



## ANALYZING COMPANIES 'USE OF INFORMATION TECHNOLOGY PORTFOLIO MANAGEMENT AS AN AID TO IT INVESTMENTS MANAGEMENT (CASE STUDY)



Fakhraddin Maroofi<sup>1</sup>

<sup>1</sup>Department of management, University of Kurdistan, Sanandaj, Iran

### ABSTRACT

*The ITPM technique has been considered as a new technique that has received little attention in IT research. This research carried out five case studies in different companies from several economic sectors which were using information technology portfolio management (ITPM). In the studied companies, seven persons interviewed and were high-level executives working in the IT department. Result show that ITPM, as one of the information assessment categories for identifying the useful innovations in IT, helps IT and business leaders to identify their priorities and companies to better manage their IT investments. So this technique is significant and useful for companies. So different levels of ITPM use was found to IT investment management. It was observed, that ITPM is used most frequently in IT investment planning, which is the process most discussed and used in analyzed companies. The ITPM technique is used more frequently in Company 2 than in the other cases because the organization of the IT area in the company is structured according to ITPM dimensions.*

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**Keywords:** Case studies, Iranian companies, IT investment management, ITPM.

### 1. INTRODUCTION

Since Information technology (IT) play a vital role in the support, sustainability and growth of businesses and in achieving competitive advantage (Chang *et al.*, 2011) companies are prompted to invest heavily in technology – acquiring systems, installing databases, and applying the internet and electronic commerce in their business operations. Business executives have a fundamental challenge that is how to properly allocate scarce resources to those investments and to assess their appropriateness and value. According to Gunasekaran *et al.* (2006), a number of methods and techniques have been used by IT managers to evaluate IT investments, varying from simple computational formulas to complex techniques that merge quantitative and qualitative analyzes. Information technology portfolio management (ITPM) is a technique to identify, analyze and manage IT investments and could be used by Organizations to manage IT in an investment view that has a continuous focus on business Peters and Verhoef (2008). The concept of ITPM as a key research issue in the IT field Burke and Shaw (2008) has recently begun to be widely discussed in IT research. The importance of ITPM in business practice becomes more illustrated. However, it has been argued that few studies exist in the IT literature about the use of this technique in companies (Kumar *et al.*, 2008) and it is an underdeveloped concept. In summary, although there are few studies considering this technique, high IT investment costs need to be justified and ITPM is a valid technique to aid in this. So, the following question arises: how does the use of ITPM assist companies to manage their IT investments? This research tends to analyze companies 'use of ITPM as an aid to their management of IT investments and companies' analysis of ITPM explored three sub-processes of IT investment management: planning, control, and evaluation. This study with five

case studies was carried out in (a pilot study and four other cases) in different large Iranian companies from several economic sectors. The companies were studied either was in the initial implementation phase of applying the technique or already using the technique.

According to [Ko and Osei-Bryson \(2006\)](#) a major concern for managers and researchers is the continuous development of IT investments during the past four decades that identify a number of ways to better manage this technology. Due to the vast investments in IT and the high level of uncertainty related to companies' use of IT, considering costs and benefits and both short and long term, we need to improve our understanding of investment management processes of companies ([Gunasekaran et al., 2006](#)). In the spite of the effect of IT investment in companies several studies were conducted ([Dimovski and Skerlavaj, 2003](#)). According to [Tiernan and Peppard \(2004\)](#) although IT fails to provide a competitive advantage, it prevents falling behind the competition or being just another organizational cost. However, another research suggests that IT investment offers different benefits in addition to competitive advantage to companies and save as much money as it cost ([Chang et al., 2011](#)). So, analyzing the management of these investments is necessitated. To know exactly what that investment is; measuring and tracking this expenditure overtime against a convenient base is the first step in managing IT investment ([Weill and Olson, 1989](#)). In a recent study it was revealed that an exploration of the strategy to invest in IT more efficiently, in a more planned way, focusing on achieving company goals is needed ([Tan and Theodorou, 2009](#)). In doing so, [Stewart \(2008\)](#) analyzed the IT investment processes that his method is adopted in this research (Figure 1). To have a more comprehensive view of these investments, this model was adopted in which the processes are divided into three phases: planning, control and evaluation encompassing all the phases necessary to guarantee that the investments in IT achieve the goals set, while applying adequate resources, and providing feedback to improve similar investments in the future. As shown in Figure 1, the first phase concentrates on examining how the investments to be made by the company, based on its purposes and needs, are defined, prioritized and selected, while providing a detailed analysis of the investments concerning costs, return and risks. The control phase signifies monitoring and tracking investments in reference to costs, schedule and designed performance and the use of management tools can be helpful for IT and business executives to better manage the investments. Ultimately, the evaluation phase engages pre- and post-implementation reviews and making adjustments if necessary. perceived as an analysis and evaluation technique, ITPM should include involvement, analysis and definition by stakeholders, evaluation of risks associated with different investment strategies, and understanding of the scope and impact of IT infrastructure development ([Irani, 2002](#)) and it has been argued that ITPM can be used in the planning, control, and evaluation including the IT investment management process ([Datz, 2003](#)).

