely, Management, Employees, Finance and Maintenance (MEFM). Each category represents a division of indirect human costs associated with the adoption of IS within an organisation. Categorizing these costs in such a way may facilitate the allocation of their sub–costs into divisions within the organisation. In doing so, one would also include the identified indirect human costs in the budgets from each of the four areas. These divisions were used for the classifications as they emerged from the cost factors

cited in the literature. A novel taxonomy for the indirect human costs cited in the literature is proposed (see figure 3.3 below).

Identification of "system costs" of indirect human costs such as "Management indirect human cost" would facilitate the appropriate allocation of the costs within the IS departmental budget. The author presumes that the main factor enabling organisations to allocate indirect costs or indirect human costs is the knowledge of their components (cost factors). For example, the indirect human cost components associated with the management division could be *loss of time*, *effort and dedication*, *training* and so forth. The knowledge of indirect cost factors enables the managers to allocate project costs appropriately and justify their investments, and can be a contributing factor in preventing cost overrun.

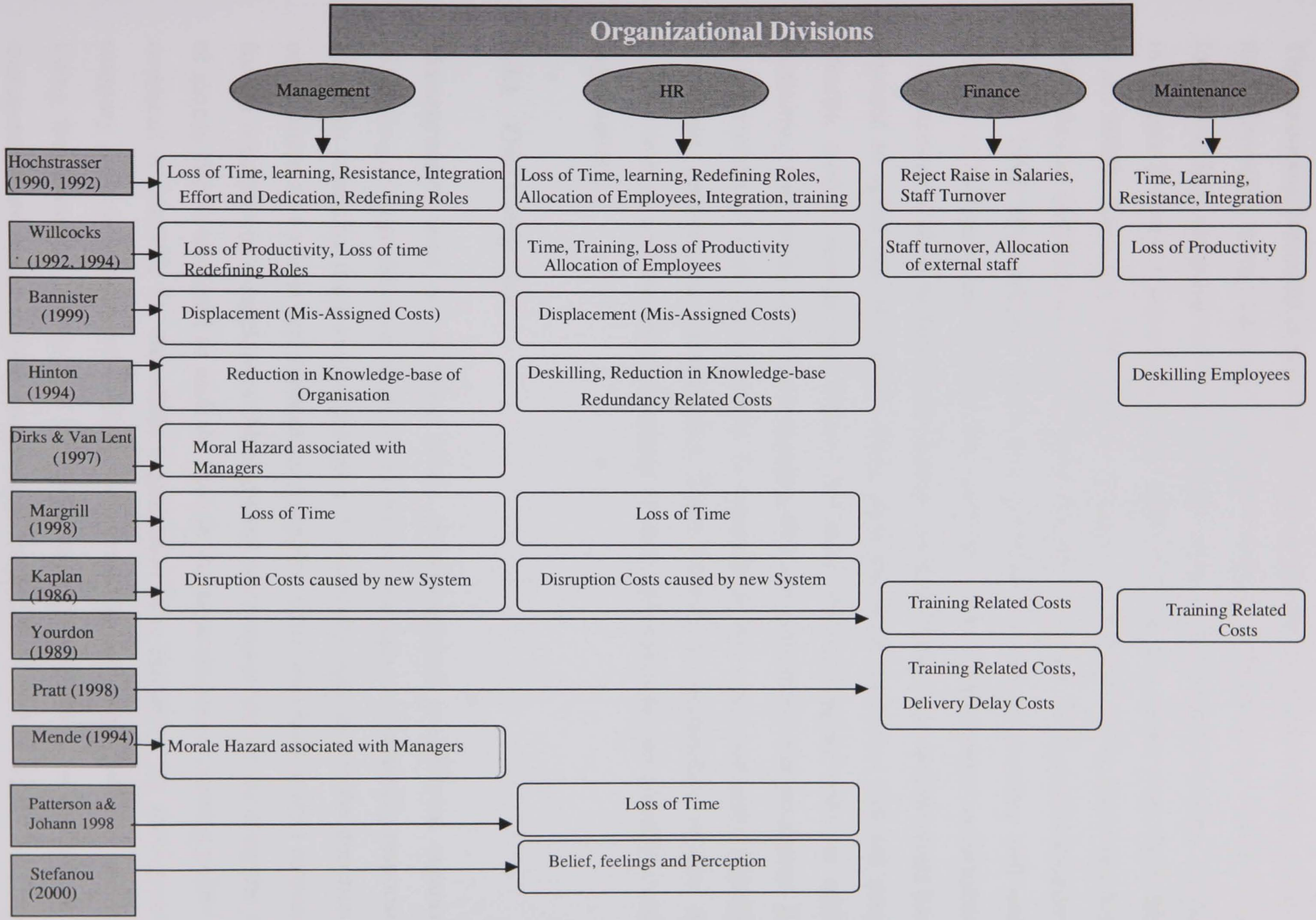

Figure 3. 3: Conceptual Taxonomy of Indirect Human Costs Associated with IS Adoption

The taxonomy presented is novel in that it categorises the indirect human costs cited in the IS literature. It also adds to the current literature, by developing a frame of reference for identifying, assigning and evaluating the costs of information systems. As discussed in Chapter 2, many (Gunasekaran *et al.*, 2003; Ooi and Soh, 2003; Irani 2002; Mohamed *et al.*, 2002b; Bannister, 1999; Ezingeard *et al.*, 1999; Irani, 1998; Dirks and Van Lent, 1997; Snyder and Davenport, 1997; Price Waterhouse, 1995; Willcocks and Lester, 1993; Powell, 1992; Hochstrasser, 1992) have explained that such taxonomy will add value. This is as indirect costs of IT/IS are not fully acknowledged prior to investment and companies need ways to help them reduce cost, particularly that indirect costs have been reported to spiral out of control. Thus, such proposed taxonomy will aid mangers to *identify, assign*, *manage* and *control* the main indirect human costs, in addition to facilitating their inclusion when evaluating IS costs, preventing cost escalation. Below is a description of each division that is represented by a cost category (management, employee, finance and maintenance). There follows an explanation of how the sub-indirect human cost factors/components of each cost-category, are actually a cost to the organisation.

3.3.1 Cost Categories

Management: there are different levels of management in different organisations, depending on organisational structure. However, managers are generally responsible for decisions regarding manpower and money. Collectively they decide the direction of the organisation as a whole and manage its strategies. They also hold overall responsibility for the organisation's employees. Management are responsible for deciding the amount of money that is allocated to each division in the organisation, according to how much overhead is available for the whole organisation. The budget of the management cost category is usually allocated to direct costs such as equipment, salaries and training. Using the taxonomy above as a reference, management can now include all of the management associated indirect human cost factors illustrated in figure 3.1 (redefining roles, reduction in knowledge, etc) in their budget. Rather than running over budget,

they can allocate their costs appropriately when knowing what is actually involved in their division.

Employee: This category is responsible for everything concerning the employees in the organisation. For example, it would have a complete database of every employee in the organisation (name, salary, division, position, job description). The budget of this division is usually allocated to direct costs such as equipment, new systems, and paperwork etc. Using the above taxonomy, indirect human costs such as de-skilling, reduction in knowledge base and redundancy could all be accounted for in the budget of this division. Gerlach *et al.* (2002) report that failure to account for IT personnel costs makes the problem of increased overhead expenditure worse.

Financial: This division is responsible for timing, monitoring and allocating budgets to all departments, including their own department. Budget in this division is usually allocated to direct costs such as payroll calculations, and can include many indirect human cost factors such as staff turnover and training.

Maintenance: This division is responsible for all aspects of technology within the organisation. They set up, maintain the technological infrastructure for the business, and aid in future development of the technology within the business. Their budget is usually allocated for use in areas such as hardware costs (new equipment, upgrades of existing equipment), new systems, training of staff to operate and maintain. Using the above taxonomy, maintenance associated indirect human costs can be taken into account when adopting IS. For example, managers will be aware that there is an indirect human cost of time and loss of productivity associated with training staff to maintain the new system that is introduced. If the system introduced is more complex than the existing one, technical support staff may resist training on the new system. Thus, a resistance cost is associated with the technical support division in addition to the learning cost, as they may not fully understand the new system. If the system is too radical and staff cannot be trained to use it, then some staff may be made redundant; such indirect human cost

factors, therefore, may lead to new recruitment costs and other indirect human costs such as job-finding somewhere else costs, redefining roles and loss of productivity.

Below is an exploration of how each cost factor of the classifications in the MEFM taxonomy (figure 3.3) is actually a cost to the organisation. As many of the cost components have been identified to overlap across divisions, the explanations below are not sectioned according to the categories in the above MEFM taxonomy, to prevent repetition. Furthermore, these costs are also referred to in subsequent Chapters 5 and Chapter 6, but they will not be outlined again.

3.3.2 Cost Components of Indirect Human Cost

Time: management time is an indirect cost in terms of transferring their training/knowledge to the IS staff. The reason is that neither IS staff or the management will be doing their routine jobs during the training period (Love *et al.* 2000; Irani, 1999; Pratt 1998; Patterson and Johann, 1998; Hochstrasser, 1992, and Yourdon 1989). Moreover, Bannister (1999) and Love *et al.* (2000) state that when introducing any new system to an organisation, training will be required for users of the system. Unless the organisation obtains a time-recording system, the indirect cost of the time spent in training would not usually show up as an IS cost. In particular, the time spent reading manuals; self-help activities and informal job training are untraceable. The implication of this for the business is that they do not keep track of time; hence an indirect cost occurs that has not been budgeted for.

Learning costs: as new users or new systems are introduced to the organisation, the users are likely to go through a learning curve. As a result, a temporary loss in productivity occurs as the users become familiar with the system. It is likely that mistakes will occur and be corrected over time, which will add to the cost of learning to activate the system to an acceptable level (Hochstrasser, 1990 and Remenyi *et al.*, 2000).

Costs of resistance: introduction of a new IS could result in an unexpected political power shift that leads some individuals or groups to resist extras. Consequently, staff may engage in behaviour that results in a disruption or even the removal of an entire system.

Clearly this is an influential indirect human cost, as it has a great impact on the organisation; not only do they have to rectify the consequences of resistance, but also bear the cost of resolving the resistance if possible (Hochstrasser, 1990). Moreover, lack of commitment to change could result in a non-operational working environment, with user resistance resulting in escalating operational costs (Stefanou 2000).

Effort and dedication: this occurs when a new system is introduced, as management at all levels spend time exploring the new system, discovering its business potential and absorbing the transition from the old system to the new system. Here, managers are being less productive, and so not adding any value to the organisation, although they are still receiving their full wages (Hochstrasser, 1992). The time utilised by management and staff incorporating the new system into the existing organisational working life results in an indirect cost to the organisation. Staff members that are influenced by the use of the new system will take time to become used to the new system, and their usual activities will not be fully performed. Consequently, the organisation will encounter high indirect integration human cost, (Love *et al,* 2001; Irani, 1999; Hohstrasser, 1990)

Cost of Redefining Roles: introduction of IS in some cases leads to organisational restructuring. By destruction of the organisation's hierarchy and reducing the number of levels, middle management is exposed to a bigger market environment, thus requiring greater flexibility. The disruption caused by this transition may result in various consequences of intangible costs within the organisation (Hochstrasser, 1990). Change in roles may lead to the introduction of training, redundancy, and promotion (Hinton *et al.*, 1994).

Missed Costs: Bannister *et al.* (2001) state that one of the major problems in tracing IS costs is mis-assigning costs. Displacement cost (also called re-allocation) is proposed as one of these mis-assigned costs. This is encountered when people and operations have to be re-allocated to accommodate a new system. Bannister (1999) suggests that, for example, if a member of the IS staff goes on training abroad, the cost of the air fare is recorded as a travel expense, the accommodation as miscellaneous and other expenses as entertainment, when essentially they are all actually IS training costs. Bannister *et al.*

(2001) call both disruption costs and displacement costs missed costs. Kaplan (1986) reported that the introduction of a new system's implementation is usually accompanied with a short-term loss in productivity as systems are disrupted; IS staff will not be doing their job as efficiently until users become adjusted. Kaplan (1986) refers to this as *disruption costs.*

Reduction in knowledge base: this is usually a result of a high staff turnover or redundancies in the organisation. Some organisations may reduce labour costs, believing that they are justifying their investment in IT, as new systems are more efficient, more tasks can be allocated to an employee and thus less people are needed for the job. Nevertheless, this is almost impossible to measure in financial terms, and results in a significant change in the knowledge base of the organisation that is impossible to predict (Hinton *et al.,* 1994), and could have a significant negative impact on the organisation's development.

Morale hazard: Mende (1994) also calls this "professionalism". It is defined to be the state in which the IS managers are interested in gaining knowledge that will help them to determine their job market value rather than being interested in organisational benefits. It could occur when decision rights are appointed to individuals who have expert knowledge. Managers may use their decision rights to maintain their own interests, rather than trying to meet organisational objectives (Dirks and Van Lent, 1997; Mende, 1994). For example, managers may approve some training courses for themselves that would enhance their CV but that would not benefit the organisation in anyway.

De-skilling: This is the inability to fully utilise the potential skills of employees. For example, as a result of a new system being introduced, the organisation may assign less demanding tasks to very skilled employees (Hinton *et al.*, 1994). As a result, the employees may seek different jobs, or the organisation may continue to assign high salaries for job roles that are worth less in financial terms. Investing in IT at the expense of reduction in labour cost leads to a situation where it is difficult to accurately predict the costs involved (Hinton *et al.,* 1994). As an outcome, significant costs could result from losing time and money already invested in an employee that has left, in addition to

requiring the same amount of money (if not more) for recruiting a substitute employee (Hochstrasser, 1992, 1990).

Cost of new salary structures: as a result of training or acquiring new skills in any way, end-users, operations staff and support staff will be aware of their new marketable skills. Therefore, they may well request an increase in their salaries to reflect their new marketable value. Rejecting the request may result in the employees seeking employment elsewhere (Hochstasser, 1992, 1990).

Beliefs, feelings and perceptions: Implementing new software can create susceptibilities, which may have a negative impact on the emotions of personnel. The implementation approach needs to take human factors such as beliefs and perceptions into consideration (Stefanou, 2000).

Training costs: this could occur when end users are provided with the skills to use the newly presented system, training the staff (e.g. development, operators, integrators, etc.) with the essential technical skills for the project. This will not just contain the cost of the training courses, materials, manuals, and facilities; it will also cover the cost of replacing the IS staff whilst they are in training. Furthermore, management time is an indirect cost in terms of transferring their knowledge to the IS staff. As mentioned above, neither IS staff nor management personnel will be doing their routine jobs during that period (Remenyi *et al.*, 2000; Pratt, 1998; Patterson and Johann, 1998; Hochstrasser, 1992, 1990; and Yourdon, 1989). This is in addition to all the indirect human cost factors associated with cost of time and loss of productivity as a result of the employee not being sufficiently trained (Li *et al.*, 2000).

Delay costs: enormous investment in IT/IS requires the approval of the organisation's stockholders and particularly large investments also need to see quality financial returns. Delayed delivery of a system could indirectly have a negative effect on the stock price of the organisation. An indirect human cost may occur through loss of confidence and fear of financial losses leading to stock prices declining. Moreover, delayed delivery of an IS project implies maintaining the function of two systems (the old and new) at the same

time. Clearly, this would require twice the effort from staff, and further costs may be driven by the overtime for development staff or even external support staff in the form of consultants and contractors (Yourdan, 1989).

Integration costs: the time utilised by management and staff incorporating the new system into the existing organisational working life results in indirect costs for the organisation. Staff members who are influenced by the use of the new system will take time to become used to it, and thus their usual activities will not be performed fully. Thus, the organisation will encounter high indirect human cost (Love *et al.*, 2001; Irani, 1999; Hohstrasser, 1990).

Redundancy costs: The functioning of IS is still being directed towards accomplishing huge improvements in productivity, such as those supposed by business process reengineering which can be as high as a tenfold enhancement. Obviously, such development will mean major redeployment or rationalisation of staff. Therefore, this will mean making major redundancy payments to those workers who are entitled to them (Hinton *et al.,* 1994).

Staff Turnover Costs: as mentioned above, the acquisition of new skills and proficiencies may result in staff either requesting an increase in salary or deciding to seek new employment. As an outcome, significant costs could result from losing time and money already invested in the employee, in addition requiring the same amount of money (if not more) for a substitute employee. In addition to spending a great deal of time and effort, recruitment costs include the cost of advertising or using expert recruitment (Love *et al.* 2001; Irani, 1999; Hochstrasser, 1992, 1990). High turnover can lead to critical posts remaining vacant for long periods.

As discussed in Chapter 2 (section 2.2), budget escalation is one of the main reasons for project cancellation and runaway projects, and even those projects that finish successfully do so within an average of 89% increase over their initially estimated budget, yet managers are still unable to justify the extra costs. Using the above taxonomy as a reference, organisations can now assign their indirect human cost factors

to their possible divisions (see figure 3.3). Depending on the structure of the organisation, cost factors may not all fall into the different divisions of the organisation as neatly as outlined in the taxonomy proposed. However, this is the first step and can be confirmed or adjusted subsequent to empirical work.

3.4 Key Indirect Human Costs

The proposed taxonomy was further examined to distinguish the *key* indirect human cost category, and the key cost factors (stage 4 of the IAMC), as illustrated in the Table 3.1 below. The ranking of the inclusion/occurrence of cost factors used throughout this study follows the following scale - "does not occur" (○), "occurs sometimes" (◒), "occurs" (●). The shaded areas are only used to help the reader distinguish the different divisions.

Cost Category

Indirect Human Cost Factors (IHC)	Management IHC	Employee IHC	Finance IHC	Maintenance IHC
Loss of Time	●	●	○	●
Learning Cost	●	●	○	●
Resistance To New Systems	●	○	○	●
Effort & Dedication Spent By Management	●	○	○	○
Consequences Of Redefine Roles	●	●	○	○
Mis-management of training	○	●	●	●
Allocation of employees	○	●	○	○
Integration With New Systems	○	●	○	●
Rejecting Salary Raise	○	○	●	●
Staff turnover	○	○	●	●
Loss of productivity	●	●	○	●
Displacement (Mis-Assigned Costs)	●	●	○	○
Reduction In knowledge base	●	●	○	○
Deskilling	●	●	○	○
Cost Associated with Redundancy	●	●	○	●
Morale Hazard	●	●	○	○
Disruption costs	●	●	○	○
Belief, feeling, and perception	○	●	○	○

Table 3.1: Key Indirect Human Cost Categories

As Table 3.1 illustrates, it appears that the employee and management divisions have the highest number of indirect human costs associated with IS adoption. Furthermore, *loss*

of time, *learning*, *training related costs*, *loss of productivity* and *redundancy* seem to be cost factors experienced by all divisions.

Gerlach *et al.* (2002) suggest that inappropriate cost allocation schemes encourage the over-consumption of under-priced services and vice-versa, which they believe lead to "suboptimal" organisational performance. It is essential to understand why the management and employee divisions have the highest cost factors associated with them. Presumably, these two divisions have the highest human factors related to them, compared to the other two divisions. In other words, the centre of attention in both of these divisions is people, while the finance division focuses on money, and the maintenance division focuses on technical aspects. However, these can be explored further during the empirical study, by testing whether empirical findings confirm that most human cost factors are associated with the Management and Employee divisions rather than the remaining divisions.

The taxonomy (figure 3.3) could be further developed and built upon using empirical research to identify further indirect human costs categories and their components. Identifying the components of indirect human costs could greatly minimise the resulting indirect costs. This would result in more comprehensive evaluation approaches that could be extended to include human aspects. To better understand these indirect human costs, and enable decision-makers to manage and control their root causes, it is important to identify their *drivers* (stage 5 of the IAMC framework) and these, it is argued, will assist managers in recognising potential areas of indirect human costs where savings may be made.

3.5 Novel Indirect Human Cost Drivers' Interrelationship Mapping Model

Identifying the indirect human cost factors could, to a great extent, reduce the resulting indirect costs. However, rather than trying to identify and reduce each of the cost factors, it is proposed to identify the key cost *drivers* (root causes) that lead to these costs. This will assist in managing and controlling them, decreasing their impact or even eliminating

them, and thus lead to the minimisation of most of the *resulting* IHCs. Thus, drivers are defined to be *"those element costs and "root causes" that have consequently resulted in the unidentified indirect cost/indirect human cost factors"*. Examining the cost components of the MEFM taxonomy proposed in the above section (see 3.3), the author proposes below an interrelationship/network model of the indirect human costs and their drivers using a cognitive (causal) mapping technique, namely, Fuzzy Cognitive Mapping (FCM) (figure 3.4).

A FCM describes the behaviour of a system in terms of concepts. Each concept represents a state or a characteristic of the system. This view takes the concept that a "unit" is a matter of degree. Rather than concepts in a system being "yes" or "no", they vary between "yes" and "no" (Kosko, 1994). Fuzzy logic permits a concept to be part of more than one set of concepts. Thus, statements of concepts may overlap or merge with one another.

An FCM is a non-hierarchic graph that is used to describe the state of a set of variables. The nodes in the FCM represent the concepts, and each concept is linked to the other by some sort of relationship. This relationship will vary in its strength, hence, the degree to which they are related. The relationship may be very little or even indirect, but the association will identity links between the two concepts, which could not be quantified in numerical terms (Irani *et al.*, 2002).

The key difference between FCM and other cognitive mappings is that FCM is a dynamic systems model, which develops upon the feedback of each concept. Concepts may be added as and whenever to the map without having to redefine the other concepts in the map as each concept is identified uniquely. The relationship between the concepts enables one to create a holistic view of the system (Irani *et al.*, 2002). From an Artificial Intelligence point of view, FCM is seen as a neural network, where each concept represents a piece of data: the greater the number of concepts, the more data, then subsequently, the greater the understanding of the system and so an appropriate solution is more vivid (Kosko, 1994).

The FCM technique (figure 3.4) was specially used to represent the interrelationship between the indirect human cost factors, as it facilitates representation of related specific concepts (the nodes) together via causal relationships (the lines of the graphs, i.e. the connections). Since the problem we have is a complex problem, it needs to be illustrated using a dynamic modelling system. The intangible interrelationship between the indirect human cost factors cannot be modelled in numerical terms, and FCM facilitates the illustration of casual relationships between costs, the degree of relationship ranges from not always to always. The degree of the relation between the cost factors and their drivers used in the FCM model below are as follows:

1) not always,
2) sometimes
3) usually,
4) often,
5) very much, and
6) always

scale of ranking, and the shaded areas are used to help the reader distinguish the main indirect human cost drivers.

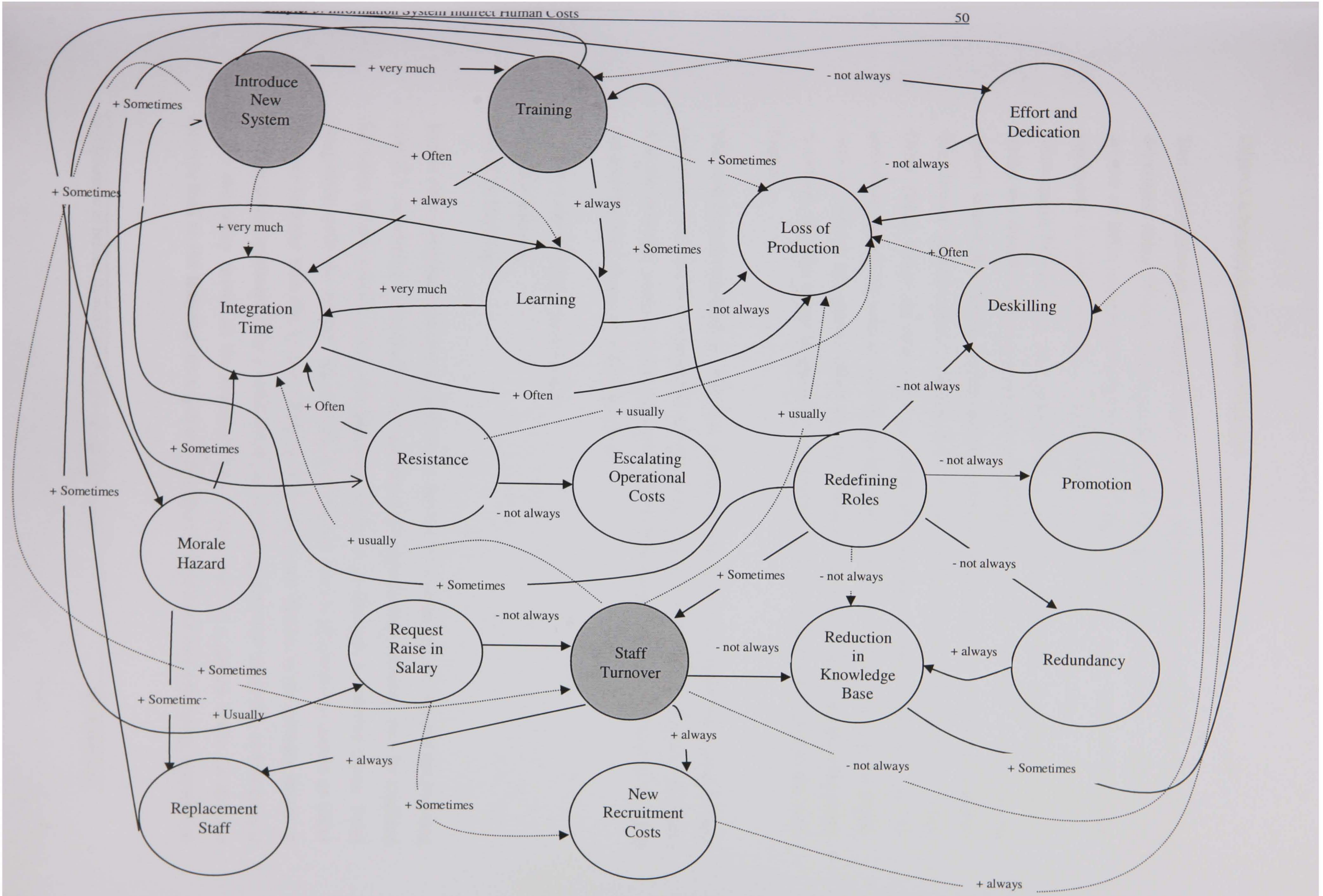

Figure 3.4: Fuzzy Cognitive Driver-mapping Model: Main Drivers and Factors of IHCs

The Interrelationship Indirect Human Cost Driver Mapping (IIHCDM) model is developed using "Fuzzy Cognitive Mapping", in an attempt to identify a selection of drivers of IHCs associated with IS adoption. Each node (i.e. fuzzy node) in the model represents a cost component. Connection of the nodes via an arrow indicates a relationship between the cost components. Solid arrows represent the primary drivers, whilst the dotted arrows illustrate the secondary drivers. The "+" and "–" signs by the arrows denote the causal relationship between the cost component in terms of whether they have a "greater effect", denoted by a "+", or a "lesser effect", denoted by a "–" sign. Other fuzzy terms are also used to define the meaning of these operators, e.g. "+ sometime" would be read as "sometimes has greater effect on", and "+ always" would be read as "always has greater effect on" etc. Through connecting each concept using these modifiers, the aim is not to quantify, but provide a causal relationship between the cost factors.

The cost factors that lead to other cost factors are the drivers. For example, if cost A leads to cost B, then cost A is a potential driver of cost B, and if cost B leads to cost C, then cost A is the potential primary driver of cost B, but it is the secondary driver of cost C, as it did not directly lead to cost C. For example if:

Cost A = introducing a new system
Cost B = training
Cost C = learning

In this case, introducing a new system (A) is the driver of training cost (B) and the learning cost (C), as when we introduce a new system to an organisation; training may be required for users of the system. Thus, the users are likely to go through a learning curve, from integration with the system. As a result, a temporary loss in productivity occurs as users become familiar with the system. Thus, introducing a new system is the primary driver of training costs, represented by a solid arrow, as it directly generates them but, in this case, it is the secondary driver of the learning costs, represented by a dotted arrow (it did not *directly* lead to the learning costs, but training did). Promotions and escalating operational

cost are the direct costs of the system and are therefore depicted in italics to distinguish them from all the indirect costs.

For example, *rejecting raise in salary* does not always lead to needing *new recruitment costs*, but it is a potential resulting cost if the *salary is rejected* and the staff chose to leave, causing *new recruitment costs* to be incurred. As it is represented in the FCM of indirect human cost *rejecting salary increase* (+sometimes) has an effect on new recruitment costs occurring.

The FCM interrelationship model above shows the relationship between all the cost factors identified. For example, The FCM model illustrates that during the introduction of a new system to the organisation, *training* and *staff turnover* are some of the potential main indirect human cost drivers (see grey shaded area in figure 3.4). These costs are said to be the *key drivers* of all the other costs demonstrated in the MEFM taxonomy.

The following section examines and discusses these key indirect human cost drivers in more detail.

3.5.1 Introduction of New System

As new systems are introduced to the organisation, the users are likely to require training, and will hence go through a *learning* period; a great deal of *time* is required to integrate a new systems. As a result, a *loss in productivity* occurs as the user becomes familiar with the system (Irani, 1999). Furthermore, introduction of a new IS could result in an unpredicted political power shift that leads some individuals or groups to *resist*, as well as resulting in escalating operational costs. Introducing a new system also results in managers being less productive, and hence not adding any value to the organisation. As a result of the introduction of the new system, the organisation may assign less demanding tasks to very skilled employees, which is likely to lead to indirect human costs such as job dissatisfaction and *staff turnover*.

Clearly, the introduction of a new system is an influential driver of indirect human costs, as it has a great impact on the organisation, and leads to many indirect human costs.

3.5.2 Hidden Costs of Training

Many managers may decide to assign some employees to a training course, their decisions based solely on direct costs such as the actual training fee. Nevertheless, as mentioned above, training has many other costs associated with it. Sooner or later they will realise that there is need for *replacement staff* to do the jobs of the staff members who are away on training. Although organisations may send employees on training courses in the belief that they will implement what they have learnt immediately when the training period is over, resulting in a more effective working environment, nevertheless a *great deal of time* is actually spent on transferring the training to other IS staff. Furthermore, IS managers may be interested in training that will benefit them on a personal level, rather than being interested in the organisational benefits, which again will result in the IHC of *Morale hazard* and many other indirect human costs (see figure 3.3).

3.5.3 Staff Turnover

As a result of training or the acquisition of new skills, employees will be aware of their new, highly marketable skills. Therefore, they may request an increase in their salaries to reflect their greater marketable value. Rejecting the request may result in *staff turnover.* High staff turnover results in a significant change in the knowledge base of the organisation that is impossible to predict.

It is argued that having identified and classified these indirect human costs and identified their potential key-drivers, decision-makers may then have the opportunity to incorporate them into their evaluation of IS deployment from the initial stages of the project. The author believes that a way of estimating/monitoring these drivers needs to be developed. Therefore, it seems plausible to suggest that if performance measures of the indirect human cost drivers can be identified (stage 6 of the IAMC), they will facilitate the evaluation of IHCs at various stages throughout the life-cycle of a project. Hence, decision-makers could more accurately predict the financial and human costs of the systems that they choose and whose value they subsequently have to justify.

3. 6 Proposed Research Conjectures

As a result of the critical literature reviews (Chapters 2 and 3), and based on the models proposed in this Chapter, the researcher proposes three conjectures:

- Conjecture **1** (based on the IAMC framework),
- Conjecture **2** (based on the MEFM taxonomy) and
- Conjecture **3** (based on the IIHCDM model).

