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UNIVERSITY OF THE WITWATERSRAND

RESEARCH REPORT

IT Portfolio Management: Barriers to Adoption and Strategies for Overcoming Them.

SUBMITTED TO THE SCHOOL OF ECONOMIC AND BUSINESS SCIENCES FOR THE 50% RESEARCH COMPONENT OF A MASTERS (BY COURSEWORK AND RESEARCH) DEGREE

DEPARTMENT OF INFORMATION SYSTEMS

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Declaration

I declare that this research report is my own effort. It is submitted for the degree of Master of Commerce (by coursework) in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any other degree or examination in any other university.

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Name

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Date

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Abstract

As organisations continuously attempt to do more with less, Chief Information Officers (CIOs) must manage their portfolio of IT investments more effectively and efficiently. In order to achieve this, CIOs can adopt a portfolio management approach; however, there are barriers to the adoption to IT portfolio management.

The purpose of this research was to explore the barriers to adoption of IT portfolio management. The barriers were identified by respondents from various sectors and across various levels in their organisations and then ranked in order to determine the most critical factors that impede adoption of IT portfolio management. Data was collected using the Delphi ranking type method, and targeted at CIOs, IT executives, and project managers. The questionnaire was designed to identify perceptions of the most significant barriers to IT portfolio management adoption and strategies for mitigating the effects of these barriers were drawn from the literature.

The rank order of 11 barriers was determined from the individual ratings and rank orders of 38 respondents in the final phase with ***'the lack of executive sponsorship, support, and understanding of IT portfolio management'*** being ranked as the most critical barrier.

Key Words: barriers; information technology; portfolio management

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Chapter 1: Introduction to the barriers to IT portfolio management adoption

Organisations today are continuously faced with the challenge of meeting the demand of new work with limited resources. More than ever, organisations have to get their products even quicker to market, and must be able to adapt quickly to changing environmental and legislative needs and requirements. Management by projects has been marketed in the industry as the key towards meeting these challenges, or at least help in bringing about some structure in the way work is managed in an organisation. However, projects themselves do not provide the complete solution. Projects focus on delivering work in a focused and disciplined manner. What is even more important is the ability for organisations to *choose the right projects* in the first place. This is where portfolio management comes in.

Similar to the way an investor on the stock exchange defines portfolios for investment, an organisation, and specifically the IT department, needs to define portfolios for its investments. The term "investments" is used here to describe the effort and decision making capability relating (but not limited) to hardware, software, and application purchases, as well as application development towards meeting the requirements of the business. Weill (2003) classifies IT investment areas that make up an organisation's IT portfolio as: transactional IT; Informational IT; strategic IT; and Infrastructure.

1.1. Background

Cooper, Edgett, and Kleinschmidt (2000, pg. 14) define portfolio management (hereinafter referred to as ITP_fM) as "a dynamic decision making process whereby, a business's list of active new products and projects is constantly updated and revised; new projects are evaluated, selected, and prioritised; existing projects are accelerated, killed, or de-prioritised; and resources are allocated and re-allocated to the active projects."

The Project Management Institute (PMI) defines portfolio management in their Guide to the Project Management Body of Knowledge (PMBOK), 3rd edition, as "The centralised management of one or more portfolios, which includes identifying, prioritising, authorising, managing and controlling projects, programs and other related work to achieve specific strategic business objectives."

Leliveld and Jeffery (2003) define ITP_fM as the combination of tools and methods used to measure, control and increase the return on individual IT investments and on aggregate enterprise level. A portfolio is defined as including all direct and indirect IT projects and assets, including components such as infrastructure, outsourcing contracts and software licenses.

Frisk and Planten (2004) recognise that IT portfolio management is an approach that could create opportunities to establish an overview and compare multiple IT projects. With the growing number of IT projects in organisations and the increasing demand for IT investments to pay off and generate value, this could be a way to obtain better control over IT projects.

To place IT portfolio management in perspective, Jiang & Klein (1999) identify ITP_fM as a discipline under the broader categorisation of IS planning which assists organisations in executing business plans and realising business goals.

Meta Group research (2002, pg.5) provides a comprehensive definition. The management of the IT portfolio is the management of "a set of assets (hardware, software, human capital, processes and projects), mapped to investment strategies (based on risk tolerance and business goals), according to an optimal mix (the percentage or range of investment made in each business area), based on assumptions about future performance, (strategic and tactical growth expectations of the business), to maximize the value/risk tradeoffs (ensuring that the selected IT investments provide the desired level of business value for the cost and risk involved) in optimising the organisation's return on IT investment". This definition will be used in this report.

Portfolio management is recognised in the industry and literature as a preferred approach for managing IT resources and investments more effectively. ITP_fM is clearly an important part of strategic information systems planning and IT management.
However, the adoption of portfolio management in IT seems to be difficult. There are barriers that prevent the adoption of IT portfolio management. This research will contribute towards a better understanding by practitioners and researchers of the challenges associated with the adoption of ITP_fM.

1.2. Problem statement

It is widely acknowledged that business spending in IT is a significant part of the budget. CIOs must justify the investments in IT by proving that the business is deriving benefit or value from these investments. However, the decision making regarding investments in IT is usually not a formal process and sometimes excludes business involvement. Essentially, those individuals or departments with the perceived political clout have their projects prioritised for resources and funding.

Meta Group research (2002) shows that companies with the ability to evaluate IT spending based on business impact and business value improves the value of IT to the business by 25% annually. The research also predicted that by 2005, more than 50% of CIOs (global 2000 companies) would adopt portfolio management (techniques and tools) for IT evaluation and investment management.

However, there are challenges to the adoption of IT portfolio management. The Meta Group research found the following challenges or obstacles for portfolio management adoption (page 15):

1. Non-current business drivers will compromise model accuracy.
2. Individuals will fail in modifying existing project management tools to provide visibility into business reward and risk modelling.

3. Managers will fail to recognise that IT assets have a useful life and that such assets require an exit or replacement strategy designed and engineered as carefully as implementation plans are.
4. Because of the measurable performance details maintained, some staff, project leaders and managers will react negatively to IT portfolio management, seeing it as the "big brother" watching their every move.
5. Failing to learn from less successful ERP implementations, IT performance will be sub-optimised by implementing portfolio management without a concomitant focus on process.
6. The things decision makers will, by necessity, change. Oftentimes, an executive team will not be in alignment as to what "value" really is to begin with. Portfolio management processes must address the challenge of creating a common vision and set of definitions for value. Best in class portfolio management processes will help executives evolve their notion of value rather than setting it in concrete.

Leliveld and Jeffery (2003) found that while interest in ITP_fM is very high, only a minority of organisations surveyed (24%) have optimised the ITP_fM approach for maximum business value. While ITP_fM is important, it is not used as extensively as it should be. It is important, therefore, to understand what barriers presently prevent the adoption of ITP_fM so that practitioners can determine strategies for overcoming these barriers.

1.3. Research Objectives

IT portfolio management is an important and necessary approach in the evaluation of IT investments, but adoption of ITP_fM is not easy. Understanding the barriers to ITP_fM adoption and determining the strategies for overcoming these barriers will extend the knowledge in this area of strategic IS planning.

The objectives of this research are:

1. Confirm that IT leaders are familiar with ITP_fM and that a lack of awareness is not an issue
2. Confirm the extent to which ITP_fM is used
3. Determine what factors form barriers to the adoption of ITP_fM
4. Determine the rank order of these factors in terms of criticality
5. Establish whether a set of barriers are observed more frequently in one organisation type as opposed to others.
6. Determine what strategies have been or could be used to overcome the most critical barriers identified.

1.4. Importance of research for practitioners and academia.

This research will be important to practitioners as:

1. It will provide a consolidated list of barriers to the adoption of ITP_fM
2. It will rank the barriers and make visible those barriers not initially identified by some of the respondents
3. Strategies for overcoming critical barriers will be identified by this research, thereby, enabling practitioners to address their specific barriers using the strategies identified by this research.

This research will be important to academia as:

1. It will add to the body of knowledge on ITP_fM, specifically in the area of constraints or critical success factors for adoption of ITP_fM,
2. It will provide a foundation or basis for further research in the area of ITP_fM, such as portfolio management processes, models and methodologies.

1.5. Structure - Chapter Outline

The remainder of the report consists of the following chapters:

Chapter 2 – Literature review

The theoretical background is presented by discussing research related to IT portfolio management (ITP_fM), confirming the awareness of ITP_fM within the IT community and determining any barriers to the successful adoption of IT portfolio management identified by other research.

Chapter 3 – Research Methodology

This chapter describes the Delphi rank-type methodology and justifies its use for this research project. The chosen method for analysing the data is also described in this chapter.

Chapter 4 – Findings

Key findings are summarised and the data is presented in chapter 4. Observations made during the process of data collection are made here as well.

Chapter 5 – Discussion of results

The data will be analysed to:

1. Confirm that IT leaders are familiar with ITP_fM and that a lack of awareness is not an issue
2. Confirm the extent to which ITP_fM is used
3. Determine what factors form barriers to the adoption of ITP_fM
4. Determine the rank order of these factors in terms of criticality
5. Establish whether a set of barriers are observed more frequently in one organisation type as opposed to another.

The 6th objective, which is to Determine what strategies have been or could be used to overcome the most critical barriers identified, will be drawn from secondary research (literature) and not from primary data.

Chapter 6 – Conclusion

Conclusions are drawn from the research, and management guidelines and recommendations for further research are presented here.

Chapter 2: Literature Survey

2.1. Introduction

The purpose of this chapter is to review the literature pertaining to IT portfolio management and the barriers to adoption. The importance of IT portfolio management is discussed in relation to Information Systems planning and IT investment management beginning with the development of modern portfolio theory. In this chapter, the researcher discusses IT success, IT evaluation, advantages of IT portfolio management, tools, models and measures and portfolio management maturity, in order to provide context and support for the concept of IT portfolio management. The chapter concludes with a discussion on the adoption of IT portfolio management and a summary of barriers found in the literature.

2.2. Modern Portfolio Theory

In the early 1950s, Harry Markowitz began developing his theories on modern portfolio management (MPT). Applying the concepts of variance and co-variance, Markowitz showed that a diversified portfolio of financial assets can be optimised to deliver the maximum return for a given level of risk (Teach and Goff, 2003). Markowitz was awarded the Nobel Prize in economics for his work in portfolio theory in 1990 and is referred to as the 'father of modern portfolio theory (MPT)'.

Markowitz (1999, pg.1) described his first article (1952) on the topic of MPT:
"My 1952 article on portfolio selection proposed expected (mean) return, *F*, and variance of return, *V,* of the portfolio as a whole as criteria for portfolio selection, both as a possible hypothesis about actual behaviour and as a maxim for how investors ought to act. The article assumed that "beliefs" or projections about securities follow the same probability rules that random variables obey. From this assumption, it follows that (1) the expected return on the portfolio is a weighted average of the expected returns on individual securities and (2) the variance of return on the portfolio is a particular function of the variances of, and the covariances between, securities and their weights in the portfolio."

Markowitz (1952) distinguished between efficient and inefficient portfolios. He proposed that means, variances, and covariances of securities be estimated by a combination of statistical analysis and security analyst judgment. From these estimates, the set of efficient mean-variance combinations could be derived and presented to the investor for choice of the desired risk-return combination. He used geometrical analyses of three- and four-security examples to illustrate properties of efficient sets, assuming nonnegative investments subject to a budget constraint.

Roy (1952) also proposed making choices on the basis of mean and variance of the portfolio as a whole. He proposed choosing the portfolio that maximises portfolio $(E - d)/\sigma$, where d is a fixed disastrous return and σ is standard deviation of return. Roy's formula for the variance of the portfolio included the covariances of returns among securities. The main differences between Roy's analysis and Markowitz' analysis were that Markowitz required nonnegative investments whereas Roy's allowed the amount invested in any security to be positive or negative *and* Markowitz proposed allowing the investor to choose a desired portfolio from the efficient mean-variance combinations whereas Roy recommended choice of a specific portfolio.

In 1981, the Harvard Business Review published an article by Warren McFarlan which took Markowitz's theory in a different direction. McFarlan argued that the fundamentals of portfolio management could be applied to corporate technology assets. McFarlan (1981) identified deficiencies with IS projects from personal experience with IS projects in the ten years prior to the article. These he summarised as having to do with a failure to assess individual project risk and the failure to consider the aggregate risk of the portfolio of projects. McFarlan points out that the systematic analysis of risks at the portfolio level reduces the number of failures and helps in communication between IS managers and senior executives towards reaching agreement on risks to be taken in line with corporate goals.

Further, he suggested that the selection of projects based on the risk profile of the portfolio could reduce the risk exposure to the organisation. However, McFarlan does not go into any detail regarding portfolio management methodology, approach, or definition but merely introduces the concept from a perspective of risk management.

Kersten and Ozdemir (2004) presented results of the application of Markowitz's modern portfolio theory (MPT) on a product portfolio of an IT company. They concluded that with the mean variance theory constructed by Markowitz, the management of a product portfolio can be improved. The results show a considerable decrease in risk, while maintaining the same return. Even with constraints applied on the portfolio and its products, the optimal portfolios perform far better. They added that the mean variance theory has proven its worthiness for an IT-product portfolio. By evaluating returns achieved in the past, portfolio selection is possible. However, returns from the past do not guarantee the same results in future. The model cannot foresee any event that could occur in the future. It only diversifies the portfolio by looking at the results of the past. The results gave the executive board of their case study insight into which direction to adjust the portfolio. They concluded that the application of MPT to domains other than for which it was originally developed yields interesting results. Their study introduced a quantitative approach to product portfolios and IT portfolios.

However, Verhoef (2005) suggests that MPT does not work for IT. According to Verhoef, IT investments are illiquid, that is they cannot be readily converted into cash. Liquidity is a necessary assumption for applying MPT. Nevertheless, trade articles such as that by Ross (2005) and Berinato (2001) recognise that the process of managing IT projects using a financial investment portfolio metaphor has attracted much interest from CIOs in Fortune 1000 companies. Teach and Goff (2003) refer to a Meta Group survey done that year which found that more than half of the 219 IT professionals surveyed had either implemented or planned to implement some aspect of portfolio theory by the end of 2004.

2.3. IT Success

Brockway and Hurley (1998) suggest that success in IT is dependant on delivering operations and systems alignment with business strategy. Any organisation should have knowledge about what systems are in place, which systems are being developed, which business processes they support and what technologies support these systems.
Further, the organisation should know how much is being spent on IT, how well it is aligned with the business strategy, and how efficient IT really is.

Another factor for IT success is the management of risk. Baccarini, Salm and Love (2004) found that most of the strategies for managing risk entail the application of project management and that very few IT risks have to do with technical issues.

Understanding the critical role of project management as a key and encompassing strategy for managing IT project risk is necessary for project success. As referenced from McFarlan earlier, it is important for organisations to look at the aggregate risk of the portfolio of projects (IT investments) rather than just the individual projects. In addition, Armour (2005) notes that all projects are risky. With reference to software projects specifically, he points out that at the start of any project, there are always key variables of the project that are unknown. Armour (2005) also draws a parallel between IT project portfolios and investment portfolios and states that it is okay to invest in high-risk projects, provided there is an associated return on investment.