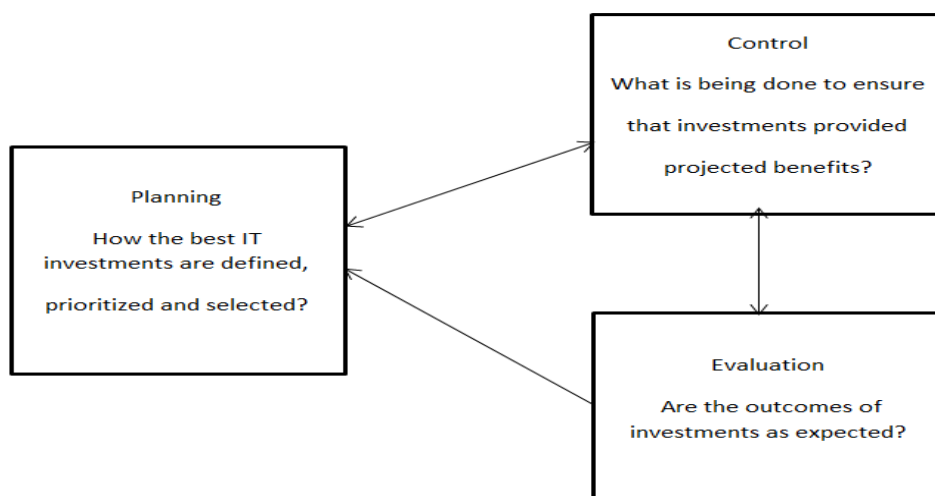


Figure-1. IT investment management

Source: [Stewart \(2008\)](#)