3.6.1 Conjecture 1

As a result of the literature review, it has been concluded that there is a need to look more carefully at indirect human costs, as there is evidence that although these indirect costs are not accounted for in the IS budget, they are taken out of the organisational overhead or the budgets of other departments (see section 2.3 and 2.4). It is proposed that *the indirect human costs of IS are unidentified, as they are hidden in other departments.* The underlying rational for Conjecture **1** is that the main barrier to the ability to identify indirect human costs is that they are hidden. Thus, organisations exceed their budgets and so manage and control the costs less effectively. Consequently, decision-makers do not know what the IS project is costing them, and the indirect costs are omitted from the IS budget. This conjecture seeks to test whether, as a result of identifying all the indirect human costs and accommodating them, decision-makers will be better informed and more able to identify and evaluate their investments.

3.6.2 Conjecture 2

Since none of the cost models cited in the literature (see section 2.2) sub-classify indirect human cost in any way, even though their importance has been confirmed (see section 2.4 and 2.5), researchers such as Love *et al,* (2000) emphasise the importance of human and organisational aspects associated with evaluation processes. The author proposes a new classification of indirect human costs into four categories. It is conjectured that

Information systems indirect human costs can be classified into MEFM taxonomy, namely, management indirect human costs, employee indirect human costs, financial indirect human costs and maintenance indirect human costs (Conjecture 2).

As one of the barriers to identifying indirect human cost is that they are hidden organisations frequently fail to identify indirect human costs throughout the life-cycle of the project, even at the project proposal level. Conjecture 2 suggests a relationship between the indirect human costs and divisions of IS. The underlying rational of this conjecture is that some costs could be correlated to the management cost category, while others can be correlated to employee, finance or maintenance cost categories within IS. Identifying and classifying indirect human costs will facilitate the control and monitoring of their impact on both the individual and the organisation. This conjecture emphasises the need to classify indirect human costs, as this will facilitate their *management* and *control*. This conjecture aims to investigate whether indirect human cost factors can be categorised into the MEFM taxonomy, and as a result, provide decision-makers with significant information. More importantly, it will facilitate recognition of these indirect human cost drivers.

3.6.3 Conjecture 3

In order to better understand these indirect human costs, it is argued that it is essential to identify their *drivers*, as, it is argued, these are likely to assist managers in recognising the areas of indirect human costs where potential savings may be made. Based on the review of the normative IS literature the IIHCDM depicted in figure 3.4, it is proposed that *training, staff turnover and introduction of a new system are the main drivers of the indirect human cost components across all IS divisions* (Conjecture 3). Thus, organisations may believe that providing training or introducing a new system will increase productivity and be cost effective, but they need to be aware that these may actually result in many indirect human costs (see section 3.4 and 3.5). For instance, introducing a new system requires training, and the actual training has many associated hidden IHCs, such as learning delay and Morale hazard cost. Employees gaining new skills may also lead to staff turnover, which again leads to other direct costs (e.g.

recruitment) and indirect costs (reduction in knowledge base), which could have a significant impact on the development of the organisation.

This conjecture aims to investigate whether identifying these indirect human cost drivers will facilitate the identification of all the other indirect human costs associated with IS adoption. Thus, decision-makers will be better informed and more able to evaluate their investments and, it is argued, they will subsequently be able to manage them more effectively. Then, having identified and classified these main indirect human costs, decision-makers may then have the opportunity to incorporate them in their evaluation of IS deployment from the initial stages of the project. It would seem plausible, therefore, to suggest that if such costs could be appropriately identified, measured, or at least estimated, and evaluated at various stages throughout the life-cycle of a project, decision-makers could more accurately predict the financial and human costs of the systems that they choose and whose value they subsequently have to justify.

3.7 Summary and Conclusions

Chapter 2 concluded that there is a pressing need for those delivering information systems to better identify the potential indirect human costs and their drivers within an organisational context. It is important to find out the implications of these costs to the organisation, and whether they can be traced back to their "root causes". This chapter has critically analysed the normative literature with a particular focus on indirect human costs, and has identified indirect human costs that are frequently cited as being omitted from the IS evaluation process. Based on the literature analysis, the theoretical IAMC framework, consisting of nine phases for identifying, managing and controlling indirect human costs, is proposed. It is acknowledged that the contributions of stages 6–9 are restricted to a theoretical level, because of the constraint of the time allocated to the present research. The understanding of indirect cost factors permits managers to allocate project costs appropriately and justify their investments, and can be a contributing factor in preventing cost overrun. The indirect human cost factors have been classified according to their association with the main divisions within an organisation. The proposed novel taxonomy consists of four categories of indirect human costs associated

with the adoption of IS, namely Management, Employee, Finance and Maintenance (MEFM).

The MEFM taxonomy reveals that the Employee and Management divisions have the most indirect human costs associated with them. Furthermore, it illustrates that *loss of time*, *learning*, *training*, *loss of productivity* and *redundancy* are cost factors for all divisions. Adapting the cost factors from the MEFM taxonomy, the author also proposed a fuzzy cognitive interrelationship model for mapping the main IHC drivers and their related indirect human cost factors. Identification and subsequent *mapping* of these indirect human costs to their drivers is reviewed in relation to the IAMC framework and in light of the impact that these costs have on both the individual and the organisation. Since the problem of illustrating the interrelationships between the IHC cost factors is a complex one, it is illustrated using a dynamic modelling system. FCM was used as a mapping technique to better explore the interrelationships between the cost factors. In so doing, three potential *key* IHC drivers were identified, namely *introduction of a new system*, *costs related to training* and *staff turnover*. Each driver is discussed in terms of its impact on the individual and the organisation. The FCM was used to symbolise a series of causally-related concepts/issues together and not to calculate the strength of causality between the cost factors.

It is argued that the proposed IAMC framework, MFEM taxonomy and the interrelationship IIHCDM model are novel and contribute towards developing a frame of reference for identifying, assigning, estimating and evaluating the costs of information systems. They add to the literature as they facilitate the identification and the appropriate allocation of these costs within the IS budget, and assist decision-makers in preparing a more realistic financial plan for their cash flow and their evaluation of IS systems, and thus attain better management and control of these costs. The aim is to develop a model that can be used up front, at the start of a project, as a guide to strategic planners, and as a means to evaluate costs against plans during and at the end of a project.

CHAPTER 4

Research Methodology

This chapter conveys how the present research's conjectures will be tested and the aim and objectives will be achieved. The chapter describes the research methodology to be followed for the study within the context of information systems. The use of a combination of the positivist and interpretivist epistemological stance with qualitative research methods is justified. Thereafter, the research method to be used will be described providing justifications for its suitability. Subsequently, the methods used for collecting qualitative data will be exemplified. The units of analysis deployed in interpreting the data obtained will be discussed. Ultimately the author forms the research processes into a protocol. This acts as a data collection technique where data is deduced from case study companies, such that the proposed conjectures can be tested and the conceptual models validated.

4.1 Introduction

The research aims to contribute to the body of knowledge in the field of IT/IS investment by facilitating the identification, management, control and thus the inclusion of indirect human cost factors in the IS evaluation process and budget proposals. In doing so, a frame of reference will be developed which will illustrate how to overcome the main barriers in identifying IHCs, encompassing an extensive list of indirect human cost factors and their drivers. To facilitate the development of such a frame of reference, conceptual framework, cost taxonomy, and driver-mapping model were suggested in Chapter 3. In developing the frame of reference, empirical data validating the models proposed beyond the conception need to be generated. Therefore, the empirical data will test the conjectures underpinning the conceptual models proposed in Chapter 3, within the confines of the study. As a result, decision-makers and evaluators can use the frame of reference for budget allocation and investment justification.

4.2 Selection of Qualitative Research and Rationalization

Since IS is multi-disciplinary, the identification of an appropriate approach is not a simple task, and there is no single framework that includes all the domains of knowledge needed for the study of information systems (Galliers, 1992). Selecting an appropriate research approach is a key task of the research design process (Walsham, 1995a and Galliers, 1994), the most common approach being either deductive or an inductive.

Deductive data analysis is the characteristic of scientific method; hypotheses are generated prior to the beginning of the study, indicating the relevant data variables to be collected. In inductive approaches, data are collected in relation to the focus of inquiry. Hypotheses are not generated prior to the beginning of the study, and relevant variables are not pre-determined. In this thesis, conceptual models are determined from the beginning based on the literature analysis, data are collected empirically, and then models revised as a result of the theoretical and empirical work.

Saunders *et al.* (2000) note that a deductive approach is employed when developing a theory and a hypothesis. A research strategy is then designed to test the hypothesis, whereas an inductive approach is used to collect data and develop theory as a result of the data analysis. In this research inductive approach was employed to formulate conceptual models and propose conjectures were based on the literature analysis of IS costs in the area of IT/IS investment evaluation. The deductive approach was used to gather primary empirical data to test theory by data analysis, allowing for alternative explanations of events.

Essentially, there are two approaches of investigation, namely, quantitative and qualitative. Maykut and Morehouse (1994) state that quantitative research is founded on observations that are transformed into distinct units that can be compared to other units through statistical analysis; while qualitative research mainly examines people's actions and words in narrative or explanatory ways, more closely indicating the situation as experienced by the participants. Myers (1997) reports that quantitative methods are well accepted methods; these are survey methods such as laboratory experiments and numerical methods like mathematical modelling. Qualitative research involves the utilisation of qualitative data such as documents, interviews and participant observation data, to understand and explain social phenomena (Myers, 1997).

Irani (1998) notes that events that form a phenomenon are conditioned by interrelated variables, such as time and culture, demonstrating that no two conditions are the same. The focus of the present research perceives information systems as a socio-technical system, and is concerned with human beings. Therefore, for the purpose of the present study, any methodology that is used must identify the variability that is inherent in human behaviour. In effect, the principle that scientific methods, such as quantitative research methods, are inappropriate to the study of people is questioned, suggesting the suitability of a more qualitative approach.

The limitations associated with qualitative research are also acknowledged here, as the challenges of qualitative research have been discussed. For example, Cornford and Smithson (1996) report that as the research uses a small number of cases, in some cases only one, it is difficult to generalise it to a wider range of circumstances.

Furthermore, as the data attained is usually rich and complex, it indicates that it is open to various interpretations, and researcher bias is an invariable danger. Miles and Huberman (1994) also report that apart from quantitative data, qualitative data has certain, rather problematic characteristics. Qualitative data is typically predominantly textual, with a richness that can be lost when combining or summing-up data. In addition, the data can be unstructured and uncontrolled as it concerns people's behaviour and attempting to understand their perception of a particular situation. Also, it is often longitudinal, to a greater or lesser extent as the observations may continue for a lengthy period of time and if interviews are used, they maybe need to be repeated at distance of a few days, weeks or months.

With these drawbacks in mind, and due to the epistemological stance being followed in this research, the reasons for selecting qualitative approach are summarised below.

4.2.1 Justifications of Qualitative Approaches

Marshall and Rossman (1999), and Benbasat and Weber (1996) review some of the types of the research that qualitative research would be suitable. Examples of these types that also correspond to the requirements of the present study are detailed below:

- Research for which related variables have to be identified
- Research that scrutinizes in-depth complexities and processes
- Research on little-known phenomenon or innovative systems
- Allows the researcher to understand nature and complexity of the process taking place
- Allows researcher considerable flexibility during interviews and observations.

Remenyi and Williams (1996) suggest when an area of science is involved with human and organisational idiosyncrasies, qualitative research methods should be used in IT/IS research. The approach used for the research described in this section is qualitative in nature as the emphasis is on understanding human cost factors and the barriers to including them in the evaluation process and budget proposals, in addition to identifying their organisational classification/location. Qualitative data is beneficial

mainly as its data is collected in its natural setting, thus facilitating the effect of the environment to be taken into account, and it has richness and holism (Miles and Huberman, 1994).

Further, Denzin and Lincoln (1994) note that qualitative research is multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. This implies that qualitative researchers study matters in their natural environment and they understand events in terms of meanings. In addition to that, using qualitative approach, the researcher is able to manipulate in questioning the participants, thus fostering more natural and realistic information making it a favourable approach for this research.

Indirect human cost has been identified as not being understood and received little attention, and the data to be collected are of a soft nature. Clearly, rich empirical data is required to provide more understanding of human cost factors; the need for rich empirical data indicates that the use of qualitative research methods is appropriate, since they allow an in-depth examining processes. Qualitative research is based on a phenomenological position, while quantitative research is based on a positivist position. Phenomenologists believe that knowledge and understanding are embedded in everyday world, thus knowledge can be quantified or reduced to numbers or statistics, but believe that truth and understanding of life can emerge from people's life experiences. As the focus of the present research is human costs, that are results form the interaction of people and systems, an understanding of systems and employees everyday interaction is required along with their impacts and resulting cost. Furthermore, applying Walsham's (1995b) remarks in that interpretivist case studies provide four types of generalisations, the drawback related to generalisations is minimised by using data triangulation.

All research is based on some underlying assumptions about what forms "valid" research and which research methods are suitable. In order to conduct and/or evaluate qualitative research, it is therefore essential to understand what assumptions there are.

4.2.2 Underlining Philosophical Assumptions

It is important to understand the philosophical assumptions underpinning the approach chosen, as it facilitates developing a strong case to select a research approach (qualitative or quantitative) for a particular study, in a particular setting. Guba and Lincoln (1994) suggest four underlying "paradigms" for qualitative research: positivism, post-positivism, critical theory, and constructivism. Denzin and Lincoln (1998) believe that a paradigm is a fundamental set of beliefs that directs actions. It consists of three elements namely epistemology, ontology and methodology. Epistemology refers to general sets of assumptions about the best ways of inquiring into the nature of the world (how do we know what does, or does not, constitute valid knowledge). Methodology focuses on the combination of techniques used to enquire into a specific situation (how we obtain knowledge). Ontology raises the basic questions about the assumptions that we make about the nature of reality (what is it that we know). Easterby-Smith *et al.* (2002) state that the use of phenomenology therefore engages a paradigm of social constructionism that "reality" is determined by people rather than by external and objective factors .

Orlikowski and Baroudi (1991) assert that information systems are not embedded in a single theoretical perspective, but there is an extensive range of philosophical assumptions regarding the underlying nature of phenomena under investigation. There are many research approaches and strategies that the researchers can select. The major paradigms that structure and organise qualitative research are positivism, post-positivism, constructivism, and critical theory and related positions.

Research in IS literature (Walsham, 1995a; Miles and Huberman, 1994; Yin, 1994; Galliers, 1992) reveals that the positivism approach has been the dominant epistemology in IS research. Orlikowski and Baroudi (1991) suggest that IS can be categorised as positivist if there is evidence of formal propositions, quantifiable measures of variables, hypothesis testing and the drawing of inferences associated with a phenomenon from a perspective sample to a stated population. Galliers (1992) notes that positivism assumes observations of the phenomena under investigation can be made objectively and rigorously (e.g. by measurement). However, positivism approach has started from scientific tradition and therefore, it is characterised by

repeatability, reductionism and refutability. An alternative to positivism is interpretivism, which assumes that the knowledge of reality is acquired only through social constructions such as language, consciousness, shared meanings, documents, tools and other artefacts.

The philosophical base of interpretive research is hermeneutics and phenomenology. Saunders *et al.* (2000) and Ritchie and Lewis (2003) declare that the phenomenological philosophy of the social world of business and management is too difficult to be theorised by definite "laws" similar to physical sciences, and would reveal the details of the situation in order to understand the reality, or perhaps a reality working behind them. In the phenomenological approach the focus is on, understanding the meaning of events for the persons being studied (Patton, 1991).

Interpretive studies are mainly conducted in an endeavour to understand phenomena through the meanings that people assign to them. Walsham (1993) believes that the aim of interpretive methods of research in IS is to provide an understanding of the context of the information system, and the process whereby the information system effects and is influenced by the context. Miles and Huberman, (1994) note that in interpretivism, researchers tend to permit concepts to emerge from field data, rather than entering the field with pre-conceived theories. However, Walsham (1995a) reports that it is essential to access existing theory in a specific subject domain, but without assuming that it represents the final truth in that area. Irani *et al.* (1999) believe that both positivist and interpretivist have an influence on empirical research strategy, as the former dictates that the researcher takes the role of an observer, whilst the latter dictates that the researcher gains knowledge by participating in the subject of the empirical study.

4.2.3 Justification of Adopting Combined Philosophical Research Stance

In the context of the present study, the researcher has selected the interpretivst research approach as appropriate. This is for the reason that the literature review and analysis presented in Chapters 2 and 3 reveal that the indirect human cost factors associated with IS adoption are interrelated and complex; being associated with the interaction of technology and people which is difficult to be separated and

investigated individually. Hence, there is a need for a research approach that will allow the author to understand the interrelationship of the cost factors, their impact on each other, and the individual within their given context.

Phenomenology is one of many types of qualitative research that examines the lived experiences of human beings and helps researchers to gain an understanding of the essential "truths" of the lived experience. Interpretive research focuses on the full complexity of human sense-making as the situation emerges (Kaplan and Maxwell, 1994), understanding of the context of the information system, and the process whereby the information system influences and is affected by the context. These facilitates accomplishing the research aim, understanding the human cost factors associated with the adoption of IS and how it influences organisations.

Positivism will only be partially adopted in this research. The present study focuses on indirect human costs that are identified to be mainly intangible and difficult to quantify. The study aims to identify potential indirect human cost and their drivers to enable their management and estimation, rather than attaching definite quantifiable measures to them. Thus, positivism is partially used in the present study in having a prior-construct, as structured case study protocol is followed for conducting the case studies, and conceptual models along with conjectures are proposed prior to empirical enquiry. Whilst the interpretivist stance is also employed, the nature of the necessary data to be generated is qualitative, and are *interpreted* based on the unit of analysis.

Having identified the strengths and drawbacks of qualitative research, this dissertation uses a research strategy for the purpose of theory testing.

4.3 Selection of an Appropriate Research Strategy

Saunders *et al.* (2000) suggest that a research strategy is a general plan of how to set about answering the research question(s). Likewise, Galliers (1992) notes that research strategy is the means of conducting research, taking on a particular style and employing different research methods for data collection. The widespread strategies employed are grounded theory, filed study, experiment, survey, case study, longitudinal studies, ethnography, action research, exploratory, descriptive and

explanatory studies (Saunders *et al.*, 2000 and Cavaye, 1996). Yin (1994) believes that to choose or differentiate between researches strategies, three criteria must be looked at carefully. These are:

1) the type of the research question posed,

2) the extent of control the researcher has on actual behavioural events,

3) the extent of focus on present events, in comparisons to historical events.

According to Yin (1994), a research strategy could be an archival analysis, history, surveys experiment, and case study research. The research strategy chosen for this thesis is an empirical one, namely a case study research. In this study, principal data were derived from lengthy interviews lasting between two and three hours.

Qualitative methods, such as grounded theory, could be used for the purpose of the present study, however it is mainly deployed for theory developing and not theory testing as it is required here. Other strategies such as field study would not be appropriate as it does not employ conjectures and does not aid in understanding the organisational structural context, which both are main parts of the unit of analysis of this study. Action research also is not an appropriate strategy as it does not define the research field to be investigated, while in the present study it is clearly defined to be IHCs within the IS evaluation.

In the context of the present study it has been selected to *adopt* case study as a research strategy, the following section justifies its appropriateness.

4.3.1 Justifying the Use of Case Study Strategy: Case-Based Method

Many researchers (e.g. Yin, 2003; Yin, 1994; Lee, 1989; Benbasat *et al.*, 1987) have reported the use of case study strategy for theory testing. Yin (1994) believes that case study is a comprehensive research strategy, in that it covers an all-inclusive method, with the logic of design integrating particular methods to data collection and to data analysis. Yin (1994) states that a case study is competent dealing in with an extensive assortment of evidence (e.g. direct observation, documents, interviews), which is more than what a usual historical study would provide.

However, Cavaye (1996) and Yin (1994) note that there are drawback linked to case study as it may allow biased views to control analysis of data obtained, and its greatest weakness is its lack of generalisibilty. One might suggest increasing the number of cases carried out, but this would not solve the problem. In this context, Galliers (1994) deems that the weakness of the case study methodology is the restriction to a single organisation, which leads to difficulty in generalising given problems of acquiring similar data from a statistically meaningful number of cases. Furthermore, the interpretations of individual researchers are different. However, Yin (1994) suggests that no one can generalise from a single experiment. This implies that scientific facts are rarely based on single experiments, but they are based on multiple experiments, that have replicated the same phenomenon under different conditions. Similarly, in the present study indirect human costs in organisations are being investigated, at different levels, i.e. from different organisational and participants points of view.

As Roesenthal (1966) argues, it is often forgotten, that bias can also enter into the conduct of experiments. To deal with this limitation, in case study research, the investigator made great effort to report all evidence fairly (Yin, 1994), and triangulation between the results of open interviews, structured interviews have been performed. Furthermore, case study may not have control over the behavioural events and has no control over independent variables, hence may limit the internal validity. Nonetheless, case studies have been reported by many researchers to be the most widespread research strategy used in the area of IS (Myers, 1997; Cavaye, 1996; Orlikowski and Baroudi, 1991).

Galliers (1994) states that the case study research offers a rich narrative, captures the reality in greater detail, and provides the possibility of analysing more variables than other possible research methodologies such as surveys, field experiments, laboratory experiments. Klein and Myers (1999) note that case study research is acknowledged as a valid research strategy within the IS research community. Yin (1994) suggests that a case study is an intensive securitisation of a phenomenon in its natural setting, using multiple methods of data to collect information from one or more sources (e.g. people, groups). They are a systematic way of looking at what is happening, collecting data, analysing information, and reporting the results. The product is an

enhanced understanding of why a particular instance occurs, and what might be vital to explore more extensively in future research. The use of a case study is a way to systematise observation and aims for in-depth understanding of the context of a phenomenon (Cavaye, 1996). Stake, (2000) reports that the study strategy is flexible and opens to a great deal of variation, and can be carried out within a positivist or an interpretivist stance.

Yin (1994) notes that there are various types of case studies such as exploratory, descriptive and explanatory depending on whether they are used to answer *what, how*, and *why* research questions respectively. Saunders *et al.* (2000) portrays exploratory studies as a valuable means of finding out what is happening; to search for new insights; to pose questions and to assess phenomenon in a new light. This is achieved through a literature search, interacting and discussing with experts in the subject, or conducting focus group interviews. Thus, the aim of the descriptive studies is to portray a precise profile of persons, events or situations, and is generally employed as an extension of a piece of explanatory research (Saunders *et al.*, 2000). Accordingly, Saunders *et al.* (2000), also note that explanatory studies, establish causal relationships between variables, and are used mainly in quantitative studies where the data is subjected to statistical tests such as correlation.

Yin (1994) suggests that "how" and "why" questions are most suited to a case study strategy. This research poses the following questions:

- *How* are these indirect human costs actually a cost to the organisation?
- *Why* are the indirect human costs not recognised and included in the evaluation processes and budget proposals?
- Archival analysis will also be used, as this research poses the questions: *what* are the indirect human costs of information systems?
- *Where* are the indirect human costs located? And *how many* costs are associated with each division?

Using these research strategies the researcher does not require control over behavioural events, but needs to focus to a certain extent on present events. As recommended by Yin (1994), the "how" and "why" questions are more explanatory

and likely to be addressed in case study research. This is because such questions deal with operations needing to be traced over time, than mere frequencies or incidence.

Taking Yin's (1994) recommendations into consideration, in the context of the present study the case study strategy is appropriate for this research purposes, and describing all the indirect human costs, and how they could actually be a cost to the organisation. Based on the above, the case study followed in this thesis can be classified as exploratory. Exploratory case studies are particularly beneficial where considerable uncertainty exists about goals, and results.

In the context of the present study, the adoption of case study strategy to determine how indirect human cost factors occur in different divisions/organisations, thus it will facilitate the identification of indirect human costs within IS. This is because this strategy offers validity due to its rigour and the careful exposition of the method; and enables change within the research setting, and will also allow for a multiple of data collection methods. These data collection methods include interviews and documentations and are detailed in sections below. Markus (1983) reports that theory testing is possible as researcher collects data; as required by the unit of analysis, and thereafter relates them back to the conjectures and conceptual models of IHCs proposed within the confines of the case study.

The intent of this research is to develop a frame of reference of indirect human costs, that facilitates their identification, allocation and thus management and control. Traditional ways of conducting case studies involve a comprehensive, time consuming history of a case which will not benefit this study greatly. An in-depth study of a number of organisations will also consume a great deal of time and resources. In contrast, adopting the case study strategy, employing case-based research, the researcher is able to focus on identifying potential indirect human cost, and analysis can be carried out simultaneously making it an efficient process. Thus, the author declares that research strategy used is case research (case study), and the research method employed is *case-based*, for the following reasons:

1) The aim of the research is to validate the models and test conjectures proposed and not an in-depth study of the individual organisations.

2) The research has a very narrow focus, just looking at indirect human costs, and not all costs involved.

3) The case study organisations were selected on specific criteria (Section 5.2) in terms of organisation and type of cost.

Thus, case-based method is employed, adopting case study strategy, and defined it as:

> *Case-based research is where empirical cases are conducted adopting a case strategy approach, but without fulfilling all the criteria of the traditional case studies, such as the in-depth descriptions usually required of the context of the phenomena studied.*

4.4 Single vs Multiple Case Studies

Yin (1994) suggests that there are different designs for the case studies; either single case study or multiple. The decision to analyse one or multiple cases is a central one to case study design. Each could be holistic (single unit of analysis) or embedded (multiple units of analysis). The present research employs the embedded type as several units of analysis are developed.

A single case study would offer "rich" primary data of the organisational context. It would further allow the research to develop a "full picture" of the organisational idiosyncrasies and to investigate the indirect human costs associated with IS adoption. Nevertheless, a single case may not offer adequate data that would justify the type of indirect human cost factors that should be used in evaluation process and during budget allocation. Therefore, in light of the characteristics of this research, a single case study will not be suitable.

Instead of the single case study organisation, multiple case study design will be employed for the present research. Admittedly, multiple cases will not provide the "richness' of data that a single case study can; nevertheless the aim of the research is to identify *potential* indirect human cost, and not an exclusive list of costs associated with IS adoption for a single organisation. Thus, carrying out multiple cases will allow the research to examine and "cross-check" outcomes. The analysis of data

across organisations will be achievable with this strategy. Herriot and Firestone (1983) state that multiple cases will give the research a more rigourous examination of cause and effect, in relation to the units of analysis, as it will be able to move the investigation form one organisational context to another, thus isolating idiosyncrasies that contribute to explaining the phenomenon.

Eisenhardt (1989) suggests that a research strategy that employs multiple case studies should not conduct more than ten, or less than four cases. Meanwhile while Dyer *et al.* (1991) states that the amount of case studies carried out by researcher should be dependant on how much is known about the phenomenon, and how much information that can be uncovered for conducting additional cases. In the context of the research presented in this thesis, a multiple case study strategy was adopted to study four case study organisations within the private sector. Nevertheless, the author sampled more data in a different organisation to investigate if there are more indirect human cost factors, and the same outcomes were found. As such, the research in this thesis employed the use of multiple cases studies within the limits suggested by Eisenhardt (1989) in having a minimum of four case studies. Nonetheless, data collection was carried out until enough data was collected to test the proposed conjectures, and only mainly stopped further investigations when additional data collection provided "none-value" from a "testing" perspective.

4.5 Empirical Research Methodology

Taking into account the case study variants and its justifications, the author suggests integrating these factors into an empirical research methodology. Janesick (2000) suggests that a qualitative research methodology could follow three phases. Likewise, the researcher has developed an empirical research methodology, which is based on three phases namely:

(a) research design;

(b) data collection and,

(c) data analysis.

The methodology is presented in figure 4.1 illustrating the phases of the research enquiry.

4.5.1 Research Design

The first phase of the methodology is the research design. Essentially, it starts with a review and critical analysis of the published literature, hence developing an understanding of the research field of IT/IS evaluation. Analysing the existent literature leads ultimately to identifying a more focused area of research (IS indirect human cost), and a research need.

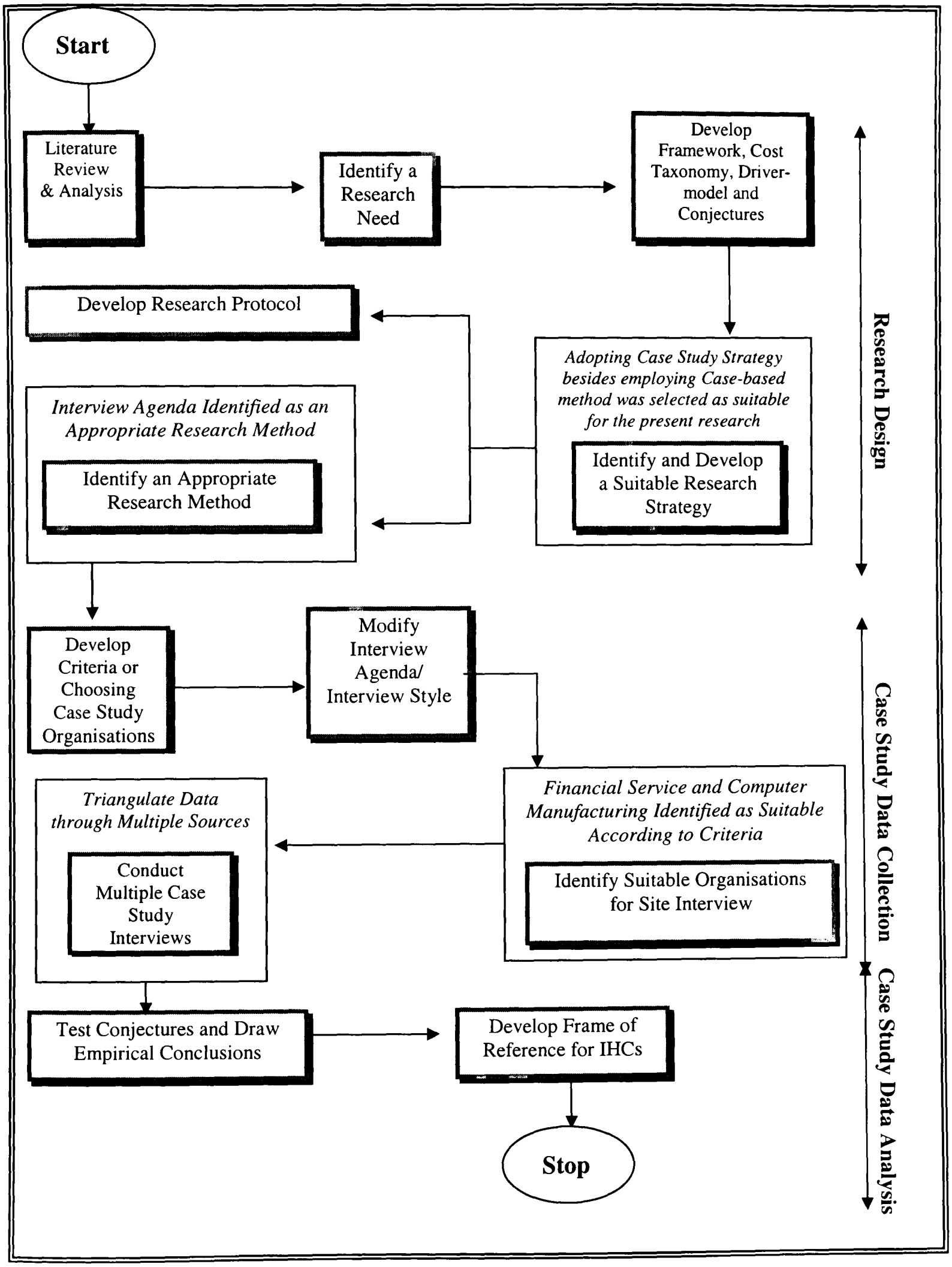

Figure 4.1: Empirical Research Methodology

As demonstrated in figure 4.1, based on the literature analysis, conceptual models are developed and conjectures underpinning these models proposed. Aspects of the conceptual models will be tested empirically. Thereafter, based on the data required to test the research conjectures an adoption of case study research strategy is selected as an appropriate research strategy. The research design strategy (a multi-case study) is identified, employing qualitative research methods for theory testing, of which justifications are provided in section 4.2. To generate consistent data that correlates to the conjectures proposed, and to achieve the aim of the research, the research design is simplified into a protocol (Friedman, 1987). The research protocols or the action plans are an essential tool for various reasons including:

- To put the task of data collection in a manageable format
- To ensure that required data is gathered
- To ensure that the research follows a particular schedule
- To follow the path at which knowledge was developed
- Allows others to reach similar conclusions by following the same procedures.