2.4. IT evaluation

While much is done to get projects or investments approved, less is done in terms of evaluation and confirmation of return on investment. Ward, Taylor, and Bond (1996) presented the findings of a survey of industry practices in the evaluation and realisation of IS/IT benefits in the UK. The results of the survey confirmed that there were (at that time) no satisfactory methods for identifying and quantifying benefits. A practice which is still prevalent today is that of post implementation reviews. Ward *et al.* confirm that post implementation reviews are used to assess time and cost conformance for IT

development rather than success or failure in delivering desired results or even evaluating the return on investment some time after the project has been completed.

Hitt and Brynjolfsson (1996) separated the issue of IT value into three dimensions – (1) the effect of IT on productivity; (2) the effect of IT on business profitability: (3) the effect of IT on consumer surplus. Their empirical examination confirmed that IT's value can be interpreted differently depending on how you look at it. IT may increase productivity but does not necessarily lead to business profits. An example would be technical projects that are necessary to improve system performance or transition to a new version of an operating system or database. This is important to remember when determining which projects make up the portfolio and the post evaluation or assessment of the portfolio performance.

Stewart and Mohamed (2002) suggest that the management of technology should be in the form of an investment management process, where an integrated approach is adopted to provide for the continuous identification, selection, monitoring and performance evaluation of IT projects, thereby providing organisations with a systematic method to minimise risks while maximising return on IT investments. They suggest the investment management process should have elements of IT project selection, IT implementation and monitoring, and IT performance evaluation.

Frisk and Planten (2004) discuss IT portfolio management in relation to the IT evaluation process. They see ITP_fM as an approach to create opportunities for comparing multiple IT projects. They recognise that the growing number of IT projects and the increasing demand for IT investments to pay off and generate value, would require a portfolio management approach in order to have control over existing and new IT projects and investments.

2.5. Portfolio of Investments

Leek (1997) identifies a portfolio of four categories of information systems projects. These are: strategic, operational, high potential, and support. Ward and Peppard (2004) illustrate the above categories as a means for facilitating agreement between senior management on the portfolio of projects available and required. Projects are categorised according to their business contribution. This is presented in appendix B.

Dickinson, Thornton and Graves (2001) found that companies invest in IT projects to remain competitive and that due to resource limitations, the organisation is required to strategically allocate resources to these projects. In their paper, they present a model, developed for the Boeing Company, to optimise a portfolio of product development improvement projects. The model also balances risk, overall objectives, and the cost and benefit of the entire portfolio. They explain that once the optimum strategy is identified, the model enables the team to quickly quantify and evaluate changes to the portfolio.

Jiang & Klein (1999) argue that IS planning is the process of identifying a portfolio of computer-bases applications that will assist an organisation in executing its business plans and realising its business goals. The authors also are of the opinion that in the selection of projects the choice and weighting of different criteria is crucial.

Solomon (2002) states that the obvious benefit of project portfolio management is that it gives executives a bird's-eye view of projects so they can spot redundancies, spread resources appropriately and keep close tabs on progress. She also notes that what CIOs find appealing is the focus on projects as a portfolio of investments and, therefore, look beyond the cost of a single project to the anticipated risks and return in relation to other projects, thereby, allowing CIOs to mix their portfolios in order to produce the highest returns.

Pickus (2003) makes a case for IT portfolio management by describing portfolio management as the basic model for IT investment planning, and suggests that organisations still make the mistake of doing IT planning at the project level with little

or no analysis done on the impact on the organisation as a whole. He recognises that organisations tend to have hundreds of projects running concurrently, all competing for the same resources and suggests that IT planning must happen at a higher level than the project level.

Kersten and Verhoef (2003), assess IT portfolio management from a banker's perspective. They describe IT portfolio management as a total approach that can be applied in order to establish a balance between risk and return. They also point out that it is important to know whether the portfolio is balanced in terms of technology, distribution, company strategy, and markets.

Kwan and West (2004) evaluate the diverse nature of IT and the implications for enterprise IT portfolio management. They note that prior study, "(McFarlan (1981); Kirsch (1997); Weill and Vitale (1999)" focus on internally developed applications. They suggest that consideration of the returns to IT spending must consider the entire application stack, from off-the-shelf systems to middleware and customised applications. They also note that previous research on strategic IS has assumed that value is achieved only if the information systems are highly strategic and aligned to the company's strategy. They suggest that consideration should be given to the different requirements within the organisation allowing for strategic and non strategic investments to form the IT portfolio. They conclude that the field needs additional research on how decisions are made regarding the IT portfolio.

Varghese and Kurien (2004) look beyond the strategic alignment of information systems (applications) and consider enterprise architecture flexibility and IT delivery efficiency. They feel it is critical to manage the information infrastructure as a portfolio and that the process of ensuring architecture flexibility and delivery efficiency is aligned with the organisation's strategic planning process.

In his article, Kifer (2005) summarises what many authors have stated in their articles or studies. Kifer states that portfolio management takes a holistic view of a company's

overall IT strategy. IT and business leaders vet project proposals by matching them with the company's strategic objectives. The IT portfolio is managed like a financial portfolio, where riskier strategic investments are balanced with more conservative investments and the mix is constantly monitored to assess which projects are on track, which need help, and which should be shut down.

D'Amico (2005) confirms what Kifer has stated in his article. He suggests that just as an investor diversifies his investments, an organisation should diversify their IT projects through project portfolio management. He recognises that the portfolio should be made up of a balance of high and low risk projects and offers a recommendation for managing the portfolio, which includes understanding the strategic goals of the organisation, assembling a cross functional portfolio management team, taking an inventory of projects, aligning them with strategic goals, prioritising them, and evaluating them regularly.

Dooley, Lupton, and O'Sullivan, (2005) suggest that projects need to be viewed as an integrated portfolio rather than a disjointed collection and that managing multiple projects brings a new set of problems that the organisations must address.

Jeffrey (2005) views IT investments as a portfolio, similar to financial portfolios of stocks and options with each IT investment having a different risk and return or ROI. He defines the methodology for choosing and managing an optimal IT portfolio as IT portfolio management and defines the process as including scorecards that executive management can use to rate projects on multiple dimensions, ranking them in relative order of importance.

2.6. Key advantages of ITP_fM

Gabas-Varini (2003) lists the following as key benefits or advantages of ITP_fM from companies who have adopted it:

1. Having a comprehensive and shared view of all ongoing or planned projects and initiatives and associated key indicators. This simple step of data collection and consolidation enabled many CIOs to realise how much work was in progress and the lack of updated, relevant performance measurements; notably for the evaluation of anticipated contribution.
2. Being able to regularly monitor the alignment of ongoing and planned projects with corporate strategy and to eliminate high-risk non-aligned projects with low ROI before they affect corporate profitability.
3. The encouragement of arbitration based on criteria such as balance, risk, contribution to specific business areas or profitability of invested capital. This exercise is conducted at the highest level of management and involves the operational entities to confirm their commitment and share the decisions.
4. Being able to regularly monitor the alignment of ongoing and planned projects with corporate strategy and to eliminate high-risk non-aligned projects with low ROI before they affect corporate profitability.
5. The encouragement of arbitration based on criteria such as balance, risk, contribution to specific business areas or profitability of invested capital. This exercise is conducted at the highest level of management and involves the operational entities to confirm their commitment and share the decisions.

Turbit (2005) identifies the following benefits of ITP_fM:

1. Faster response to changing conditions
2. More quick wins
3. Not having minor projects escalate into major undertakings
4. Focus on what will achieve the initiative rather than on the project itself
5. IT responsibilities centred on one business area rather than trying to compromise across several

6. Blending business and IT projects and treating both as contributors to the same goal
7. Portfolios can be constantly reviewed and altered if necessary to produce the highest returns based on changing situations
8. Management see the projects as groups of activities contributing to an initiative. They are not a series of unrelated work.
9. Dependencies are easier to identify. If we don't upgrade these servers, we can't run the new software. Both are part of the same initiative.

Ericson (2003) notes that the value of ITP_fM is found in the fact that projects gain value relative to one another and that organisations move beyond doing projects well to doing the right projects in the first place.

2.7. Tools

Many ITP_fM solution providers offering solutions or tools have emerged. This is evident from the website listings in a Google search on IT portfolio management. At the point in time when this report was compiled, a search on "IT Portfolio Management" revealed 383,000 hits. A search for "solution providers" within the main search revealed 136,000 hits. This does not mean that there are 136,000 solution providers or tools, as the list includes (inevitably), duplicates, direct links to solution providers as well as articles relating to their solutions (tools). Nevertheless, the above gives an indication of the focus on tool solutions.

The tools (or solutions) offer status (progress against baseline schedules) and expense tracking rolled up to a portfolio level. Portfolio progress reporting from these tools tend to include more advanced reporting such as bubble diagrams which indicate the expected return on investment and risk per project in the portfolio. Such reports make it easier for the CIO or executive management reviewing portfolio progress to assess performance of projects in relation to one another.

However, Duffy (2002) notes that the tools are relatively immature and while they are evolving quickly, they are not yet able to analyse IT investments completely. Before tools can help, the project management and portfolio management discipline needs to be in place.

Hoffman (2003) describes categories of tools and makes the following observations:

1. Project management portfolio packages, such as the one from ProSight Inc. primarily focus on managing individual projects from start to finish. They typically provide limited portfolio management and analysis capabilities.
2. More sophisticated analytical tools are offered by vendors such as New York-based United Management Technologies Corp. (UMT) and Ann Arbor, Michigan based Program Planning Professionals Inc., also known as Pcubed.
3. While the niche vendors focus on project management and IT portfolio management capabilities, enterprise software vendors such as PeopleSoft, Oracle and Computer Associates International Inc. are beginning to make inroads in the IT portfolio management space.
4. A shortcoming of most IT portfolio management tools is their inability to focus on the life cycle of an asset, determine the financial value of a software package or piece of hardware and indicate whether or when it makes sense to retire that technology.
5. Vendors still need to fill gaps in their IT portfolio management products as these systems lack the ability to assess risks, a critical component in evaluating IT investments.

2.8. ITP$_f$M Models and Measures

Even though interest in the ITP$_f$M approach has only recently been increasing, a number of models have been suggested. Ghasemzadeh, Archer and Iyogun (1999), for example, propose an optimisation model for selecting and scheduling an optimal project portfolio based on the organisation's objectives and constraints such as resource limitations and interdependence among projects, as part of the overall process of selecting project

portfolios. The proposed model addresses the major issues that should be considered in project portfolio selection. These issues include the existence of multiple, conflicting criteria, resource limitations, project interdependencies, portfolio balancing in terms of risk and time to complete, and project scheduling. Ghasemzadeh *et al*. (1999) do caution, however, that algorithms should not be used to prescribe solutions without allowing for judgment, experience, and insight of decision makers. Project portfolio selection is a process that includes several related steps.

A white paper published by Grant Thornton (2003) proposes four imperatives that comprise what they call Agile Portfolio Management (hereinafter referred to as APM). They define APM as the combination of four principles that go beyond software to fundamentally improve the way IT organisations think about projects. The principles are:

1. Select a mix of low-risk and high risk investments with the highest combined value
2. Optimise the staging of the portfolio by understanding project dependencies, complexity and payoff
3. Allocate skills necessary to support the portfolio
4. Actively select the portfolio risk profile.

The four imperatives are:

1. Valuation
2. Optimisation
3. Allocation and
4. Risk Selection

These principles and imperatives are not really different from that of portfolio management as generally described by previous authors. Further on, however, they suggest that the portfolio management process be decoupled from the planning and budgeting cycle of the business. While they claim this to be a rewarding aspect of APM, more research needs to be done to determine whether coupling or decoupling the

portfolio management process and the planning and budgeting cycles is more or less beneficial to the organisation.

Stewart and Mohamed (2002) observe that financial benefits have always been considered as the prime objective for selecting IT projects, but that there is a growing awareness of other objectives such as competitive advantage, market share and future growth. They suggest using multi-criteria utility theory (MCUT) for project selection. MCUT takes into consideration the decision maker's preference in the form of utility function which is defined over a set of criteria (Goicoechea, Hansen, Duckstein – 1982).

Benko and McFarlan (2004) offer a portfolio management methodology and suggest the following three key ideas for improving the performance of a portfolio.

1. Expand the goal setting activities of the organisation to include adoption of best practice project management
2. Use the notion of "sides" to profile the project portfolio and its impact on processes
3. Break major projects into smaller projects – or 'chunks'. Chunking keeps planning, managing, and evaluation of projects aligned with changing market realities.

Cable, Ordonezi, Chintalapani and Plaisant (2004) investigate the use of Earned Value Management (EVM) for tracking project performance across the portfolio and explore the benefits of an interactive visualisation technique called Treemaps to display project performance metrics for the entire portfolio. EVM integrates scope, schedule and resources for measuring project performance. It compares the amount of work that was planned with what has been accomplished to determine cost and schedule performance (PMI, 2004).

Jeffrey (2005) recognises that a major challenge for executives is deciding which IT projects to fund. For a large organisation, this could be a complex decision as their IT budget runs into several million dollars with hundreds of projects running

simultaneously. He goes on to discuss the ITP_fM process and concludes that as we move into the next phase of the technology revolution, e-business initiatives will be evaluated on the same basis as other investments made by the organisation.

As part of the process of choosing which projects to fund, organisations must use some process or approach for ranking projects. Buss (1983) suggested that top management, IS managers, and users should be involved in ranking IT projects. He stated that factors which affect the ranking of IS (project / investment) proposals include: 1 – its financial benefits, 2 - its technical importance, 3 - business objectives, 4 – intangible benefits such as decision support. He concluded that projects can be ranked on a cost-benefit analysis, followed by ranking according to intangible benefits, technical importance, and degree of fit with corporate objectives.

2.9. Portfolio Management Maturity

Pennypacker (2005) describes five levels of Portfolio Management Maturity (pp 35 – 37).

Level 1: Initial Process

There is a recognition that that there are project portfolio management processes; however, there are no established practices or standards. Project managers are not held accountable by any standards and documentation is ad hoc.

Level 2: Structured Process and Standards

Portfolio management processes exist in the organisation but are not considered organisational standards. Management supports the implementation of portfolio management but there is no organisational mandate for all projects to comply with.

Level 3: Organisational standards and Institutionalised Process

Portfolio management processes are in place and established as organisational standards. Nearly all projects and project portfolios use these processes with minimal exception.

The portfolio management processes are automated and each project and portfolio is evaluated against organisational strategy and business value.

Level 4: Managed process

Portfolios are managed with consideration given to past performance and future expectation. Common objectives and metrics are defined for the portfolio and reviewed periodically with senior management to balance the portfolio. Portfolio information is interated with other corporate systems o optimise business decisions.

Level 5: Optimising Process

Processes are in place and actively used to improve project portfolio management activities. Lessons learned are used to improve the portfolio management process, standards and documentation. Focus is on continuous improvement and metrics collected during execution are used to improve management decision making capability.

The Centre for Business Practices (2005) surveyed 54 senior level project portfolio management practitioners and reported that more than 90% of organisations are at Level 1 or 2 in project portfolio management maturity and none are at level 4 or 5. Observations from the study are that organisations which use portfolio management better align their projects to business strategy and tend to work on the right projects. They also found that the more mature the organisation, the more benefits the organisation realised due to their portfolio management practices. For other organisations who want to experience the same gains as a result of using *and/or* developing their maturity in portfolio management, it is necessary that they are aware of the potential barriers so that they can develop strategies for overcoming them.

The Centre for Business Practices (2005) reported the following improvements as organisations moved from maturity level 1 to 3:
(*Rating was based on a 5 point scale*)

	Level 1	**Level 2**	**Level 3**
Allocating resources optimally	2.7	3.1	3.6
Killing poor projects	2.8	2.9	3.5
Spending in the right areas	3.1	3.5	3.8
Working on the right projects	3.4	3.5	3.6
Eliminating project redundancies	3.1	3.2	3.4
Increased cost savings	3.3	3.4	3.6
Better aligning projects to strategy	3.7	4.1	4.2
Increased profits	3.2	3.4	3.8
Managing gaps in portfolio	2.8	3.4	3.6

2.10. Adoption

Adopting the portfolio management approach is not easy. Cooper, Edgett and Kleinschmidt (2000) have noticed that while there is an increase in interest in portfolio management, effective portfolio management has proven to be an illusive goal for many businesses. They go on to say that some of the difficulties related to portfolio management include: resource balancing, prioritising projects against each other, making go/kill decisions, and too many minor projects in the portfolio.

Gliedman (2002) recognises that few organisations perform any regular portfolio planning, analysis or reporting. As a result, the investors in IT operate with less information. He suggests that adding an appropriate set of financially based tools at the project and portfolio levels can improve IT alignment, effectiveness and resource utilisation. Gliedman's observation that few organisations perform regular portfolio planning is an indication that the adoption of ITP_fM is slow. This is despite the fact that portfolio management is a topic of considerable discussion in the IT trade press.

Teach and Goff (2003) note that the public sector in the United States of America may be ahead of the private sector in embracing IT portfolio management. They refer to the Clinger-Cohen Act of 1996 which made IT portfolio management mandatory for federal agencies and report that the state of Washington, for one, has been practicing it since 1998. Verhoef (2002) concluded earlier that while the Act enforced the use of IT portfolio management, it did not explain how it should be implemented operationally.

Verhoef (2002) also notes that there is increasing interest in deploying IT portfolio management. He quotes a 2002 survey of 400 IT executives where 60% reported an increase in the level of pressure to prove ROI on IT investments, but 70% believed their metrics did not capture the value of IT. He suggests that quantitative IT portfolio management will benefit organisations who want to implement IT portfolio management. He presents tools and benchmarks to aid implementation.

Leliveld and Jeffery (2003) look at the challenges and best practices of IT portfolio management. According to the findings of their research, 89% of the respondents demonstrated strong awareness of ITP_fM, and 65% believed ITP_fM would yield significant value. However, very few organisations (24%) appeared to be maximising the value that could be obtained from ITP_fM. They identify some possible barriers to ITP_fM adoption. These include: (1) Estimating IT benefits is a challenge; (2) Lack of the right metrics with which to measure value; (3) IT staff lack knowledge of financial concepts; (4) IT staff turnover is a major issue; (5) Lack of mutual respect and understanding makes business executives misuse ITP_fM to generate reasons for not spending on IT; (6) Business and Strategy decision makers lack good knowledge of IT; (7) IT project scope changes too often to practically track financial benefits. These are just seven of the top ten reasons identified by the survey and each reason was cited by at least thirty percent of the respondents.

Dooley and O'Sullivan (2003) highlight the following **difficulties associated with portfolio management:**

1. poor leadership and direction
2. poor alignment between goals and projects
3. poor monitoring of holistic process results
4. poor planning and control of action implementation

Kifer (2003) notes the following as possible hurdles to portfolio management.

1. Decision making must be done by group consensus as opposed to individuals.
2. There is no tool for ITP_fM that does everything.
3. Management now has to make the tough decisions regarding which projects to run and which to cancel.
4. ITP_fM will require more focus from management.

For portfolio management to be adopted successfully by any organisation, there has to be an established culture and project management discipline and practice. Kendra and Taplin (2004) conclude that for organisations to be successful with the adoption of project management (and for that matter, portfolio management), they need to establish a shared set of values and beliefs (a project management culture) that aligns with the social and technical aspects of project management to achieve the organisation's business objectives.

2.11. Conclusion

IT departments are continuously being asked to do more with less. Prioritising and allocating limited IT funds requires the appropriate level of decision making. Competing demands on IT from the business and within IT itself places pressure on the IT manager in terms of project / investment selection. Making IT decisions in the absence of an understanding of the organisation's strategic direction will lead to poor IT investments and lost opportunities for IT to support business strategy. To improve the IT investment decision making process, IT portfolio management is being adopted by chief

information officers as the approach to follow. There's no single right way to do ITP_fM. Vendors, consulting companies, and academics offer tools, methods, approaches and models, and often organisations develop their own methodologies.

From the literature survey, it can be concluded that there are many opinions about IT portfolio management, but that adoption of ITP_fM is not easy. Understanding the barriers to ITP_fM adoption and determining the strategies for overcoming these barriers will extend the knowledge in this area of strategic IS planning and help practitioners and researchers get a better understanding of the issues in ITP_fM. This report will confirm barriers identified in existing literature and establish further barriers that are important to executives, IT managers and project managers within the South African context.

Summary of barriers to ITP_fM adoption from the literature include:

a) Project Scope changes too often and there are too many incomplete projects.
b) The inability to estimate, measure, and report IT benefits.
c) Without benchmarking current practice and delivery and then regularly measuring the benefits of portfolio management there is no way to justify its existence.
d) A lack of skilled resources to perform the portfolio management function.
e) Business leaders don't understand that ROI is not always applicable.
f) Business executives regard IT as a necessary evil.
g) Companies are unable to align their budgets with business needs more than once a year.
h) Companies do not do business cases for any of their projects.
i) ITP_fM is seen as a "big brother" watching every move of project managers. Hence it will attract resistance.
j) Managers will fail to recognise that IT assets have a useful life and that such assets require an exit / replacement strategy
k) Individuals will fail in modifying existing project management tools to provide visibility into business reward and risk modelling.
l) Lack of project management culture and discipline.
m) More focus on projects required from management. Management forced to decide which projects to keep and which to cancel.
n) There is no tool for ITP_fM that does everything.
o) Decision making (for project selection) must be done by group consensus as opposed to individuals.

CHAPTER 3: Research Methodology

3.1. Introduction

The purpose of this chapter is to explain the methodology and data collection and analysis approach chosen for this research.
The rank-type Delphi survey method was chosen as the approach for data collection.

The Delphi technique was developed by NC Dalkey and associates at the Rand Corporation in the 1950's. It is used in applications such as group decision making, predictions concerning the impact of new policies, and research to identify and rank key issues for management attention (Delbecq, Van de Ven, & Gustafson, (1975)).

The most significant difference between the Delphi technique and many other methods is that respondents do not communicate with one another (Delbecq *et al* 1975). There is also a high degree of anonymity and participants do not have to travel but can respond at their convenience within a time limit (Addison and Allan (2002)).

The method consists primarily of knowledgeable and expert contributors individually completing a survey and submitting results to a central coordinator. The coordinator processes the contributions, looking for central and extreme tendencies. The results are fed back to the respondent group who are asked to resubmit views based on 'new' input provided by the coordinator. The process continues until an acceptable level of consensus has been reached. This process is more easily facilitated through the medium of e-mail.(Addison and Allan (2002)).

3.2. Data Collection

3.2.1. Method/Instrument

Schmidt, Lyytinen, Keil and Cule (2001) state that in order to ensure a reliable and validated data collection process, the research (or inquiry) must be open to divergent opinions and that feedback-based convergence and closure on factors that really count must be sought. The ranking-type Delphi Survey method was chosen, therefore, as it allows for feedback or contribution from a divergent group of respondents and allows for convergence towards determining the critical barriers. The ranking-type Delphi survey method has also been used in various research projects done on key issues in information systems. This lends further support of this method for this research project.

The Delphi method is a series of linked questionnaires beginning with an open-ended questionnaire. Succeeding questionnaires feed back group responses to the preceding questionnaire and ask for further information. The process stops when consensus has been reached or sufficient information has been gathered (Brancheau *et al* -1987).

On the surface, Delphi seems like a very simple concept that can easily be employed. However, Linstone and Turroff (1975, page 6) list some of the reasons for failure:

1. "Imposing preconceptions or views of a problem upon the respondent group
2. Poor techniques of summarising and presenting the group response
3. Ignoring and not exploring disagreements so that discouraged dissenters drop out and an artificial consensus is generated
4. Underestimating the demanding nature of a Delphi and the fact that respondents should be recognised and compensated for their time if the Delphi is not an integral part of their job function."

An advantage of Delphi, which was attractive for this research, is the fact that a Delphi can be conducted without bringing the respondents together physically. For the purpose of obtaining divergent opinions from respondents across various companies and locations, it would have been a logistical challenge to bring respondents together physically.

Linstone and Turoff (1975, page 192) predicted that "widespread use of the (Delphi) methodology would result in continued modification of the original design and that the use of on-line Delphi techniques will spread." They suggested that there would be a whole family of Delphi-inspired techniques in a broad range of applications. This is evident from Schmidt (1997) who suggests an approach for IT related research.

Linstone and Turoff (1975) offer the following advice for Delphi Designers and Monitors: (page 226)

1. "When presenting statements for a vote, be aware of ambivalent wording. Two statements may appear to mean the same thing. Vague wording may also lead to misinterpretation.
2. When editing respondents' comments, try to preserve the intent of the originator
3. Design the handling of data so that each response can be processed as it comes in
4. Keep track of how different sub-groups in the respondent group vote on specific items
5. Pre-test questionnaire on any willing candidates. Go over the design of the questionnaire with a sponsor."

The above advice has been followed in this research.

Blum (2005) found that Delphi research is an excellent method when experts in a certain field are located and the problem is solved in a more effective manner based on subjective conclusions. The researcher inquires the experts with open-ended questions, gathers data, and then based on a consensus of the answers, re-interviews the same experts for more opinions. With the advent of emails, this method has become easier to achieve.

Schmidt (1997) suggests that data should be collected using three distinct phases in Delphi ranking-type surveys. He states that the objective of the first phase is to discover the issues; the list of issues is narrowed down in the second phase; and the third phase is

used to reach consensus on the ranking of the issues. The method for Delphi ranking-type surveys presented by Schmidt (1997) was used as the principle method for this study. However, a variation was applied as in Scott and Walter (2001) and Addison (2003). This variation entailed respondents rating issues on a Likert scale; thereafter, software was used to count responses by Lickert type, enabling phase 3 ranking.

A pilot group was established to evaluate and verify the initial set of questions and a small sample of respondents, which included a lecturer, CIO, company director, project manager, and business development manager, was asked to evaluate the questionnaire as a pre-test to confirm the questions were clear and understandable.

Phase One:

Survey questionnaires were emailed to a convenience sample (associates of the researcher) of more than sixty (60) CIOs, IT executives, and project managers across various companies in Gauteng, South Africa. These companies ranged from banks and insurance companies within the financial services sector to software development and other service providers within the ITC sector. The target group comprised of IT executives and professionals. Fifty (50) responses were received in the first phase. A minimum of thirty (30) homogeneous responses were targeted from project / program managers.

The researcher also approached IT Web (IT online magazine) to have the survey published on their website. Due to the timeframe and IT Web's deadlines, a third party was sourced to provide the survey tool and database for storing the responses. Visitors to the IT Web site could click on the survey advert and be directed to the survey hosted by the third party. The survey advert remained on the IT Web site for a period of one month; however, the number of responses via this channel was poor. Only four (4) responses were received.

In this phase, the following was addressed:

(a) ITP_fM was described and the level of awareness amongst the target group was queried.

(b) The level of ITP_fM adoption and use amongst the target group was determined.

(c) Respondents were asked to provide a list of a minimum of ten barriers. Respondents were also asked to provide a brief description (rationale) of each barrier as this would give clarity where the same or similar barriers were worded differently.

(d) Results were collated and consolidated and where the description of barriers was unclear, respondents were approached to provide more clarity.

Barriers were grouped according to broad categories which was not predetermined but which became apparent from the responses. This is referred to as inductive analysis of data, meaning that the critical themes emerged out of the data (Patton, 1990).

The categories included:

1. Executive Support,
2. Implementation,
3. Culture of teamwork,
4. Measurement and metrics,
5. Governance,
6. Knowledge and understanding,
7. Risk management,
8. Data and Tools,
9. Skills,
10. Organisation size and structure,
11. Communication,
12. Process and methodology,
13. Project Management Office, and
14. Organisation Maturity and change management.

This aided in the collation process where similar barriers were placed under the broad categories. The 35 distinct barriers could then be determined.

Phase Two:

The objective in this phase was to pare the list of issues to a manageable list that the participants can rank. Feedback from phase one was sent to respondents and they were asked to confirm their acceptance of the list of barriers. Barriers should not be presented in any order of importance as this may influence respondents when ranking these barriers. Respondents were asked to choose their top ten barriers as a means of narrowing the list of barriers. This approach was used by Brancheau, Janz, and Wetherbe (1996); as well as Galliers, Merali, and Spearing (1994).

In phase two, barriers listed in the literature were included in the list of barriers from respondents.

Phase Three:

Respondents were presented feedback on a minimised list and were requested to rate the top eleven barriers in order to reach closer consensus on the importance of barriers. The minimised list comprised eleven barriers as opposed to ten due to the fact that four barriers shared the same number of nominations from phase two.

To motivate the respondents to cooperate with the researcher, they were offered a summary of the final results. Further, the cover letter outlined the benefits from the study to the respondent and their respective organisations.

Refer to appendix A for the survey instrument.

Strategies for overcoming barriers

Once the ranked list of barriers was determined, a further survey of the literature was done to identify strategies for overcoming these barriers. Studies such as that done by Leliveld and Jeffery (2003) and Cooper *et al.* (2000) offered approaches to successful ITP_fM adoption.

3.3. Data Analysis

3.3.1. Reliability & Validity

According to Stenbacka (2001), the answer to creating good validity is very simple. The understanding of a phenomenon is valid if the informant is part of the problem area and if he/she is given the opportunity to speak freely according to his/her own knowledge structures. Validity is therefore achieved when using strategically well defined informants.

Patton (2001) states that validity and reliability are two factors which any researcher should be concerned about while designing a study, analysing results, and judging the quality of the study. Lincoln & Guba, (1985) suggest that the terms Reliability and Validity are essential criteria for quality in quantitative paradigms. Consistency or Dependability and Applicability or Transferability are to be the essential criteria for quality.

Lincoln & Guba, (1985) further state that, "Since there can be no validity without reliability, a demonstration of the former is sufficient to establish the latter." (p.316).

The following section describes the analysis steps that will be adopted when analysing the data received per survey question linked to each research objective.