This is mainly needed where the subject under investigation are subjective, and where the research is based on qualitative methods.

Included in the research protocol, a qualitative research method was developed to collect data as required by the units of analysis. The main method was in the form of an interview agenda (see Appendix C), which is a sequence of questions associated with the units of analysis, and intended to direct the researcher, during the semi-structured interviews. In addition to the interviews, data was collected through various other sources such documents and website material.

4.5.2 Data Collection

The use of multiple data collection methods makes the triangulation possible that provides stronger substantiation of theory (Eisenhardt, 1989) and therefore, it lends credibility to the researcher's findings (Saunders *et al.* 2000). Flick (1992) and Patton (1987) perceives the triangulation technique as a tool by which data can be validated.

Types of triangulation are: Theory triangulation, Interdisciplinary triangulation, Methodological triangulation and Data triangulation.

Theory triangulation refers to the deployment of multiple perspectives to interpret a single set of data. Investigator triangulation means that several researchers are used to collect the same data type from a single source. Interdisciplinary triangulation is related to the investigation of issues associated with more than one discipline (Janesick, 2000).

In the context of the present research, to enhance the reliability, validity and quality of data acquired, data (interviews, organisational documentation) and methodological (interview agenda and web-site material) triangulation was used to cross check the collected information in an attempt to reduce bias affecting the data generated (Bell, 1996). Methodological triangulation refers to the use of multiple methods to study a single problem. Data triangulation means the use of a variety of data sources in a study, such as using organisational documentation, interviews and website material. Data. Thus, the existent of the cost factors validated were cross-checked through the different case study organisations. The research methods followed during this study employed multiple lines of enquiry, as views of several informants/case study organisations were obtained, increasing the reliability and accuracy of the conclusions drawn.

Denzin and Lincoln (1998) note that interviews are considered as the main tool for qualitative research of data. According to Sharp and Howard (1996), most social scientists perceive interviews as giving high quality of information without bias. Thus, interviews may be the only way of obtaining a realistic picture of the way people view it. Similarly, Rubin and Rubin (1995) believe that interpretive social researchers favour ideas that emerge from the interviews, from real life. Saunders *et al.* (2000) and Denzin and Lincoln (1998) note that there are three major types of interviews – structured, semi-structured and unstructured. Yin (1994) also points out that the most common case study interviews are of an open-ended nature; however, interviews can also be semi-structured. Furthermore, Walsham (1995) state that interviews permits the best access to the:

(i) interpretations that the informants have associated with the actions that have or will take place,

(ii) the views and aspirations of themselves and other informants.

In addition, it allows researchers to step back and scrutinize the interpretations of their fellow interviewees in more detail. Other methods may not allow this advantage.

In the context of this research, structured, semi-structured and open interviews were selected as the main data collection method deployed. As illustrated in Table 4.1, interviews were conducted with a number of employees within the selected organisation (e.g. product manager, project manager, senior services delivery manager, assistance services delivery manager, director, financial manager, IT consultant). The study was set with the objective of interviewing different job functions, but in reality it was hard to achieve. Different companies may call different employees different names, for example in case 4, manager of HR, is also manager of finance. To avoid negative implications of speculations against generation of the data, the researcher has allowed for this in the methodology by asking interviewees for their job descriptions (See Appendix F). Furthermore, the analysis and testing of the conjectures allowed for this via only considering cost factors that are identified by two to three organisations in the final frame of reference.

The main criteria for selecting the case study organisations was to be in the private sector, which adopt and recognise IS as the core of their business described in detail in Chapter 5 (section 5.2), as they will be interested in the outcome of the research. Table 4.1 demonstrates the informants interviewed in each organisation. These interviewees were people that that researcher had access to, and also agreed that they knew the portfolio of costs that might occur within the organisations and were able to allocate them within the different divisions or categories. Others, such as independent auditors for example, are external to the organisation and may not have similar objectives to the other stakeholders. They are only interested in publishing accounts, so want hard costs; they might know the cost portfolio but might not have detailed knowledge of the various cost categories. Moreover, they may not be able to allocate the costs within different divisions, as they are not fully aware of how the company operates (it is beyond the scope of this thesis to prove that, but still a possibility and

thus taken into account). Table 4.1 below summarises the background to data collection.

Case Study Organisation	Interviewees	Support Data Sources
IB1	• Service delivery manager • Assistant service delivery manager • Independent Consultant	• Website Material • Email • Telephone (Informants were from three different business units)
IB2	• Project / Product manager	• Website Material • Journal papers • Email • Annual reports
IC1	• IT consultant	• Annual reports • Website Material • Computing Journal papers • Email
IC2	• Director • Financial manager	• Website Material • Email

4.1: Informants in Case Study

Primary data were derived from in-depth, open, structured and semi-structured interviews (see Appendix C). In the initial interviews questions relating to the role of individuals, backgrounds of the organisation and general facts about the organisations that were not found through other channels (e.g. website material) were asked. These questions were open-ended to acquire as much information as possible and not restricting the respondent in any way. Semi-structured interviews were carried out using the use of the interview agenda. Using this type of interview the author was able to clarify some issues that emerged from structured interviews. In the majority of cases, interviews took place at the interviewees' office, except for two interviews in which one was conducted in an airport for two hours before the interviewee's flight. The other took place in the researcher's office for the convenience of the informant. Every interview was conducted on a one-to-one basis.

The interviews were in-depth and as a defined research problem, the researcher knew the type of data required. The informants had been briefed by deploying the pre-

prepared interview agenda as a guide in the interview process (see Appendix C) and were focused during the interview. The nature of questions provided and the use of different sources prevented data bias during the case study. Furthermore, it allowed interviewees to understand the different terminology used, without providing answers for them.

Interviews provide the researcher with the opportunity to probe deeply to uncover new clues, open up new dimensions of a problem and to secure vivid, accurate inclusive accounts that are based on personal experience (Easterby-Smith *et al.*, 2002). Conducting face-to-face interviews means that questions may be omitted or added based on the nature of events within the particular context. This is important since the phenomenological philosophy is being applied. The deployment of semi-structured interviews, according to Saunders *et al.* (2000) enables the researcher to "probe" for answers where the interviewees will be asked to explain or build on their responses. Furthermore, Saunders *et al.* (2000) state that interviews provide the opportunity for interviewees to receive feedback and personal assurance about the way in which information will be used. Thus open-ended questions in interviews were partially used as they could yield responses of a different type to those gained from a more structured format. Open-ended questions in interviews were preferred as theory emerges from the data and from the informants; hence specific questions were not asked, that may result in a specific answers (e.g. loss of productivity a human cost to the IT division would result in a yes or no answer). Although questions were mainly focused on the conjectures proposed, they also allowed exploration of other cost factors that were not cited in the literature and their impact on the organisation.

In addition to the interviews, additional information were gathered through web sites (e.g. history of the organisation), company documentation (e.g. annual reports), and published research journal papers related to the selected organisation wherever possible. As taking notes during the interviews requires a great deal of time, the author considered tape recording a more effective way of conducting interviews. Every interview was tape-recorded and then transcribed as soon as possible after each interview. Subsequent to each interview, the interview agenda questions were refined and any emerging cost factors were added to the original list, for the subsequent interviewees to identify. The results of the transcription analysis were given to each

interviewee to check and detect any discrepancies that may have occurred and to attempt to avoid any interviewer bias via triangulation. Telephone and the email were also used to elucidate and probe unclear issues that occurred subsequent to transcribing the interviews.

The use of semi-structured interviews was selected as most appropriate for exploratory research because it allowed the researcher's understanding to increase throughout the series of the interviews (Yin 1994, Denzin 1978). In addition, in an attempt to avoid interview bias that is associated with this type of research, triangulation between the results of the open interviews and the structured interviews was performed. To help lessen the contradictions associated with data gathering across multiple sources, the data were cross-checked several times. For example, if the interviewee had ticked a human cost factor as being a cost to their organisation in the structured questions, it was cross-checked that the same cost occurred in their answer to an open question of the different cost factors that occurred in their different organisational divisions. The number of cases to be carried out was subject to time and resources allocated to the present study, but mainly it was dependant on the researcher acquiring sufficient depth and richness in the data collected (Bassey, 1981).

4.5.3 Data Analysis

A difficulty in the employment of qualitative data is that the methods of analysis are not always well formulated (Miles and Huberman, 1994). In the present study, in the same way to other studies (e.g. Ramanath, 2000 and Irani, 1998) data were analysed through examining the meaning of people's words and actions. As suggested by Maykut and Morehouse (1994) the research findings of this study are derived from empirical data collected, in relation to the focus of inquiry. In the context of the present study, conjectures and conceptual models were developed based on the literature analysis to be revised according to the empirical findings. Empirical findings are then used to develop the frame of reference for identifying, allocating, managing and controlling indirect human costs.

Data were analysed using an element of grounded theory, which is based on the coding of data (Glaser and Strauss, 1967). In contrast to other qualitative research, grounded theorists use their emerging theoretical categories to outline the data collection during the later stages of fieldwork. In testing the conjectures proposed, a number of issues present themselves as supporting factors. These issues contribute towards establishing the validity of the conjectures and models proposed in Chapter 3, the relationship between the questions asked in the interview agenda and the research conjecture are illustrated in Appendix D. The units of analysis developed are listed below.

- Organisational Structure.
- Indirect Human Cost Identification Process (IHCIP).
- Identification of Indirect Human Cost Drivers (IHCD).
- Barriers of Accommodating/identifying Indirect Human Cost.
- Justification Process, Budget Proposals.

The above listed units of analysis in the context of each case study organisation are detailed in Chapter 5 (section 5.4), as they form the basis of the empirical enquiry reported. As exemplified in Figure 4.2 below, data from each organisation were scrutinised and the concepts organised by recurring themes with associated categories then being linked. Subsequently, data were categorised into existing concepts within the proposed taxonomy.

The *elements* of the analysis' structure that is usually used in grounded theory, is used here for theory testing, through a continuous interplay between analysis and data collection. Data collection, coding and memoing occur simultaneously from the beginning. The emerging code forms the direction and eventually decides the relevant aspects to continue sampling. Data were re-examined and re-coded to determine the categories and concepts that include as much data as possible. This continuous inspection of the data resulted in a set of broad categories and associated concepts of indirect human cost factors.

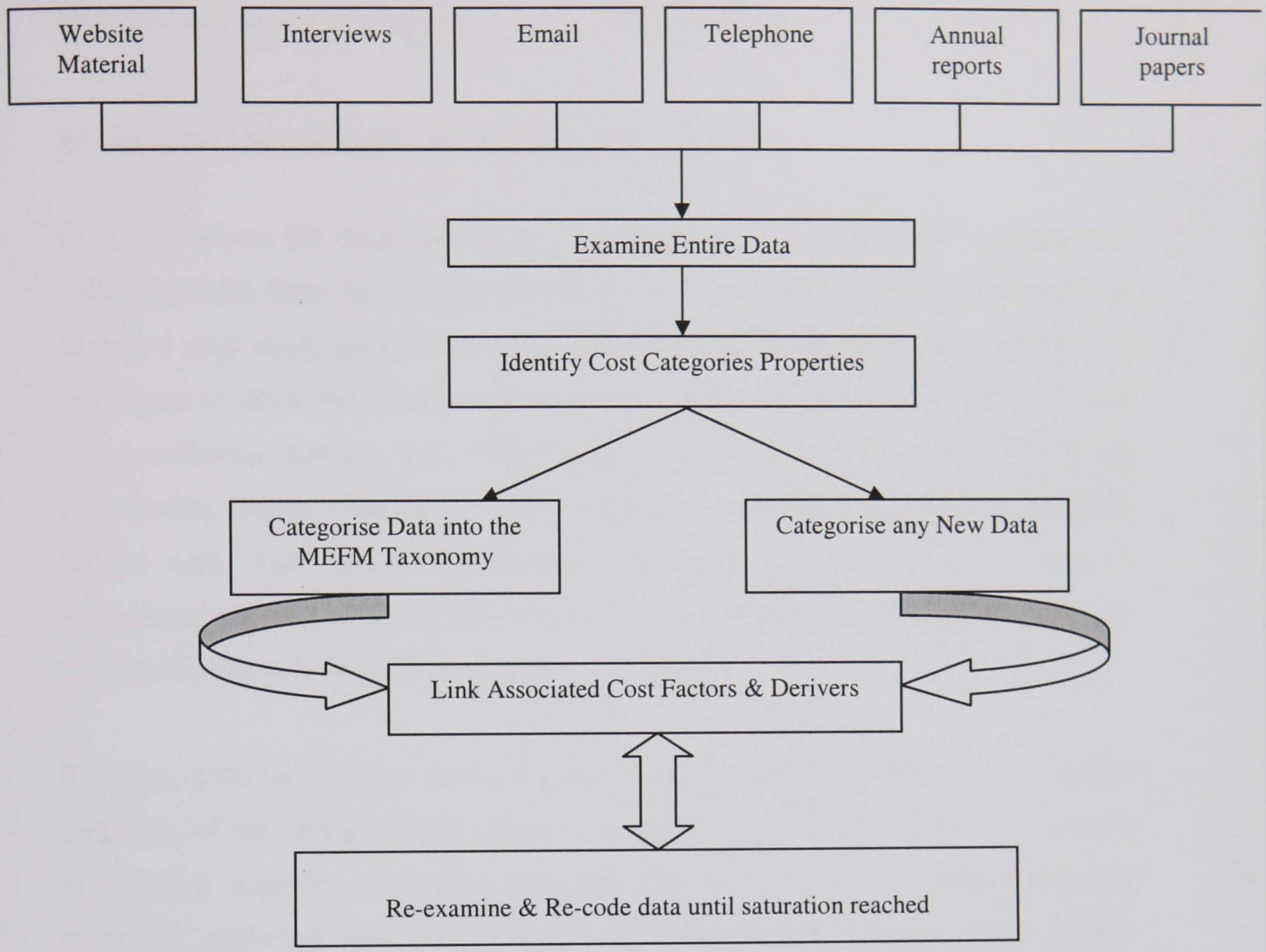

Figure 4.2: Process of Data Analysis

Analyses of data in this research commenced by examining the entire costs obtained from the different sources outlined in the previous section; subsequently the identified costs were categorised into existing classifications in the proposed MFEM taxonomy, while any new indirect human cost that did not fit the existing taxonomy were categorised. This seeks to identify new possible categories (beyond MEFM) of indirect human cost and their properties. When the costs were scrutinised, the cost factors were organised according to their association, and allocated to their appropriate divisions within IS. Data were re-examined and re-coded to determine the cost categories and concepts that include as much of the identified costs as possible. Bassey (1981) notes the reliability of a case study is more imperative than its generalisability and sample sizes within multiple enquiry. Thus, this process

reiterated until the codes were saturated, and no further indirect human cost factors were emerging. When additional data collection proved to be no further value, as only few new insights could be gained the data sampling ceased.

4.6 Indirect Human Costs' Case Study Protocol

In studies where the empirical inquiry is subjective, and is based on irregular data collecting tools, then, researchers such as Irani *et al.* (1999) discuss the importance of having a case study protocol as a scientific path of the research that needs to be developed to allow other researchers to follow the same pathway of data collected, and conclusions derived. Yin (1994) proposes a protocol approach for conducting case studies, laying emphasis on field procedures, case study questions, and a guide for the case study report. Yin alleges such an approach to be a key tactic in strengthening the reliability of the research. Moreover, the protocol includes rules and regulation by which the case study data is collected.

Remenyi (1991) deems that such a protocol to be essential to enhance the consistency and focus of the data gathering process. Likewise, Stake (1995) suggests a sequence of essential steps for conducting the case study method, such as posing research questions, gathering data, data analysis and interpretation. Stakes (1995) differs, placing emphasis on a more naturalistic approach, the significance of the philosophical underpinnings of case studies, as well as the significance of the description of contexts.

Yin (1994) suggests that the set of case study questions is an important element of the case study protocol. The main purpose of questions is to maintain the researchers focus. In the present study, a set of interview questions were developed prior to the empirical enquiry (see Appendix C). The questions were broad and aiming at open answers, following the intent of the research questions. Yin (1994) proposes that case studies could have questions at five levels, as illustrated in table 4.2 below:

Question Level	Research Question	References in the Dissertation
Level 1	Questions asked of specific interviewees	4.5.2
Level 2	Questions asked of an individual case study	4.5.1, 4.5.2, 4.5.3
Level 3	Questions asked across multiple case enquires	4.5.3
Level 4	Questions asked of entire study	1.5, 7.1
Level 5	Questions about the recommendations and Conclusions beyond the scope of the study	7.1

Table 4.2: Questioning Levels in a Multiple Case Enquiry, adopted from: Yin (1994)

According to Yin (1994) a case study protocol should have the following components:

(a) Overview of the case study.
(b) Procedure of the fieldwork research.
(c) Questions addressed by the research.
(d) The research output format.

This dissertation adopts the outline suggested by Yin, and this chapter addresses levels 1, 2 and 3 (case study 1–4) questions, while level 4 and 5 questions will be addressed in the other parts of this thesis (see table 4.2 above).

4.6.1 Case Study Overview

The author states that it is not the intention of this research to offer an exclusive list of indirect human costs associated with IS adoption but to identify potential indirect human cost from case-based study perspective that permit others to relate their experiences to those reported. Hence, this thesis provides an enhanced understanding of indirect human cost associated with IS adoption that can be used in budget allocation and evaluation process.

This section of the protocol provides an overview of present research context and specifies the issues to be investigated. Focusing on these issues, the researcher is able

to generate the necessary data to explore the indirect human costs associated with IS adoption. Concentrating on these issues is essential to sustain focus during data collection, particularly in the interview process. These issues are as follows:

- Are indirect human costs recognised as a cost to the organisation in study?;
- Identify the indirect human costs associated with the adoption of IS and used by the case study organisations;
- Identify the indirect human costs considered during IS evaluation or budgeting proposals;
- Identify where the indirect human costs are allocated within the case study organisations;
- Identify how each recognized cost is actually a cost to the organisation in the study;
- Identify the main indirect human costs associated with the IS adoption by the cases study organisation;
- Identify the drivers of the main indirect human cost;

4.6.2 Procedures of the Fieldwork Research

Case studies mainly involve data collection for the issues under investigation in their "real life" natural settings. Researchers must be capable of coping with real world events. The researcher needs to be organised and make contingency plans, as they are unable to control the data collection environment – the interviewing schedule must be planned according to the interviewees' availability and plans and not the researcher's schedule. If the documentation required is not available; some of the respondents may dropout, interviews might be re-scheduled. For example, when arranging for the first case study, an interviewee did not reply in the time scheduled, so another organisation was contacted and a new interviewee booked. However, it might not always be possible to find another organisation or employee on so easily.

Likewise, the researcher and interviewee may well be interrupted during the interview. In all these cases, the researcher should be able to deal with such situation and have a case study procedural reminders or guidelines that aid in collecting the

required data. The procedure for conducting the present multi-case study is outlined below.

- **Defining Interviewees**: before the empirical enquiry was carried out, it was planned to interview the following informants: project managers; IT managers (their position and role was perceived as important in adopting IS, they also have knowledge of budget proposals, evaluating and monitoring of projects as well as awareness of staff behaviour within the organisation); financial directors (in charge and have knowledge of cost allocation); accounting managers (have knowledge of dealing with invoices); senior managers and budget managers (knowledge of budget planning and allocation); HR (knowledge of: recruitment, employment contracts, redundancies, staff records and job descriptions, information about training), head of technology; chief technology officer (CTO); chief financial officers (CFO, responsible for budgeting); directors (aware of the over all costs).

It was planned to interview as many of people as possible in these roles: they are respondents that would recognise the types of human cost that occur within the organisations. Others, such as independent auditors, are external to the organisation, while familiar with the costs, they will not recognise all the cost categories, as they are not aware of how the detail of how the company operates: the finance and accounts managers would have that knowledge. Nevertheless, the researcher did not have access to all the above-mentioned interviewees, and only the informants detailed in section 4.5.2 were interviewed.

The criteria for selecting the organisations to be studied are detailed in Chapter 5 (section 5.2). Computer Manufacturing and the Financial Services were selected to be appropriate industries to match the chosen criteria.

- **Appropriate Data Gathering Techniques:** it is important to identify appropriate data gathering research methods and determine line of inquiry. An Interview agenda was developed prior to conducting the case-based studies to collect rich primary data through open, structured and semi-structured interviews.

The agenda was used as a guide in the interview process which was tape-recorded and later transcribed.

Complementary data to confirm findings were planned to be collected from archived records, and other documentation: internal reports, budget proposals, published reports, publications, budget proposal, and satisfaction surveys (especially useful for extracting training and turnover data). Documents were collected onsite, from the website of the organisation and any other sources that were available. The complementary data that the researcher had access to are detailed in section 4.5.2.

♦ **Supplementary Fieldwork Procedures**: the researcher provided each interviewee with a confidentiality agreement. Thus, indicating the confidentiality of information related to both the interview and the organisation. The statement also included how the data collected from the interview will be used. The organisations were asked for permission for the information to be published, without its specific identity being disclosed.

Presenting the confidentially agreement at the beginning of the interview is essential. The researcher gains the interviewee's confidence and it assists the interviewee in feeling comfortable in discussing issues that may be controversial and confidential. Each of the four organisations agreed that information could be published if its specific identity was not disclosed. Therefore, the researcher will be referring to the organisation and interviewees in the dissertation using false names.

To initiate a positive interviewing climate, the researcher commenced the interview by asking general questions then, when the interviewee was comfortable with the process and the presence of the tape recorder, moved to follow the interview agenda. Conducting interviews necessitate the skill of distinguishing between what is relevant, and any additional information from the interviewees. It also requires the ability to persuade interviewees to discuss issues that may be confidential. While interviewing, the researcher made sure that, though permission was given to record the interview, the interviewees were not

conscious of its presence, to make him/her feel more at ease. Interviewees were not interrupted when discussing a certain point, as it often lead to the disclosure of relevant data. When interviewees diverted the conversation from the focus of inquiry, the researcher used "steering" to go back to the subject of inquiry and refocus the interviewee's attention.

All three types of probes (elaboration probes, clarification probes and detail oriented-probes) were used as tools for going deeper into the interview responses. To validate the data, data triangulation was used as detailed in section 4.5.2.

4.6.3 Questions Addressed by the Research Case Study

The protocol questions were essentially developed to assist the researcher to keep focus of the issues being investigated during data collection, Yin (1994) suggests that a set of questions addressed by the research are outlined. The researcher employed the set of questions developed as reminder while carrying out each case study. The questions outlined are essential for testing the conjectures of the study proposed in Chapter 3 within the given context.

Question Number	Question
1	What indirect human cost are associated with IS adoption?
2	Where are the identified indirect human costs located?
3	How are the identified costs actually a cost to the organisation?
4	Do the findings confirm the cost taxonomy proposed?
5	What are the drivers of the main indirect human cost?
6	Are any of the indirect human cost factors identified by the organisations included in their budget proposals or evaluation process?

Table 4.3: Questions Addressed by the Empirical Enquiry

The above outlined questions were mainly used for consultation before and after the interviews and were not shown to the interviewees.

4.6.4. Research Output Format

The empirical data analysis and the format at which the output of the enquiry took place are illustrated in Chapter 5. The researcher addressed issues associated with large amounts of data that are likely to be generated as a result of the case-based

studies, through aligning each question within the interview agenda with the conjectures to be tested as illustrated in Appendix D. This was an effective approach for testing the conjectures proposed, and aided the elimination of many questions from the interview agenda at the initial stages of the research, as they did not correspond to any of the conjectures. Guidelines were set to establish the degree of data relevance, ensuring that each question contributed to testing of at least one conjecture. Furthermore, the interview agenda was constructed such that the data are directed to their designated location within the case study. For example, main categories of indirect human costs were set out in a table format (see Appendix C), allowing the researcher to allocate the costs during the interview, rather than just having them as list, to be assigned at a later stage. This also allowed the researcher to cross analyse the case studies. For example, with such an output format the researcher was able to instantly notice that a cost factor such as redundancy, was not included by any of the four case study organisations in their budget proposal or evaluation process.

4.7 Summary and Conclusions

This chapter has identified the methodological approaches taken to obtain the research aim and objectives. The philosophical assumptions underlying the research strategy and method have been presented. Thus, having a prior-construct, conceptual models, and a structured case study protocol is followed for conducting the case studies; along with conjectures that are proposed prior to the empirical enquiry following literature. The author illustrates that a combination of both the positivist and the interpretivist approach as suitable for supporting the research aim and objectives. Thereon, quantitative and qualitative research approaches were discussed, suggesting that in the context of this research, a qualitative approach is more appropriate for the reasons implicated. In particular, indirect human cost is a phenomenon that has received little attention, and qualitative research would facilitate its examination in its natural setting.

Rather than conducting the case study strategy in its traditional way which requires extensive historical background of the context of the case study organisations, the *adoption* of case study strategy in this research using *case-based* method was

justified. The justification for deploying the case-based method was based on the rational that:

a) the aim of the research is to validate the models and test conjectures proposed and not an-in-depth case study of the individual organisations;
b) the research has a very narrow focus, just looking at indirect human costs, and not all costs involved;
c) the case study organisations were selected on specific criteria (see section 5.2) in terms of organisation and type of cost.

Thus, a historical background was perceived irrelevant to the aim of the study, and particularly that an in-depth study of a number of organisations will consume a great deal of time and resources. Weaknesses and strengths of using a case study strategy were acknowledged in this dissertation.

Multiple case studies were employed within this case research to explore and enhance understanding of indirect human costs. Moreover, the deployment of research methods was discussed and justified for their appropriateness to generate the necessary data. Thus, varieties of data sources have been used to derive the findings of the empirical enquiry. The number and depth of cases conducted were limited to the time and resources allocated to the current study; nevertheless, the purpose of the study is not to generate theory in relation to the context where rich understanding of context is required. Instead, the present study is interested in theory testing; hence the outcomes are validated across cases. The identification of the *same* cost factors across all organisations studied generates an interesting outcome of potential cost factors and can be considered by decision-makers and evaluators during the budget allocation and evaluation process.

Previous research has shown that the analytic approaches of different research strategies are compatible and that their synthesis can prove useful for the understanding of issues related to the use of IT. In this research, an element of grounded theory has been selected as an approach for the interpretation and analysis of empirical data. A case-research strategy is used, along with an element of grounded theory for developing units of analysis. This combination gives new dimensions to traditional case studies where the focus is either on multiple case studies or on a single or longitudinal case study.

The sources used include interviews, transcriptions of data, illustrative materials (e.g., annual reports and other publications that form part of the case study organisations' history), telephone conversations, email, web site material. Empirical research methodology and data triangulation and the case study protocol used as a tool to operationalise the action plan for the empirical enquiry were all reported. Semi-structured and open interviews have been selected as the tool in collecting data. The rationale for this comes from the ability of these techniques to produce qualitative data that is rich deep and provoking. Thus, through an iterative process of interviews followed by documentation and transcript analysis, data collection was carried out until enough data was collected to test the proposed conjectures. Data were to be analysed and examined by coding and categorization. Finally, the empirical results derived from the analyses are to develop a frame of reference for indirect human cost of factors. It is recommended that others relate their experience to the results of this research, following the protocol outlined using a case study perspective.

CHAPTER 5

Case Studies and Empirical Analysis

This Chapter analyses the empirical data collected from the interviews conducted in four private sector organisations. The objective of this Chapter is to analyse the data obtained, while observing phenomena in the organisational settings. The data collected are used to test the proposed MEFM taxonomy and the fuzzy cognitive interrelationship-mapping model of the main drivers and factors of IHC (IIHCDM) presented in Chapter 3. This Chapter commences by providing background information on each of the four organisations studied. Data are analysed using the units of analysis illustrated in the framework outlined in Chapter 4. The framework is based on analysis of the coding used by those that use traditional Grounded Theory, but is used here for theory testing. Initially, data are reduced via the processes of coding and categorisation. Patterns and themes that emerge from this process are compared with the proposed conceptual MEFM taxonomy and the IIHCDM model. Data that are considered to be anomalous are then grouped into new categories. Interviewees then verify the resulting models, and their feedback is used to further enhance the proposed MEFM taxonomy and IIHCDM model. Conclusions are presented at the end of the Chapter.

5.1 Introduction

Moving from the conceptual phase to the empirical, the validity of the proposed conceptual taxonomy and IIHCDM model are empirically tested using case settings to extrapolate data through interviews and multiple-lines of inquiry for the purpose of testing conjectures. In doing so, this Chapter presents the data analysis of the four organisations studied within their case settings. From a conjecture testing perspective, additional data collection proved to be of little value and the researcher suggests that a fifth case study would provide insignificant benefits. Carrying out multiple case studies enabled the researcher to scrutinise, explore and cross-examine the findings that emerged from the data analysis. Centring on the three proposed conjectures relating to the identification, assigning, and the drivers (root causes) of indirect human costs (IHC), several units of analysis were developed.

This Chapter gives an empirical analysis of the studied organisations and identifies and assigns distinctive IHC associated with the adoption of IS. The analysis of the case studies is not presented individually, as the data required to test the proposed research conjectures are interrelated. The analysis of the empirical data should not be viewed as a comparison between the actual cases, as the aim of the study is not an in-depth investigation of the individual organisations, but to have a collective view of potential IHC associated with the adoption of IS across these organisations. It is not claimed that the outcome of the empirical data analyses can be generalised beyond the study conjectures, but they can be generalised within the conjectures of the study within the given context. The researcher has sought to develop an extensive list of IHC associated with IS adoption thus allowing others to compare and relate their costs to those reported in this Chapter.

5.2 Organisational Background

The organisations selected for the study provide computer manufacturing and financial services in the private sector. The organisations elected anonymity, so the anonyms "IB1" and "IB2" are used to refer to the participating investment banks, and "IC1" and

"IC2" to refer to the participating computing companies. To select the participating organisations, the following criteria were used:

- Organisations that adopt and recognise IS as the core of their business.
- Organisations that are internally perceived as having a rigorous IS costing system.
- Organisation that are internally perceived as having a budget allocation system.
- Organisations that ensure their interest in cost identification and minimisation.
- Organisations with divisions that correspond to those in the proposed MEFM taxonomy.
- Organisations that are interested in the research outcomes, as to provide some access to data (people and documentation).