The objectives of this research are:	**Survey Questions:**	**Analysis Steps**
1. Confirm that IT leaders are familiar with ITP_fM and that a lack of awareness is not an issue	5.1. How would you rate your understanding of ITP_fM on a scale of 1-5 (1 = not good; 5 = excellent) 4.1. If your organisation is using a portfolio management approach, please rate the following items (characteristics) on a scale of 1-5 (1 = weak; 5 = strong) in terms of the extent to which each characteristic is emphasised in your organisation.	5.1. Determine percentage of respondents who scored 3 or more. 4.1. Determine percentage of respondents who confirm their companies use portfolio management Determine percentage that score 3 or more (i.e. how successful is each of the characteristics being

	a. *The list of IT projects / investments is actively managed. Projects are selected, prioritised, de-prioritised (if strategic objectives have changed).* b. *Portfolio management tools and methods are used to measure and control the IT portfolio performance.* c. *Resource allocation is managed across IT projects.* d. *A portfolio management steering committee or similar forum meets regularly to actively manage the IT portfolio(s).*	applied).
2. Confirm the extent to which ITP_fM is used	2.1. Does your organisation translate its *business* strategy into specific portfolios? 2.2. Does your organisation translate its *IT* strategy into specific portfolios? 3.1. Does your organisation specifically select or identify projects or programs to fulfil the *business* and *IT* strategic objectives? 3.2. Are the projects or programs that are undertaken in your organisation balanced in terms of risk and return on investment? 3.3. Does your organisation use an IT portfolio management steering committee (or similar group or forum) to plan the portfolio (select / deselect projects / investments)?	Determine the extent to which strategy is translated into portfolios and further into projects and whether the project selection process considers risk and return on investment.
3. Determine what	**Delphi phase 1**	Analyse the list of barriers

factors form barriers to the adoption of ITP_fM	6.1. What do you consider to be the most critical barriers to the adoption of IT portfolio management? Adoption here means to actively practice the approach or discipline rather than just buying into the philosophy of portfolio management. Please provide a brief rationale for each item placed on the list.	received per respondent and determine any obvious categories of barriers.
4. Determine the rank order of these factors in terms of criticality.	**Delphi phase 2 and 3**	The most important barriers must be determined in Delphi phase 2 & 3, firstly by selecting the top ten (individual's choice) in phase 2 and then rating them in phase 3. The results from phase 3 are then ranked.
5. Establish whether a set of barriers are observed more frequently in one organisation type as opposed to others.	**Delphi phase 2 and 3**	Draw a comparison of input across respondent companies taking into account the demographic information.
6. Determine what strategies have been or could be used to overcome the most critical barriers identified.	**Literature**	Strategies for overcoming barriers will be sought from the literature

Chapter 4 - Findings

4.1. Phase 1

4.1.1. Response Rate

In Phase 1, 60 respondents were approached to participate. 50 respondents completed and returned the first survey document. The deadline for the Phase 1 responses was extended due to the time in the year that the survey was distributed. The survey was sent in November, a period in the year which proved to be a busy one before respondents went on summer holiday in December. The deadline was extended to the end of January once respondents returned from their vacations. To further ensure a good response rate, respondents were continuously reminded via SMS, email, voicemail and face-to-face conversation.

4.1.2. Results of data screening

Responses were screened as and when they were received. In some instances, clarity had to be obtained with the relevant respondents as to the description of the barriers they listed as well as the rationale used.

4.1.3. Respondent profile and demographics

Respondents at various levels were targeted. According to Delbecq, Van de Ven, & Gustafson, (1975), few new ideas are generated within a homogenous group once the size exceeds 30 participants. Nevertheless, a homogenous group of 33 project and program managers were determined as a subset of the sample.

The researcher also targeted respondents across industries / sectors to ensure that a balanced view was achieved as opposed to a single industry / sector biased view. The following tables describe the respondent in the first phase according to various demographic criteria.9

The researcher targeted various respondents at various levels in the organisation by focussing on a homogenous group or project / program managers. In some

organisations, the designation of Development Manager is used to represent project / program managers.

Table 1

Representation of respondents by designation

Designation	No.
General manager IT / CIO – (chief information officer)	2
CEO – (chief executive officer)	1
CTO – (chief technology officer)	1
Director / Executive manager	2
Business owner / Managing Director	2
Risk specialist	1
Analyst	1

Designation	No.
Engineer	1
Academic and community development specialist	1
IT Architect	1
Development / Program / Project manager	33
Head of Systems Development	1
Associate / Consultant	1
Accounts Manager / Manager	2

It was also important to get responses from various industries / sectors in order to determine if any barriers were experienced more significantly in one industry when compared to other industries. As can be seen in table 2, a fairly broad spectrum of industries is represented with most respondents coming from the insurance, medical aid administration and IT professional services & consulting sectors.

Table 2

Representation of respondents by Industry / Sector

Industry	No.
Professional Services & Consulting	9
IT Software development	5
Transportation	1
Government Services	4
Banking & Financial	4
Education & Training	2
Insurance (Long term & Short term)	9
Food	1

Industry	No.
Mining	1
Telecommunications	1
Pharmaceutical	1
Manufacturing	1
Medical Aid Administration	9
Aerospace	1
Casino/Entertainment & Hospitality	1

4.2. Phase 2

4.2.1. Response rate

Since the beginning of phase 1, some of the respondents changed employers. Three respondents could not be reached and another respondent requested to be removed from the survey. Of the remaining respondents, 39 responded to Phase 2.

In phase 1, 150 "barriers" were received from the 50 respondents. The barriers were carefully reviewed and categorised according to themes that became evident from the data.

The literature was also surveyed for any barriers that were not identified by respondents.

A list of 35 distinct barriers (including those from the literature) was determined once duplicates from the respondent submissions were removed. This list was sent to the respondents who were asked to choose their top ten barriers without ranking or rating them.

Below, is an example of a barrier where the process of consolidating various responses into a single description of the barrier was followed. Under the category of Process/Methodology, 9 respondents submitted barriers. After consultation with respondents it was agreed that the final description of the barrier was appropriate to describe the remaining descriptions of the same barrier.

PROCESS / METHODOLOGY
BARRIER
Final Description of barrier: Absence of methodology to manage portfolio of IT projects, and a lack of project selection criteria and project life cycle standardisation
Response 1: Process / Methodology Executive / Management understanding of the prescribed process / methodology and the ability to understand how and what the incorporation of such a process into the company will mean. As a result of complete understanding there also needs to be an ability to adapt and modify the process to better suit the company's needs in such a way as to keep the process / methodology principles intact.
Response 2: Tools are not always necessary, provided that adequate processes exist to accomplish the same goal.
Response 3: Absence of methodology to manage portfolio of IT projects and the inter-dependency therein.
Response 4: Inconsistent use of project and portfolio management processes
Response 5: The heads of business units, in conjunction with the senior IT leaders in each of those units, should compile a list of projects during the annual planning cycle and support them with good business cases that show estimated costs, ROI, business benefit and risk assessment. The leadership team should vet those projects and sift out the ones with questionable business value.
Response 6: A senior-level IT steering committee or IT Council made up of business unit heads, IT leaders and perhaps other senior executives meets to review the project proposals; a good governance structure is central to making this work.
Response 7: IT projects tend to be completed on an ad hoc basis therefore do not follow formal SDLC or planning process.
Response 8: CobiT not fully implemented. CobiT when fully implemented will ensure that the IT portfolio is well managed
Response 9: Processes: People within the enterprise do not follow a specific approach that was chosen to manage the projects auditing: projects may come to an end or be completed successfully but whether the project was managed properly is another thing altogether because factors like proper budgeting need to be taken into consideration, proper resource management, time allocation have to be considered. We in IT need to start auditing the performance of managers and see if they delivered on the above.

4.2.2. Consolidated list of barriers

The following is the consolidated list of barriers from phase 1 from which the respondents had to select their top ten.

Barriers 2, 6, 7 and 11 were identified by respondents and literature.

Barriers 19 to 27, 29 and 30 were identified in the literature only.

The remaining barriers were identified by respondents only.

Table 3

Consolidated list of barriers presented at the start of phase 2

#	Barrier
1	A lack of executive sponsorship, support, and understanding of IT portfolio management.
2	Project Scope changes too often and there are too many incomplete projects.
3	A lack of middle management driving the operationalisation or application of IT portfolio management.
4	A lack of commitment and teamwork throughout the process.
5	Measuring IT project performance often highlights huge inefficiencies, time and cost overruns and strategic misalignment which do not reflect well on staff and management, resulting in resistance.
6	The inability to estimate, measure, and report IT benefits.
7	Without benchmarking current practice and delivery and then regularly measuring the benefits of portfolio management there is no way to justify its existence.
8	A lack of understanding of Portfolio management or where to start with regards to adoption.
9	Lack of effective Risk management. A culture of risk management is required in order to support effective portfolio management.
10	Underlying IT project data and portfolio management tools are lacking.
11	A lack of skilled resources to perform the portfolio management function.
12	Organisation is too small to warrant a portfolio management approach.
13	The decentralised structure of the IT organisation makes it difficult to implement a standard portfolio management approach across the organisation.
14	IT Portfolio management introduces a management overhead and increases the total spent within the IT Organisation.
15	In a growth phase, (project) cost is not a priority. Thus the impact of no portfolio management is not obvious. The opportunity costs are not measured; hence there is no awareness of the potential loss that may be incurred.
16	Absence or poor implementation of a methodology to manage the portfolio of IT projects, lack of project selection criteria and project life cycle standardisation.
17	The lack of a formal or effective PMO (Project Management Office) will impact the adoption of a portfolio management approach.
18	A lack of communication and respect between CIO and business executives.
19	Business leaders don't understand that ROI is not always applicable.

20	Business executives regard IT as a necessary evil.
21	Companies are unable to align their budgets with business needs more than once a year.
22	Companies do not do business cases for any of their projects.
23	ITP_fM is seen as a "big brother" watching every move of project managers. Hence it will attract resistance.
24	Managers will fail to recognise that IT assets have a useful life and that such assets require an exit / replacement strategy
25	Individuals will fail in modifying existing project management tools to provide visibility into business reward and risk modelling.
26	Lack of project management culture and discipline.
27	More focus on projects required from management. Management forced to decide which projects to keep and which to cancel.
28	The capability maturity of the organisation is not at a level for portfolio management adoption
29	There is no tool for ITP_fM that does everything.
30	Decision making (for project selection) must be done by group consensus as opposed to individuals.
31	Strategy at board level and middle management level is misaligned
32	Business demands pushing for immediate delivery. There's no time for elaborate portfolio management as new initiates require quick response.
33	Weak IT governance. Organisations feel the discipline of formal methodologies introduces bureaucracy and restricts their creativity and flexibility.
34	Strong silos prevent adoption of portfolio management discipline
35	Traditional Communication structures inhibit portfolio management discipline

4.2.3. Results from Phase 2

Once respondents had submitted their list of 10 most critical barriers, the responses were collated and the nominations per barrier, counted.

Graph 1 shows the distribution of nominations of barriers in phase 2:

Eleven (11) barriers made up the new list due to a four way tie for eighth place.

Graph 1: Distribution of nominations for barriers received in phase 2

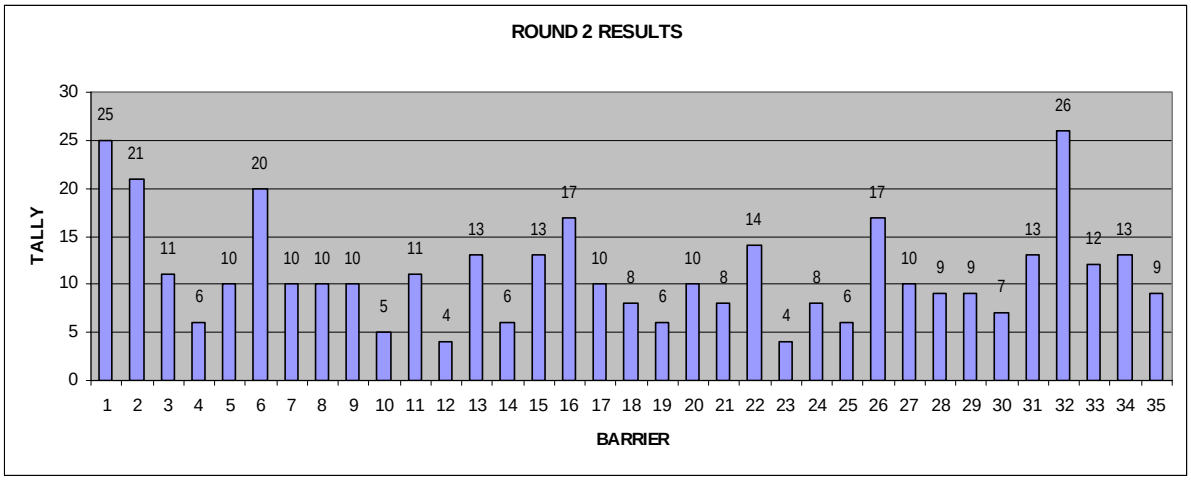

Table 4: Top 11 barriers

#	Barrier	Nominations
1	A lack of executive sponsorship, support, and understanding of IT portfolio management.	25
2	Project Scope changes too often and there are too many incomplete projects.	21
6	The inability to estimate, measure, and report IT benefits.	20
13	The decentralised structure of the IT organisation makes it difficult to implement a standard portfolio management approach across the organisation.	13
15	In a growth Phase, (project) cost is not a priority. Thus the impact of no portfolio management is not obvious. The opportunity costs are not measured; hence there is no awareness of the potential loss that may be incurred.	13
16	Absence or poor implementation of a methodology to manage the portfolio of IT projects, lack of project selection criteria and project life cycle standardisation.	16
22	Companies do not do business cases for any of their projects.	14
26	Lack of project management culture and discipline.	17
31	Strategy at board level and middle management level is misaligned	13
32	Business demands pushing for immediate delivery. There's no time for elaborate portfolio management as new initiates require quick response.	26
34	Strong silos prevent adoption of portfolio management discipline	13

(The number in the left column represents the number of the barrier as it appeared in the previous list of 35 barriers)

Barriers 2 and 6 were identified by respondents and literature in the original list.
Barrier 26 was identified in the literature only. Quite a number of barriers identified by literature only did not make the final selection of top 11 barriers.

4.3. Phase 3

4.3.1. Response Rate

The results from phase 2 were collated and the top 11 barriers were chosen for rating. The list of 11 barriers were sent to respondents from phase 2 who were asked to rate the barriers on a scale of importance from 1 to 10, with 1 = low importance and 10 = high importance. 34 respondents returned their ratings within the stipulated timeframe.

While carrying out Phase 3, the researcher was invited to attend a workshop on Project portfolio management. At the workshop, the researcher invited candidates to respond to Phase 3 of the survey and rate the 11 barriers. Only 4 responses from 20 candidates were received. The workshop candidates were not asked to carry out phases 1 and 2 as this would have changed the minimised list of barriers. They were; however, apprised of the 3 phase process and were willing to participate in future rounds if required.

4.3.2. Results from Phase 3

All responses were screened to ensure correctness. One respondent had given a barrier two ratings. The respondent was asked to correct the rating and her response was then added to the summary table.

Table 5 shows the combined summary results of the 34 respondents from the original target group and the 4 respondents from the workshop.
Table 6 shows the summary results of the 4 respondents from the workshop only.

Table 5

Summary results.