It was essential to select organisations that adopt and recognise IS as the core of their business as this was fundamental to the research and the exploration of the IHC associated with IS adoption. Since there are not many organisations with well-developed methods of evaluation, the researcher selected those organisations that have, or at least claim to have; an established and effective IS costing system, to scrutinise the type of costs they identify. The researcher was able to examine whether the IHC noted in the literature are identified as part of the IS costing and budget allocation system of the individual case study organisations, thereby confirming or challenging the literature and simply theory testing. Furthermore, establishing whether the case study organisations have divisions that correspond to the cost taxonomy proposed allowed for the facilitation and validation of the proposed taxonomy. The principle criterion in selecting the case study organisations from the computing and banking industries was the assumption that their private sector status would ensure their interest in cost identification and minimisation.

To provide some insight into the study organisations and their culture, brief details are given, however, as the primary objective of this research was to test the conjectures proposed in Chapter 3, detailed study organisation settings and histories are not required as justified in Chapter 4 (section 4.3.1). Understanding the organisational structure is

necessary, as it facilities the verification of the MEFM taxonomy and testing of Conjecture 2, as both are based on allocating cost factors to main divisions within the organisational structure.

Case Study 1

IB1 is one of the world's leading financial management and consultative companies, with offices in about 40 countries and total client assets of over $1 trillion. IB1 is a leading global underwriter of debt and equity securities and a strategic advisor to corporations, governments, institutions and individuals worldwide. This bank is one of the world's largest managers of financial assets, with more than 70,000 employees with different backgrounds. To obtain a feel for this organisation, its structure is outlined in section 5.4.1.

IB1's divide its IS costs to: direct (traced back to one entity such a salary of a manager who manage one department); indirect (traced back to more than one entity e.g. salary of a manger who manages two departments), and absorption (traced back to many entities/department and they are usually centrally allocated). All these costs IB1 state MUST add up to a 100%. What can not be allocated directly or indirectly gets absorbed, i.e. shared among all divisions; they claim that their divisions usually only overrun 12% over forecast.

Each business unit has it is own cost-centre and all are handled by a corporate services division. The budget is centrally allocated to all divisions but the budgets are not equal, as they depend upon the number of employees and resources required. It is argued that the one issue with the company is that it does not have strategies for choosing costing methods, but it acknowledges that in the real world it should really aim to use cost transparency. Cost transparency is an activity-based method in that there is a menu of prices and activities and a division is charged each time they use a resource. Until about five years ago, the key word used in this organisation was "allocation", and whatever the overall allocation, it would be divided equally between divisions. For example, a

percentage may have to be met where a business unit would pay 20%, another 2% and another 7% and so on, overall equalling 100%. The two main models used are cost transparency and allocation, both based on percentages or formulas. When an activity is carried out, divisions are charged on the basis of that activity, with a central budget being used. For example, if IT has a £30m budget, this is held centrally with each business unit paying on a utilisation basis. So they would spend £30m, but every time any of these business units indents for an activity, they will get the sum required for that activity, be it £90 or £100, etc. IT has a budget of £30m every year in order to break even. Where it fails, service delivery managers believe, is when they predict what the end product is, and fail to account for both its direct and indirect costs.

When calculating human cost, a fixed calculation is generally used. For instance, the cost of an employee for an organisation will not simply be the cost of his or her salary. The cost of an employee could be up to 2.2[1] multiplied by their salary or even more if expenses such as National Insurance, time off, training, travel, a PC and a desk are included. Thus, whatever the base value is, it is multiplied by 2.2, and that is considered to be the actual cost of having that person on site, i.e. the total employee cost. It is believed that other companies may multiply by another 2.2 (i.e. 2.2 x "2.2 times their salary") to obtain the yearly cost of having an employee on the organisation's books.

Information systems used by this organisation include a change management system, which is called MD, where they input changes. If, for example, a division wanted to upgrade a computer, the request for this change is submitted, as all the impacted parties have to be informed and agree about whether they want the change to happen or not. Anything that affects production has to go through an approval process before it can go ahead.

Case Study 2

IB2 is also a multinational bank, which started with capital of about $2 million and is one of the first financial service companies in the U.S. to bring together banking,

[1] A simple calculation and not a real example

insurance and investments under one umbrella. With one of the most diverse ranges of products and a wide distribution capacity, this multinational bank's 270,000 employees manage about 200 million customer accounts across six continents in more than 100 countries.

IB2 believes that technology plays an ever more significant role in increasing productivity and containing expenses. In 2001, as part of a cost management initiative, IB2 focused on integrating operations and technology in each country and the reorganisation of infrastructure, with the objective of operating processes in locations with lower cost structures. For 2002, one focus was to use global market presence to deliver products through the Internet for both corporate and consumer clients, thus supplying innovative electronic solutions for their corporate customers. IB2 provides a full range of financial service products to satisfy the needs of small and large companies, governments, and institutional and individual investors. Its Financial Centre Network consists of local offices and is complemented by electronic delivery systems, including ATMs and the World Wide Web.

It was stated in their annual report for 2001 that maintaining a "tight lid" on costs is a constant part of IB2's corporate culture. Furthermore, it was reported that its operational flexibility has allowed it to start a number of efficiency-focused projects that, in 2001, cut expenses by $600 million, with further reductions expected in 2002/3.

In terms of the organisational structure, the four main divisions are referred to as "support services", and are detailed in section 5.4.1. The particular division where the interviews were carried out was responsible for building, developing and maintaining trading platforms and transaction platforms, for example foreign exchange, money markets and confirmation matching systems for these clients.

Information systems used include self-service, where there is an intranet which gives news of the bank and information such as views and changes, directories and organisational employees services. Thus, if an employee wants to contact someone on the other side, he/she logs down on their telephone number and just logs into the directory and accesses the organisational structure of the employee's own department.

Case Study 3

IC1 is also a multi-national company, one of the largest IT companies in the world. It operates in the development and manufacture of the world's most advanced information technologies. With over 300,000 staff in 100 countries, IC1 is both a definer and a pioneer of e-business solutions. Its total assets in 2001 were valued at approximately $90 billion. Its turnover in 2001 was over $80 billion, with a net income of over $7 billion. The products and services it provides include: personal computing, software development, business and IT services and training. IC1 as an IT organisation is viewed as a cost centre, in which the variable costs related to labour are favoured over an investment in centrally co-ordinated systems management tools and processes, as people are seen as the most important assets. IC1 has a centrally controlled infrastructure, with practices within various units. The organisational structure is further detailed in section 5.4.1.

Case Study 4

IC2 is an IT company that mainly manufactures software; its focus is on creating Short Message Service (SMS) and Instant Messenger Service (IMS) products for business. It consists of four employees, all of whom hold equal shares. It has the combined experience of over ten years within the software and web development sector, including two years in the new wireless technology market. Utilising the latest technologies from Microsoft and the power of XIB1, they spend much time on specifying technology architecture and the development of next generation messaging platform.

IC2's vision resulted in TriNet – a single technology platform. This is a piece of technology that enables the rapid development of technical solutions. These solutions might include functionality to send and receive text messages or integrate into databases. Most of the work has already been done to integrate these other technologies, so the company only needs to specify the logic and structure of the communication when creating a solution. The platform handles the interactions provided, and IC2 only really needs to specify the logic in logic modules that utilise the functionality of the platform.

This is a very rapid way of delivering high value and high reliability projects, even with complicated requirements. TriNet can deliver desktop, wireless and web applications including web management tools, a partner platform and an integrated billing mechanism. IC2 intends to develop and distribute applications utilising this platform.

5.3 Data Collection

A variety of data sources have been used to test the conjectures proposed. These include interviews, interview transcripts, illustrative materials, web-site material and past project documentation. A predefined interview protocol developed by the researcher (Chapter 3, section 4.6) was used to operationalise the data needed for the research. The utilisation of this protocol was particularly important in generating consistent data that correlated to the conjectures proposed.

As illustrated in Table 4.1, interviews were conducted with a number of employees within the selected organisations (e.g. product manager/project manager, senior services delivery manager, assistance services delivery manager, director, financial manager, IT consultant). The study set out with the objective of interviewing people with different job functions such as HR and finance directors of each organisation but this proved difficult to achieve in reality. Different companies may call different employees in similar positions by different names, or there may be a degree of overlap between positions: for example in Case 4, the manager of HR is also the manager of finance. Thus, to avoid confusion when generating data, the researcher has allowed for this in the methodology by asking interviewees for their job descriptions and holding interviews clarifying the point of view the interviewee was holding when being interviewed. For example, if an interviewee holds the positions of the HR manger and the Finance Manager, when answering, they were requested to clarify the perspective that underlies their answers. Furthermore, in the analysis and testing of the conjectures, this was allowed for by only including cost factors that were identified by at least two of the selected organisations in the final frame of reference.

Primary data were derived from in-depth open and semi-structured interviews (see section 4.5.2 and Appendix C). Every interview was conducted on a one-to-one basis. The interviews were in depth, as the present study has a defined research problem and the researcher knew the type of data required. Therefore, The interviewees were briefed by deploying the pre-prepared interview agenda (see Appendix C) as a guide in the interview process, but the nature of questions provided and using different sources, minimised bias during data collection. This method allowed interviewees to understand the terminology being used without providing answers for them. To help lessen the contradictions associated with data gathering across multiple sources, the data were cross-checked several times. For example, if the interviewees ticked a human cost factor as being a cost to their organisation in the structured questions, it was cross-checked that the same cost occurred in their answer to an open question about the different cost factors that occur in their various organisational divisions.

The researcher would have liked to examine documents such as budget proposals, and meeting agendas or meeting minutes, but these documents were difficult to obtain. Despite offering signed confidentiality agreements for the case study organisations interviewees declined to release such documents (even archived documentation), saying that all information needed would be provided in the interviews. They were reluctant to reveal these documents to non-company people, even on company premises., The researcher attempted to interview personnel from HR and financial mangers of the investment banks; these appointments were either repeatedly cancelled, or again, access was denied. This might present a limitation of the study in terms of not being able to explore a wider point of view of costs, and it also prevents the researcher from looking at old projects and making direct comparisons between costs proposed in the budget proposals by managers, and costs that were actually used. It also prevents the researcher from detecting what projects were stopped or cancelled due to cost escalations, and what types of cost caused this escalation.

5.4 Data Analysis

Data were analysed using an element of grounded theory, which is based on the coding of data. The units of analysis developed (taking into account the conjectures proposed in Chapter 3) are outlined in Chapter 4 (section 4.5.3). The following sections details and presents the outcomes of each unit of analysis.

5.4.1 Organisational Structure

The results obtained from each organisation were analysed in relation to the MEFM taxonomy. The initial step prior to examining the organisations' awareness of indirect human cost was to find out whether they have divisions that correspond to those proposed in the MEFM taxonomy. The reason for this is that it would facilitate the validation of the MEFM taxonomy and testing of Conjecture 2, and thus identify where the IHC occur within the organisation.

All four organisations have their main divisions corresponding to the ones proposed in the MEFM taxonomy, as central divisions sitting across the whole organisation. These divisions provide services across all the different business units/departments within the organisations.

IB1 is structured so that the Board of Directors is at the highest level: they make decisions about the organisation's direction. The Board of Directors is made up of directors and managers, where each manager runs a department: HR, Finance, IT and Business Units. The HR and IT divisions sit across the whole company, i.e. they are in charge of providing services for the overall organisation, and thus both IT and HR have employees across all the other business units, including some contractors, and also have some relationships with agencies for non-permanent staff. Similarly, the finance division controls budgets for the whole organisation. Each business unit has a financial controller. Those representatives of these business units sit on a finance board, as they provide services for the whole organisation. There are many business units within the organisations such as Equity, Debts and Cattle markets, etc. The business units are fairly independent; however, some have interlinked relationships depending on their core

activities. In addition to the divisions proposed in the MEFM taxonomy. IB1 also has a Facilities department that sits across all business units and is responsible for issues such as lighting, cables, desks, cleaning etcetera.

Similarly, IB2 has thousands of different business lines within the organisation. Each of these business lines has its own HR department, so there are many HR sub-divisions. The main HR division support these sub-divisions, which have direct links to many different business lines. Likewise, each of these business lines has its own accounts department, responsible for financial control and budgeting, etcetera. As with HR, they have a central "fincon" (Financial Control). The finance departments of the various business lines do not report to "fincon", as they are a support service like HR, and have their own separate audit. These all feed their way up to the top level in the organisational structure. Nevertheless, the structure of the IT division is not as clear-cut as the other support services. For example, if there are service centres, they tend to have operational reporting lines but these are not specific to every business unit. They do not have their own IT support, as there is an IT support service which straddles different business divisions.

IC1 has a centrally controlled infrastructure, with practices within various units. The Principles are in charge of these practices, and mainly deal with the overall project revenue. The practices are separated by applications that IC1 implement, such as SAP (ERP) implementation. Within these practices, there is Resource Deployment Managers (RDM) whose main role is managing the project resources. Interviews were carried out with consultants from the Business Intelligent Systems Unit (BISU), whose main function is to carry out Personal Relationship Management (PRM) implementation. There is a second set of managers to support HR called Personnel Development Managers (PDM): each of the application practices has one PDM. There are consultants in the practices that carry out implementation of the projects. The PDM managers are responsible for all HR issues and personnel development for the IT consultants, such as progress, promotion, salary etc. There is a hierarchy of Principles, from the Principle of the branch, to the Principle of region, the country and so on. The Finance and IT

divisions sit across all the practices, and IC1 call all the four main divisions proposed "support services".

IC2 is a small company; each person within the team has multiple functions within multiple departments. For example, the same person manages human resources and maintenance; thus management roles and technical roles are performed by the same person. The ownership of the company is split equally in order to embed a sense of ownership for each individual, and thus everyone wants the company to do well and everyone works hard to make that a reality. Employees work extra hours and in multiple roles, and fill any gaps that need filling to make the company successful mainly as they feel ownership of the company.

5.4.1.1 Awareness of the Term 'Indirect Cost'

Prior to starting the interviews and to prevent confusion (in terms of terminology used), the researcher examined interviewees' knowledge of the term "indirect human cost". Unsurprisingly, as Table 5.1 illustrates, the organisations used different terminology.

	Aware of Indirect cost	Use different Terminology	Aware of IHC	Terminology Used
IB1	✓	✓	x	Non-transparent costs or Absorbed costs
IB2	✓	x	x	Hidden costs
IC1	✓	✓	x	Hidden Costs
IC2	✓	✓	✓	Wasted opportunity or Miscellaneous Business cost

Table 5.1: Knowledge of Indirect Costs

Although IC2 was the only company to be aware of the term 'indirect human cost', all four case study organisations seemed to be aware of indirect cost in general, but referred to the term using different narratives. This illustrates that the organisations, although aware of indirect cost, were not aware of the different cost components of indirect costs, which may explain why they found it difficult to identify indirect costs or manage them. Cost identification within each organisational division was examined in each of the organisations within their case settings.

5.4.2 Cost Identification

To prevent interviewees' bias, and to ensure that the interviewees and interviewer had the same understanding of the indirect human costs and their implications, the interviewees were not presented with the IHC taxonomy. Instead, interviewees were initially asked to give some examples (IHC factors) of their own. Following this, a list of indirect human cost factors that were derived from the literature (see section 3.3.2 for description of each individual cost factor) was presented, to see whether they recognised them as cost to their organisation or challenged them. Table 5.2 illustrates the cost factors confirmed by interviewees within each organisation.

	Organisations			
Indirect Human Cost	**IB1**	**IB2**	**IC1**	**IC2**
Loss of Time	●	○	●	●
Learning Cost	●	◒	●	●
Resistance To New Systems	●	●	●	◒○
Effort and Dedication Spent by Management	●	◒	●	◒○
Consequences of Redefining Roles	●	●	●	◒○
Mismanagement of training	●	◒	●	◒
Integration with New Systems	●	●	●	●
Loss of Productivity	●	●	●	●
Rejecting Salary Raise	●	◒	●	◒○
Staff Turn Over	●	●	●	●
Cost Associated with Redundancy	●	●	●	●
Delayed Delivery of A System	●	○	●	●
Reduction Knowledge Base in Organisation	●	●	●	●
Displacement (Mis-assigned Costs)	●	○	●	●
Deskilling Employees	●	●	●	◒○
Disruption Costs Resulting from Introducing New System	●	●	○	●
Morale hazard Associated with Managers	○	○	○	◒○
Belief, Feeling, And Perception	○	●	○	◒○

Table 5.2: Identification of IHC

The ranking of cost factors inclusion/occurs used throughout the dissertation follows the following scale – "does not occur" (○), "occurs sometimes" (◒), "occurs" (●), "potential cost but does not occur often" (○◒). The shaded areas of the columns are only used to help the reader distinguish the different organisations.

As Table 5.2 illustrates, IC2 differs from the other organisations as it identifies many costs as being potential costs that do not necessarily occur in their organisation. This is as IC2 is a small organisation and differs from the other three multi-national organisations in having an open culture. Table 5.2 also shows that interviewees in all four organisations confirmed that most of the proposed IHC were costs associated with IS adoption. Nonetheless, IB2 disagreed that costs such as "training" and "effort and

dedication" were not IHC, but that they were direct costs that can be planned for, as they were considered to be part of the project. IB2 believed that costs such as "effort and dedication" were part of the managerial jobs, and therefore they assumed that they were naturally budgeted for within the manager's salary. Similarly, IC2 believed "training cost" to be a direct cost rather than an indirect cost. In contrast to the other three case study organisations, IB2 agreed that *rejecting salary raise* requested by the employee was an important indirect human cost; however, they did not believe that it was actually a cost to their organisation.

The interviewees appreciated that as result of training or acquiring new skills, employees will be aware of their new marketable skills. Therefore, they may request an increase in their salaries to their new marketable value. Consequently, rejecting the request may result in *staff turnover*. They agreed that this had a great impact on their organisation, as significant costs could result from losing the time and money already invested in the employee, in addition to requiring the same amount of money (if not more) to recruit new employees. IB2 deems that even if the organisation refused to increase the salary of the employee and he/she leaves, they would be likely to bring him/her back as a consultant. This represents a redefinition of roles and cost, due to the implementation of the new system. IB1 believes that the organisation would usually tie the employee with a six months working contract, or otherwise require them to give the cost back. So if an employee decides to leave subsequent to being trained then he/she has to pay the organisation the cost of the training back or incur some financial penalty.

IB1 revealed that recruitment fee for x staff based on attrition (which is measured by HR division) may be a 12-month cost model in the finance division. Further, in the IT division, examples of cost that IB1 included were re-training costs and learning curves leading to low space/time productivity. However, the actual staff turnover was not included in the evaluation process or in the budget proposal as an indirect human cost. Furthermore, they acknowledge that high staff turnover results in a significant loss of organisational knowledge base, which is impossible to predict/manage.

> *"Nutrition is the problem. Every couple of years, people will want promotion. People would want to leave. People will get poached. And every time to stick with the people of the team of six is a good example. Let's say you have a team of six and you lose one person for a reason. You have lost up to 16-18% of your site knowledge. Say you lose two a year – that is almost 30% of your site knowledge. The problem is that the team keeps turning over. Gone are the days of jobs for life. Nowadays if you look at the market and the pattern of things, people job-hop either for promotion or mainly for salary. People will job-hop."*
>
> IB1 Senior Manager

Nevertheless, the senior manger of IB1 deems that the big corporate strategies, encourage their staff to move on to a different job within the organisation every 18, 24 or 36 months, so that people do not become stale; they can get experience doing a range of diverse jobs. At the same time, the organisation avoids losing employees they might find difficult in replacing. In contrast, although aware of all these impacts of the rejecting salary raise, IB2 state that salaries have been the same for the last couple of years; this might have been true in the past, but it is not the case in the current employment climate. This implies that due to the present high redundancy rates, employees are not likely to leave their jobs as a result of their salary raise request being rejected. At the time of carrying out the case enquiry, IB1, IB2 and IC1 were all going through a great deal of redundancies, and a Project manager in IB2 stated that:

> *"People are more likely to hold on to their jobs nowadays, and worry about who will be made redundant next...especially in these times when employers can call the shots with their employees, and we can see it happening to us, to all of us to a degree. There is no progression right now. Everything is staying still. No one is moving, everyone is doing their jobs"*

IB2 believes that redundancy would not always be an indirect cost, and that organisations would not make redundancies if they did not know that there is still tangible cost savings that they can make by saving labour. They could make one redundancy package, which, although an undeniable cost, would only represent around half a year's salary. For example, in some cases, even if the employee had been working in the organisation for a long time, the organisation could still save money by making him redundant.

> *"The reason is that they are not an indirect cost like desk base systems. Support may have to be paid on allocation depending on the number of heads. There will be a cost*

> *saving in the end. Nonetheless, there may still be indirect costs in terms of morale, but it is not going to cost you anything in the dollar."*
>
> IB2 Product manager.

IB2 believes that when introducing a new system, a loss of productivity and "learning" may not be an indirect human cost, as their product manger states:

> "*I don't think that it is as black and white as that, because there are so many different types of scenarios that you can apply that to*".
>
> IC1 Product manager

Thus, he considers that it is only a cost if productivity slips below the expected levels; for example, no one expects an employee working with a new system to be at their highest productivity level. He gives further examples to illustrate the fact that it depends on how the new system is designed; for example, with the introduction of some streamlining processes, instead of four buttons, the employee now has to press one. Therefore, he believes that there is no real cost in such a scenario, as there is not much of a learning curve.

IC1 reports that there are systems that may just effect one division, such as Finance. For example, in SAP application implementations, they had a system called FICO, which was the Financial and Controlling module of the application. This system was used purely for finance, and handles the accounts receivable, accounts payable and the profit and loss and balance sheet of the company. Costs such as learning, training etc., would be associated with this all the time. On the other hand there are systems that can, when introduced, be costly to all divisions. For instance, he gives an example of a company which decided to integrate its existing systems with Lotus Notes instead of Microsoft (Outlook, internet, and email). They wanted to send internal memos and external communications through the Lotus Notes email communications service. Every department across all divisions was affected, including finance, employees and maintenance services. So greater indirect costs (e.g. loss of productivity, effort and dedication, learning period) occurred, affecting the entire organisation and not just one division.

The assistance services delivery manager of IB1 reports that they usually upgrade existing systems, rather than completely changing them, and thus there are no much indirect costs associated. Every time they upgrade a system, it is always updated on the company's website, which has an online training manual, reference guides and FAQs. Meanwhile, the services delivery manager of IB1 states that indirect human cost resulting from introducing a new system is most evident at post-implementation/post-training level (he believes that most organisations are not aware of this point or tend to ignore it). At post-implementation/post-training phases, teams are not as productive in the first couple of days or even weeks depending on how complicated the new system is.

> *"That will probably be budgeted for, because you know that the business has to continue. You know that you have got to send someone off for three days' training; you can't close the business so you have got to get someone to come in cover that. Yes. So that is normally included in the cost. What people, I believe would tend to forget is that when that person comes back after three days he is not an expert. He sat in a workshop; learn what it is, come back, implement it. Then have a period, probably a couple of weeks where they are not as productive on that system as they were on the previous one. So, for example again, I am just picking figures out the air: where they have done three days' work on the old system; on the new system for the next two weeks, they will only be probably able to do two days' work. So you have lost a day. And after two weeks, you have actually lost 10 working days on one person. If you have got 10 people in fact you have actually lost 100 working days."*
>
> IB1 Senior services delivery manger

Further, within that first day/week after employees come back from their training course, in addition to their reduced productivity if they encounter a problem, there is no one within the business unit to help them out. Nevertheless, the service delivery manager of IB1 also considers that people in the IT environment have moved away from the old mentality of "change is bad", and states that:

> *"If you look at what's happening over the last four or five years – the hardware is out of date within six to eight months, 18 months maximum. Over the last five or six years, we have had Windows NT, Windows 2000, various things comes through. The manufacturers have changed their distributing systems and then we have got our pro-line and various different distributing systems. There is the big strike in moving away from distributing systems back to central systems as well. IT/IS staff are not contractors; they come and go. A job for life has gone as well. There is a culture where now you swap a job every 18–20 months because otherwise you get stagnant. So the resistance to change culture in the IT*

environment I think is not as big as it used to be, but resistance to change will always be there."

IB1 Services deliver manger

Resistance, from a negative point of view, never goes away, but there is awareness within the IT environment that new systems are almost always introduced, and therefore resistance would not be an indirect human cost that is always associated with introduction of a new system, so they seem to accept resistance as part of the culture. Regarding disruption costs, IB1 states that it can be an indirect human cost that impacts on the management division, but it depends on the severity of the disruption, and it may impact the IT division in terms of lost days and weeks. Interviewees also believe that disruption costs could invoke Disaster Recovery, and again disruption indirect cost is not included in either the evaluation process or budget proposals. Also, costs that result as a consequence of not taking the beliefs, feelings, and perceptions of employees into account are identified as IHC factor by IB1, which considers that they may also lead to time costs, as Line Managers will need to manage staff and this can be very time consuming. If issues such as the beliefs, feelings, and perceptions of employees are not taken into account, employees may prefer to use the old system, and the new system may not be fully utilised as a result. IC1 reports:

"Because normally they feel that the IT you are implementing will replace their job, but any like the normal action they do is to resist it really. So it is a cost. They don't really see it as a tool to improve their daily work if you like".

IC1 Consultant

The consultant reports that some organisations account for this factor by selecting Super-users, designated users that are likely to be willing to train in the new system and use it. These selected users will help the IT implementation and make sure that IS is in place to support both the implementation and the change management.

"I think within every implementation now; while we are working on these being recommend professionals as well as users – select users, have a change management request. And group within the implementation to recognise exact the belief, the feeling and perception of the new system. That in itself in relation to the effort, time, learning or whatever planning they need to do"

IC1Consultant

Hence, IC1 acknowledges that beliefs, feelings and perceptions associated with a newly introduced system are an indirect human cost, and thus deem that a change management group is a cost always attributed to the project implementations. "I think every implementation recognises that there is a cost involved" (IT consultant). IC1 recommends that this change management group should commence when the implementation of a new system starts.

To test the validity of the MEFM taxonomy, the researcher asked the interviewees to assign each of the confirmed IHC to its appropriate division within their organisation. At this point, the researcher had no influence on the interviewees' allocation of the costs factors, as the costs factors were given as merely as list of cost, and interviewees independently allocated them to the different categories within the MEFM taxonomy. This would enable the researcher to re-confirm that these identified cost factors are actual costs to the organisation, and would also enable comparison of these costs with the assignment of costs proposed by the MEFM. Table 5.3 illustrates the interviewees' cost allocation to the main divisions within their organisations.

5.4.3 Validating the MEFM Taxonomy

As Table 5.3 below illustrates, all four case study organisations identified most of the IHC as being associated with at least one division. The only cost that was not assigned to any division by IB1 and IB2 was morale hazard (professionalism). This is defined as the state in which the IS managers are interested in gaining knowledge that will help them to determine their job market value rather than being interested in organisational benefits, which is a cost to the organisation. It could occur when decision rights are assigned to individuals who are experts. Thus, according to the literature, managers may use their decision right to maintain their own interests rather than trying to meet organisational objectives. All case study organisations deem that morale hazard is non-existent in their organisations, as every manager always has someone to report to; hence, any type of training needs to be approved by someone else. They deem that there might be morale hazard associated with decision-making, but this is difficult to detect. Nonetheless, the

MEFM taxonomy allocates morale hazard to the top and middle management, and not any of the other divisions within the organisations. So, organisations can monitor the budget allocated/spent on training. The case study organisations further believe that training is part of the business plan, and organisations presently encourage personal development. Thus, training that benefits and enhances employees' experience would not be rejected.

Table 5.3: Assigning Indirect Human Costs

Organisations →	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2
Divisions Across organisations → **Indirect Human Cost ↓**	**Management (Middle & Top Level Management**				**HR**				**IT**				**Finance**				**Other Divisions (e.g. corporate services)**			
Loss of Time	●	○	●	●	◒	○	●	●	●	○	●	●	◒	○	●	●	●	○	●	○
Learning Cost	○	●	●	○	○	○	●	●	●	○	●	●	○	○	●	●	●	○	●	○
Resistance To New Systems	○	●	●	○	○	○	●	●	●	●	●	○	●	●	◒	●	●	○	●	○
Effort & Dedication by Management	○	○	●	●	◒	○	●	●	●	●	●	●	●	○	●	●	●	○	●	○
Consequences of Redefining Roles	●	○	●	●	●	○	●	●	●	●	●	○	●	○	●	●	●	○	●	○
IHC Cost Associated with Training	○	○	●	●	●	○	●	●	●	●	●	●	●	○	●	●	●	○	●	○
Integration with New Systems	○	○	●	●	○	○	●	●	●	●	●	●	○	○	●	●	●	○	●	○
Loss of Productivity	○	●	●	●	●	○	●	●	●	○	●	●	○	○	●	●	●	○	●	○
Rejecting Salary Raise	●	○	●	●	○	○	●	●	●	○	●	●	○	○	●	●	○	○	●	○
Staff Turnover	○	○	●	●	◒	○	○	●	●	○	●	●	●	○	●	●	○	○	●	○
Cost Associated with Redundancy	●	●	●	●	●	○	●	●	●	○	○	●	●	○	○	●	○	○	○	○
Reduction Knowledge Base in Organisation	○	○	●	●	○	●	●	●	●	●	●	●	○	●	●	●	○	○	●	○
Displacement (Mis-Assigned Costs)	○	○	●	○	○	○	●	●	●	○	●	○	○	○	●	●	○	○	●	○

Organisations →	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2
Divisions Across organisations → / **Indirect Human Cost ↓**	**Management (Middle & Top Level Management**				**HR**				**IT**				**Finance**				**Other Divisions**			
Deskilling Employees	○	○	●	○	●	○	●	●	●	○	●	●	●	○	●	○	●	○	●	○
Delayed Delivery of A System	●	○	●	●	◒	○	●	●	◒	●	●	●	●	○	●	○	○	○	●	○
Disruption Costs Resulting from Introducing New System	◒	●	○	●	○	○	○	●	●	○	●	●	●	○	●	●	○	○	●	○
Morale Hazard Associated with Managers	○	○	○	●	○	○	●	●	○	○	○	●	○	○	○	●	○	○	○	○
Belief, feeling, and perception	○	●	○	●	◒	○	●	●	○	○	●	○	○	○	●	●	○	○	●	○

Table 5.3: Assigning Indirect Human Costs

IB1 in particular believes that this issue is very rare and, that it is thus very unlikely that morale hazard would be associated with their IS adoption. Their services delivery managers declared that most companies have an electronic method of tracing activities. If staff want to acquire training on a training course, they can book up a training authorisation that is called Brasereck. This will then trial off automatically in the system, as it has its checkpoint to meet. A manager would authorise that and that authorisation would automatically be recorded. If the training cost more than £3,000, for example, the request is referred to a certain management level in the organisation, and if it cost more than x thousand pounds, it goes to the next level up and so on. Conversely, IC2 seems to believe that morale hazard is an indirect human cost that can be associated with any division, depending on who has the right of decision-making; however, they suggest that it would be more noticeable in smaller organisations. It can still be considered a cost if all related decisions have been assigned to one person.