			(Low) LEVEL OF IMPORTANCE (High)									
#	BARRIER	Mean	1	2	3	4	5	6	7	8	9	10
1	A lack of executive sponsorship, support, and understanding of IT portfolio management.	7	0	2	5	2	2	2	5	3	8	9
2	Project Scope changes too often and there are too many incomplete projects.	6	0	5	3	3	4	2	9	2	6	4
6	The inability to estimate, measure, and report IT benefits.	6	0	1	1	5	5	6	9	7	3	1
13	The decentralised structure of the IT organisation makes it difficult to implement a standard portfolio management approach across the organisation.	5	3	5	7	4	6	1	5	5	2	0
15	In a growth Phase, (project) cost is not a priority. Thus the impact of no portfolio management is not obvious. The opportunity costs are not measured; hence there is no awareness of the potential loss that may be incurred.	6	0	3	2	6	6	7	4	3	3	4
16	Absence or poor implementation of a methodology to manage the portfolio of IT projects, lack of project selection criteria and project life cycle standardisation.	7	0	0	5	4	4	4	2	8	2	9
22	Companies do not do business cases for any of their projects.	6	3	4	1	3	3	3	4	9	6	2
26	Lack of project management culture and discipline.	6	0	3	3	2	7	4	3	8	3	5
31	Strategy at board level and middle management level is misaligned.	7	1	3	1	1	3	6	9	4	5	5
32	Business demands pushing for immediate delivery. There's no time for elaborate portfolio management as new initiates require quick response.	7	0	5	1	2	2	6	3	8	5	6
34	Strong silos prevent adoption of portfolio management discipline.	6	2	4	3	4	4	5	4	6	5	1

Table 6

Summary results of respondents from workshop:

		LEVEL OF IMPORTANCE									
		Low									High
#	BARRIER	1	2	3	4	5	6	7	8	9	10
1	A lack of executive sponsorship, support, and understanding of IT portfolio management.									2	2
2	Project Scope changes too often and there are too many incomplete projects.		1	1		2					
6	The inability to estimate, measure, and report IT benefits.				1	1	1	1			
13	The decentralised structure of the IT organisation makes it difficult to implement a standard portfolio management approach across the organisation.		1	2				1			
15	In a growth Phase, (project) cost is not a priority. Thus the impact of no portfolio management is not obvious. The opportunity costs are not measured; hence there is no awareness of the potential loss that may be incurred.		1	1				1			1
16	Absence or poor implementation of a methodology to manage the portfolio of IT projects, lack of project selection criteria and project life cycle standardisation.								1		3
22	Companies do not do business cases for any of their projects.								2	1	1
26	Lack of project management culture and discipline.							1	1		2
31	Strategy at board level and middle management level is misaligned.							1	2		1
32	Business demands pushing for immediate delivery. There's no time for elaborate portfolio management as new initiates require quick response.		1			1			1		1
34	Strong silos prevent adoption of portfolio management discipline.			1				1	1	1	

4.4. Presentation of results grouped by survey question

1	STRATEGY DEFINITION		
1.1.	How frequently does your organisation review its business (overall) strategy?	Every Year	92%
		Once every 2 years	6%
		Less frequently than once every 2 years	2%
1.2.	How frequently does your organisation review its information technology (IT) strategy?	Every Year	78%
		Once every 2 years	12%
		Less frequently than once every 2 years	10%

Interpretation:

More than 90% of companies review their business strategy annually, but less than 80% of organisations review their IT strategy annually. 14% of companies, who review their business strategy annually, do not review their IT strategy as frequently.

2	STRATEGY TRANSLATION		
2.1.	Does your organisation translate its business strategy into specific portfolios?	Yes	72%
		No	28%
2.2.	Does your organisation translate its IT strategy into specific portfolios?	Yes	72%
		No	28%

Interpretation:

More than 70% of organisations translate their business *and/or* IT strategies into specific portfolios. While the results suggest that 72% of respondent organisations do both, the data reveals that some organisations do one or the other; that is, they translate either their business strategy *or* IT strategy into specific portfolios.

3	PORTFOLIO PLANNING & IMPLEMENTATION		
3.1.	Does your organisation specifically select or identify projects or programs to fulfil the business and IT strategic objectives?	Yes	86%
		No	14%
3.2.	Are the projects or programs that are undertaken in your organisation balanced in terms of risk and return on investment?	Yes	62%
		No	38%
3.3.	Does your organisation use an IT portfolio management steering committee (or similar group or forum) to plan the portfolio (select / deselect projects / investments)?	Yes	76%
		No	24%

Interpretation:

While a large proportion of organisations carry out project selection aligned to strategic objectives, a smaller number of organisations balance their projects in terms of risk and return on investment. The implication for those organisations that are not balancing their projects in terms of risk and return on investment is that while they may be doing the right projects, they may not be optimising the project portfolio and could focus more energy on projects with low return on investment.

4	PORTFOLIO PERFORMANCE MEASUREMENT	(1 = weak performance; 5 = strong / excellent performance)	
4.1.a.	The list of IT projects / investments is actively managed. Projects are selected, prioritised, de-prioritised (if strategic objectives have changed).	1	4%
		2	18%
		3	38%
		4	28%
		5	12%
4.1.b.	Portfolio management tools and methods are used to measure and control the IT portfolio performance	1	20%
		2	32%
		3	24%
		4	12%
		5	12%
4.1.c.	Resource allocation is managed across IT projects.	1	8%
		2	20%
		3	36%
		4	26%
		5	10%
4.1.d.	A portfolio management steering committee or similar forum meets regularly to actively manage the IT portfolio(s).	1	8%
		2	18%
		3	30%
		4	28%
		5	16%

Interpretation:

Generally, respondents felt they are managing their portfolios well. However, less than 50% feel they have the necessary tools and methods to measure and control the IT portfolio performance.

5	LEVEL OF UNDERSTANDING OF ITPfM		
5.1.	How would you rate your understanding of ITPfM on a scale of 1-5 (1 = not good; 5 = excellent)	1	24%
		2	20%
		3	32%
		4	14%
		5	10%

Interpretation:

A small majority of respondents claim to have a moderate to excellent understanding of portfolio management. This confirms that IT leaders are familiar with IT portfolio management and that a lack of awareness should not be an issue.

4.5. Summary: Interpretation of findings matched to survey questions and research objectives.

Previously stated objectives of this research:	Survey Questions:	Interpretation and links to literature
1. Confirm that IT leaders are familiar with ITPfM and that a lack of awareness is not an issue	5.1. How would you rate your understanding of ITPfM on a scale of 1-5 (1 = not good; 5 = excellent) 4.1. If your organisation is using a portfolio management approach, please rate the following items (characteristics) on a scale of 1-5 (1 = weak; 5 = strong) in terms of the extent to which each characteristic is emphasised in your organisation. a. *The list of IT projects / investments is actively managed. Projects are selected, prioritised, de-prioritised (if strategic objectives have changed).* b. *Portfolio management tools and methods are used to measure and control the IT portfolio performance.* c. *Resource allocation is managed across IT projects.* d. *A portfolio management steering committee or similar forum meets regularly to actively manage the IT portfolio(s).*	All respondents answered the question which confirms that all respondents have some level of awareness of ITPfM. 56% of respondents claim to have a moderate to excellent understanding of portfolio management. More than 50% of organisations manage their portfolios but less than 50% have the necessary tools to measure and control the IT portfolio performance.

Continued:

Previously stated objectives of this research:	Survey Questions:	Interpretation and links to literature
2. Confirm the extent to which ITPfM is used	2.1. Does your organisation translate its *business* strategy into specific portfolios? 2.2. Does your organisation translate its *IT* strategy into specific portfolios? 3.1. Does your organisation specifically select or identify projects or programs to fulfil the *business* and *IT* strategic objectives? 3.2. Are the projects or programs that are undertaken in your organisation balanced in terms of risk and return on investment? 3.3. Does your organisation use an IT portfolio management steering committee (or similar group or forum) to plan the portfolio (select / deselect projects / investments)?	More than 70% of organisations translate their business and/or IT strategies into specific portfolios. The majority of respondents have indicated that their organisations do select projects that are aligned to business and IT strategic objectives. A smaller majority indicated that they also balance projects in terms of risk and return on investment. 76% of respondents indicated that they use an IT portfolio management steering committee or similar group to plan the portfolio. The above suggests that organisations are using ITPfM to a greater or lesser degree.

Continued:

Previously stated objectives of this research:	Survey Questions:	Interpretation and links to literature
3. Determine what factors form barriers to the adoption of ITPfM	Delphi Phase 1 & 2 6.1. What do you consider to be the most critical barriers to the adoption of IT portfolio management? Adoption here means to actively practice the approach or discipline rather than just buying into the philosophy of portfolio management. Please provide a brief rationale for each item placed on the list.	At the end of phase 2, the barriers that received 20 or more nominations were: 1. A lack of executive sponsorship, support, and understanding of IT portfolio management. *Dooley and O'Sullivan (2003) identified* ***Poor leadership and direction*** *as a difficulty associated with portfolio management* *Kifer (2005) notes that ITPfM* ***will require more focus from management****.* 2. Project Scope changes too often and there are too many incomplete projects. *Leliveld and Jeffery (2003) identified that* ***IT project scope changes too often to practically track financial benefits.*** 3. The inability to estimate, measure, and report IT benefits. *Leliveld and Jeffery (2003) identified that* ***estimating benefits was a barrier for adoption of*** *ITPfM****.*** *META (2002) found from their survey that there were no project metrics in place.* 4. Business demands pushing for immediate delivery. There's no time for elaborate portfolio management as new initiates require quick response. *Leliveld and Jeffery (2003) suggest linking effort and contributions to ITPfM to incentives and recognition.*

Continued:

Previously stated objectives of this research:	Survey Questions:	Interpretation and links to literature
4. Determine the rank order of these factors in terms of criticality.	Delphi phase 3 Respondents were asked to RATE the top 11 barriers, after which, the barriers were RANKED.	A clear distinction was made between Rating and Ranking the list of barriers. The responses were summarised into a table, the ratings summed, and a ranking order determined based on the cumulative rating score per barrier.
5. Establish whether a set of barriers are observed more frequently in one organisation type as opposed to others.	Analysis	Generally, most barriers were chosen across industries and sectors. Two barriers were raised specifically by respondents from the insurance sector - barriers 5 and 9: *- In a growth phase; (project) cost is not a priority. Thus the impact of no portfolio management is not obvious. The opportunity costs are not measured; hence there is no awareness of the potential loss that may be incurred*. *- Strategy at board level and middle management level is misaligned.*
6. Determine what strategies have been or could be used to overcome the most critical barriers identified.	From Literature and/or focus group	Strategies for overcoming barriers to the adoption of ITPfM were found in the literature for most of the barriers. The detail can be found in chapter 5.

Chapter 5 - Discussion

Research objective 1: Confirm that IT leaders are familiar with ITPfM and that a lack of awareness is not an issue.

Question 5 of the survey (in phase 1) asked respondents to confirm their understanding of ITPfM on a scale from 1 to 5 where 1 represented a poor understanding and 5 an excellent level of understanding.

A small majority (56%) of respondents indicated a rating of 3 and above, suggesting that there is a good to excellent level of understanding of ITPfM amongst the respondents. This is consistent with Leliveld and Jeffery (2003) who also found that the majority of IT leaders surveyed understood ITPfM. This is important because it gives credence to the rest of the survey in determining the barriers for adoption of ITPfM.

To further validate the awareness and use of ITPfM, question 4 raised specific questions related to the use of ITPfM in the organisations represented. It was found that:

1. The majority of the respondents rated their organisations as moderate to strong performance (rating of 3-5) in terms of actively managing the list of IT projects and investments. This entails project selection, prioritisation, and de-selection.
2. With regard to resource allocation being managed across IT projects, a majority gave their organisations a moderate to strong performance rating.
3. The use of a portfolio management steering committee or similar forum to actively manage the IT portfolio was rated as moderate to strong performance by the majority of respondents.
4. Less than half the respondents indicated a moderate to strong performance rating for the use of portfolio management tools and methods to measure and control ITPfM performance.

Research objective 2: Confirm the extent to which ITP$_f$M is used

While 72% of organisations surveyed translate their IT strategy into specific portfolios, 86% identify projects to fulfil business and IT strategy objectives; 62% say their projects are balanced in terms of risk and return on investment; and 76% plan their portfolio of projects using an ITP$_f$M steering committee or similar forum.

Research objective 3: Determine what factors form barriers to the adoption of ITP$_f$M.

The following factors were chosen by respondents as the most critical barriers to the adoption of ITP$_f$M in phase 2.

#	BARRIER	Nominations Received
1	A lack of executive sponsorship, support, and understanding of IT portfolio management.	25
2	Project Scope changes too often and there are too many incomplete projects.	21
6	The inability to estimate, measure, and report IT benefits.	20
13	The decentralised structure of the IT organisation makes it difficult to implement a standard portfolio management approach across the organisation.	13
15	In a growth phase, (project) cost is not a priority. Thus the impact of no portfolio management is not obvious. The opportunity costs are not measured; hence there is no awareness of the potential loss that may be incurred.	13
16	Absence or poor implementation of a methodology to manage the portfolio of IT projects, lack of project selection criteria and project life cycle standardisation.	17
22	Companies do not do business cases for any of their projects.	14
26	Lack of project management culture and discipline.	17
31	Strategy at board level and middle management level is misaligned.	13
32	Business demands pushing for immediate delivery. There's no time for elaborate portfolio management as new initiates require quick response.	26
34	Strong silos prevent adoption of portfolio management discipline.	13

Research objective 4: Determine the rank order of barriers.

The 34 responses from respondents who participated throughout the research as well as 4 responses from respondents invited to participate in phase 3 only, were combined. The number of nominations per rating per barrier was summed. The totals per barrier were then ranked based on the largest total being ranked as number 1 and the smallest total being ranked as number 11.

For example, barrier 1 received nominations per rating as illustrated below, i.e. 2 respondents gave it a rating of 2, while 7 respondents gave it a rating of 10, and so on. Each rating was multiplied by the number of nominations and a factor of 270 was determined by adding the products for each rating. The factors were compared against each other and ranked accordingly.

		LEVEL OF IMPORTANCE											
		LOW									HIGH		
#	BARRIER	1	2	3	4	5	6	7	8	9	10	TOTAL	RANK ORDER
1	A lack of executive sponsorship, support, and understanding of IT portfolio management.	0	2	5	2	2	2	5	3	8	9		
	Product (nominations x level of importance)	0	4	15	8	10	12	35	24	72	90	270	1

The result of this ranking technique is illustrated in the table that follows:

Table 7: Rank order of barriers

#	BARRIER	Rank Order
1	A lack of executive sponsorship, support, and understanding of IT portfolio management.	1
2	Project Scope changes too often and there are too many incomplete projects.	7
6	The inability to estimate, measure, and report IT benefits.	8
13	The decentralised structure of the IT organisation makes it difficult to implement a standard portfolio management approach across the organisation.	11
15	In a growth phase, (project) cost is not a priority. Thus the impact of no portfolio management is not obvious. The opportunity costs are not measured; hence there is no awareness of the potential loss that may be incurred.	9
16	Absence or poor implementation of a methodology to manage the portfolio of IT projects, lack of project selection criteria and project life cycle standardisation.	2
22	Companies do not do business cases for any of their projects.	6
26	Lack of project management culture and discipline.	5
31	Strategy at board level and middle management level is misaligned.	4
32	Business demands pushing for immediate delivery. There's no time for elaborate portfolio management as new initiates require quick response.	3
34	Strong silos prevent adoption of portfolio management discipline.	10

The level of agreement on the final rankings can be tested statistically.

Brancheau and Wetherbe (1987) used Kendall's Coefficient of Concordance (W) in their Delphi survey to determine the level of agreement amongst respondents in the final phase. This is further supported by Schmidt (1997) who points out that Kendall's method is preferable to other methods when used in a Delphi approach.

Schmidt (1997, pg.771) cautions that "The trade-off between feasibility (the indulgence of the panellists, the researcher's resources, and the additional time required) and the potential gain to be achieved must be considered. When Kendall's W is small, the decision is trivial. But with moderate consensus, the trade-off is more difficult to weigh."

Schmidt (1997) also recognises that Significance level does not indicate strength, it only indicates whether or not some consensus exists. (pg. 771) "For panels of more than ten experts, even very small values of W can be significant."
Siegel (1956) emphasizes that a high or significant value of (W) does not mean that the ordering is correct as it depends on the criterion used by the judges.

The findings from the final phase of the survey in this research indicate the following:

1. When all responses were compared, the consensus was weak (below 0.5) at W=0.1
2. Consensus amongst all project managers was also weak at W=0.1
3. Consensus amongst project managers within one organisation was stronger but still below the 0.5 value. W=0.2.
4. Consensus amongst the CEO, CIO, CTO and MD of an IT company, however, was strong with W=0.5.