During the interviews, interviewees were asked to list IHC beyond those in the proposed MEFM taxonomy that influenced their organisations, and the results are discussed in the following section.

5.4.4 New IHCs

Case study organisations identified new indirect human cost factors that were not reported in the literature. Each case study listed the new cost factors that they believed to be IHC to their organisations. Interviewees were also asked to allocate these new costs to their appropriate organisational divisions. The researcher categorised these costs according to the units of analysis (see figure 4.5.3) comparing them to the MEFM taxonomy and categorised them as assigned in the taxonomy, which was later confirmed by the interviewees. Furthermore, anomalous data that did not fit with the initially proposed MEFM taxonomy were examined for new categories. Table 5.4, illustrates the new costs that that were identified by the interviewees and the descriptions given by the identifying organisations, followed by a detailed description of the cost factors.

Newly Identified Indirect Human Cost	Identifying organisation	IB1	IB2	IC1	IC2	Comments
Delay costs	IB1	●	●	●	●	Throughout the life cycle of a system
Project delays	IB2	●	●	●	●	Not being completed on time
Manufacturing delays	IB1	●	●	●	●	Availability of leading edge kit/software supply from manufacturers everyone's tasks are delayed if the kit is not available
Delivery delays	IB1/IB2	●	○	○	○	Product not arriving on scheduled time
Employee delay	IC2	●	●	●	●	On particular urgency of delivery times: delays could be caused by incompetent staff, staff availability, sickness/illness
Testing delays	IB2	●	●	●	●	Due to poor coding
Inability to re-use coding	IC1	●	●	●	●	Due to poor coding
Start-up of new employee resources	IC2	●	●	●	●	If permanent staff, costs involved include: Recruitment, staff induction teams, site familiarisation teams
Inaccurate deliverables	IB1	●	●	●	●	Days/weeks lost, Installs, scheduling are effected, sales team will have to chase kit
Misunderstanding	IB1	●	●	○	●	Leads to inaccurate deliverables, and loss of a great deal of time
Inaccurate selection of recruitment	IB1	●	●	○	●	Morale in team may fall, leading to less productivity, and HR and service delivery teams mainly affected
Inaccurate specification (scope and Planning)	IB1	●	●	○	●	IB1: A definite cost to IT/IS
Unknown (unpredicted issues)	IC1	●	●	●	●	Due to poor planning/or missing/or misunderstanding, cost depends on severity
Miss-prioritisation	IC2	○	○	●	○	Depending on severity of tasks
Learning material	IC2	●	●	●	●	Books, manuals
Lack of communication	IC2	●	○	○	●	IB1: all teams, project managers should have overall responsibility
Cost of involving end user	IC2	○	●	●	●	Scheduling teams, installs staff, user availability delays. i.e. Come back tomorrow/next week as I am busy now

Table 5.4: Newly Identified Costs

Manufacturing delays: a manufacturing development delay would include access to live servers for deployment. If the access is granted late, that means that the final testing in the live environment cannot happen and the final

delivery can be delayed. This is a significant delay. Costs here are very difficult to pass onto manufacturers. Further, it is reported that everyone's "tasks" are delayed.

Employee delay: this human cost can be more influential in small organisations, or even in small teams within larger organisations. If a key person goes away, it can be costly. For example, if an employee who is there to test the functionality does not turn up for one reason or another, this will cause delays and thus affect the rest of the project. Employee sickness is one of the costs that interviewees believe is very difficult to predict. Furthermore, if the project is delayed, then it may over-run into a key person's holiday, which is usually booked long in advance, and the project may be delayed even further. Other examples include staff availability, (technical lead/implementation officer). Usually, alternatives are sought, but if no one else can carry out the task, then it will be delayed. Delivering the project does not usually depend on one person, but it comes down to how many people are allocated against one task. Also, the reason a project over-runs into somebody's holiday may be because it was delayed in the first place, indicating poor project management. Thus, this factor is unlikely to be included in evaluation processes or budget proposals.

Project delays (project miss-management): If any critical part of a project is delayed, then the whole project will be delayed. If projects are not delivered on time, it costs both in terms of financial and non-financial terms. There are costs that are reputational, and not just on a business level but on a personal level as well. This is clearly an indirect cost that can be caused by human factors, as mentioned above (e.g. employee delay). Furthermore, urgency of the deliverable, if not communicated, could result big delays.

> *"The urgency of the deliverable; If you don't communicate the urgency of the deliverable, and someone who thinks that they have a little bit of slack and they are not on a critical path...and all of a sudden they are on a critical path and they've left it too long."*
>
> IB2 Product manger

Inaccurate deliverable: This is the situation where the deliverable is not what the client wanted, which is not unusual in IS projects. It is said to be biggest IHC – manufacturers deliver what they thought was required, but the client says, "we didn't want this – you misunderstood". This misunderstanding of what is actually required comes under the category of poor communication. This is usually due to a poor

requirement analysis process. This has a huge impact; although there are checkpoints, in the worst-case scenario, the whole process may have to be started again. The manufacturer needs to fix what has been delivered to match what the client actually wanted, if this is possible. Interviewees report that in their organisations, days and weeks can be lost as a result of these costs. Particularly in the IT division, this indirect human cost is very influential. Installation and scheduling, are affected, sales teams will have to expediting the process through chasing the kit, e.g. proof of delivery, etc. However, this is included in neither the evaluation nor the budget proposals at the beginning of the project.

Cost of user involvement: this is a human cost that is associated with IT divisions in particular. It is mainly caused by the end-user not having IT skills, and not knowing exactly what to order. This cost mainly includes scheduling teams and installation staff, and although it is budgeted for, it is never actually included in the evaluation process.

> *"So what happens they take what they think they can have, which then goes to approval to their business unit. The managers said, yes you can have that. Then it comes to IT. IT looks at it and says, 'what are you on about?' Go back to the original user and say, 'what do you actually want?' Understand their requirement, change their paperwork; re-send it out for approval; comes back to you. What you have actually done, you have added a load of delay to it."*
>
> IB1 Assistant services delivery manager

IB1 assistant delivery manager claims that although there are considerable benefits associated with involving the end user, nonetheless this particular human cost could have a big knock-on effect on everyone. Therefore, the interviewee believes that, asking the end user to order what they want does nothing except to add to the delay, as they do not have the skills to perform that action.

> *"So what you have actually done is downloaded that function from your IT who has given it to the business unit. Business unit mess it up. Comes back to you and you spend more time going back and cleaning it up again. So whilst that 18 months where everyone gets used to it and everyone understands what it is and the end users get round to it. You will have lots of benefits at the end but there is a lot of pain getting there. What most business units will end up doing is that not many of the end users do that function. What they will say is every time you want something, come to your IT business focal point."*
>
> IB1 Senior Manager

The IB1 system delivery senior manager believes, nonetheless, that the practice of the end-user going to the IT business focal point works for the business units and not

for the IT division. This is because staff at the IT focal point will have awareness and knowledge of what their requirements are and they will raise a request on their behalf. They then raise the request and send it back to the IT division. Thus, the function has been shifted to a business unit away from IT, because in the long run this approach will work better. The business unit suddenly has to employ someone to provide that function. If they have 400 people within their department, every one of who is making a request every day, they would need to have a dedicated resource. IB1 deems that this is a hidden cost that has actually been passed on to the business unit. The business unit sees a long-term requirement, and does not want to carry out IT functions:

> *"What business unit end up doing is saying 'look – this is an IT Function, we can't be bothered; we don't want to do it – you do it for us'? So that forces you, they would need to do the work, because it is going to be wrong anyway. So what happens is that, that 18 months plan then takes place in 36 months because they find it so difficult..."*
>
> IB1Senior services delivery manager

User availability delays: this scenario occurs in situations where a particular user is not available, or gives excuses such as "come back tomorrow/next week, I am busy now", etc. This type of delay can also cause a significant overall delay to the delivery of the system.

Start-up of new employees: this is identified as an indirect human cost, particularly if it is for permanent member of staff, as it requires the involvement of recruitment staff, induction teams, site familiarisation teams etc., and other departments may be involved, such as indications teams, on-site familiarisation, hands-on training and shadowing. There are many areas to cover. However, it is not included in the evaluation process or in the investment budget proposals. IB1 claims that they have a calculation based on the formula "add £x000 for each new permanent staff member recruited". IB2 states that the IS project budget includes recruitment cost, but if urgent issues arise, then extra client costs may by involved, even though they do not usually need to bring in people from outside the organisation. These costs are not included in the evaluation process, but may be built into cost models for budget proposals.

Inaccurate selection of recruitment: This is especially costly if it involves inaccurate selection and recruitment of permanent staff, particularly in the IT division. Morale within the team may fall, leading to less productivity. This is especially true for HR and service delivery teams, but again it is not included in either the evaluation process or the budget proposal. Inappropriate recruitment could also sometimes lead to coding or testing sabotage. This is said to be one of the major IHC:

> *"One of the biggest problems you have is the incorrect selection. I would choose you to deliver a project that you couldn't deliver. I choose you because you came across good in the interview; I choose you because I know you; I choose you because you, I just happened to ask a question that you knew the answer to, I had recommended you. Whatever the situation is, it comes down to a situation where the selection is incorrect. I have recruited someone incompetent through no fault of my own. Through no fault of you, for you would probably sit there and think 'I can do it' as well".*
>
> IB1 Senior manager

Inaccurate specification (scope and planning): this is said to be another major IHC. IB1deems that it depends on severity; however, when it occurs it has a great negative impact on both the management division and HR, and is even more costly to the IT division. Interviewees state that post "screw-up", investigation teams/committees may have to be called in. Further, investigation teams, correction teams and the best practice procedures policy team all need to be called in for the evaluation process, but none is included in the budget proposals. This cost is not allocated to anyone to pay; it can lead to great delays throughout the project life cycle, and can also lead to unpredictable issues.

> *"Because of the bugs and of the delaying messages and because the system was not specified correctly at the beginning for changes to take place. So because of these bugs and because some changes need to take place throughout the actual project, the clients discovered these problems and then classified the whole project as a failure. But we had somewhere in the region of, I don't know many thousands of calls that was made by the system. The project didn't give our client back the money that they invested into the project."*
>
> IC2 Director

Mis-prioritisation: this occurs in a situation where more time is being allocated to tasks which are less financially important to the company, which results in task schedules not being adhered. A task may thus into the next task's target time line, with time pressure leading to delays. IB1 believes that how much this costs the organisation will depend on the severity of the situation, and IC2 notes:

> *"Yes. But if you have been given a task, which takes two days, and you have another task, which is less, important which has to take half a day. If you spend that half a day in a two-day period and you miss your target for the important task, that is not effective time management or indeed project management and that is a cost."*
>
> IC2 Financial manager

Learning material: this is said to be a human cost when introduction of a new system requires new tools, and this requirement is sometimes included in the budget proposals, but not in the evaluation process. IB2 claims that learning material is a direct cost that they cater for:

> *"I would say that it is a direct cost, because it is usually, at least in our ones, it is usually included in the project plan. Preparing manuals; training. Such as books, internet resources, CDs."*
>
> IB2 Project manager

Lack of communication: this is identified to be an indirect human cost that can have an impact on all divisions. Depending on its severity, all teams may be impacted, and project managers should have overall responsibility. Again, this is not included in the evaluation process or budget proposals.

Unknown (unpredicted) issues: these are issues such as software being prone to viruses. IB1 states that it is a potential indirect human cost to all divisions, depending on severity; nevertheless it is a definite cost to the IT division. It cannot be predicted, and is therefore not included in the evaluation process or budget proposals.

Testing and inability to re-use coding: this occurs in situations such as having a deliverable that is there for one person; and there is one person (person A) who is in charge of testing areas of resistance. Very rarely would an organisation have backup for person A for that particular deliverable. Normally, a backup for the normal day-to-day job for person A will be available. This is as person A is in testing in addition to his or her normal job, but if person A is away during the period where the testing is required, then delay will surely occur and that affects the rest of the project.

Furthermore, poor coding can cause project delays. For example, if five days are allocated for testing in the initial plans but the coding is very poor; more days will be needed for testing. Subsequent to testing, the product may have to be re-coded, re-

tested and sent for some more coding to fix the bugs discovered in the original coding plan.

Misunderstanding: this can lead to unforeseen problems, and it is said to be one of the biggest problems, as it can easily lead to inaccurate deliverables, which can lead to great delays in the whole process. In such situations IB1, notes that the business unit is not going to pay for the inaccurate deliverables to be fixed.

> *"Business unit will not pay. The IT is going to say 'that is what you asked for' to the user, and that is where the directors get involved. Somebody is going to have to pay for it. Somebody will have to fix it. Not forget all the, really coming from a monetary term – yeah, morale problems initially – yes – they are all aside because they are not basically, as far as I am concerned it is not money. It is not costing any money. But the fix things it is going to cost money. To fix people's morale is going to take them years to get the morale of the place back. So yes. One of the biggest one does not understand what is required"*
>
> IB1 Services delivery manager

Interviewees from the four organisations were asked by the author to assign the new costs that they had identified to their organisational divisions (that correspond to the MEFM taxonomy). The results of the interviewees' allocations are displayed in Table 5.5. These findings will be discussed in detail as an extension of the MEFM taxonomy in Chapter 6, when re-visiting the conjectures proposed in Chapter 3.

Organisations →	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2
Organisational Divisions → / **New Indirect Human Cost ↓**	**Management, Middle & Top Level Management**				**HR**				**IT**				**Finance**				**Other Divisions (e.g. Corporate Services)**			
Delays (throughout the life cycle)	●	○	●	●	●	○	●	○	●	●	●	●	●	○	○	●	○	○	○	○
Manufacturing delays	○	○	○	●	○	○	○	○	●	●	●	●	●	○	○	●	○	○	○	○
Inaccurate deliverable	○	●	○	○	○	○	○	○	●	●	○	●	●	○	●	●	○	○	○	●
Employee delay	○	○	○	●	○	○	○	●	○	●	○	●	○	○	○	●	○	○	○	○
Start-up of new employees	○	○	○	○	◒	○	●	●	●	●	○	●	●	○	○	●	○	○	○	○
Inaccurate selection of recruitment	○	○	○	●	◒	○	○	●	○	●	○	●	●	○	○	●	○	○	○	○
Inaccurate specification (scope & Planning)	◒	○	○	●	◒	○	○	○	●	●	○	●	●	○	○	●	○	○	○	○
Mis-prioritisation	○	○	○	○	○	○	○	●	●	●	○	●	◒	○	○	●	○	○	○	○
Learning material	○	○	○	○	○	○	○	●	○	●	○	●	○	○	○	○	●	○	○	○
Lack of communication	◒	○	○	●	●	○	○	●	●	●	●	●	●	○	○	○	●	○	○	○
Cost of user involvement	○	○	○	○	○	○	○	○	○	●	●	●	○	○	○	○	○	○	○	○
Unknown (unpredicted) issues	◒	○	○	●	◒	○	○	●	◒	●	●	●	●	○	○	○	◒	○	○	○
Project delays	○	○	○	○	○	○	○	○	●	●	●	●	○	○	○	○	○	○	○	○
Testing delays	○	○	○	○	○	○	○	○	●	●	●	●	○	○	○	○	○	○	○	○
Inability to re-use coding	○	○	○	○	○	○	○	○	●	●	●	●	○	○	○	○	○	○	○	○
Miss-understanding	●	○	○	●	●	○	○	●	●	●	●	●	○	○	○	○	○	○	○	○

Table .5.5 Assigning Novel Indirect Human Costs

The above empirical outcome contradicts the proposed MEFM taxonomy, as the IT division seems to have the highest number of indirect human cost factors. The initially proposed MEFM suggested that human resources and management divisions would have the highest number of IHC associated with IS adoption. IB2 suggests that top-level managements, and thus *management division* would not have a high number of IHC, as they managements are not involved except as a site for decision support systems and staff. Further, finance divisions will also not have the highest number of costs, as they mainly deal with budget allocation, i.e. they are mainly concerned with money systems. IB2 believes that IT has the highest number indirect human cost factors, as it is the division that covers the human related resources such as people, implementation and so on. However, IB2's Assistant services delivery manager suggests that the management division should be targeted for research, and that is justified by stating:

> *"Because they are the ones who have control over this indirect cost, morale, productivity; they should be the ones who understand indirect cost, systems implementation. Of course IT providers will help for example; we know that when we go to sell a solution we know how to sell it. And we sell it because we are in the knowledge and we sell the knowledge that this is going to be costing much to those systems".*

Nevertheless, IB1 deems HR to be the division with the highest number of associated IHC. The reason for this is that for the management team, once a project starts, they know that they have to dedicate time to it etc., and so are aware of the costs that are likely to incur. Likewise, IT knows that they are going to do the work. They have a project to roll out, for example, 10 PCs or 100 PCs, and they can see the work coming too. Finance will have to prepare budgets and plans, and thus aware of the costs that are likely to incur. Nonetheless, HR will are less likely to have prior knowledge of the costs that could incur, this is as in most cases; to start with HR is not informed of these projects. Therefore, interviewees in IB1 declare that the biggest indirect costs that an organisation should budget for are those HR related, as they are not easily predicted.

In line with the initially proposed MEFM taxonomy, IB1 identified *Time*, *Learning*, *Training related costs*, *Loss of productivity* and *Redundancy* to be cost factors to all divisions. Nevertheless, interviewees stated that this was dependent on the type of system adopted and the project size. IB1 in fact believes that most managers ignore

the hidden costs associated with activities such as training, although they are aware of them.

> *"The management in some cases will say, I have to train my staff – so I am going to stop doing my day as usual. Business as usual stops. That can happen. If you can have a back-fill to come and cover for you, then you have got cost to get that back to enable you to provide that service. Some managers will say that has to be done I am going to do it. Yes, whilst you are training the other people, that business as usual will either stop or your will do that as well. Nine times out of 10 what you will find is that a manager will stay behind and do it late over night. They will do the work during the daytime and then do their own daytime. So what really happen is that hidden cost gets actually swallowed by the employees, because managers in most cases don't get overtime – but they get performance enhancement so they will get a bonus et."*
>
> IB1 Senior manger

Managers of IB1 note that, most of the time they have to do the training-related work during the day time; and then stay and do their normal work at the end of the day and that can lead to many problems with morale.

> *"This adds to your morale problems; your fatigue problems; your working-time directive – but – your performance over a period of time. Your working-time directives that don't let you work legally by law don't let you work more than 37 unless you signed off your life for various things. That gets kicked out of place. So it has a big knock on effect and most people will find that they will take to it. They will take the responsibility of doing it on their own shoulders...aware of these hidden costs but usually ignored."*
>
> IB1 Senior manger

Interviewees in IB1 believe that time may be a human cost to HR and Finance divisions depending on the project size. Thus, if the project is small, the HR and Finance divisions may not be involved; nonetheless, the Finance division needs to be consulted at some point. In contrast, findings from IB2 illustrate that time is not actually a cost factor to any division. Its length can differ depending on the activity being carried out and the person performing it and it is considered to be part of the job and not a hidden cost. In fact, Table 5.6 also illustrates that IB2 does not seem to assign about a third of their costs that they initially confirmed as IHC to any of their divisions. Furthermore, it seems that the computer manufacturing sectors (IC1 and IC2) identify more IHC associated with their organisations, compared to the financial services (IB1 and IB2).

Having confirmed that the case study organisations could identify the proposed IHC and assign some of them to the suggested originations divisions, the next step was to find out whether they could identify their drivers.

5.4.5 Identification of IHC Drivers

Interviewees were required to identify drivers of the revised list of indirect human cost factors. Based on the literature analysis in Chapter 3, the researcher has suggested that there are three main indirect human cost-drivers; namely; introduction of a new system, training related costs and staff turnover. Interviewees' responses in identifying cost-drivers are outlined in Table 5.6.

As shown in Table 5.6, the four case study organisations have confirm the proposed drivers to be root causes of most IHC factors associated with IS adoption. The case enquiries validate the introduction of new systems and staff turnover as the main drivers. Rather than training, many IHC seem to be caused by delays throughout the life-cycle (e.g. manufacture delays, employee delays). The Product/Project manager in IB2 reported that in particular, delivery delays and project delays are major drivers that essentially result in IHC. All the drivers are, interviewee believes, from the user perspective, i.e. people do not want to be involved or use systems. The services delivery manager adamantly refused to accept training as a driver of IHC, while the assistant services delivery manager agreed that it could be a driver. The services delivery manager deemed that training was always a strategic development, and it is an investment in the long term. Newly-identified indirect human cost drivers are demonstrated in Table 5.7, which is followed by a detailed description of the main newly identified drivers.

Organisation →	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	Comments
Drivers → / **Indirect Human costs ↓**	**Training**				**Staff Turnover**				**Introduction of a new system**				**Delays**				**Other**				
Loss of Time	○	◒	●	●	●	○	●	●	●	●	●	●	○	●	○	●	M	M	E	E	
Learning Cost	●	○	●	●	●	○	●	●	●	○	●	●	○	○	○	○	M + p	○	E	E	
Resistance To New Systems	○	◒	○	●	○	○	○	○	◒	●	◒	●	●	○	○	○	○	M	E	E	
Effort & Dedication Spent by Management	○	○	●	●	●	○	○	●	●	○	●	●	○	●	○	○	○	○	○	E	
Consequences of Redefining Roles	◒	○	◒	○	◒	○	●	●	●	○	●	●	○	○	○	○	R	○	○	○	M= Morale
All IHC Cost Associated with Training	○	○	○	○	●	○	○	●	●	○	○	●	●	○	○	○	○	○	○	○	E = Factors of education
Integration with New Systems	○	○	○	○	●	○	○	○	●	●	●	●	○	○	○	○	○	M	○	M	P = Planning
Loss of Productivity	○	●	●	●	●	○	●	●	●	●	●	●	●	●	○	●	○	○	○	E	R = Redundancy
Rejecting Salary Raise	○	◒	●	●	◒	○	○	◒	●	○	◒	○	○	○	○	○	○	○	○	○	
Staff Turn Over	○	○	○	●	○	○	○	○	●	○	○	●	●	○	○	○	○	○	○	○	
Cost Associated with Redundancy	○	○	○	●	○	○	○	○	●	○	●	●	◒	○	○	○	○	○	○	○	
Reduction Knowledge Base in Organisation	○	○	○	○	●	○	●	●	○	○	○	○	○	○	○	○	○	○	○	○	
Displacement (Mis-Assigned Costs)	○	○	○	○	○	○	●	●	○	○	●	○	●	○	○	○	○	○	○	○	
Deskilling Employees	○	○	○	○	●	○	○	○	◒	○	●	●	●	○	○	○	○	○	○	○	
Delays (through out the life cycle)	○	○	○	○	●	○	○	●	●	○	○	○	●	○	○	●	○	M	○	○	

Orgnisation →	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2	IB1	IB2	IC1	IC2
Drivers → / **Indirect Human Cost** ↓	**Training**				**Staff Turnover**				**Introduction of a new system**				**Delays**				**Other**			
Manufacturing delays	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	●	○	○	○	○
Inaccurate deliverable	○	○	○	○	●	○	○	○	●	○	○	○	○	○	○	●	○	○	○	○
Employee delay	○	○	○	●	○	◒	○	○	●	○	○	○	○	●	○	○	○	M	○	○
Disruption Costs Resulting from Introducing New System	○	●	●	●	●	○	●	●	●	●	●	●	●	●	○	●	○	M	○	○
Morale Hazard Associated with Managers	○	●	●	●	○	○	○	○	○	○	●	○	○	●	○	○	○	M	○	○
Belief, feeling, and perception	○	●	○	●	○	○	○	●	●	●	●	●	○	●	○	○	○	M	○	○
Start-up of new employees	◒	○	○	●	●	○	○	●	●	●	●	○	●	○	○	○	○	○	○	○
Inaccurate selection of recruitment	◒	○	○	○	●	○	○	●	●	○	○	○	○	○	○	●	○	○	○	○
Inaccurate specification (scope & Planning)	○	○	○	○	○	○	○	○	●	○	○	○	●	○	○	○	○	○	○	○
Mis-prioritisation	○	○	○	●	○	◒	○	○	●	○	○	●	○	○	○	●	○	○	○	○
Learning material	○	○	○	●	○	○	○	○	●	○	○	●	○	○	○	○	○	○	○	○
Lack of communication	○	○	○	○	○	◒	○	○	○	○	○	○	○	○	○	○	○	M	○	○
Cost of user involvement	○	○	○	○	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	○
Unknown (unpredicted) issues	○	○	○	○	○	◒	○	○	○	○	○	○	○	●	○	●	○	○	○	○
Project delays	○	○	○	○	○	◒	○	○	○	●	○	○	○	●	○	●	○	○	○	○
Testing delays	○	○	○	○	○	○	○	○	○	●	○	○	○	●	○	●	○	○	○	○
Inability to r-use Coding	○	○	○	○	○	○	○	○	○	●	○	○	○	○	○	●	○	○	○	○
Mis-understanding	○	○	○	○	●	○	○	○	○	○	○	○	○	○	○	○	○	M	○	○

Table 5.6: Identification of IHC Drivers

New Drivers	Identifying Organisation			
	IB1	IB2	IC1	IC2
Morale	●	●	●	○
Project Delay (project mismanagement)	○	●	○	○
Delays throughout the life-cycle	○	●	●	●
Inaccurate Planning	●	○	○	○
Factors of Education	○	○	●	●

Table 5.7: New Drivers of IHC

Morale: organisations have been more aware in last few years of the impact of morale. If an employee does not want to be involved in a new system; or does not like the idea of the new system, this can lead to many indirect costs. IB2 interviewees believe that many of the human costs can be classified as relating to morale, as it is a unifying theme. As a result of not taking morale into consideration, indirect human cost occur such as management time and increased resistance arises, and this also leads to integration delays. For example, if an organisation is trying to integrate a new system and poor morale is the cause of delays in projects, people will not work on the project; people may not take to the new application, as they like the application that they have used to work with.

Another example was given by IB1, illustrating how the morale issue affects the whole team.

> *If there are six people within a team, who are highly motivated and productive because of one particular change; and suddenly three have gone, and three seniors have been introduced who then need training, site familiarisation, awareness, etc., the three who have been left behind may suddenly think 'hang on – three of our friends have just been kicked out, now these guys are senior to us'.*
>
> IB1 Senior services delivery manager

This, the IB1 senior services delivery manager believes, also creates a progression block which ultimately leads not just to lack of motivation and morale issues among employees but also to productivity issues, which then can have a knock-on effect by delaying the whole project. It causes unseen and untold effects.

When a system breaks down, there is a diagnostic process; one can check certain aspects and go through a series of steps to reach a solution in a given time. However, if one has six human beings to deal with, the potential problems/issues that can arise will be endless, and there are no simple diagnostic procedures. The next issue that could arise is that one of them might say, "well, my position is not clear" and decide to take the situation to the tribunal, or to a disciplinary hearing.

> *"Endless connotations of the problems that you might have. You may have just decided that this is a skill that we will support, so we need some new skills, so we change the composition of the team. That's the simple decision and based on all the things like that. If they go to tribunal, they could be looking at couple of years. And then you would have to go to court hearings. That main cost may not get attributed to that actual project but it is a knock on effect to the company".*
>
> IB1 Senior manager

Delays throughout the life cycle: Interviewees believe that this could only be a cost to the HR and financial divisions if permanent staff have been recruited and have no work to perform, as contractors or temps can be given a week's notice. In the IT division, allowances are usually made for delays in actual installation to desk, otherwise not likely to be a cost. When asked about other divisions, the services delivery manager in IB1 states that:

> *"Wherever the delay is, financial penalties to other divisions due to delays 'cause' by them are rare".*

When asked about the inclusion of this delay in proposals, interviewees said only the basic "user not available on the day" type issues are included in the evaluations process, and some sort of allowance is also "added" to the budget, but it is not accurate.

The following typically causes delays:

- Incompetent staff
- Staff availability, (technical lead/implementation officer)
- Staff shortages, (sickness/illness)
- Larger organisation have synchronisation problems with other global regions
- Key component (critical path) of service not ready, so delays everything else
- Availability of leading edge kit/software supply from manufacturers.

IC1's consultant revealed that in their meetings, most of their discussions are about cost justification with less attention being given to other issues such as implementations. Their aim is to minimise costs and increase productivity; this, they believe, will result in meaningful and effective implementation.

While validating that the case study organisations identify the proposed indirect human cost factors, their appropriate divisions and root causes, it was interesting to find out whether they took them into account in the IS evaluation process or their investment budget proposals. IB1 stated that there was a project proposal and evaluation process for every single project that they undertook. Interviewees were asked to identify which of the revised indirect human cost factors were included in their IS evaluation processes and budget proposals, and their responses are summarised in Table 5.8.

Factors of Education: Interviewees believe that this is an important driver that is associated with the need to learn and thus results in all the indirect human cost factors related to learning, such as loss of productivity and resistance.

Other Drivers: Other drivers such as Project mismanagement and Inaccurate Planning are described in section 5.4.4.

5.4.6 Inclusion of IHC in Budget and Evaluation Process

Organisations →	IB 1	IB 2	IC 1	IC 2	IB 1	IB 2	IC 1	IC 2	
Indirect Human Cost	**Included in The Evaluation Process**				**Included in IS Budget Proposal/Allocation**				**Comments**
Loss of Time	●	○	●	○	●	○	○	○	Depends on project size
Learning Cost	●	○	●	○	●	○	●	●	Installs only included
Resistance to New Systems	○	○	○	○	○	○	○	○	Rarely, no scientific method is standard,
Effort and Dedication Spent by Management	○	○	○	○	○	○	○	○	
Consequences of Redefining Roles	●	●	○	○	●	●	○	○	Where costs fall outside remit, people ignore them
All IHC Cost Associated with Training	●	●	●	●	●	●	●	●	Pre project start and actual rollout will normally be costed in.
Integration with New Systems	●	●	○	●	●	●	○	●	Not all the time
Loss of Productivity	○	○	○	○	○	○	○	○	
Rejecting Salary Raise	○	○	○	○	●	○	○	○	If the forecast run for 12 months, then 3%
Staff Turn Over	○	○	○	○	○	○	○	○	
Cost Associated with Redundancy	○	○	○	○	○	○	○	○	
Reduction Knowledge Base in Organisation	○	○	○	○	○	○	○	○	
Displacement (Mis-assigned Costs)	○	○	○	○	○	○	○	○	
Deskilling Employees	○	○	○	○	○	○	○	○	
Delays (throughout the life cycle)	○	●	○	○	○	●	○	○	Some sort of allowance is normally added into budget. Slack time (e.g. sickness)
Manufacturing delays	○	○	○	○	○	○	○	○	
Inaccurate deliverable	○	○	○	◒	○	○	○	●	
Employee delay	○	○	○	○	○	○	○	○	Cannot predict sickness
Disruption Costs Resulting from Introducing New System	○	○	○	○	○	○	○	○	
Morale Hazard Associated with Managers	○	○	○	○	○	○	○	○	
Belief, feeling, and perception	○	○	◒	○	○	○	●	○	
Inaccurate selection of recruitment	○	○	○	○	○	○	○	○	
Inaccurate specification (scope and Planning)	○	○	○	●	○	○	○	●	
Mis-prioritisation	○	○	○	○	○	○	○	○	
Start-up of new employees	○	○	○	○	●	○	○	○	Built into cost model £x is added for each new permanent staff
Learning material	○	○	○	○	○	●	○	○	
Lack of communication	○	○	○	○	○	○	○	○	
Cost of user involvement	○	○	○	○	●	○	○	○	
Unknown (unpredicted) issues	○	○	○	○	○	○	○	○	Depend on severity
Project delays	○	◒	○	○	●	○	○	○	
Testing Delays	●	●	○	○	●	○	○	○	
Inability to re-use Coding	○	●	○	○	●	○	○	○	
Misunderstanding	○	○	○	○	○	○	○	○	

Table 5.8: IHC Inclusion in Budget Proposal and Investment Process

The results given in Table 5.8 are summarised in Table 5.9. Table 5.9 illustrates the percentages of the IHC that are included in the evaluation process or budget proposals in the organisations used as cases. The percentage cost factors include both the previously confirmed costs (those cited in the literature) and the cost factors newly identified by the interviewees.

Services	IHC Included in the Evaluation Process (%)	IHC Included in the Budget proposals (%)
Computer Manufacturing	11%	8.6–14.3%
Financial	17–22 %	25–31%

Table 5.9: Percentage of IHC Included in Evaluation Process and Budget Proposals

Table 5.9 shows that the manufacturing services only include 11% of the IHC that they have confirmed in their evaluation process as being associated with their adoption of IS; and only up to 14.3% of the costs that they have confirmed in the budget proposals. Likewise, financial services only include up to 22% of the IHC that they confirmed in their evaluation process, associated with their adoption of IS, and only up to 31% of these costs that have been included in the budget proposals.

It seems that almost 80% of the costs the four organisations identify as an IHC to their organisation are neglected in their evaluation processes. Similarly, approximately 70% of the IHC factors identified are not considered in the investment budget proposals. These support the initial findings from the IS normative literature discussed in Chapter 2. For example, IB1 deems that redundancy does indeed result in indirect human cost, such as redundancy payments in the HR division, and training costs for new employees, and believes that learning curve space/time productivity is low, particularly in the IT division. Nevertheless, in IB1, as a service delivery senior manger reports, redundancy is a HR related function, within a computer centre, and as mentioned previously, HR is centrally allocated in this organisation. Since the IT division pay the same as the other divisions for resources, if they do not use HR when they are needed, HR costs will still come under central allocation and it is not included in either the evaluation process or the budget proposals.

The IB1 senior manager further declares that when a new system is installed, people tend to forget that there is substantial cost associated with the selection process. To carry out the selection process, HR engagement is required for the selection process, and this involves a meeting with HR. An hour of each HR person's time will be needed to travel to and from the location, as they are usually based on site, plus an hour for the meeting its self. This will mean three hours for them, plus one hour for the manager of the division where redundancy will take place. HR here is asked to help decide how to lose two members of staff. HR will then put some comments together, as well as an extensive list of the requirements for what must be carried out. This will include not just technical requirements, but also communication requirements. The senior manger gives an example of the process that a division and HR would usually follow:

> *"Once a list of requirement is prepared, you have to get all 10 people to go to the competency profiler. This needs to be marked, then you must decide which two are going. That takes you several weeks. To put the competency together for a role is not easy. Then you think about how you are going to measure it. You have got to get these ten people to then fill in this non-fill a minute; it is normally an interview where you have got to do it together. You will have to go away and arbitrate on which two you have got to get rid of. Then you have got to see through the communication programme to make sure that you get everyone to understand why those two were picked in case there is a morale issue. Then you have got to go through the redundancy process; give them 30 days notice. Then you have to get through the legal side. Your own department may not be picking up those costs. But HR has gone ahead and done a lot of work on that. And when they come back and you go through the competency profile, maybe 1 hour with each person and there are ten of them, that is another ten hours...that is how you would get rid of two people out of a group of ten. That would take you at least two to three weeks I would say, minimum".*

Clearly, the whole process is very time consuming, and none of these is included in the evaluation process or the budget proposals. Furthermore, as the assistant delivery manager reports, it could add to other people's jobs

> *"Someone actually got made redundant and he was involved in one area that not a lot of people had much knowledge about – foreign exchange systems. So basically what happen was Mr X (one of the line managers) had to start going to other meetings and find out what stage they are at right now and the systems they use just to get a better background. So in a way, that was a cost to Mr X because he was neglecting his other work...and then that is a cost to the GFX people, the foreign exchange people as well because they are having to spend more of their time now on joining him, whereas they could have gotten on with something else and gone on that bit further."*

Also, regarding deskilling costs, IB1 deems that HR need to change the scope of employment, and the finance division is likely to have work to do with regards to reduction in the skills required for roles. In the IT division, it was reported that more

experienced staff are sometimes moved into other roles. HR, particularly, may need to find roles for staff within the company, and they may need to go into Transfer Undertaking and Protection for Employees (TUPE) in redundancy situations. Nevertheless, none of these issues are actually accounted for in the budget proposals or evaluation process. Nevertheless, IB2 suggested that the term "deskilled" is inappropriate, as skills are not really taken away from employees: organisations just take the opportunity to learn from them. They thus suggest referring to the process as "*demoting*".

A computer service delivery senior manager of a computer centre in IB1 stated that generally, only tangible costs are included budgeted, when preparing budget proposals. For example, only installs are usually included in the evaluation process and budget proposals. Support of the new application/system after "go-live" is someone else's problem. Post-installation support normally falls in other departments' laps; some projects may "exclude/forget" the post costs by "accident". In fact, he considers that:

> *"not only indirect costs, they just don't cost it properly. They say they will charge you X, Y and Z. The business unit now buy in. The business units now have a relationship with IT whereby the say, we are going to try and save as much money as possible because you are an external supplier. There is an internal supplier but you know it is like having your own business. So the conversation here is to try and save as much money. The conversation here is to have as much money to deliver a breakeven good service and that's where the unit comes. And the business unit would 'say can't do this, can you do this and that' and the bank would then say 'you have got to buy it, you have got to deliver it, you have got to install it, it will take you three hours to do this, it will cost you £60 an hour to do the work'. And IT has woken up and where it goes wrong, the delay come in and various other things."*
>
> IB1Service delivery senior manager

IB1 now admits that training costs can be hidden and easily missed, but claims that they are mostly budgeted for. The services delivery manger notes that training costs are taken into account at the beginning of the project or the offset when the budgets are prepared:

> *"if I am sending someone on training course, I would have to pay him some travel and it is a five-day training course. It probably would accrue four nights' overnight accommodation, plus food, plus etc., but a bit about making some phone calls home so you will have the telephone bill to pick up as well within reason. So because of my experience, I will budget that into a particular project, whereas you might have someone coming and say well we have six people, they're all going to need training course. Ring the training department. They say £1,500 and suddenly you find that you are £1000 under budget".*
>
> IB1Service delivery senior manager

Thus the interviewee states that these indirect costs occur, but it depend on how the company is set up, and on how the costing works, but believes that it get usually missed. However, the senior Services deliver manger of IB1 considers that in their organisation, although hidden, this cost is included in the budget:

> *"You can actually recover money...When you do your budgets, if you have six people and I will stick with six people and you assume that they will do 10 days' training each that is 60 days' cover you need. Someone to cover for 60 days. So that is 60 days' cost you are going to work out. On top of that, you know that, say basically you are give them 10 days' training, that is 60 days' training. If during the year, you can only give them 30 days' training, you can say to yourself you can use some of that portion in the budget. That is a commonplace to hide money. When you need it later you will put it back. Very commonplace. The other one is to not pay people overtime. You know. Paying people as little as possible.*
>
> IB1Service delivery senior manager

Furthermore, resistance costs are not in included in the budget proposals or the evaluation process by any of the four organisations. IB1 considers that resistance is rarely included in the evaluation or budget proposals. This is mainly as they believe that there is no scientific method that is currently standard; nonetheless, delay times may be added. Effort and dedication cost are also not included either in the evaluation process or the investment proposal; nonetheless, IB1's interviewees state that there is a great deal of effort and dedication involved in the finance calculation. Their justification is based on that finance is usually measured on "procuring" projects under budget (and at the best price for company) compared to other quotes, so a lot of effort would go there, i.e. in trying to reduce amount of budget proposed, so that the project would not get rejected.

Further, they believe that a great deal of management's effort and dedication are associated with disaster recovery, depending on the nature of the business. It is further suggested that costs such as "redefining roles" may be accounted for in the evaluation process or budget proposals. The reason for this is that redefining roles can be costly, particularly if associated with implementation managers. Again, where costs fall outside the remit, people tend to ignore them wherever possible: unless a company "best practice" methodology exists no body want take responsibility. For example, the cost of morale that is associated with redefining roles is not taken into account. IB1's senior manager of services delivery states that:

> *"If I want to reduce my team from 10 to eight because of new systems we are going to get rid of two people. I will try and redeploy them with other managers with*

> *similar job functions or whatever if they want to make a change. But other managers are not forced to take them on, that is all I am saying. You are not forced to take them on. Why should upset your balances to help someone out. You know you budget will deliver, because everyone is making targets"*

If other jobs within the organisation are not found for the employees, then their managers have no choice but to make them redundant, and IB1's manager admits that redundancy and the hidden cost of redundancy are enormous, such as having to pay for the length of service and various others things. For example, it could lead to "redefining roles" and thus result in various other IHC:

> *"For each job function, you will have a salary band probably saying that for this function you will probably get between 20 and 25,000 depending on what skills they have and service, etc. Say you have got some managers at 30 coming down to the 25 job band, what that will do is upset the other people within that new function you are moving into. Someone like you would say 'I would be in this department for two years. I am on 22, you are coming on day one, and you are 30, what is going here?' The best upset you have got to say to your staff is to tell them what someone else's salary is."*

Hence, in such situations mangers expect in the next pay review to encounter some set-up problems. They report that morale problems and set-up issues will also certainly occur. In addition to that, budgetary problems will also be set up, and most importantly, they believe all these leads to upsetting the whole balance of that team, when someone who has been in the business unit has a lower salary than the newcomer.

Interviewees from IB1 state that integration time is a cost that is associated with the IT division, but is not always included in the evaluation process or the investment budget proposal. Similarly, loss of productivity is reported to not be included either the evaluation process or the investment budget proposal. IC1 deems that employees' feelings, perceptions and beliefs should be included within the proposal documents as part of the change management.

Looking at the above results, it seems that most of the IHC factors are not included in the evaluation process or budget proposals, as they are not appropriately assigned. The project manger of IB2 claimed that they are missed unintentionally; additionally interviewees mentioned in several occasions that there is no standard way for estimating these IHC.

> *"They are not actually budgeted for so they are just taken out of miscellaneous cost...Those are the main reasons, because you don't see them and so you can't budget for them"*
>
> IC2 Financial manager

These findings support the researcher's proposal that performance measures are needed for these costs to be included in both the evaluation process and budget proposals. IB1 reports that only costs such as pre-project training and actual rollout will normally be included in both the evaluation process and budget proposals. IB2's project manager comments:

> *"I have seen some bad examples and it wouldn't surprise me that these costs have actually come around and slapped these guys in the face, because I would say a lot of projects are over budget primarily because the initial estimation was completely wrong. Not just in terms of not taking into consideration that these things change".*
>
> IB2 Project manager

IB2 confirms that rejecting employees' request of salary raise could be an indirect human cost to the organisation, but suggests that this is not influential in the current employment climate. Likewise, IB1 identifies several costs resulting from staff turnover as IHC (see above cost allocation section), furthermore in contrast to IB2, IB1's manager reports a turnover of about 15–20% each year, which he believes to be very high. He states that organisations are really looking for 7–10% staff turnover or even less.

> *"Some of the technical departments within our company do that: the more technically qualified your are, the more you can do. So that is one. The other thing is that people go on training courses, come back and they only have a paper qualification. The sensible ones actually spend the next year learning that system, doing things and being more marketable. It is interesting, the rate that people leave the company; you can't affect it. You have a turnover of about 15–20% each year. This is very high. You are really looking for 7–10 or even less. Currently some companies have turnover of 15–20%. They are forever training people. Forever going back and forever going back".*
>
> IB1 Senior manager

Nevertheless, these interviewees do not consider staff turnover to be a cost to their organisations, and claim that in extreme cases the cost model may be revisited. If the forecast runs for 12 months, then a possible 3% uplift in the cost model may be included, but it is unlikely and depends on scope of change. Thus, they did not include this factor in either the evaluation or budget proposals.

IC1's consultant reports that when he puts forward a project proposal, it is supposed to dictate everything to do with the project cost, how the system would fit in, change

management, time, strategy: all the issues that relate to the project's implementation. However, he admits that when it comes to costs, the estimate is usually made purely on a financial basis, even though budget is one of the main areas highlighted in the proposals, basically because that is the way it is "usually done".

Clearly, there is a need to look more carefully at the barriers to identifying these costs and their inclusion in the budget proposal and evaluation process. This is as there is a range of evidence from the literature (see Chapter 2) to support the case study findings that although these indirect costs are not in the IS budget, they are deducted from the organisational overhead or the budget of other departments.

> *"Since you are over budget, you are going to end up needing more money from somewhere. So it comes back to needing more money. And if no one wants to give it to you, then it comes down to chopping non-essential projects. Which if you look around the city all non-essential projects are being chopped. And the next thing you do, if you can't chop that you chop a bit of this, you cut off your client entertainment, and you cut off your staff entertainment which is going to have a natural effect on morale. So it is ideal as usual to get your budgeting right."*
>
> IB1 Senior manager

The interviewees from the four organisation stated that having such indirect human cost allocation is beneficial in facilitating more accurate investment proposals.

5.4.7 Barriers to Identifying Indirect Human Costs

Interviewees from the four case study organisations were presented with four main barriers to identifying indirect cost, as reported in the literature. Interviewees were asked to rank the barriers from 1–5, with the highest barrier being 1, and the lowest barrier being 5. Their ranking results are outlined in Table 5.10.

Barriers	IB1	Rank	IB2	Rank	IC1	Rank	IC2	Rank
Difficult to identify	•	1	•	4	•	1	•	1
Difficult to measure	•	2	•	1	•	5	•	5
Intangible	•	4	•	2	•	2	•	2
Hidden	•	3	•	3	•	3	•	3
External to IS projects	•	5	•	5	•	4	•	4
Other					Difficult to assign			

Table 5.10: Barriers in Identifying Indirect Human Costs

As illustrated in Table 5.10, the barrier to identifying IHC factors with the highest ranking is reported to be "difficult to identify", and the second is that they are "intangible" in nature. The meanings of each ranked barrier were agreed among the interviewees and the interviewees thus:

- Difficult to identify = not knowing what the actual cost factors are;
- Difficult to measure = not being able to attach a numerical value to the cost;
- Intangible = the cost factors are not evident;
- Hidden = unable to allocate the cost factors;
- External to IS projects = not reported as part of IS project costs.

IB1, IB2 and IC1 recommended that the proposed list of indirect human cost were divided into tangible and intangible costs, as this would lead to much better cost estimation. When managers were asked if performance measures were established for estimating these IHC, both IB1 and IB2 revealed that they estimated some of these costs (only those costs included in the budget proposals). However, each organisation seems to have their own way of estimation for those costs they identify, and all managers seem to have their own personal views. It appears that estimation is based on the personal approach of management and there is no standard method to be followed or known list/frame of indirect/IHC to refer to when preparing budgets or during the evaluation process. Furthermore, it appears that the IT/IS investment

decisions merely consider the direct cost estimates. IC1's IT consultant, who also worked as a consultant for many other organisations, confirmed this:

> *"I totally agree with the belief that many organisations undervalue the total cost of IT/IS. For this specific reason, I find myself always on the brink of going out of a project in many occasions simply because of the lack of realisation of direct as well as indirect costs involved with IT/IS projects. In fact, I am now in the exact situation indicated here with the application implementation we are doing."*
>
> IC1 IT Consultant.

The IT consultant of IC1 further stated that although cost is highlighted at a very high level, nevertheless he does not think that IHC are actually discussed in detail. Investment decisions and cost allocations seems to be fundamentally based on "act of faith", and confirming that cost classification is also based on the same concept.

> *"That is because we make these decisions without proper Frameworks"*
>
> IB2 Product Manger

Nevertheless, all four case study organisations welcomed the idea of developing standard performance measures for the main IHC, by first identifying cost factors, and then identifying the root causes, and finally reducing them. This is particularly true given that the studied organisations are all in the private sector, where one of the main concerns is cost saving and investment justification. Subsequent to our research, these organisations became aware of the indirect human cost, and have reported that they are likely to consider them or try to take them into account as a result of the interviews.

5.5 Summary and Conclusions

Empirical data for the present study were extrapolated through interviews and multiple lines of inquiry, to test the conjectures and conceptual models developed in Chapter 3. Although generalisation from case research would not be appropriate, this dissertation has used data from case-based studies to identify potential IHC associated with IS adoption. In doing so, the identified indirect human cost factors can be used as a reference when preparing budget proposals, or allocating budgets in the private sector, within the given context but without claiming generality. Data were collected until there was enough data to test the proposed conjectures. From a conjecture testing perspective, a fifth case study would provide insignificant benefits, as further data collection was confirmed to be of little value.

Cost identification within each organisational division was examined in all of the organisations within their case settings. Empirical findings revealed that all four case-study organisations seemed to be aware of indirect cost in general, but referred to the concept using different terms. Thus, four alternative names that were not cited in the literature for indirect cost were identified: non-transparent cost, absorbed cost, wasted opportunity, and miscellaneous business costs. This implies that organisations lack an awareness of the different cost components of indirect costs, which may clarify the difficulty they find in the identification and management of indirect costs. The findings of the empirical enquiry reveal that the MEFM taxonomy may be beneficial in allocating IHC, given that its categories comprise existing IS divisions within the organisations in the case study. The organisations used in this case research were thus easily able to identify indirect human cost factors and assign them to the corresponding IS divisions.

The results obtained were compared with a proposed taxonomy. Interviewees in all four organisations confirmed that *most* of the proposed IHC were costs associated with IS adoption. As a result, the proposed MEFM taxonomy was validated and the original list of the IHC was expanded and was used as an extension of the MEFM taxonomy. In addition, the taxonomy empirically revealed Computer Services (IT) and HR as the key divisions that incur most cost factors, and *loss of time*, *learning costs, hidden cost of training*, *loss of productivity* and *redundancy* as the key costs common to all divisions. The IT and HR divisions were reported as the divisions that needed to be targeted most as they have the highest associated number of IHC: this contradicts the initially proposed MEFM, which suggested that human resources and management divisions would have the highest number of IHC associated with IS adoption. Furthermore, it seems that the computer-manufacturing sector (IC1 and IC2) identifies more IHC associated with its organisations, compared with the financial services sector (IB1 and IB2).

The mapping of the indirect human cost factors to their drivers by the interviewees validated the IIHCDM model proposed in Chapter 3, thus potential key IHC drivers are found to be the *introduction of a new system*, *mismanagement of training* and *staff turnover*. The empirical findings reveal that the IHC noted in the literature are identified as part of the IS costing and budget allocation system of the individual case study organisations. Further, the studies identified seventeen new cost factors and

four drivers that were not cited in the literature. The newly identified cost factors included inaccurate deliverables, inaccurate planning, misunderstanding and mis-prioritisation. These were reported to result in some of the major IHCs, such as post "screw-up" teams, investigation teams/committees, investigation teams, correction teams and the best practice procedures policy team, who may all need to be called in for the evaluation process, but none of whom is included in the budget proposals. The newly identified drivers included delays throughout the life-cycle, inaccurate planning, as well as factors of education and morale.

It is reported that organisations are aware of IHC resulting from drivers, such as introducing a new system, as being most evident at the post-implementation/post-training level; however, they tend to ignore them and do not include them in the evaluation process or budget proposals. It is claimed that there is awareness within the IT environment that new systems are constantly being introduced, and therefore resistance would not be an indirect human cost associated with the introduction of a new system: resistance seems to be accepted as part of the culture. Nevertheless, even those costs that most organisations admit to being enormous, such as redundancy, were not included by any of the four organisations in their evaluation process or budget proposals. The empirical findings reveal that more than two thirds of the costs that the four organisations identify as an indirect human cost to their organisation are neglected in their evaluation processes and in the investment budget proposals.

In particular, the findings confirmed that, although a majority of these indirect costs are not accounted for in the IS evaluation process or IS budget, they are nevertheless taken out of the organisational overhead or the budget of other departments. Thus, from the four case enquiries, it appears that these organisations do not yet have a standardised, rigorous way of setting an IS budget or a well-defined process for costing IS indirect costs. Therefore, it appears that estimation is based on the personal approach of management, and that there is no standard method to be followed, or known list/frame of indirect/direct human costs to refer to, during budgets allocation and evaluation process.

The main barrier to identifying IHC was reported to be that they were difficult to identify. In addition, a barrier that was not mentioned in the literature, but that was

reported in the present empirical enquiry, is the *inability to assign* the costs to a specific department within the organisation, or to find out whether it is a shared cost or one that can simply be traced back to one of the divisions. These findings support the author's proposal that performance measures are needed for these costs to be included in both the evaluation process and budget proposals. Managers do not know the factors that incur costs for them; empirical enquiry demonstrated that organisations were aware of the indirect costs, but did not know how to measure them. It has also been identified in the literature, and empirically confirmed, that the inability to identify indirect cost factors forces management to invest based on an "act-of-faith" strategy. Hence there is a need to identify ways to include IHC in both the IS evaluation process and when allocating budgets. It seems that there is a need for all these findings/views to be pulled together into a common frame of reference.

The frame of reference would facilitate the identification and allocation of the potential IHC, thus enabling their management. Once these costs are managed, they can be estimated and reduced, thus contributing to preventing budget overruns and a more effective evaluation.

CHAPTER

6

A Frame of Reference for Identifying, Allocating and Managing Indirect Human Costs

The empirical evidence that resulted from the analysis outlined in Chapter 5 revealed the necessity to modify the conceptual models proposed in Chapter 3. The reason for this was the identification of a range of new IHC; this chapter re-visits the conjectures that underpin the conceptual models previously proposed in Chapter 3 and revises the MEFM taxonomy and the proposed IIHCDM model. In doing so, it offers decision-makers and researchers a frame of reference for identifying, assigning, and managing IHC.

6.1 Introduction

A review of the normative literature on the evaluation of information systems (IS) investments has revealed a dilemma facing evaluators in identifying, managing and controlling hidden indirect costs, IHC (IHC) having been identified as one. The researcher exemplified these through the literature presented in Chapters 2 and 3, and the empirical findings discussed in Chapter 5. Accordingly, the research reported in this dissertation has contributed to the knowledge surrounding indirect costs through *highlighting* and *identifying* IHC factors. In doing so, a framework has been developed that suggests nine steps to be followed in identifying, managing and controlling (IAMC) indirect costs. Considering the literature analysis, the author proposed taxonomy of IHC factors associated with the adoption of information systems. Based on the first five stages of the framework, three conjectures, which underpin the conceptual models, MEFM taxonomy and IIHCDM, were proposed.

The proposed MEFM taxonomy allocates IHC to four IS organisational divisions, namely, Management, Employee, Finance and Maintenance divisions. By adapting the cost factors of the proposed MEFM taxonomy, an interrelationship-mapping cost driver model (IIHCDM) was developed. By identifying the root causes of the cost factors, the IIHCDM model facilitates the management and minimisation of the overall IHC associated with the adoption of the IS costs. Therefore, this research has contributed towards a greater understanding of indirect costs, and may lead to their improved management and control. Based on the findings of the empirical inquiry presented in Chapter 5, this chapter revises both the MEFM taxonomy and the IHC driver-mapping model. In doing so, it enables the researcher to transform the conceptual taxonomy and driver model to serve as frames of reference for identifying and allocating IHC.

It is not claimed that the proposed frame of reference is appropriate for all decision-making situations, but it can establish itself as being beneficial to those organisations adopting information systems. Thus, when adopting IS, the MEFM taxonomy may be of particular use to decision-makers, mainly during the evaluation process and budget

proposal, as it will facilitate the identification and allocation of the cost factors. The driver model will also help in identifying the "root causes" of IHC and their impact on the organisation, beyond the limitations of traditional appraisal techniques.

This chapter presents the revised conjectures of the research, a novel MEFM taxonomy and IIHCDM model for the adoption and evaluation of information systems. In doing so, it demonstrates that the research aim presented in Chapter 1 has been achieved.

6.2 Revision of the Taxonomy, Driver Model and Conjectures Proposed

The findings of the empirical analysis that are illustrated in Chapter 5 are used in this chapter to extend and modify the MEFM taxonomy and the driver model that were proposed in Chapter 3 (see figures 3.3 and 3.4). Thus adding to the existing models newly identified cost factors (not cited in literature previously and identified through the empirical enquiry) and drivers (root cause of cost factors) derived from the empirical research. The revised models should allow others to relate their experiences to the case enquiries reported in Chapter 5. The presented frame of reference identifies potential areas of cost saving, thus allowing others to relate their situations to those of the case studies. Accordingly, the frame of reference consists of phases (stages 1–5 of the IAMC framework) by which the inclusion of IHC in the evaluation process or during budget allocation can be established. The phases depicted in the frame of reference (Figure 6.1) illustrate how to overcome the barriers (which were identified through literature review and empirical findings) to identifying IHC by *allocating* their cost factors and *identifying* their potential "root causes". Thus, the frame of reference combines:

a) the phases of the IAMC framework related to identifying and managing IHC (figure 3.1),
b) the revised MEFM taxonomy (figure 3.3) and
c) the IIHCDM model (Figure 3.4), to be used as a frame of reference during the budget proposal or the evaluation process of the IS/IT investment.

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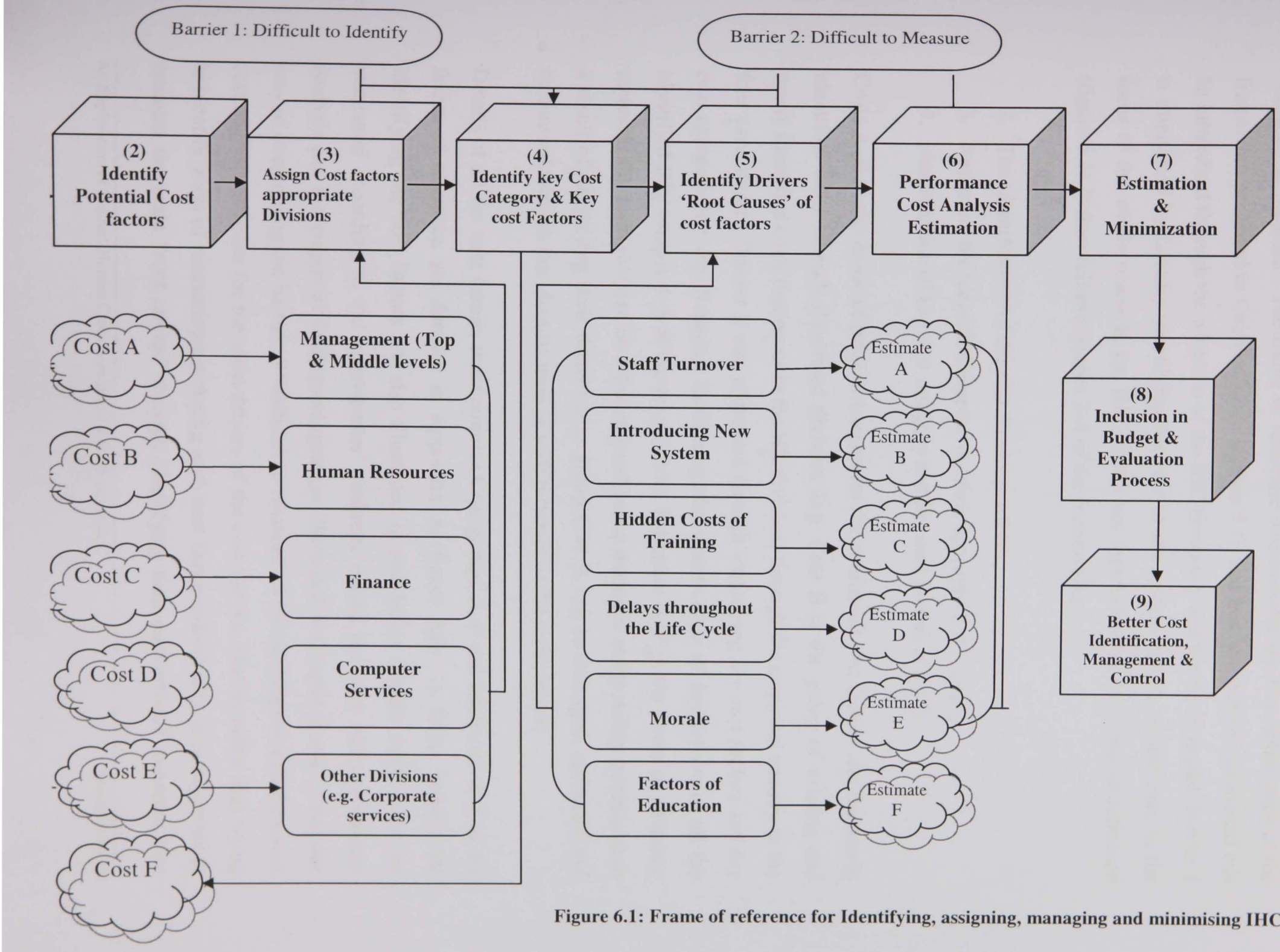

Figure 6.1: Frame of reference for Identifying, assigning, managing and minimising IHC

Figure 6.1 illustrates how the two main barriers were addressed to identifying IHC acknowledged in the literature review (Chapter 2), namely "difficult to identify" and "difficult to measure". The frame of reference demonstrates the five initial steps of the framework proposed in Chapter 3 (see section 3.1), and how the barriers mentioned can be minimised through the adoption of the IHC taxonomy and the driver model. Barrier 1 is minimised by initially identifying the cost of the system, which, in this case, is the focus of the whole research, i.e. IHC, hence not represented in the frame of reference (figure 6.1). It then follows (stages 2–4 of the framework):

2. The identification of the cost factors portfolio;
3. Assigning the identified cost factors their appropriate divisions;
4. Identification of key cost category and key cost factors (Cost F)

Costs A–E in the frame of reference represent the confirmed cost factors and the newly identified costs in each illustrated division (e.g. Cost B is the group of existing and newly identified costs that occur in the HR division) through the empirical enquiry in the four case studies. Barrier 2 was addressed through identifying *key cost factors* and *key cost category* (or key division), facilitating the identification of *key drivers* of all the identified IHC (stages 4–5 of the framework). Estimates A–F in the frame of reference represent the costs that can be estimated and hence managed and possibly minimised as a result of identifying their drivers (e.g. group Cost A can be managed, estimated and minimised through the identification of staff turnover as the main driver).

Details of all the cost factors that comprise Cost groups A–F and Estimates A–F of the frame of reference are detailed in Appendix A (figure App. 1). Other barriers for identifying the cost factors are also illustrated in text boxes (Figure App.1) and are numbered according to the interviewees' rankings during the case study. Literature analysis and the empirical findings suggest (as illustrated in Chapter 2 and 3) that one way of overcoming the barrier of "difficult to measure" is by carrying out a performance cost analysis estimate for the main drivers of the cost factors. That is, rather than trying to identify ways of measuring/estimating each cost factor individually, it is suggested to estimate the main "root causes" through identifying their performance measures (see

stage 6 of the IAMC framework, figure 3.1), facilitating their management, minimisation and control.