The results for the sample outside the respondents that represent the c-suite (CIO,CEO,CTO) can be explained as being due to the fact that their levels in their respective organisations as well as the fact that they represent a number of different types of organisations, suggests that their perception or experience of the barriers is notably different.

The low W proves that there is not a lot of consensus regarding barriers to adoption of ITPfM and suggests that the field is not mature. Further iterations (rounds) in phase 3 could have been administered, however, it was felt that this would not have improved consensus with this sample group to a point of W=0.5.
Ratings in phase 3 were converted to rankings to determine if there would be any influence on the value of W. No difference in W was found.

Research objective 5: Establish whether a set of barriers are observed more frequently in one organisation type as opposed to others.

Most barriers were identified across sectors. Cost not being a priority in a growth phase and board level and middle management level strategy being misaligned were identified by respondents from a life insurance company.

Business demands pushing for immediate delivery was identified as a barrier by respondents in the banking and Medical aid sectors. However, it received a high number of nominations from respondents across sectors in order to make 3rd position on the rank order. The decentralised structure of the organisation as a barrier to adoption received a higher number of ratings from 1 to 5 placing it in 11th position in the rank order.

Table 8: Identification of barriers by sector

RANK	BARRIER	IDENTIFIED BY
1	A lack of executive sponsorship, support, and understanding of IT portfolio management.	Across sectors
2	Absence or poor implementation of a methodology to manage the portfolio of IT projects, lack of project selection criteria and project life cycle standardisation.	Across sectors
3	Business demands pushing for immediate delivery. There's no time for elaborate portfolio management as new initiates require quick response.	Banking and Medical Aid
4	Strategy at board level and middle management level is misaligned.	Life Insurance
5	Lack of project management culture and discipline.	Across sectors
6	Companies do not do business cases for any of their projects.	Across sectors
7	Project Scope changes too often and there are too many incomplete projects.	Across sectors
8	The inability to estimate, measure, and report IT benefits.	Across sectors
9	In a growth phase, (project) cost is not a priority. Thus the impact of no portfolio management is not obvious. The opportunity costs are not measured; hence there is no awareness of the potential loss that may be incurred.	Life Insurance
10	Strong silos prevent adoption of portfolio management discipline.	IT software development company
11	The decentralised structure of the IT organisation makes it difficult to implement a standard portfolio management approach across the organisation.	Insurance Company & IT software dev. company

Research objective 6: Determine what strategies have been or could be used to overcome the most critical barriers identified.

Barrier 1: A lack of executive sponsorship, support, and understanding of IT portfolio management.

Leliveld and Jeffery (2003) note that although ITP_fM ought to be a joint responsibility between IT and business, the initial burden of proof is on the IT organisation. They suggest that initiative has to come from the CIO, with visible support from the CEO and CFO. They further suggest that early consensus with business leaders around ITP_fM scope, objectives, metrics and expectations are established and that when communicating ITP_fM benefits, they should be focused on benefits to the business instead of traditional IT department performance.

Barrier 2: Absence or poor implementation of a methodology to manage the portfolio of IT projects, lack of project selection criteria and project life cycle standardisation.

Cooper et al (2000) discuss challenges related to project selection criteria.

They point out that most project selection tools consider the project against some minimum criteria or hurdle such as NPV (Net Present Value). However, many projects may pass the minimum required criteria. They recommend doing a forced ranking of projects against one another, taking into account the efficient allocation of resources. This ensures that priority is given to projects which have been ranked higher in relation to all other proposed projects.

Barrier 3: Business demands pushing for immediate delivery. There's no time for elaborate portfolio management as new initiatives require quick response.

Leliveld and Jeffery (2003) suggest linking effort and contributions to ITP_fM to incentives and recognition. They also suggest avoiding a big bang approach, as this will alienate participants, and to build confidence in ITP_fM by demonstrating benefits in a phased approach. Attempting to implement ITPfM throughout the organization while delivering business demands would lead to one or the other being done poorly. The

implementation of an ITPfM approach could be seen as interfering with business delivery or perceived as a bureaucratic process.

Barrier 4: Strategy at board level and middle management level is misaligned.

Henderson and Venkatramen (1999) discuss strategic alignment and suggest that the most effective and sustainable uses of IT are those that occur when IT is tightly integrated into every aspect of the organisation's strategic thinking. "Alignment is the degree to which IT resources are directed towards the organisation's strategic objectives."

Lederer and Mendelow (1986) point out that "Strategies must be communicated and implemented throughout the organisation by all levels of business and IT management" and that "Senior managers must ensure that strategies fit with the organisation as a whole and middle managers must work to ensure that strategies are turned into practical and effective blueprints for action, while operational managers focus on implementing and monitoring projects."

Barrier 5: Lack of project management culture and discipline.

Wyatt (2004), in his article on building a project management culture, states that, "A project management culture is an environment that exhibits a healthy respect for the time and dollars spent on a project. Time and money are tracked. Change can be managed. There is a shared commitment for a successful outcome. Every hour spent should count toward the delivery of the scope of the project. Tools and methodologies can help, but it is only through human intervention that project management problems can be resolved. Tools and methodologies can't manage people; people must manage people. Project management cultures can't be bought. They must be built from the ground up and driven from the top down within an organisation. The good news is that there are gains that can be made by committing to some very simple principles for running projects."

Barrier 6: The inability to estimate, measure and report IT benefits.

Kulatilaka and Venkatramen (1999) outline estimating IT benefits as "the process of determining and representing the likely outcomes of pursuing a specific course of action and evaluating the consequences in terms of a value proposition – usually a financial rate of return."

Estimating IT benefits plays an important role in organisations, however, Tallon, Kraemer, Gurbaxani, (2000) recognise that despite its importance, organisations lack the skills for doing this task effectively.

McKeen and Smith (2004) describes strategies for estimating IT benefits. These include:

1. Establish IT's role in creating benefits
2. Classify benefits within the IT portfolio
3. Map IT benefits to business strategy
4. Build IT benefits into project development
5. Use risk to discount IT benefits and
6. Put post implementation reviews (PIRs) to work.

Leliveld and Jeffery (2003) suggest starting small and staying focused by avoiding "broad data gathering excursions that could stir up scepticism across the organisation." New projects are often a good place to start applying ITPM principles and budget processes and metrics that are already in practice in the organisation should be used."

Barrier 7: Project Scope changes too often and there are too many incomplete projects.

Cooper et al (2000) identify some reasons for scope changing too often and projects not being completed. These include (from their research):

1. Preoccupation with financial results and over-emphasis on shareholder value
2. Management impatience and a "just do it" attitude
3. A lack of discipline – urgent things taking precedence over important things.
4. The dynamic nature of markets and competition and
5. The difficulty in finding revenue generators.

Cooper et al (2000) suggest balancing resources (appropriately) across project types. Some resources committed to bolder projects while others are committed to new product development, platform projects, and technology projects.

Barrier 8: Companies do not do business cases for any of their projects.

ITP_fM instils the discipline of ensuring that investment is made in projects that are supported by the business and which provide a tangible return. Jeffery and Leliveld (2004) point out that this is evidenced by the business case. Further, the business case not only allows for projects to be evaluated upfront, but also at the end (post implementation) when evaluating actual performance.

Barrier 9: In a growth phase, (project) cost is not a priority. Thus the impact of no portfolio management is not obvious. The opportunity costs are not measured; hence there is no awareness of the potential loss that may be incurred.

CIOs are required to justify their spending on IT investments. Initially, the focus is on getting the business off the ground and high IT costs are expected to put in place the fundamental systems. A young organisation, therefore, has more activities in a growth phase.

According to Theodore (2000), the organisation must have a strategy to raise the competitive position and weight of these activities. In doing so, cost of and return on investments become a priority. The portfolio management approach becomes a natural selection for managing IT investments; however, it takes commitment at all levels of the organisation (Shefvland, 2003).

Barrier 10: Strong silos prevent adoption of portfolio management discipline.

Leliveld and Jeffery (2003) suggest establishing joint teams with business owners at a tactical level to vet ITP_fM assumptions and confirm that efforts are relevant to the business. Business will buy into the concept if ITP_fM demonstrates value to the business.

Barrier 11: The decentralised structure of the IT organisation makes it difficult to implement a standard portfolio management approach across the organisation.

Brown and Magill (1994) recognise that IT can have a variety of impacts on an organisation's structure. These include changes in managerial structure, roles and responsibilities, processes, new methods of organising work, and integrated systems.
McKeen and Smith (2004) point out that structure is a key factor in how firms organize to promote IT innovation and adoption to get returns from IT investments. This obviously applies to ITP_fM adoption as well. The organisation needs to balance the degree of slack needed for innovation with the degree of control needed to infuse innovation into the organisation. Huber, Miller, and Glick (1990) suggest that the trend in maintaining this balance is toward recentralisation of infrastructure decisions and decentralisation of applications and project management decisions within organisations. For such a structure to work effectively there must be a high degree of sharing between IT and functional (business) areas.

Chapter 6 - Conclusion

In order to ensure successful implementation or adoption of ITP_fM, it is necessary to identify the barriers to adoption of ITP_fM. Hence, the main focus of this research was to determine a ranked list of barriers to the adoption of ITP_fM. The development, definition, relevance, and importance of ITP_fM were described in the earlier chapters. It is necessary to understand and appreciate the value of ITP_fM if one is to seriously consider the barriers to adoption determined in this research.

6.1. The objectives of this research were to:

1. Confirm that IT leaders are familiar with ITP_fM and that a lack of awareness is not an issue
2. Confirm the extent to which ITP_fM is used
3. Determine what factors form barriers to the adoption of ITP_fM
4. Determine the rank order of these factors in terms of criticality
5. Establish whether a set of barriers are observed more frequently in one organisation type as opposed to others.
6. Determine what strategies have been or could be used to overcome the most critical barriers identified.

6.2. What has been accomplished?

1. Confirmed that there is awareness of ITP_fM.

It was necessary to confirm that respondents were aware of ITP_fM so that their contribution to the research could be based on knowledge of the subject and its challenges. All respondents confirmed that they had some level of awareness or knowledge of ITP_fM.

2. Confirmed that a number of companies are in the process of adoption.

Companies recognise the importance of ITP_fM and are gearing themselves towards implementation / adoption. As described in chapter 4, the majority of organisations surveyed are performing aspects of portfolio management, such as translating strategy into portfolios, doing portfolio planning and implementation and portfolio performance management. This research will help in as far as it identifies the challenges these organisations face or have faced when adopting ITP_fM.

The sample may, however, be considered biased as it comprised companies to which the researcher had access through personal contacts, resulting in self-selection.

3. A key list of barriers has been identified as well as strategies for overcoming these barriers.

a. This will help practitioners and organisations in their adoption to plan appropriately for these barriers so that the risk of failure is mitigated.
b. Identifying the barriers and strategies for addressing the barriers, will help academics as it will expand the body of knowledge in ITP_fM, as well as provide input to future research.

4. The rank order of barriers was determined.

The rank order of 11 barriers was determined from the individual ratings and rank orders of 38 respondents in the final phase with the lack of executive sponsorship, support, and understanding of IT portfolio management being ranked as the most critical. A discussion around the level of consensus was also presented.

5. Observation of barriers amongst organisations.

Generally, most barriers were experienced across the types of organisations that participated in the study. While some barriers were identified by 1 or 2 sectors only, it cannot be concluded that those barriers only occur in those types of organisations. These barriers made the final list of 11 which implies that respondents from other sectors agreed that these barriers are important. However, it is also important to

note that while there has been a focus on the top ten or eleven barriers, there were other barriers within 1 or 2 points of being included in the top ten / eleven.

6. **Strategies for overcoming barriers have been discussed.**

There is adequate literature that provides strategies that could be used for overcoming the barriers identified in this research. It is widely accepted, however, that organisations would need to look at their specific circumstances, environment and culture before choosing an approach.

6.3. Limitations of study

The limitations associated with this research include:

1. **Research limited to Gauteng province in South Africa.**

The Gauteng province is the economic hub of South Africa, with the majority of South African company head offices residing in the region. Hence, eventhough respondents were not actively sought after from organisations in other provinces of South Africa, it is unlikely that the results would vary from that presented in this research. Nevertheless, the initial survey was advertised on IT Web – a South African based online IT magazine, allowing respondents from across the country with access to the Web, the opportunity to participate in the survey.

2. **Respondents largely represented the ICT and Insurance sectors**

The ICT and insurance sectors were mainly represented by respondents, due in part to the researcher's access to key individuals in those sectors. Nevertheless, there was representation from other sectors, albeit not as significant as the ICT and insurance sectors. It cannot be confirmed whether or not the outcome of the ranked barriers would have differed, but if the representation was balanced, comparative analysis amongst sectors might have shown possible trends.

3. **Respondents might not have answered survey objectively. Responses may have been influenced by bad personal experiences**

While it was necessary for respondents to provide a list of barriers in phase 1 according to their experience, some initial contributions were expressed

emotionally rather than objectively. Further, some respondents gave reasons for ITP_fM instead of barriers to adoption. This was handled in phase 1 by revisiting the list of barriers with the respective respondents for clarity.

4. **Perception of whether or not an organisation practices portfolio management is experienced differently across the organisation depending on respondent's position and role in the organisation**

The results indicate that experience or exposure to ITP_fM in an organisation varies across management levels. For example, in one organisation, a project manager and the head of systems development disagreed on the following:

a. How frequently the organisation reviewed its IT strategy
b. Whether or not the organisation translated its business and IT strategies into portfolios
c. Whether or not the projects were selected to fulfil strategic objectives
d. Whether or not the portfolio is adjusted to changing strategic objectives
e. The degree to which portfolio performance measurement is done.

5. **Respondent profile of project and program managers.**

The literature focuses on the importance of ITPfM to CIOs. While both CIOs and project managers were targeted for the survey, more project manager responses were received. Project and program managers that participated in the study represented a varied number of years experience. Their levels of exposure to key decision making also varied. Their contribution, therefore, was a broader list of perceived barriers to IT portfolio management adoption.

6.4. Managerial Guidelines

Kifer (2003) suggests the following for ITP_fM implementation:

1. **Gather: Do a project inventory.** Gather a detailed inventory of all projects in the organisation as this provides a good foundation for developing the projects that best meet the strategic objectives.
2. **Evaluate: Identify projects that match strategic objectives.** A good evaluation process can help organisations detect overlapping project proposals, stop projects with poor business cases, and improve alignment between IT and business.

3. **Prioritise: Score and categorise projects.** Even after evaluating the portfolio of projects, there may still be too many projects for the organisation to manage. The prioritisation process will confirm which projects are closer aligned to the organisation's strategic objectives so that resources and budget can be assigned to those projects first.

4. **Review:** Actively manage the portfolio. Naturally, having a prioritised list of projects becomes useless if the projects and the portfolio is not actively managed. Project portfolios must be monitored regularly, which includes making the tough decisions to stop projects that may have gone off the rails or are no longer valid. Finance and human resource effort should not be wasted on projects merely for the sake of completing those projects.

META Group (2002) offers the following guidelines for managers:

1. Ownership of the portfolio must be an executive level function to enable change, institute governance, and facilitate business decision making.
2. Be clear about the differences between portfolio management, program management and project management.
3. IT portfolio management must be integrated into the strategic and tactical planning and budgeting ecosystem.
4. Portfolio analysis requires specialised toolsets and collaborative processes.
5. An IT portfolio management tool with no clear IT portfolio management process will not produce the anticipated benefits.
6. Investment prioritisation criteria must be instantiated in strong IT portfolio management governance.
7. Mature IT portfolio management processes drive the need for portfolio specific analysis toolsets.

Jeffery and Leliveld (2004) add that implementation of ITP_fM should be phased in iteratively, focusing on a business unit at a time instead of the whole organisation; tracking not more than 12 metrics; and adjusting metrics as IT assets progress through their respective life cycles. They also point out that trained staff and business involvement from the beginning are necessary to ensuring successful implementation.

6.5. Future Research

This research has described the importance of ITP_fM and the barriers to adoption.

A further study can be conducted to convert views on the importance of ITPfM into evidence, by targeting a larger sample of organisations, comprising those that use as well as those that do not use ITPfM. One would need to also consider dimensions such as the measurement of project success and/or failure between organisations that use ITPfM and those that do not use ITPfM.

From the remaining barriers in phase 2, the following can be considered for future research:

1. **"The role of middle management in driving operationalisation of IT portfolio management."**

   Much has been said about the need for executive support; however, even with executive support, the adoption of ITP_fM is not likely to happen effectively if there is no support from middle management. Moreover, the role of middle management in ITP_fM needs to be explored and detailed to avoid ambiguity which impedes ITP_fM adoption and performance.

2. **"Managing the change to overcome resistance to IT portfolio performance management."**

   Measuring IT project / portfolio performance highlights inefficiencies such as time and cost overruns, strategic misalignment and inappropriate allocation of resources. As a result, staff and managers are likely to resist performance measuring through ITP_fM. Appropriate change management needs to be applied to overcome such resistance if ITP_fM is to be successful.

3. **"IT portfolio management – where to start"**

   While respondents indicated an awareness of ITP_fM, there are varying opinions as to where to begin with ITP_fM. It is important to present a consolidated view, indicating advantages and disadvantages of the various approaches. The use of case studies may be appropriate for such a topic.

4. **"Having the right knowledge and skills to perform IT portfolio management"**

There are a number of stakeholders involved in ITP_fM at various levels in an organisation. The level of knowledge and skills at each level and for each role needs to be defined so that ITPfM can be practiced successfully.

5. **"The role of the project management office in IT portfolio management"**

The PMO (project management office) has been a key topic in many project management seminars and conferences over the past few years. As its (PMO's) role and significance evolves, it would need to consider integration with and of ITP_fM.

6. **"IT portfolio management: Methodology, Life-cycle, Tools and Techniques, Metrics and Performance monitoring, change management, organisational culture and strategic alignment."**

A host of portfolio management tool vendors offer solutions that look at aspects of the methodology, life-cycle, and reporting. More work needs t be done to present a comprehensive discussion on the abovementioned aspects of portfolio management.

7. **"The role of ITPfM in IT Governance"**

One of the barriers which received a high number of nominations eventhough it did not make the top 11 was that there existed weak IT governance. According to the respondents, organisations feel that the discipline of formal methodologies introduces bureaucracy and restricts creativity and flexibility. While reference is made of IT governance, there could also be wider implication for corporate governance as well. The benefits of ITPfM for governance (IT or corporate) need to be demonstrated.

8. **"IT portfolio management: Managing Risk and Measuring performance"**

and

9. **"IT portfolio management: From strategy to implementation"**

Topics 8 and 9 would address more of the specifics around how to achieve risk management, performance measuring, and strategy implementation. Organisations will benefit from having a well researched paper that provides guidance for implementing ITP_fM, risk management, performance measuring and strategy implementation.

10. "Determine what dynamics influence ranking"

The results of this survey revealed a low concordance amongst respondents with regard to the ranked list of barriers. This provides a good opportunity for further research which would investigate and determine the factors or dynamics that influence ranking.

11. Overcoming barriers to adoption of ITPfM.

While strategies for overcoming barriers have been discussed briefly in this report, more in-depth research in this area needs to be done. An investigation into how companies successfully overcome these barriers would be beneficial to practitioners.

12. The effectiveness of ITPfM

This report discussed the importance of ITPfM. The effectiveness of ITPfM in organisations needs to be reported so that other organisations can evaluate whether or not the investment in ITPfM is worthwhile for them. This could be accomplished with empirical research which surveyed companies using, and other companies not using ITPfM, and suitable measures for "effectiveness".

13. The rate of adoption of ITPfM over the past 20 years.

Investigating the rate of adoption of ITPfM over a period of 20 years would illicit findings which could be compared to that of other approaches. The rationale for slower or faster adoption of ITPfM, as the case may be, compared to other approaches will contribute to the better understanding of the discipline of ITPfM.

In conclusion, IT portfolio management as a preferred approach for managing IT resources and investments more effectively is clear. ITPfM is definitely an important part of strategic information systems planning and IT management. CIOs must justify the investments in IT by proving that the business is deriving benefit or value from these investments. Decision making regarding investments in IT must include the business and investments need to be aligned to strategic objectives. The IT organisation can develop and maintain a close alignment with the business, enabling better IT investment decisions and providing better return on investments to the business through IT portfolio management. Overcoming the barriers identified in this research is one of the early steps in the process of adoption.

References

Addison, T., (2003), "**E-commerce project development risks: evidence from a Delphi survey.**", *International Journal of Information Management,* Vol. 23, pp.25-40

Addison, T., Allan, G., (2002), "**The Delphi Technique as a method for Management Research**", Proceedings of the European Conference on Research Methods for Business and Management Studies, April, pages 1-6, Reading, UK, Published by MCIL.

Archer, N.P., Ghasemzadeh, F., (1996), "**Project Portfolio Selection Techniques: A Review and a Suggested Integration Approach**", *Innovation Research Working Group Working Paper No. 46*, McMaster University.

Archer, N.P., Ghasemzadeh, F., (1999), "**An Integrated Framework for Project Portfolio Selection**", *International Journal of Project Management*, Vol.17, No. 4, pp. 207-216.

Armour, P.G., (2005), "**The Business of Software**", *Communications of the ACM*, Vol. 48, No. 3, pp.17-20

Baccarini, D., Salm, G., Love, P.E.D., (2004), "**Management of risks in Information Technology projects.**", *Industrial Management & Data Systems*, Vol. 104, No. 4, pp 286-295.

Benko, C., McFarlan, W., (2004), "**Managing a growth culture: how CEOs can initiate and monitor a successful growth culture**", *Strategy & Leadership*, ABI/INFORM Global, Vol. 32, No. 1, pg 34.

Berinato, S., (2001), "**Do the Math**.", *www.cio.com*

Blum, K., Muirhead, B., (2005), "**The Right Horse and Harness to pull the Carriage: Teaching Online Doctorate Students about Literature Reviews, Qualitative, and Quantitative Methods that Drive the Problem**", *International Journal of Instructional Technology & Distance Learning,* Vol. 2, No. 2, *http://www.itdl.org/Journal/Feb_05/*

Brancheau, J.C.; Wetherbe, J.C.; (1987); "**Key Issues in Information Systems Management**"; *MIS Quarterly,* pg 23.

Brancheau, J.C.; Janz, B.D.; Wetherbe, J.C.; (1996); "**Key Issues in Information Systems Management: 1994-1995 SIM Delphi Results**"; *MIS Quarterly,* pg 225.

Brockway, D., Hurley, M., (1998), "**Achieving IT success**", *Information Management & Computer Security*, Vol. 6, No. 5, pp 199-204.

Brown, C., Magill, S., (1994), "**Alignment of the IT function with the enterprise: Toward a model of antecedents**", *MIS Quarterly*.

Buss, M.D.J., (1983), "**How to rank computer projects**", *Harvard Business Review*, Vol. 61, No. 1, pp 188-126.

Cable, J.H., Ordonezi, J.F., Chintalapani, G., Plaisant, C., (2004), "**Project Portfolio Earned Value Management Using Treemaps.**", *Proceedings of the Project Management Institute research conference, London.*

Centre for Business Practices, (2005), "**Project Portfolio Management Maturity: A Benchmark of Current Business Practices.**", *Research Report*.

Cooper, R.G., Edgett, S.J., Kleinschmidt, E.J., (2000), "**New Problems, New Solutions: Making IT Portfolio Management More Effective**", *Research Technology Management*, Vol. 43, No. 2.

D'Amico, V., (2005), "**Manage your IT projects like an investment portfolio**", *Handbook of Business Strategy*, pp 251-255.

Delbecq, A. L., Van de Ven, A. H., & Gustafson, D. H. (1975), "**Group techniques for program planning**", Scott, Foresman and Company, *Glenview, IL*

Dalkey, N., Helmer, O., (pre 1986), "**An Experimental Application of the Delphi Method to the use of experts**", *Management Science,* Vol. 9, No. 3, pg. 458.

Dickinson, M.W., Thornton, A.C., Graves, S., (2001), "**Technology Portfolio Management: Optimizing Interdependent Projects Over Multiple Time Periods**", *IEEE Transactions on engineering management*, Vol. 48, No. 4.

Dooley, L. and O'Sullivan, D. (2003), "**Developing a software infrastructure to support systemic innovation through effective management**", *The International Journal of Technological Innovation and Entrepreneurship (Technovation)*, Vol. 23 No. 8, pp. 689-704.

Dooley, L., Lupton, G., O'Sullivan, D., (2005), "**Multiple Project Management: a modern competitive necessity.**", *Journal of Manufacturing Technology Management*, Vol. 16, No. 5, pp 466-482.

Duffy, T., (2002), "**Keeping an eye on IT**.", *Network World*

Ericson, J., (2003), "**Facing IT Portfolio Management.**", *www.Line56.com*

Frisk, E., Planten, A., (2004), "**Evaluating IT: Learning from the past to design the future**", Working paper, Department of Informatics, Goteborg University.

Fitzgerald, D., (2004), "**Another Look at Project Portfolio Management.**", *http://www.asapm.org/asapmag/a_lookatppo.asp*

Gabas-Varini, E., (2003), "**Project Portfolio Management: Get more value from IT**

investments", *White Paper – Artemis International Solutions Corporation*, *www.aisc.com*

Galliers, R.D.; Merali, Y.; Spearing, L., (1994), "**Coping with Information Technology? How British Executives perceive the key information systems management issues in the mid-1990s**", *Journal of Information Technology*, Vol.9, pp. 223-238.

Ghasemzadeh, F., Archer, N., Iyogun, P., (1999), "**A zero-one model for project portfolio selection and scheduling**", *Journal of the Operational Research Society*, Vol.50, pp. 745-755.

Glaser, B.G., Strauss, A.C., (1967), "**The Discovery of Grounded Theory: Strategies for Qualitative Research."** Chicago, IL: Aldine.

Gliedman, C., (2002), "**The Many Faces of IT Portfolio Management.**", *RESEARCH DIGEST*, Volume 5, Issue 3, *www.aisc.com*

Grant Thornton, (2004), "**Evolution of the PMO: Agile Portfolio Management.**", *White Paper. www.grantthornton.com*

Harwood, G., (1994), "**Information Management.**", *Logistics Information Management*, Vol.75, No. 5, pp. 30-35.

Henderson, J.C., Venkatramen, N., (1991), "**Understanding Strategic Alignment**", *Business Quarterly*, pg. 55.

Henderson, N.R., (2002), "**The many faces of qualitative research**", *Marketing Research,* Vol. 14, No. 2, pg. 13.

Hitt, L.M., Brynjolfsson, E., (1996), "**Productivity, business profitability, and consumer surplus: Three different measures of information technology value.**", *MIS Quarterly*, Vol.20, No. 2, ABI/INFORM Global, pg. 121.

Hoffman, T., (2003), "**Balancing the IT Portfolio.**", *www.computerworld.com*

Huber, G., Miller, C., Glick, W., (1990), "**Developing more encompassing theories about organisations: The centralization-effectiveness relationship as an example**", *Organisation Science*.

Hussey, J., Hussey, R., (1997), "**Business Research. A practical guide for undergraduate and postgraduate students**", Palgrave, Houndmills, Basingstoke, Hampshire.

Jeffery, M., Leliveld, I., (2004), "**Best Practices in IT portfolio management**", *MIT Sloan Management Review*, Vol. 45, No.3, pg.40

Jiang, J., Klein, G., (1999), "**Project Selection Criteria by strategic orientation**", Information and Management, Vol. 36, pp. 63-75.

Kendall, M.G., (1955), "**Rank Correlation Methods",** *Charles Griffin & Company, London*

Kendra, K., Taplin, L.J., (2004), "**Project Success: A cultural Framework.**", *Project Management Journal*, Vol. 35, No.1, ABI/INFORM Global, Pg. 30

Kersten, H.M.P., Ozdemir, S., (2005), "**Optimising a product portfolio of an IT-company**", *Working paper*, Free University Amsterdam and LogicaCMG Finance.

Kersten, H.M.P., Verhoef, C., (2003), "**IT portfolio management: a banker's perspective on IT**", *Cutter IT Journal*, Vol. 16, No. 4, pp 34-40.

Kifer, R., (2003), "**Portfolio Management – How to do it right.**", *www.cio.com*

Kulatilaka, N., Venkatramen, N., (1999), "**Measuring Information Technology Investment Payoff**", Idea Group Publishing, Hershey, PA.

Kwan, S.K., West, J., (2004), "**Heterogeneity of IT Importance: Implications for Enterprise IT Portfolio Management**", *Working Paper,* San José State University, *www.crito.uci.edu*

Lederer, A., Mendelow, A., (1986), "**Issues in Information Systems Planning**", *Information and Management*, pg. 10

Leliveld, I., Jeffery, M., (2003), "**IT portfolio management. Challenges and Best Practices**", *Research*, Kellogg School of Management, *www.kellogg.northwestern.edu*

Leek, C., (1997), "**Information Systems Frameworks and Strategy.**", *Industrial Management & Data Systems*, Vol.97, No. 3, pp. 86-89.

Lincoln, Y.S., Guba, E.G., (1985), "**Naturalistic Inquiry**", Sage, Beverly Hills, CA.

Linstone, H.A.; Turoff, M, (1975), "**The Delphi Method. Techniques and Applications**", Addison-Wesley, Reading, Massachusetts

Markowitz, H.M., (1952), "**Portfolio Selection.**", *Journal of Finance*, Vol. 7, No.1, pp. 77-91.

Markowitz, H.M., (1999), "**The early history of portfolio theory: 1600-1960.**", *Financial Analysts Journal*, Vol. 55, No.4, ABI/INFORM Global, Pg. 5

Meta Group, (2002), "**IT investment management: Portfolio Management Lessons Learned.**", *metagroup.com , 800-945-META [6382]*

McFarlan, F.W., (1981), "**Portfolio Approach to Information Systems**", *Harvard Business Review*; Sep-Oct; pp.42-150.

McKeen, J.D., Smith, H.A., (2004), "**Making IT Happen: Critical Issues in IT Management**", *Wiley Series.* West Sussex, England

O'Keefe, R.M., O'Connor, G., Kung, H., (1998), "**Early adopters of the Web as a retail medium: small company winners and losers**", *European Journal of Marketing,* Vol. 32, No. 7/8, pp. 629-643.

Orlikowsky, W.J., Barodi, J.J., (1991), "**Studying information technology in organizations: research and assumptions**", *Information Systems Research*, Vol. 2, pp. 1-28.

Patton, M.Q., (2002), "**Qualitative evaluation and research methods**", 3rd ed., Thousand Oaks, CA: Sage Publications, Inc.