The frame of reference has three main objectives; it acts as a guide for decision makers to:

- Facilitate identification of the IHC factors that are associated with IS adoption. This is achieved through using the cost factors presented in the MHFC taxonomy.
- Facilitate the allocation of the identified cost factors to their appropriate organisational divisions. This is to be achieved through using the categories of the MHFC taxonomy.
- Enable the minimisation of IHC factors through the identification of their root causes. This is to be achieved through using the driver model; thus, the main drivers can be included in the investment budget proposal and evaluation process and help managers to recognise and map IHC to their potential root causes.

The frame of reference presented in this chapter is structurally similar to the conceptual models proposed in Chapter 3 (figures 3.2, 3.3 and 3.5). The models were described in sections 3.3 and 3.5. However, the models presented in Chapter 3 were based on the literature analysis, while the frame of reference presented in this chapter is derived from the empirical analysis presented and discussed in Chapter 5. The revisions made to each of the initial proposed models (the MEFM taxonomy and the IHC Driver model) and conjectures are described in the following sections.

6.2.1 Revision of Conjecture 1: Cost-identification Barriers

The review of the normative literature in Chapter 2 revealed evidence that there is a need to look more carefully at IHC (Irani *et al.*, 2001; Love *et al.*, 2000; Weatley, 1997; Willcocks and Lester, 1993; Willcocks, 1992; Hochstrasser, 1992). Although these indirect costs are not accounted for in the IS budget, they are taken out of the organisational overheads or the budget of other departments (Hogbin and Thomas, 1994;

Willcocks and Lester, 1993; Hochstrasser, 1992; Keen, 1991). Thus, the first conjecture proposed in Chapter 3 was *Information systems' IHC are unidentified, as they are hidden in other departments.*

All case study organisations were aware of indirect costs in general, but referred to the term using different terms. Nonetheless, as illustrated and discussed in Chapter 5 (section 5.4.6), almost two-thirds of the costs that the four organisations identified as IHC to their organisation were neglected in their evaluation processes and budget proposals (see table 5.8 and 5.9). Ganek and Corbi (2003) state that, in the face of an economic downturn, there is an increasing management focus on "return on investment" and operational cost controls, while staffing costs are beyond the costs of technology. This is in line with the literature review and empirical findings: organisations admitted that they still evaluate their systems based purely on financial criteria, even though budget is one of the main areas highlighted in the proposals, basically because that is the way it is: usually done".

The empirical evidence gathered from the four organisations indicates that there is a need to recognise the barriers to identifying, allocating and including IHC in both the IS evaluation process and budget proposals. In particular, the findings confirmed that most of these indirect costs are not accounted for in the IS evaluation process or IS budget; they are nevertheless taken out of the organisational overheads of the budget of other departments. These findings support the initial findings from the IS normative literature review discussed in Chapter 2 (Khalfan and Gough, 2002; Price Waterhouse, 1995; Hogbin and Thomas, 1994; Willcocks and Lester, 1993; Hochstrasser, 1992). During the empirical enquiry, reasons put forward by interviewees for not including the IHC in their evaluation process and budget proposal were as follows:

- Costs are not appropriately assigned, so difficult to recognise where they are allocated.
- They are missed unintentionally.
- There is no standard way for estimating these IHC.

Nevertheless, since the interviewees initially identified the proposed IHC to be cost factors associated with their organisation, it is clear that they are aware of them. but do not include them in their evaluation process or budget proposal. As reported in some of the interviews, managers are aware of these indirect costs, but they just tend to ignore them.

Interestingly, it is reported that the computer manufacturing sectors identify more IHC associated with their organisations compared to the financial services IB1 and IB2. This may be due to the computer manufacturing organisations using IS more than the financial services; for example, they may change their systems more often and are thus more prone to the resulting associated IHC, or it could be that they have a better understanding of how IS impacts the organisation.

Since there is much literature (Ooi and Soh, 2003; Goodwin, 2003; Giaglis, 1999; Ezingeard *et al.*, 1999; Irani, 1998; Standish, 1998; Standish, 1995; Lederer and Prasad, 1995; Jones, 1994; Beam, 1994; Roos, 1993) to support the view that many projects run over budget, leading to project failure; the present research explored the different barriers that organisations encounter in identifying IHC factors. As illustrated in Table 5.10, the barrier of "difficult to identify" was the highest in ranking. Furthermore, as discussed in Chapter 2, managers are increasingly conscious that investment related costs occur throughout the system's life-cycle yet find it difficult to identify, manage and minimise these costs; this was confirmed empirically through the case studies. Therefore, the main barrier in including IHC in budget proposals and evaluation processes is extended from the research to be "difficult to identify". rather than "they are hidden", as was proposed in Conjecture 1. Conjecture 1 is therefore revised to be *Information systems IHC are not accounted for, as they are difficult to identify.* All the main barriers that were ranked highly by the interviewees are illustrated in figure App.1 (Appendix A) in their order of ranking (1 being the most important).

6.2.2 Revision of Conjecture 2: the MEFM Taxonomy

The investigation of case studies IB1, IB2, IC1 and IC2 demonstrated that the MEFM taxonomy proposed in Chapter 3 was only partly representative of the indirect human factors and their appropriate divisions. For example, all four organisations confirmed that they have the main divisions (proposed in the MEFM taxonomy) of their organisations going across all the different business units (Table 5.3). However, these divisions may be named differently; for instance, case study 1 referred to the management division as a *Board of Directors* and case study 2 referred to it as *Management Division,* while all four organisations agreed that they call the employee division *Human Resources*, and the maintenance division as *IT Support* or *Computer Services.* Additionally, few costs such as "training" and "effort and dedication" were claimed to be direct costs that can be planned for, as they were considered to be a component of the project. Cost factors that can be planned for, such as high staff turnover and morale hazard, were acknowledged; but it was noted that they are not costs to the case study organisations in the current employment climate. Employees who want to leave may only be able to do so when alternative jobs are available. Organisations avoid losing employees who they might find difficult to replace; at the same time, it is reported that many organisations presently have high redundancy rates and that employees are unlikely to leave their secure jobs.

Interviewees in all four organisations confirmed that most of the proposed IHC were costs associated with IS adoption. The MEFM taxonomy was renamed as MHFC taxonomy (Management, Human resources, Finance and Computer services), and the IHC allocation was validated within the given context. This implies that, for any organisation to use the MFEM taxonomy, they do not necessarily need to have their main division exactly matching that proposed in the MEFM taxonomy. Organisations can use the allocation of cost factors applied in the taxonomy, given that they have similar divisions with the similar functions, regardless of what they are named.

The empirical outcome contradicts the proposed MEFM taxonomy in regards to the key cost category/division. The IT division was reported to have the highest number of IHC

factors. The initially proposed MEFM taxonomy suggested that human resources and management divisions would have the highest number of IHC associated with IS adoption. Based on the empirical findings, the frame of reference also considers that the "Computer Service" division is the division that needs to be most targeted, as it has the highest number of IHC associated with it. This confirms what was discussed in Chapter 3 that the division with the highest number of cost factors needed to be targeted for further research. During the empirical enquiry, 17 new IHC factors, not previously been cited in the literature, were identified. These were presented, described in detail and discussed in Chapter 5 (see Table 5.4), and are included in the frame of reference across Cost groups A–E and Estimates A–F (see figure App.1 and Appendix B). Therefore, Conjecture 2, "*Indirect human costs can be classified into four main categories, namely management IHC, employee IHC, financial IHC and maintenance IHC*", is validated with existing and new costs. The amendments to the taxonomy are presented in figure 6.1, as part of the frame of reference. In compliance with the outcomes of the empirical enquiry, the conceptual MEFM taxonomy is revised to include all confirmed IHC that were initially proposed in the literature (presented in text boxes in figure App.1, assigned to the appropriate divisions). In addition, the newly identified IHC factors are also included, and are illustrated in italics in the text box in figure App.1 and Appendix B.

6.2.3 Revision of Conjecture 3: IHC Fuzzy Cognitive Driver Mapping Model

Based on the review and analysis of the normative literature of IS (Chapter 2), it was proposed that training, staff turnover and introduction of a new system are the main drivers of most of the IHC. As exemplified in Table 5.6, and discussed in Chapter 5, the four case study organisations have *mostly* (i.e. most of the interviewees) confirmed the proposed drivers (costs related to training, staff turnover and introducing a new system) to be "root causes" of most of the IHC associated with IS adoption, thus validating these drivers. In addition, empirical findings reveal that many IHC seem to be caused by "delays throughout the life-cycle" (e.g. manufacture delays, employee delays) and morale. For example, as a result of not taking *morale* into consideration, IHC occur, such as management time and increased resistance, and this in turn also results to

integration delays, and, more importantly, it was reported to lead to productivity issues, which can then have a knock-on effect by delaying the whole project.

Therefore, Conjecture 3, *"Training related costs, staff turnover, morale and the introduction of a new system are the main drivers of most of the IHC components across all IS divisions"*, has been tested. In addition to the confirmed drivers, the newly identified IHC drivers that were demonstrated in Table 5.7 are included in the frame of reference (figure 6.1) along with their resulting costs (figure App.1). The initially proposed drivers are described and discussed in Chapter 3 (section 3.5), and each of the new drivers is explained in Chapter 5 (section 5.4.5). In an attempt to prevent bias, only cost drivers that were identified and confirmed by at least two of the four case study organisations are included here.

Interestingly, ways for managing IHC and their main driver, such as *"introduction of a new system"*, were suggested. Senior manager reported that IHC resulting from introducing a new system can be minimised through selecting "super-users", i.e. designated users that are likely to be willing to train in the new system and use it. These selected users can help the IT implementation and make sure that IS are in place to support both the implementation and the change in management. Thus, a change in the management group should always be a cost-attributed to the project implementation, and should commence when the implementation of a new system starts.

While focusing on reducing and controlling costs, quality and delivery of services should also be key elements of the cost reduction process. Chapter 2 looked at the IS domain: in this chapter, the literature was revisited and conclusions have now been synthesised. Looking at more mature literature where concepts/theories are not directly related to IS, it is found that the approach used in this dissertation seems to fit well with Quality Management and Cost Quality theories. Quality theories centre on the understanding of what causes a system to "fail" and how this failure should be identified. The concept of "cost" is a recurrent theme throughout Quality theory: costs are not just monetary either, so the term relates to the "price" associated with the quality

sought, although it is well accepted that, to persuade management to do something about poor quality, this cost "concept" must be translated into pounds (Bicheno, 1998) .

In this dissertation, as the IIHCD mapping model suggests that to identify "vital few costs" (i.e. the drivers) as opposed to the "trivial many costs" (i.e. that individual cost factors) that take up most of the resulting indirect costs. In line with this dissertation, many quality management "'tools", such as Pareto Analysis, are used to analyse and present findings similar to the ones presented in this dissertation (Bicheno, 1998). The Pareto principles for solving methodology were introduced in the 1950s by Juran. The Pareto principle identifies the "vital few" rather than the "trivial many" or the "useful many" (Bicheno, 1998) . Pareto analysis is also called ABC analysis and the "80/20" rule. It acknowledges that a small number of problem types account for a large percentage of the total number of problems that occur. This is in harmony with the approach used in mapping the cost factors to their drivers, as one main driver can lead to many other cost factors. Bicheno (1998) believes that the name "80/20" is representative of the Pareto analysis; possibly 80% of all problems are due to 20% of the problems that occur; the name ABC is also suitable, as it suggests that the range of types of problem be classified into A, B, and C classifications to specify their importance.

It also suggested that quality costs should be recorded and categorised (Bicheno, 1998), thus making it easier for middle managers (i.e. once it is translated into money) to deal with. The Cost of Quality concept is divided into the following three categories: prevention costs, appraisal costs, and costs of failure of control (Bicheno, 1998).

It is suggested that increasing the salary of an employee that is newly trained, rather than rejecting their request of a salary increase might minimise or even prevent future indirect/direct costs occurring, such as new recruitment costs and loss of productivity when employing new staff. In quality management, Prevention Costs (e.g. education and training, continuous improvement efforts) are the planned costs incurred by an organisation to certify that errors are not made at any of the different stages throughout the delivery process (e.g. design, development) of that product or service to a customer (Beecroft, 2001) . These costs are related with changing the process/system to improve it

(changing the way in which a product/service is made might add x amount of pennies to its production cost, but save £100–x in scrapped product later on down the line; thus, there is a "cost" (£x) as well as a "'saving" (£100-x) associated with preventing quality failure).

In the case of the present study it is suggested that, if inaccurate planning occurs, it could lead to activities on the critical path being delayed, and thus higher project costs being incurred by delaying the whole process. In quality management, Failure Costs are the costs that occur as a result of a company's product or service not meeting its requirements, and the product requiring repair or substitution, or the service needing to be repeated (Beecroft, 2001). These costs are associated with poor quality reaching the customer. For example, it could be a warranty claim, loss of good will, or follow on failure costs (e.g. if product X fails and damages product Y in the process, then both X and Y need to be replaced).

Moreover, appraisal costs are said to be the costs of verifying, checking or evaluating a product or service at the various stages of the delivery process of that product or service to the customer (Beecroft, 2001) . These costs are associated with preventing poor quality from reaching the customer (checking the product/service against specification before it is delivered to the customer) or with monitoring the process as a whole (in process inspection). In the case of the present study, this could be projected viability studies or on-going project meetings, in monitoring cost of investment rather than waiting to reach project cost overruns, or project termination due to cost escalation.

In IS, there are many indirect costs that have been reported in the literature to accommodate over half of the overall cost of a system, yet it has been empirically confirmed that almost two-thirds are not included in the evaluation process or budget proposal. This is reported to be due to the same barrier encountered in identifying hidden quality costs, i.e. difficult to identify. Likewise Beecroft (2001) reported that many of the costs in "quality costs" are hidden and very difficult to identify by formal cost measurement systems, and that, if these cost were identified, they would be accounted

for as part of the overall business cost. Customer-incurred costs and customer dissatisfaction are reported to be part of the major "Cost of Quality" hidden costs, which are not considered in most cost of quality control systems, but which are, however, reported to be most significant. Beecroft (2001) further noted that potential purchasing decisions by both current and future customers are very dependent on these costs. Hence, if external failures (costs that result when a customer finds failure, e.g. customer complaint administration, replacement product) are eliminated, all of these costs are also eradicated.

Crosby (1985) also believes in what he called "system is prevention", i.e. that prevention is better than detection or appraisal. In the case of the present study, this is consistent with saying that it is better to find performance measures for the main drivers and manage those, rather than managing each individual cost (Bicheno, 1998). Clearly, the concepts of mapping driver-cost factor presented in this dissertation are similar to existing ones, such as Juran's Pareto analysis and Ishikawa's (1985) work. In the present study, the interrelationship-mapping model facilitates the logical sequence of relationships between several cost factors and drivers. The aim was to reach a consensus about drivers (root causes), and about the sequence in which cost analysis/management should proceed, in order to facilitate the identification and prioritisation of areas to be tackled and avoid tackling inappropriate lower level cost factors.

Similarly, Ishikawa (1985) emphasised the human side of quality and introduced the familiar Ishikawa diagram. Some of his philosophical ideas about quality include the need to remove the root causes. In harmony with the IIHCDM model proposed in this study, finding the root causes of the problems was essential to Ishikawa, and thus he developed the Ishikawa diagram. The diagram is also called the "Cause and Effect" diagram and the "fishbone" diagram. It is mainly used to "brainstorm" the potential underlying causes of a specific problem or defect (Bicheno, 1998) .

Beecroft (2001) stated that, if the business strategy is to add to profit in a particular product, the projects selected should focus on reducing quality costs by reducing faults,

removing "non-value-added" actions and waste. Through applying analysis of the IHC factors by means of the identification of their drivers, as proposed in this dissertation, managers can become aware of the root causes of cost escalation, and thus resources/efforts can be concentrated upon avoiding these failures/cost overruns. In "quality management" terms the increase of appraisal and prevention costs is proposed. Overall, total costs are lower if more is spent on appraisal and prevention. Hence, a 20% increase in both areas could deliver an 80% saving in failure costs, so the overall total cost (Prevention + Appraisal + Failure) drops significantly, as suggested in quality management approaches.

Irani *et al.* (2003) noted that life-cycles are changing, that they are not as they used to be, and that they are not traditional life-cycle models with a start and an end point. Life-cycle models can now be more integrated. Thus, these costs may not just be the costs associated with IS adoption, as was initially proposed, but could be the costs that are associated with IS throughout the system life-cycle. This dissertation aims to develop a strategic cost identification, management and control tool, through the adoption of the IAMC framework and frame of reference presented in figure 6.1, and to carry out cost reduction at the early stages of business system adoption in order to prevent failures caused by budget overruns, or projects terminating due to cost escalation.

6.3 Summary and Conclusions

This chapter presents the rationale behind the development of a frame of reference for identifying, allocating, managing IHC. It has mainly focused on revisiting the conjectures, conceptual cost taxonomy and conceptual models proposed as the result of the literature analysis in Chapter 3. Testing of these conjectures were based on the empirical evidence presented, analysed and discussed in Chapter 5.

The frame of reference included both the confirmed MHFC taxonomy and the IHC driver model, along with the 17 newly identified cost factors and cost drivers that have not previously been reported in the literature, thus establishing novelty. Such an illustration of the suggested frame of reference allows decision-makers to allocate their

potential costs to appropriate organisational divisions, and identify the cost factors and trace them back to their main driver's support audit trails. As a result, a comprehensive cost analysis was presented, allowing a better understanding of and contribution towards improved decision-making. It is concluded that the MHFC taxonomy will be beneficial in allocating IHC, given that the organisations have divisions that are the same as, or similar to, those outlined in the taxonomy.

The empirical evidence gathered from the four organisations indicates that there is a further need to acknowledge the barriers to identifying, allocating, and including IHC in both the IS evaluation process and budget proposals. In particular the findings confirmed that, although more than two-thirds of these indirect costs are not accounted for in the IS evaluation process or the IS budget, they are nevertheless taken out of the organisational overhead or the budgets of other departments. Each organisation seems to have their own method of cost estimation in general, and all managers seem to have their own personal view, so it seems that estimation of IHC is based on the personal approaches of management and there is no standard procedure to be followed. There is not yet a standardised, rigorous way of setting an IS budget, or a well defined IS costing process. The identification of the key divisions with most cost factors, as a direct result of the present study, may encourage organisations to stop using central-cost allocation systems, as some divisions will use more resources than others; consequently, some become over budget, while others do not but are still charged. Rather than using central allocation in budgets or estimating indirect costs through the act-of-faith approach that most organisations use, a planned systematic approach is suggested, as outlined by the IAMC framework proposed in this research, along with the use of the empirically confirmed frame of reference for cost identification. Thus, IHC factors and their drivers must be more appropriately managed, through the phases of the framework presented for identifying the cost factors, identifying their drivers, assigning them to the appropriate divisions within the organisation, and developing performance measures to facilitate their inclusion in the evaluation process and budget proposals, and hence their minimisation.

The conclusions of the present study were revisited through the lens of more mature literature, such as quality management. It is found that the concept of the driver-mapping model provided in this dissertation fits well into the quality theory's approach of the cause and effect relationship. The richness of these models is not captured in detail in here, as it is beyond the scope of the dissertation. It is referenced to identify the link between the outcome of the research and these approaches. Inherent within this approach is the reliance on a good understanding of the system/process. and understanding and tackling the root cause of the problem to prevent the problem re-occurring in the future. In the present study, this relates to the cost drivers and secondary costs of the driver-mapping model. If only the elimination/reduction of the secondary costs (i.e. cost factors) is concentrated upon, then the cost driver is still there and the cost/failure/overrun will re-occur in the future. It is argued that, by identifying the cost drivers and managing them, the overrun of the sub-costs (cost factors) that occur later on in the process can be prevented. This also seems to be the essential concepts of root cause analysis and the process/system improvement of quality management, originally developed in the 1930s and 1940s (Bicheno, 1998), and thus the concepts provided in this dissertation have already been accepted within the field of management science.

Identification of the components of IHC will facilitate the appropriate allocation of these costs within the IS budget. The identification of IHC, their drivers and their performance measures throughout the whole life-cycle may assist decision-makers and managers in planning a more realistic strategy for their cash flow and their evaluation of IS systems, and hence remaining within budget. In addition, it will provide greater transparency for those who require further evidence, or justification, of how and why those decisions were made. The current economic climate is such that those paying often enormous amounts of money for IS systems are, quite rightly, expected to be provided with something that delivers what they need and, importantly, within budget. There is, then, a pressing need for those delivering such systems to better recognise the indirect costs and their drivers within an organisational context. The novelty of the frame of reference exemplified in figure 6.1 will be discussed in Chapter 7.

CHAPTER 7

Conclusions and Recommendations for Future Research

This chapter begins by presenting the main findings and conclusions drawn from the literature analysis and the empirical research carried out. There follows an overview of the contributions the research makes to the body of knowledge, and of the research implications, both to academics and practitioners. Thereafter the research methodology is critically evaluated and the limitations of the research process are discussed. The chapter concludes by providing suggestions that can be used as a foundation for future research in the areas of IS evaluation and cost identification.

7.1 Research Overview and Findings

Information Systems (IS) investments' evaluation literature has, to date, focused primarily on research related to direct costs, that is, costs that are transparent in IS and make up the IS budgets. IS research into strategic planning, on the other hand, has underestimated the expenditure on the hidden costs that are incurred in the adoption of IT/IS within organisations. There is, nonetheless, evidence to suggest that these indirect costs account for much of the IS budget, hidden or otherwise. Given the continuous spending on IT/IS and the often considerable amount of risk involved, it would seem essential to gain a better understanding of indirect costs and their impact on both employees and the organisation. The research presented in this dissertation addresses the growing need to identify the *total* indirect costs associated with IS adoption, as a fundamental part of both the cost-estimation planning and the evaluation processes when adopting IS.

The literature findings in Chapter 2 Background Theory highlighted that one of the difficulties faced by those planning IS investments is the identification and management of the hidden indirect costs. Chapter 2 concluded that it is not possible to estimate or evaluate indirect costs without first identifying them. The literature review highlighted the need to look more closely at the identification of indirect human costs (IHC), an aspect of the evaluation of information systems that has received little attention. Based on the literature analysis, a framework for identifying, allocating, managing and controlling IHC was developed. Linked with the need to identify the IHC is the need to better understand their different categories and drivers as, it is argued, these will be likely to assist managers in recognising potential areas of indirect human costs.

In trying to identify and appropriately assign the costs of IT/IS investments that could be used throughout the evaluation process, in Chapter 3 Focal Theory, three Conjectures were proposed that are related to the identification of IHC. Associated with these the following models were proposed:

(a) Framework for identifying, allocating and managing IHC.

(b) Taxonomy of indirect human cost factors.

(c) Cost factors' driver interrelationship-mapping model.

The proposed IAMC framework proposes nine steps to be followed for the identification of indirect costs and their inclusion in the evaluation process. The proposed Management, Employee, Financial and Maintenance (MEFM) taxonomy comprises many of the IHC factors cited in the literature, and assigns them to their appropriate divisions within the organisation. The MEFM provides a useful first step towards a *better* understanding of this area of information systems, and thus makes its contribution towards developing a *frame of reference* for *identifying*, *assigning, managing,* and *evaluating* the costs of information systems.

By adapting the cost factors in the MEFM taxonomy, a fuzzy cognitive-interrelationship driver-mapping model (IIHCDM) was proposed. The proposed conceptual model incorporates the main IHC drivers and their components (i.e. cost factors) that are associated with IS adoption. The identification and ensuing mapping of these IHC to their drivers is discussed in light of the effects that such costs have on both the individual and the organisation, and it is concluded that it is possible to trace most of the identified cost factors to their root causes. Based on the literature analysis, potential key IHC drivers were found to be the introduction of a new system, costs related to training, and staff turnover. Recognising such costs will facilitate the identification of their impacts on both the individual and the organisation.

Chapter 4 Data Theory outlined the research approach, methodology, research design and unit of analysis developed to carry out the research reported in this dissertation. The present research approach is based on a combination of the positivist and interpretivist stance, since a blend of a prior construct (case study protocol) and the interpretive approach to analysing the data was used. Qualitative research methods were used to collect data from the studied private sector organisations. The necessary data were extrapolated through interviews and multiple lines of inquiry, in order to test the conjectures made in Chapter 3.

Chapter 5 reported the empirical findings of the four case-study organisations. In doing so, it is concluded that the MEFM taxonomy might be beneficial in *allocating* IHC, given that its categories comprise the existing IS divisions within the organisations studied. Nonetheless, the empirical evidence indicates that there is a need to identify the barriers for identifying, allocating, and including indirect human costs in both the IS evaluation process and the budget proposals. The main barriers to identifying indirect human costs were reported to be "difficult to identify". The findings also confirmed the IHC driver-mapping model, and resulted in 17 newly identified cost-factors and four cost-drivers that had not previously been reported in the literature, establishing novelty and allowing decision-makers to identify and allocate their potential costs to appropriate organisational divisions, and identify their root causes. The empirical evidence derived from the case studies therefore resulted in a revision and verification of the first five phases of the IAMC framework; an extension of the taxonomy and driver model (in Chapter 6). These in turn led to the development of the final frame of reference, which includes an extensive list of IHC factors associated with IS adoption (section 6.1 and 6.2). Revisions to these conjectures were made on the basis of the empirical evidence presented, analysed and discussed in Chapter 5.

The identification of such indirect cost factors has significant implications for the decision-making process, as it promotes a more rigorous evaluation and the development of a model that integrates human, organisational and other categories of investment-related costs into the decision-making process. Therefore, decision-makers are provided with a frame of reference for evaluating indirect costs. It is emphasised that there is a need for decision-makers to acknowledge the "softer" issues associated with IS adoption, and demonstrates *why* these cost factors should be incorporated into their evaluation process. It is further argued that, to aid effective strategic planning of cost estimation and to prevent cost overruns, understanding of the *key* cost factors that occur during the adoption of IS is essential in supporting the effective management of these costs by decision-makers.

The research concludes that the IT and Human Resources (HR) divisions incur the highest IHC. The introduction of new systems, mismanagement of training, staff turnover, morale and delays were empirically identified as key drivers of IHC. For this reason, people involved in the budgetary process, such as strategic planners and operational people, need to focus on these divisions, key drivers and key costs when planning IS adoption, in order to attain better cost management. The frame of reference produced is a starting point; the objective is to have a model that can be used from the start of a project as a guide to strategic planners and as a means of evaluating costs against plan during and at the end of a project.

Outcomes of the Research

- Reviewing the IS evaluation literature with a focus on costs revealed an absence of theoretical models that identify IHC factors associated with IS adoption. The reason proposed for this was the difficulty in identifying and measuring these costs, due to their hidden nature. IHC are underestimated and little understood. It is suggested that the inability to identify indirect cost leads to escalated project costs, which contribute to project failure or termination before the implementation stage is reached: in some cases, projects may continue, due to momentum and practical pressure. These voids in the literature are addressed by constructing IAMC framework, indirect human cost taxonomy, and cause and effect relationship diagram, as detailed below.

- A framework for identifying indirect human cost factors, that comprise of nine sequential phases for *identifying* and *managing* these cost. It facilitates the *identification, management* and control of the indirect costs within the IS budget through the suggested phases, and assists decision-makers in preparing a more realistic financial plan for their cash flow and their evaluation of IS systems.

- An empirically verified novel cost taxonomy. The taxonomy *identifies* and *assigns* the IHC factors to their appropriate divisions of an organisation. The

proposed model is based on the four main divisions that the case study organisations use and that usually straddle all the business units/departments.

- The fuzzy cognitive driver-mapping model (IIHCD) allows the illustration of the cause-and-effect relationship between costs. The conceptual model can be used as a tool when preparing budget proposals or during the evaluation process.

- The proposed MEFM taxonomy and the IIHCD model can be valuable in identifying the IHC associated with IS adoption and their drivers. Thus, facilitating the identification and tracing-back of cost factors to their root causes and hence enabling their estimation and effective management.

- Empirical findings reveal that in their evaluation process or budget proposals, companies do not even include those indirect costs of which they are aware. The real problem is, therefore, not just that companies are unaware of their existence, but that, even when they are aware of them, they do not know how to deal with them or estimate them.

- It has been empirically confirmed, that the inability to identify indirect cost factors forces management to invest based on an "act-of-faith" strategy. Thus, estimation is based on the personal approach of management, as there is not yet a standardised, rigorous way of setting an IS budget, nor a well defined IS costing process that includes indirect costs. It is suggested that organisations can now use the sequential estimating phases that have been introduced through the IAMC framework, rather than by using an act-of-faith strategy.

7.2 Research Novelty and Contributions

The outcome of this research has extended the boundaries of knowledge through making novel contributions to the areas of IS evaluation and cost identification (see 7.2.1 and 7.2.2). The contributions presented here stem from a number of elements: analysis of the IS evaluation normative literature; the conceptual models proposed in Chapter 3: the

research methodology in Chapter 4; the case-based data analysis leading to amendments of the MEFM taxonomy and IIHCDM in Chapter 5; and the frame of reference presented in Chapter 6. In the following sections, the contributions and research novelty of the thesis are presented.

7.2.1 Research Contribution

In addressing the void in the literature underpinning the lack of theoretical models, which identify indirect human cost factors and facilitate their evaluation, management, minimisation and control, the author proposed and empirically confirmed three specific contributions.

1) IAMC Framework

A novel indirect human cost framework that offers nine sequential phases facilitating the identification and management of indirect costs for the inclusion of IHC in IS budget proposals and investments evaluation process. The framework identifies the cost of the system and its subsystems: that is, it identifies each cost factor and, importantly, how the identified costs become a true cost to the organisation and how these costs can be managed.

2) MHFC Taxonomy

The dissertation proposes empirically tested cost taxonomy of four categories of IHC associated with the adoption of IS, namely, Management, Human Resources, and Finance divisions and Computer Services. The research presented in this dissertation modifies the view portrayed in the literature that managers do not know the factors that incur costs; empirical enquiry demonstrated that organisations were aware of the indirect costs, but did not know how to measure/estimate them. Further, empirical evidence has suggested revisions to the taxonomy by incorporating the 17 newly identified costs that were derived from the empirical case studies.

3) IHC Frame of Reference

The key novel contribution of this dissertation is an empirically confirmed, indirect human costs *frame of reference*. The frame of reference encompasses the first five phases of the IMAC framework, namely the MEFM taxonomy and the IIHCD model. The frame of reference developed was based on a critical literature analysis and empirical findings; the blend of the cost factors makes the frame of reference novel, since it results in an extensive set of cost factors. Such a demonstration of the proposed frame of reference allows decision-makers to assign their potential costs to appropriate divisions, to identify the cost factors easily, and to trace them back to their main drivers. Thus, a comprehensive cost analysis is facilitated, allowing a better understanding and management of IHC, and contributing to better decision-making.

7.2.2 Impacts of this Research

The most significant practical contribution of this research is the rich insight it provides into the process of identifying indirect costs in an IS-adoption context. Organisations need to gain a better understanding of cost implications and their potential sources. Further, the identification of the main cost drivers provided in this research may prove useful to decision-makers and managers when preparing budget proposals, and particularly in minimising cost overruns by identifying cost drivers before the investment is initiated. Organisations can put the proposed frame of reference into practice, and use it to identify potential areas of indirect costs' management and reduction and as and aid during budget allocation and IT/IS evaluation.

The results of this research at a conceptual level have already been presented to several organisations in the private sector. They have shown interest, as they believe that indirect costs do have a great impact on budget overruns, but they lack the knowledge of how such costs could be identified, managed, estimated, controlled and hence minimised. The results of the empirical findings of the research illustrate that two of the main problems faced by organisations are the lack of performance measures even for those costs that they can and do identify, and their inability to predict the occurrence of

these costs. These problems can now be minimised through the application of the proposed framework and frame of reference.

The IMAC framework can be used by an organisation to develop its own taxonomy or its own list of indirect cost factors. The driver model also contributes to a better estimate and understanding of these costs, their impacts on the organisation and their interrelationships. The IMAC framework and frame of reference can both be used as tools by the IT department, or by any of the business units within an organisation, when preparing investment budget proposals. Decision-makers can consult the frame of reference when adopting IT/IS; system evaluators, costing managers and finance managers can also use it. The frame of reference has an extensive list of human cost factors that can be considered also be used by those needing justification for their investments.

Academics and practitioners can use the results of this research as a starting point to have a clear and collective view of IT/IS costs through investigating other cost factors in different divisions, sectors and countries. These classifications can be used and followed to develop a frame of reference for indirect human costs, it can also be adopted and used to develop a holistic frame of reference for any other type of cost associated with IS adoption, whether direct, indirect, or some other type. The concept of the proposed frame of reference can be used by decision-makers and IS evaluators to recognise potential areas of IHC and savings, to help managers to identify, assign, estimate and possibly minimise the main IHC, and to facilitate the allocation of the sub-costs of IHC to the appropriate divisions within the organisation and the IS project budget. Furthermore, it can be used to identify further IHC categories and their components, and to help decision-makers prepare a realistic financial plan for their cash flow. In so doing, it better informs future research and practice, and enhances the examination of human costs in all phases of the evaluation process. It leads to clearer understanding, better decision-making and great benefits in the information systems industries.

As suggested by Figure 7.1 below, other disciplines can benefit from the research outcome.

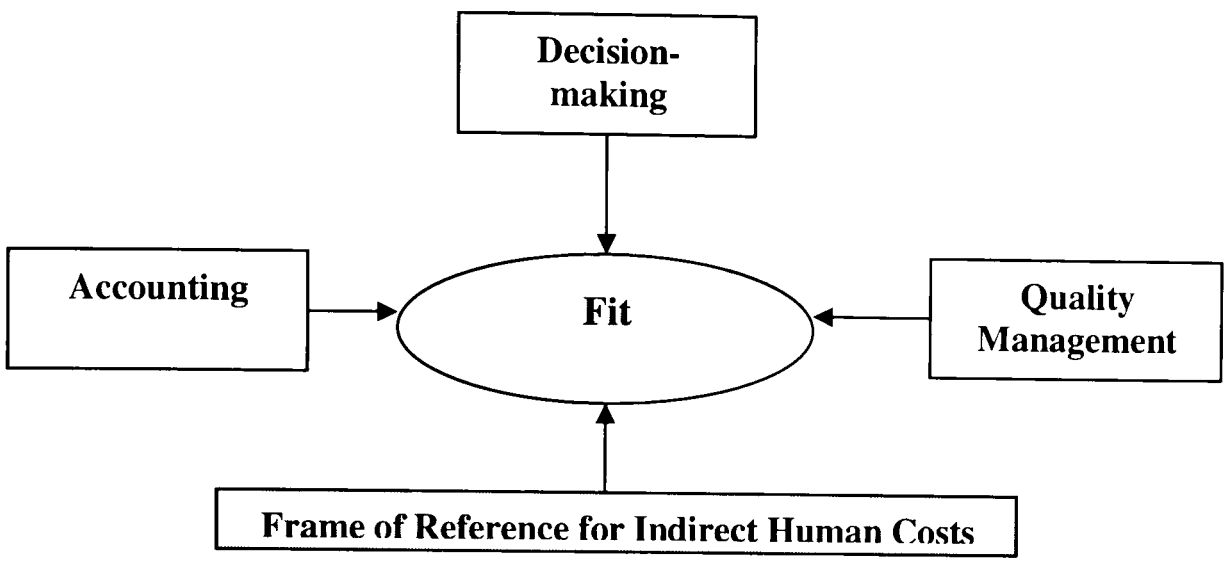

Figure 7.1: Other Areas that Can Benefit From the Proposed IHC Frame of Reference

The framework illustrated in figure 7.1 suggests that the dissertation offers areas of possible exploration where the empirical findings could be synthesised by looking in a broader domain, such as quality management, accounting and decision-making, thus the frame of reference of indirect human costs developed for IS can also be used in these domains. For example, Accountants can use the IAMC framework to develop performance measures of intangible indirect costs and enable their estimation and the same concept can be used by to extend Cost Quality theories regarding quality of cost, cost estimation and cost analysis. McKean (1999) states that many organisations find themselves spending a great deal of capital beyond what they need, due to their inherit information weakness associated with their initial decision-making. Thus, the proposed IHCs frame of reference is beneficial, in situations, such as organisations needing to make a decision on the type of system to be adopted, as the identification of the associated indirect costs will contribute in a more effective decision-making process.

7.3 Limitations of the Research Approach

The frame of reference presented is only a starting point, as it is limited to the cost factors identified through the literature review and the four case studies in the private sector. Furthermore, to develop the final frame of reference (figure 6.1), this research depended on the initially developed conceptual MEFM taxonomy and driver model. In so doing, it did not leave room for other representations or forms of allocation for cost factors apart from those appearing in the main divisions (Management, HR, IT and Finance) spanning the different business units. The data collection and the units of analysis were restricted to the costs occurring in these divisions.

As described in Chapter 4, the use of qualitative techniques was justified for collecting the data for the study. The reason for this is that these methods facilitate generalisation of *soft, rich* contextual data, which is associated with human and organisational issues. Regardless of its advantages, qualitative research methods do have inherent weaknesses: for example, there is much concern about the degree to which qualitative research can be generalised outside the confines of the investigation, particularly as the sample of companies in the present study was small. Although only four companies were used in this study, to increase the sample size further would not be guaranteed to increase its external validity. However, the author sampled more data in another context (in a different organisation) to see if there are more IHC factors that would occur, and the same results were obtained.

The findings were also limited because of the restricted access to data in the organisations studied. Access was denied to documents such as old budget proposals, and appointments with financial managers and HR managers were repeatedly postponed or cancelled. For example, in IB1, each business unit has its own cost centre, and the Corporate Services division handles all cost centres of all the business units. However, access to the Corporate Services division was not, in practice, available to the researcher. Owing to limitations of time and resources, the research in this dissertation has not integrated other cost factors and drivers that may have benefited the frame of reference.

Qualitative case-study research does not provide the opportunity of replication. However, this drawback is acknowledges in this dissertation by using material from multiple case studies, various resources and different stakeholder views. Nevertheless, in future research, more companies could be studied, which may enable further areas of potential indirect human costs and savings to be identified.

The research methods followed were mainly selected for the present study, as they are able to gather rich primary data from organisations in a real-life context. However, qualitative methods, as with every set of data collection techniques, have their own drawbacks, such as the production of substantial amounts of data. The work on the literature review and the empirical enquiry resulted in a large amount of data, and its analysis was a demanding task. Nonetheless, the relative difficulty of analysing the data did not invalidate any conclusions drawn, since multiple-case-studies analysis was applied to the data obtained.

Qualitative research is also criticised for its inability to make a scientific link between theory and research. Nevertheless, as explained in Chapter 4, the bias of qualitative research that results from the interpretation element allows a comparison of the data with other empirically accumulated data, and adds further flexibility in developing rationalisations. However, in the case of this research, the author also addressed this concern through developing a conceptual taxonomy and driver model that proposes cost factors associated with IS adoption, and which builds a framework for accommodating these costs. Qualitative research is structured when a research protocol is developed; in this research, the author developed a case-study protocol as a guide for the research process. To ensure reliability, the reasons leading to the conclusions were clearly verified through the theoretical conjectures proposed, and the units of analysis developed were based on these conjectures. Moreover, as the grounded-theory approach has been seen to be effective for discovery, theory building and testing, grounded theory can now be acknowledged as an appropriate research methodology for IS evaluation.

7.4 Directions for Further Research

In order to have a better insight into IHC, and therefore for decision-makers to manage them more efficiently, it would seem essential to identify what drives the IHC. Such identification will support managers in focusing on areas of IHC where potential savings may be made. Furthermore, having identified and classified these main IHC, decision-makers may then have the opportunity to integrate them into an evaluation of IS deployment from the initial stages of a project. It seems, therefore, that if such costs could be appropriately identified, managed and evaluated at various stages throughout the life-cycle of a project; decision-makers could control them and more accurately predict the financial and human cost of the systems that they select and whose value they afterwards have to justify.

The empirical findings could be synthesised by looking in a broader domain, such as quality management, accounting and decision-making. For future research, the author recommends further development and extension, using empirical enquiry, of the present IHC taxonomy, in order to identify further IHC categories and their components. A further topic would be to develop procedures that allow for the effective evaluation of these costs and that take their impact into account, and identify measurements that offer decision-makers a frame of reference when considering the evaluation of IHC. Further testing of the validity of the taxonomy is needed to see how it can aid managers to identify and manage the key IHC, and then to help them to accommodate the IHC in the justification process and investment proposals. In addition, there is a need to validate the presented frame of reference empirically and to develop taxonomies of the root causes of IHC, facilitating the effective evaluation of these costs, their management and their control. Identifying the IHC components and their main drivers could greatly reduce their resulting indirect costs and establish approaches to evaluation that could be extended to include human aspects.

This research has found that computer-manufacturing services incur a higher indirect human cost than financial services. At a lower level of analysis, it is suggested that the results of this research be used to produce a model of IHC that is differentiated across

sectors, as well as to produce sector-based maps of costs in order to analyse the differences between the same type of cost occurring in each sector or service.

It is appreciated that the contribution of this research to the framework for accommodating IHC is currently restricted, for stages 6–9, to a theoretical level, because empirical studies have yet to be carried out. Empirical testing of the entire framework is required to demonstrate how fieldwork data can be used to support the results presented. By testing against case studies and perhaps ultimately formulating a new research base, further questioning and debate can take place around the model. The direct results of this research (the framework and frame of reference) can be used to develop a comprehensive framework for evaluating IHC that may be used to assess the impact of each individual cost on an organisation. In addition, the results can be used to develop a holistic frame of reference for *all* the costs associated with IS adoption, thus offering decision-makers a frame of reference when considering evaluation of IHC.

To refine such a frame of reference and identification framework, the cost taxonomy and driver model proposed in this dissertation may further validate the research presented. Therefore, it is recommended to transform the proposed taxonomy, model and frameworks into a large-scale survey questionnaire, instead of using interpretive epistemology. Evidently, this would not have been feasible in the past, since the taxonomy, driver model and frameworks did not exist. A large-scale survey will give the opportunity to determine the generic significance of the issues associated with the proposed framework reference and model (e.g. cost factors, drivers and additional steps in the framework for identifying the cost).

In the reported research, three multi-national organisations and one small organisation were used, for reasons given in Chapter 5 (section 5.2.). In examining a representative sample of organisations, the criteria and factors related to the proposed frameworks and model can be better verified and understood. An interesting additional research proposition would be to confirm whether the MEFM taxonomy can be used by small- and medium-sized enterprises (SMEs), or only by large organisations: as large

organisations have the main divisions sitting across all business units/departments, whereas small organisations may not have such a clearly defined structure. It would be interesting to examine whether the taxonomy is applicable to SMEs. It is suggested that this can be achieved using a methodology similar to that described in Chapter 4. This will improve analysis in this area; contribute to better understanding, and support decision-making, particularly that associated with budget allocation and the cost-estimation methods to be used.

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Appendix A: Detailed IHCs Frame of Reference

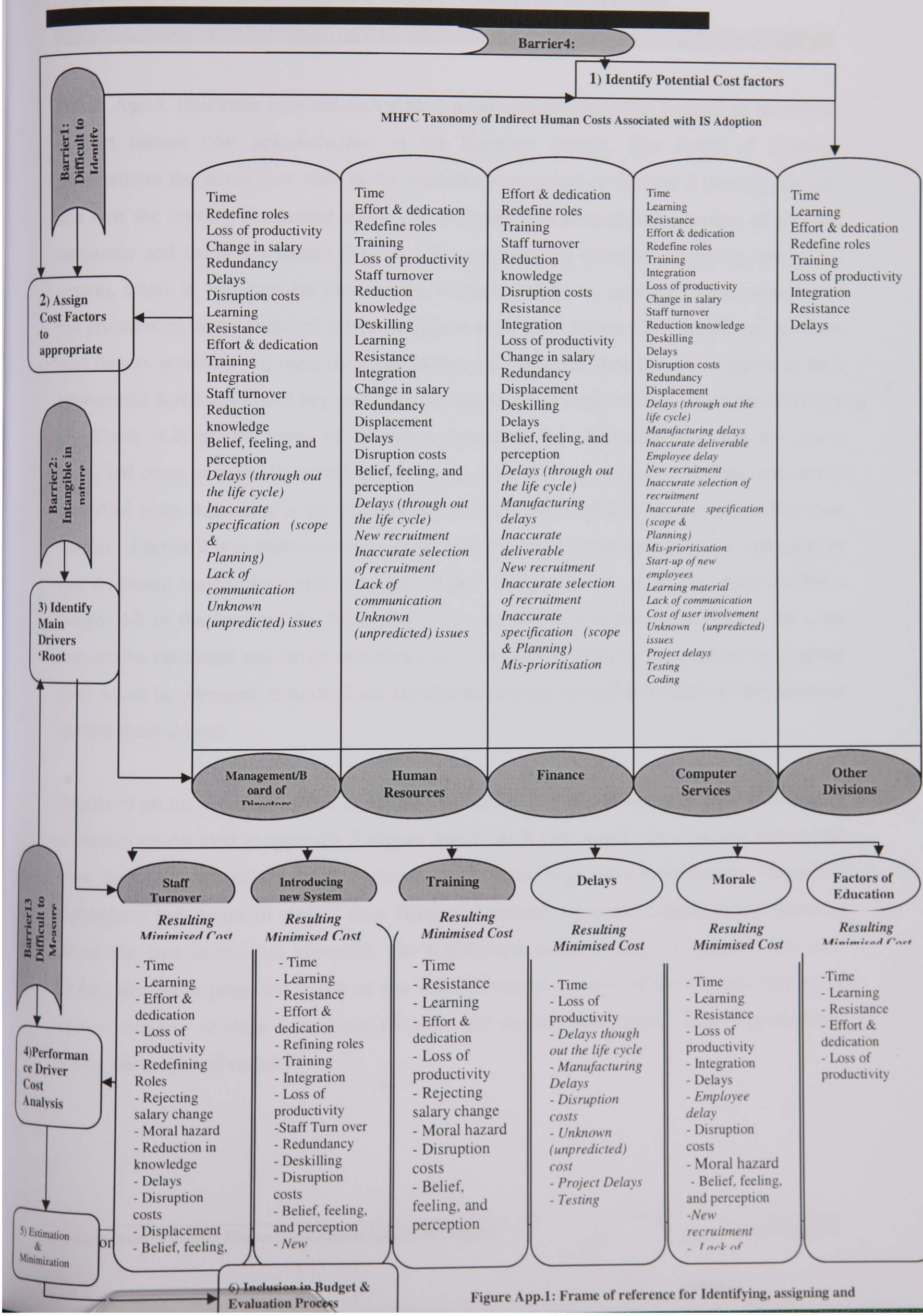

Figure App.1: Frame of reference for Identifying, assigning and

Appendix B: Detailed Outline of IHC Frame of Reference

Figure App.1, illustrates how the author have addressed the main two barriers of identifying indirect human cost acknowledged in the literature review. The frame of reference demonstrates the initial five steps of the framework proposed in Chapter 2 (see section 2.6), and how the barriers mentioned above can be minimised through the adoption of the IHC taxonomy and the driver model. Barrier 1 is minimized by initially identifying cost of the system, which in this case the focus of the whole research, i.e. indirect human costs, hence not represented in the frame of reference (figure 6.1). Then follows, the identification of the cost factors portfolio (1); once the costs factors are identified then thy are assigned to their appropriate divisions(2) and key cost category and key cost factors (Cost F) are identified too (3). Costs A-E in the frame of reference represents the confirmed cost and the newly identified costs in each illustrated division (e.g. Cost B is the group of existing and newly identified costs that occur in the HR division) through the empirical enquiry in the four case studies. Barrier 2 was addressed through identifying key cost factors, key cost category (or key division); hence facilitating the identification of key drivers of all the identified IHCs (stages 4-5 of the framework). Estimates A-F in the frame of reference represents the costs that can be estimated and hence minimised as a result of identifying their driver (.e.g. group Cost A can be managed, estimated and minimised through the identification of stuff turnover as their main driver).

Details of all the cost factors that comprise Cost group A-F and Estimate A-F of the frame of reference are detailed in appendix 5 (figure App.1). In figure App.1, the new cost factors that were derived from the empirical evidence are in italic (e.g. mis-prioritisation). The initial highlighted text boxes in stage 1 (e.g. Human resources) represent organisational divisions where the cost factors are allocated. The highlighted boxes in stage 3 represent the cost-drivers that were proposed based on the initial literature review, while the text boxes that have no shadow at stage 3 represent the new cost-drivers 'root causes' that were proposed during the empirical enquiry.

Appendix C: Interview Agenda

Indirect Human Cost Questionnaire

Indirect costs are identified to be those costs that occur throughout the life cycle of the system, however not readily identified, as they may appear outside the IT/IS project budget. Furthermore, they may not directly produce a cost that is quantifiable in financial terms and can be highly intangible in nature. Many researchers states that the total cost of IT/IS projects is undervalued, and that one of the difficulties in particularly identifying indirect costs is that they are not explicitly reported as a cost of the project. A useful categorisation of indirect human cost have been provided, proposing that indirect costs could be classified into indirect human costs (time of employee, staff turnover, management time, etcetera) and organisational costs (losses in productivity, organisational restructuring, etcetera,) arguing that these categorisations may enable organisations to avoid some of the complications that they may meet during justification of the information systems' investments. Moreover, it is suggested that taking these into account would enable companies to better manage and control their expenditure

A study is being carried out which looks at how to identify, monitor, and manage information systems' indirect human cost. This questionnaire is divided into 4 sections. Where a box is shown, please 'check' all relevant response(s) to the question. Where open-ended questions are provided, please detail all relevant information. This questionnaire should take approximately 10 minutes to complete and all information will remain confidential.

Thank you for your co-operation.

Part 1: Demographics & General Information

Name _____
Job Title _____
Organisation _____
Address _____
Postcode _____

Phone _____
Email _____

Primary Industrial Sector:

- ❑ Automotive
- ❑ Banks/Financial
- ❑ Computing
- ❑ Other:

_____

1. This survey is being completed:

- ❑ Total Organisation
- ❑ A Particular Business Unit Only

3. In what geographical area does your organisation primarily operate?

- ❑ Operate Globally
- ❑ Primarily in North America
- ❑ Western Europe only
- ❑ Africa
- ❑ Western and Eastern Europe Asia
- ❑ South America

4. What are the organisational divisions within your organisation?

_____
_____
_____
_____

5. If your organisation is unaware of the term "indirect cost/indirect human cost", are there any other definitions given to these types of costs? If so, what are they?

_____

Part 2: Strategy, Approaches and Process

6. Do you adopt Information Systems (IS) in your organisation?

- ❑ **Yes**
- ❑ **No**

7. How long have you adopted IS in your organisation?

- ❑ (A) < 1 year
- ❑ (B) 1-2 years
- ❑ (C) 2-5 years
- ☐ (D) > 5 years

8. Do you evaluate your information systems project?

- ❑ **Yes**
- ❑ **No**

If yes, how regularly?

_____

_____

9. Which of the following techniques do you use to do you use to evaluate your information systems?

- ❑ Cost Benefit Analysis (CBA)
- ❑ Return on Investment (ROI)
- ❑ Pay Back (PB)
- ❑ Discount Cash Flow (DCF)
- ❑ Accounting Rate of Return (ARR)
- ❑ Other, please specify

  _____

Part 3: Cost Identification & Management

10. Do you recognise any of the following as an indirect information systems' cost to your organisation? Please √

Indirect Human Cost Component (IHC)	**It is a cost to our organisation**
Time	
Learning	
Resistance	
Control System	
Effort & dedication	
Redefine roles	
Training	
Allocation of employee	
Integration	
Change in salary	
Staff turn over	
Los of productivity	
Displacement	
Reduction In knowledge	
Deskilling	
Redundancy	
Morale Hazard	
Disruption costs	
Belief, feeling, and perception	

11. What do you think are the main barriers in identifying indirect human costs?

- ❑ Difficult to identify
- ❑ Difficult to measure
- ❑ Intangible
- ❑ Hidden
- ❑ External to IS projects
- ❑ Other, please specify

12. What approaches do you use to manage/minimise your costs?

_____

_____

_____

13. Do you agree that the following costs are associated with any of these divisions, please?√ And are they included in your evaluation process & in IS projects budgets?

	IS Divisions						
Indirect Human Cost Component (IHC)	**Management IHC**	**Employee IHC**	**Finance IHC**	**Maintenance IHC**	**Other Please Specify**	**Cost Included in evaluation process**	**Included in IS budget**
Time							
Learning							
Resistance							
Control System							
Effort & dedication							
Redefine roles							
Training							
Allocation of employee							
Integration							
Change in salary							
Staff turn over							
Los of productivity							
Displacement							
Reduction In knowledge							
Deskilling							
Redundancy							
Morale Hazard							
Disruption costs							
Belief, feeling, and perception							

14. Which of the following divisions do you think have the most indirect human costs associated with it? And why

- ❑ Management
- ❑ Employee
- ❑ Maintenance
- ❑ Finance
- ❑ (F) Other, please specify

_____

_____

_____

15. Do you capture, measure and track the *value* of your indirect human cost?

❑ Yes ❑ No

If yes, how:

_____

_____

16. What category of indirect cost should be targeted? And why?

- ❑ (A) Management indirect human cost
- ❑ (B) Employee indirect human cost
- ❑ (C) Maintenance indirect human cost
- ❑ (D) Financial indirect human cost
- ❑ (E) Other, please specify _____

17. It has been identified through the literature that the following are the main derivers of indirect human costs? Training, introduction of a new system, and staff turnover. If yes please tick the box.3

	Cost Deriver			
Indirect Human Cost Component (IHC)	**Training**	**Staff Turn over**	**Introduction of a new system**	**Other deriver, please specify**
Time				
Learning				
Resistance				
Control System				
Effort & dedication				
Redefine roles				
Training				
Allocation of employee				
Integration				
Change in salary				
Staff turn over				
Los of productivity				
Displacement				
Reduction In knowledge				
Deskilling				
Redundancy				
Morale Hazard				
Disruption costs				
Belief, feeling, and perception				

18. If the above-mentioned costs were the main indirect human cost derivers, how would you meas Monitor them? Please fill in the table below

Cost derivers	Performance measure 1	Performance measure 2	Performance measure 3
1. Training			
2. Stuff turnover			
3. Introduction of a new system			
4.			
5.			
6.			

Appendix D: Relationship between Interview Agenda, Hypotheses & Data Collection

Question	Corresponding Hypotheses	Type of Data	Method of Data Collection	Source of Data
5	2	Qualitative Open ended	Documentation	▪ Email questions
9	1	Qualitative Open ended	Interview Documentation	▪ Face to face ▪ semi-structured
10	1 & 2	Qualitative Close ended Open-ended	Interview	▪ - Face to face ▪ -Structured ▪ -Semi structured
11	1	Qualitative Open ended	Interview	▪ -Face to face ▪ -Structured ▪ -Semi structured ▪ -Unstructured
12	1	Qualitative Close ended	Interview	▪ -Face to face ▪ -Structured ▪ -Semi structured
13	1& 2	Qualitative Close ended Open-ended	Interview	▪ -Face to face ▪ -Structured ▪ -Semi structured ▪ -Unstructured
14	2	Qualitative Open ended/ close ended	Interview	▪ -Face to face ▪ -Structured ▪ -Semi structured
15	2	Qualitative Open ended Close ended	Interview	▪ -Face to face ▪ -Structured ▪ -Unstructured
16	3	Qualitative Close ended	Interview	▪ -Face to face ▪ -Structured ▪ -Semi structured

Appendix E: Job Descriptions

The following are examples of the informants describing their job description.

IB1 Assistant Services Delivery Manager

GMIT - Debt Technology. The Technology group is focused on meeting the company's technology challenges. It is responsible for developing and supporting the information systems of the organisation as well as developing a world-class service delivery Programme centred on the company's data centres and computer networks. The Technology group supports all the business areas, providing creative, state of the art software solutions and helping to create new business opportunities.

The role of the Service Delivery Assistant involves supporting the following Project Support Project Management - develop GTS component of overall project plan, track and report progress Project Administration - organize and attend project meetings with representation from GMI, GMIT, GTS and other service providers, as appropriate Project Coordination (global) - work with counterparts in other business lines to provide coverage for horizontal GTS initiatives Resource Planning - work with service providers to engage resources required to meet project deliverables Change Management - negotiate authorizations and represent change at change meetings Crisis Management. solutions Communications - Ensuring escalation and notification lists are kept up to date in the event of scheduled and unscheduled service interruptions.

IB1 Senior Delivery Manager

We have about 5,000 employees in there. And free trading floors – has the traders who are working away. Now if they have fault with their PC, their software, their hardware – they pick up the helpdesk number. They ring the helpdesk. The helpdesk then decided which support group should go out and fix a fault. Yes, if it is in excel you probably would need the software people going to fix etc, etc. Those calls will filter through let's say my break fix team. Which means any problem with the PC, the monitor the screen, the mouse, the fly leave right down to the floor. So anything from

the desk down the floor. Thus if there is a problem the mail go out and they will fix that fault within 6 – 8 minutes. Now from the time the guy picks up the phone and put it down from the helpdesk, my team will be there within 6 – 8 minutes, between 7am and 7pm.

This is just one particular team. I have got my team – and we have got 15 minutes fixed for any of the buildings that we service, between 12 hours spread, 5 days a week – if you log a call, we will fix that within 15 minutes. From the time that you receive the call, you have got to get off your desk; go six floors up; go there; find the person on a huge trading floor; diagnose their PC and put another one in – 15 minutes is tough. Very very touch. We are hitting 92% of our 90. So every 92 calls out of 100 we are actually achieve that. Yeah. If you said to me, how your team working when they get a 15-minute call. I would say whatever they are doing, they drop it and run. As they have got to get up there to do the work and come back. If you said to me when they get up to the user what do they do. I would say well, the minimum that they can, they don't want to get in conversation: hi, hello, I'm going to do this , I am going to disappear. To do that they pick up the phone and ring up the helpdesk to close that call I've done it. They have 15 minutes to do that. And then they have got on to the next 15 minutes call. There might be a next call. They have 8 hours, 2 hours, 4 hours and 15minutes.

IB2 Product/Project Manager

The specific unit that I am part of we are responsible for building, developing and maintaining trading platforms and transaction platform, for example foreign exchange, money markets and confirmation matching systems for these clients. Actually *Youth and Treasury finale* and also, we started to look at trade finance.

I'm mainly responsible for the design, delivery and management of trading platforms for ecommerce foreign exchange dealing and, more recently, (international) trade finance payments businesses. He also claims that ensuring value from IT/IS investment is something he has been involved in for sometime.

IC2

I handle financial business side such as invoicing, while my colleague handles project management, new lead; in fact he is acting like a managing director. A third person is in charge of all technical development. However, I do some programming, so does my other two colleagues.

Appendix F: Abbreviations

Abbreviation	Definition
IT	Information Technology
IS	Information Systems
IHC	Indirect Human costs
MEFM	Management, Employee, Finance and Maintenance Divisions of an organisation
IAMC Framework	Framework for Identifying, Allocating, Managing and Control of IHCs
IIHCDM	Interrelationship Indirect Human Cost driver mapping
IHCD	Indirect Human Cost Driver model
FCM	Fuzzy Cognitive mapping

Appendix G: Traditional Appraisal Techniques

Here is a brief description for some of the traditional appraisal techniques

Pay Back

The payback method looks at how long it takes for a business to recover its initial investment. How long will it take before the cost savings or increased income repays the initial investment.

Discounted Payback Period

The discounted payback period can be defined as the period required for the initial cash investment in a project to equal the discounted value of the expected cash inflows. The discounted payback method is similar to the payback period in that it looks at the length of time it takes a project to "payback." The difference lies in the discounting of the cash flows with the discounted payback period, while the cash flows are not discounted in the traditional payback period. The discounted payback period is a better gauge of break-even than the payback period because it is a period beyond which a project generates economic profit rather than accounting profit . The discounted payback period is also a more conservative approach to capital budgeting than the traditional payback period.

Net Present Value

One method of comparing different options is to consider the NPV of each. Provided an appropriate interest rate is chosen, an investment with a NPV which is positive is worth pursuing. If a choice between investments has to be made, the one with the highest NPV is the more profitable. The first step in calculating NPV is to estimate the cash flows, both positive and negative, for the expected life of the project. This could be expenditure on a CAD (Computer Aided Design) system for a service business, or on plant for a manufacturing business, or the total cost of a Research and Development (R&D) project, together with the income expected to arise from that expenditure. The net cash flow is usually shown as the net profit, ignoring interest and tax and depreciation, which does not represent a movement of cash.

Internal Rate of Return

The alternative to calculating net present value is to calculate the IRR. This is the estimated annual percentage return on the initial investment, once again allowing for the fact that future receipts are worth less than receipts today. With NPV a pre-determined rate of return I used. Calculating the IRR provides the rate of return for a project. The IRR is, simply, the discount rate which gives an NPV of zero. It is the same as the figure which lenders quote as the Annual Percentage Rate (APR). It can be compared to the cost of the capital or, in larger businesses, often to a predefined threshold. If it is higher than the cost of capital or the threshold, the investment is worth pursuing; an investment with a higher IRR is more profitable. Uncertainty also needs to be considered. The more risky a project, the higher IRR is to compensate for the risk, but assumptions may be less certain. Therefore, a lower level of risk may be chosen and a lower IRR accepted. Calculating the IRR is normally used by larger companies, who need to know the precise yield, and who have a minimum threshold below which they will not accept projects. The IRR can be determined by calculating NPVs at different rates of interest, and then interpolated to show the interest rate for an NPV of zero.

Return On Investment

The term Return on Investment (ROI) is commonly used in different ways. In financial circles, the strict meaning of Return on Investment (ROI) is "Return on Invested Capital, a measure of company performance: The company's total capital is divided into the company's income (before interest, taxes, or dividends are subtracted). Alternatively, ROI is sometimes equated with Return on Assets: a company's income for a period divided by the value of assets used to produce that income.

Sources:

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2) http://www.sbaer.uca.edu/Research/1990/SBIDA/90sbi012.htm
3) http://www.msu.edu/course/prr/371/BUDGET%20READINGS/Capital%20Budgeting%20&%20Investment%20Analysis.htm#return%20on%20investment%20(ROI).