Pennypacker, J. S., (2005), "**PM Solution's Project Portfolio Management Maturity Model.**", *Centre for Business Practices, www.cbponline.com*

Pickus, J., (2003), "**IT's Portfolio Challenge.**", *www.line56.com*

PMI, (2004) "**A Guide to the Project Management Body of Knowledge**."

Ross, M., (2005), "**A Holistic Approach to IT Department Wellness – Systematic Portfolio Management Planning.**", *Working Paper, www.galarath.com*

Roy, A.D., (1952), "**Safety first and the holding of assets.**", *Econometrica*, Vol.20, No. 3, pp. 431-449.

Schmidt, R.C.; (1997); "**Managing Delphi Surveys Using Nonparametric Statistical Techniques**"; *Decision Sciences,* Vol. 28, No. 3, pp. 763-774..

Schmidt, R., Lyytinen, K., Keil, M., Cule, P., (2001), "**Identifying Software project risks: An International Delphi Study**", *Journal of Management Information Systems,* Vol. 17, No. 4, ABI/INFORM Global, pg. 5.

Scott G., Walter, Z., (2001), "**Management Issues in Web Systems Development**", *Working paper, University of Connecticut.*

Shaw, E., (1999), "**A guide to the qualitative research process: evidence from a small firm study",** *Qualitative Market Research: An International Journal*, Vol.2, No. 2, pp. 59-70.

Siegel, S., (1956), "**Nonparametric Statistics",** *McGraw-Hill Kogakusha LTD., Tokyo*

Solomon, M., (2002), "**Project Portfolio Management.**", *www.computerworld.com*

Stenbacka, C., (2001), "**Qualitative research requires quality concepts of its own",** *Management Decision*, Vol.39, No. 7, pp. 551-555.

Stewart, R., Mohamed, S., (2002), "**IT/IS projects selection using multi-criteria utility theory.**", *Logistics Information Management*, Vol.15, No. 4, pp. 254-270.

Strauss, A., Corbin, J., (1990), "**Basics of qualitative research: Grounded theory procedures and techniques.",** *Newbury Park, CA: Sage Publications, Inc*

Suwardy, T., Ratnatunga, J., Sohal, A.S., Speight, G., (2003), "**IT projects: evaluation, outcomes, and impediments.**", *Benchmarking: An International Journal*, Vol.10, No. 4, pp. 325-342.

Tallon, P., Kraemer, K., Gurbaxani, V., (2000), "**Executives perceptions of the business value of information technology: A process oriented approach**", *Journal of Management Information Systems*, Vol. 16, No. 4, Spring, pp. 145-173.

Teach, E., Goff, J., (2003), "**The fundamentals of portfolio management are being applied to corporate technology assets.**", *CFO Magazine*. *www.cfo.com*

Theodore, A.N., (2000), "**Analysis of the project and application portfolio management of the Pharma Development Biometrics Informatics department of Roche**", *Université De Lausanne*

Turbit, N., (2005), "**Project Portfolio Management.**", *www.projectperfect.com.au*

Varghese, J., Kurien, P., (2004), "**IT imperatives beyond strategic alignment: enterprise architecture flexibility and IT delivery efficiency.**", *Handbook of Business Strategy*, pp. 275-279.

Verhoef, C., (2002), "**Quantitative IT Portfolio Management**", *Science of Computer Programming,* Vol. 45, pp. 1-96

Verhoef, C., (2005), "**Quantifying the Effects of IT-Governance Rules**", *Working Paper,* Free University of Amsterdam, Department of Mathematics and Computer Science

Ward, J., Peppard, J., (2004), "**Strategic Planning for Information Systems**", *Wiley Series.* West Sussex, England.

Ward, J., Taylor, P., Bond, P., (1996), "**Evaluation and realisation of IS/IT benefits: An empirical study of current practice**", *European Journal of Information Systems*, Vol. 4, No. 4, pp. 214-226

Weill, P., (2003), "**Managing the IT Portfolio**", *www.CIO.com*

Weill, P., Olson, M.H., (1989), "**Managing investment in Information Technology: Mini Case Examples and Implications**", *MIS Quarterly*, Vol. 13, No.1, ABI/INFORM Global, pg.3.

Weill, P., Vitale, M., (1999), "**Assessing The Health Of An Information Systems Applications Portfolio: An Example From Process Manufacturing,**", *MIS Quarterly*, Vol. 23, No.4, ABI/INFORM Global, pg.601-624.

Weill, P., Subramani, M., Broadbent, M., (2002), "**Building IT infrastructure for agility**", *MIT Sloan Management Review*, Vol. 44, No.1

Wyatt, B., (2004), "**Building a Project Management Culture**", *www.computerworld.com*

APPENDIX A – PHASE 1 SURVEY INSTRUMENT



UNIVERSITY OF THE WITWATERSRAND

IT portfolio management: Barriers to successful adoption

RESEARCH INVESTIGATION

----- Phase 1 of 3 -----

SCHOOL OF ECONOMIC AND BUSINESS SCIENCES

DEPARTMENT OF INFORMATION SYSTEMS

Please return this form to:

Clive Enoch
Email: clivee@discovery.co.za
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PURPOSE OF INVESTIGATION

The purpose of the investigation is to illicit opinion (responses) on the subject of IT portfolio management. In particular, the researcher is attempting, as a result of this investigation, to derive a list of factors which form barriers to the successful adoption of IT portfolio management.

The investigation (research) is not intended for commercial resale but is being used to complete a MCom (Master of Commerce) degree.

Process:

The data collection method used for this research is the ranking-type Delphi method. This method involves a series of linked questionnaires beginning with an open-ended questionnaire (feedback form). Succeeding questionnaires feed back group responses to the preceding questionnaire and asks for further information. The process stops when consensus has been reached or sufficient information has been gathered. This typically takes the form of three (3) phases of questionnaires (feedback).

This is the 1st of three feedback forms. Some demographic information is requested in this form which will be used in the research findings to describe the respondents in terms of level in their organisation, the size of the organisation, nature of business or industry and coverage of their organisation in relation to national or international presence. Respondents are also requested to indicate what they think the barriers to IT portfolio management adoption are.

The 2nd feedback form will be a consolidated list of responses from all respondents sent back to respondents to confirm the list of barriers and add any new barriers. Respondents must review this list to confirm that no barriers were left out in the data collation process.

The 3rd feedback form will be a final list of barriers sent to respondents to rate according to what they (individually) deem critical. Respondents will be asked to rate the top ten barriers from the combined list of barriers.

The researcher hopes to achieve a confirmed list of ranked barriers within 5-6 weeks of commencing the investigation. This will be possible if respondents submit their responses timeously – i.e. within five (5) days of receiving the investigation feedback form in each phase. Please note, the identity of respondents and the companies they represent will remain confidential and will not be revealed to other respondents participating in this survey, neither will their identity be revealed in the final research report. Only the information gathered with regard to barriers to adoption of IT portfolio management will be discussed.

Your participation in this 3-phase investigation is highly appreciated.

SECTION A – Organisational Information

1.	**What is the approximate annual revenue of your organisation?**	
	…...……..……... Less than 1 million …….…..…...…….	[ ]
	……... 1 million - 5 million ……..…….	[ ]
	……..…. 5 million – 10 million …….	[ ]
	……..……... 10 million – 20 million …….	[ ]
	……..……. More than 20 million …….…….	[ ]
2.	**What is the size of the organisation in terms of number of employees?**	
	…...……..……... Less than 1 hundred ……..…...…….	[ ]
	……..……..…. 100 – 500 ..…….……...…….	[ ]
	……..…..……...…. 500 – 1 000 ……..…….	[ ]
	……..……..... 1 000 – 5 000 ..…….…….	[ ]
	……..…….. More than 5 000 ……..…..…….	[ ]
3.	**Is your organisation situated …**	
	…...……..... Locally only ……..…...…….	[ ]
	…….. Countrywide …….…..…...…….	[ ]
	…….……...…. International ……..…….	[ ]
4.	**What is the primary end product or service of your organisation?**	
	…….……....….. Manufacturing ….…….…….....	[ ]
	……..... Chemical or Pharmaceutical …….....	[ ]
	……..…..……..... Government Services…..…..…….....	[ ]
	……..……..... Educational …….…….....	[ ]
	…….…..... IT – Software Development ……..……...	[ ]
	……..... IT – Hardware ……..…….....	[ ]
	……..……..... Banking ……..…….....	[ ]
	…….……..... Insurance …….…….....	[ ]
	….……..……..... Logistics …….…….....	[ ]
	….……..... Other (Please specify) ……....…..	[ ]

SECTION B – Definition of IT Portfolio Management

Organisations today are continuously faced with the challenge of meeting the demand of new work with limited resources. More than ever, organisations have to get their products even quicker to market, and must be able to adapt quickly to changing environmental and legislative needs and requirements. Management by projects has been marketed in the industry as the key towards meeting these challenges, or at least help in bringing about some structure in the way work is managed in an organisation. However, projects themselves do not provide the complete solution. Projects focus on delivering work in a focused and disciplined manner. What is even more important is the ability for organisations to *choose the right projects* in the first place. This is where portfolio management comes in.

Similar to the way an investor on the stock exchange defines portfolios for investment, an organisation, and specifically the IT department, needs to define portfolios for its investments. The term "investments" is used here to describe the effort and decision making capability relating (but not limited) to hardware, software, and application purchases, as well as application development towards meeting the requirements of the business.

IT portfolio management is a dynamic decision (making) process whereby, a business's list of active new projects is constantly updated and revised; new projects are evaluated, selected, and prioritised; existing projects are accelerated, stopped, or de-prioritised; resources are allocated and re-allocated to the active projects. The selection of projects (or investments) is guided by the business' and IT division's strategic objectives and available resources. The IT portfolio includes components such as infrastructure, outsourcing contracts and software licenses. The management of the IT portfolio requires the use of tools and methods to measure, control and increase the return on IT investments.

Following on the next page are specific questions to assess how your organisation treats its business and IT strategy definition and translation, and portfolio planning, implementation, and measurement.
The last question requires you to identify barriers to the adoption of IT portfolio management. You may have experienced (or presently experience) these barriers or are aware of barriers that an organisation such as your could possibly face. Please substantiate why you've indicated an item as a barrier by stipulating your reason in the 'rationale' section.

1.	**STRATEGY DEFINITION**	
1.1.	**How frequently does your organisation review its *business (overall)* strategy?** … Every year …… … Once every two years …… … Less frequently than once every two years ……	 [ ] [ ] [ ]
1.2.	**How frequently does your organisation review its *information technology (IT)* strategy?** … Every year …… … Once every two years …… … Less frequently than once every two years ……	 [ ] [ ] [ ]

2.	**STRATEGY TRANSLATION**	
2.1.	**Does your organisation translate its *business* strategy into specific portfolios**? Portfolios would represent high level groupings of things to do to realise the strategy. For example: ➢ ***Portfolio 1* = *Growth*** (Expansion into local and/or international markets) ➢ ***Portfolio 2* = *Influence*** (Beyond growth – your organisation has the ability to influence the industry or sector landscape) ➢ ***Portfolio 3* = *People*** (Initiatives to develop your people and provide an enjoyable work environment)	Yes [ ] No [ ]
2.2.	**Does your organisation translate its *IT* strategy into specific portfolios?** It may be assumed that if the business strategy is translated into portfolios, the IT strategy is translated similarly. This may not be the case in reality. IT projects or investments are usually carried out on request without corroboration with the IT strategy. Further, the IT portfolio set may include additional portfolios (when compared to the business portfolio set) such as Business Continuity (Disaster Recovery). Hence the need for specifically translating ***IT*** strategy into portfolios.	Yes [ ] No [ ]

3.	**PORTFOLIO PLANNING AND IMPLEMENTATION**	
3.1.	**Does your organisation specifically select or identify projects or programs to fulfil the *business* and *IT* strategic objectives?**	Yes [ ] No [ ]
3.2.	**Are the projects or programs that are undertaken in your organisation balanced in terms of risk and return on investment?**	Yes [ ] No [ ]
3.3.	**Does your organisation use an IT portfolio management steering committee (or similar group or forum) to plan the portfolio (select / deselect projects / investments)?**	Yes [ ] No [ ]

4.	**PORTFOLIO PERFORMANCE MEASUREMENT**					
4.1.	**If your organisation is using a portfolio management approach, please rate the following items (characteristics) on a scale of 1-5 (1 = weak; 5 = strong) in terms the extent to which each characteristic is emphasised in your organisation.**					
4.1.a.	*The list of IT projects / investments is actively managed. Projects are selected, prioritised, de-prioritised (if strategic objectives have changed).*					
	1	**2**	**3**	**4**	**5**	
4.1.b.	*Portfolio management tools and methods are used to measure and control the IT portfolio performance*					
	1	**2**	**3**	**4**	**5**	
4.1.c.	*Resource allocation is managed across IT projects.*					
	1	**2**	**3**	**4**	**5**	
4.1.d.	*A portfolio management steering committee or similar forum meets regularly to actively manage the IT portfolio(s).*					
	1	**2**	**3**	**4**	**5**	

5.	**LEVEL OF UNDERSTANDING OF ITP_fM**					
	How would you rate your understanding of ITP_fM on a scale of 1-5 (1 = not good; 5 = excellent)					
	1	**2**	**3**	**4**	**5**	

6.	**FACTORS THAT IMPEDE THE ADOPTION OF IT PORTFOLIO MANAGEMENT**	
	What do you consider to be the most critical barriers to the adoption of IT portfolio management? Adoption here means to actively practice the approach or discipline rather than just buying into the philosophy of portfolio management. Please provide a brief rationale for each item placed on the list. {see table on next page}	

#	**BARRIER**
1	
Rationale	
2	
Rationale	
3	
Rationale	
4	
Rationale	
5	
Rationale	
6	
Rationale	
7	
Rationale	
8	
Rationale	
9	
Rationale	
10	
Rationale	

RESPONDENT'S PERSONAL INFORMATION

Name	
Title	
Designation	
Company	
Telephone	
Email	
Date	

APPENDIX B – CATEGORIES OF IS PROJECTS

STRATEGIC Strategic projects provide a distinct strategic advantage that is critical to future business success. They create or support change in how the organisation conducts its business, with the aim of providing competitive advantage. **Driving Forces:** Market requirements, competitive pressure or other external forces. **Critical Requirements:** Rapid development to meet business objective and realise benefits within the window of opportunity. Flexible systems that can adapt easily as business evolves.	**HIGH POTENTIAL** High Potential projects investigate new technologies and approaches which may create opportunities to gain a future advantage but are as yet unproven. **Driving Forces:** New business ideas or technological opportunity. Value of the idea needs to be demonstrated. **Critical Requirements:** Rapid evaluation of prototypes. Understand potential benefits in relation to business strategy.
KEY OPERATIONAL Key operational projects for day-to-day operations are necessary to sustain the existing business operations. **Driving Forces:** Improving the performance of existing activities (speed, accuracy, and economics). Integration of data and systems to avoid duplication, inconsistency and misinformation. Compliance with industry legislation, **Critical Requirements:** High quality, long life solutions and effective data management. Balancing costs with benefits and business risk.	**SUPPORT** Support projects provide underlying support to many activities and improve business efficiency and management effectiveness. These projects don't necessarily provide competitive advantage. **Driving Forces:** Improved productivity / efficiency of specific business tasks. Most cost effective use of IS/IT funds and resources. **Critical Requirements:** Low cost, long term solutions. Objective cost/benefit analysis to reduce financial risk and control costs carefully.

Source: Ward and Peppard (2004), page 310