## 2. ITPM

According to Jeffery and Leliveld (2004) the ITPM technique in terms of managing IT is defined as a portfolio of assets akin to a financial portfolio and striving to improve the performance of the portfolio by balancing risk and return. Further, ITPM is connected to the attainment of IT investment synergy affecting IT portfolio return and risk (Tu and Shaw, 2011). One of the most key factors in building an IT portfolio is the understanding of the strategic value or alignment of IT that determine the success of the portfolio (Cho and Shaw, 2009). Although most IT managers found it difficult to practically achieve this, It seems that they are aware of the importance of investments in strategic IT. However, major projects often do not have high strategic value. Therefore, the employment of ITPM can help companies in managing IT investments and enabling them to 1) increase the value of IT investments while decreasing the risk; 2) provide increased visibility and evaluation into IT spending; 3) develop communication and alignment between IT and business leaders; 4) provide increased transparency into IT decision making; 5) reduce costs, improve control and facilitate agility; and finally, give planners the opportunity of having more efficient resources scheduling and help to prioritize the investments (Datz, 2003). The employment of ITPM to the three steps (planning, control, and evaluation) of the IT investment management process (Stewart, 2008) assists in decreasing the number of non-essential investments. Although the IT literature comprises several different ITPM models or frameworks (Maizlish and Handler, 2005) most researchers take a more general view of portfolio and did not define the exact meaning of a portfolio, and the rest focus on selecting the IT portfolio (Cho, 2009) or on general rules to be applied when planning an IT portfolio (Karhade *et al.*, 2009). Considering the topic within the wider managerial structure or the context of the management of IT investments as a whole, which would permit to explore the topic of "IT portfolio" and its dimensions more? Weill and Broadbent (1998) pointed out that with taking into account the stages for IT portfolio building (Maizlish and Handler, 2005) companies can structure the IT portfolio applying the four dimensions (infrastructure, transactional, informational and strategic) that are described below (Aral and Weill, 2007). As the foundation for the IT capabilities which is referring the technical and managerial expertise needed to provide a reliable IT services to the organization, IT infrastructure is the basis of the portfolio. Such applications as servers, networks, laptops and customer database use shared investments with IT services and provide such benefits as business integration, business agility, business flexibility, and leads to of IT in the business units and cost reduction of IT over time, as a result of standardization. The processes that automate the repetitive and basic transactions of enterprises are associated with the transactional dimension. Substituting labor with capital or work with larger volumes of transactions with greater speed and at a lower unit cost, or increase productivity decrease costs, which is our objective. The reliable capacity of the infrastructure is a basis that another dimension of IT portfolio, Transactional systems, is built on and is dependent on. Providing information for the management and control of the company is the task that the informational dimension bears on and it supports management control, decision making, planning, communication, and accounting. Investments are considered to provide information for such objectives as accounting, reporting, compliance and analysis and expected to provide benefits such as increased control, better intelligence, better integration, better quality of information and information cycle timing within the company. There are subtle differences between the strategic dimension, as the last one, purposes and other parts of the portfolio. By supporting entry into new markets or by helping to develop new products, services or business processes and in order to gain competitive advantage, such investments are made. In the light of this research, the necessity for a greater understanding of IT investment management pointed out and is illustrated that ITPM and its dimensions are suitable to help companies to manage their investments. The following question is posed: how does the use of ITPM help companies to manage their IT investments? In order to answer this question, this qualitative case research is carried out that engage several different Iranian companies. The following sections address the research and findings.

### 3. RESEARCH METHOD

Carried out as a case study of five different companies, this research is qualitative and exploratory. Since this research seeks to describe the complexity of a situation, understand dynamic processes and analyze variable interaction (Richardson *et al.*, 1999) all relate to ITPM use in the Iranian organizations, a qualitative approach is suitable. In this study, the studied companies are those beginning to use or are using ITPM techniques to help the three steps including planning, control, and evaluation of IT investments. The high-level executives in the companies' IT departments (e.g. chief information officer (CIO), chief information manager, IT director, IT infrastructure supervisor) have interviewed. The IT managers, who were knowledgeable about ITPM concept, were of high interest in the topic as well as in the relationship between academic research and their companies. We considered factors, including traits of the respondents concerning the time they spent working in the IT area, time as employees of the company and knowledge of ITPM. Based on the literature review, we developed the case study protocol validated it in a pilot case study. All the information required to guide the researchers in collecting the data is included the protocol (Yin, 2003). The research instrument was divided into four sections:

- (1) General features of the company (company's name, sector's name, annual revenues and IT annual expenditures).
- (2) Respondents' traits (name, background, position in the company, time working in IT, time working in the present position and how they know about ITPM).
- (3) IT investment management, raising questions like how are IT investments defined? What are the factors affecting IT investment decisions? Are there evaluations of IT investments?
- (4) IT portfolio, with questions like how ITPM assist the company in justifying the IT investments? How ITPM aids the company to control the IT investments?

Do you believe that investment in IT infrastructure aids in integrating the company? Which IT investments for transactional processes provide assistance in reducing costs? How do IT investments help the company to improve the quality of the information? What IT investments are applied for strategic purposes? We carried out the research using case studies met the requirements of this study that include large companies with high IT investments and companies starting to use or already using ITPM technique. Applying a CIO with knowledge of the executives and their cognizance of ITPM, we identified the companies and contact with their managers and used semi-structured interviews along with secondary evidence provided in document forms such as investment sheets, corporate websites and other available relevant documentation, while respecting the company's information security policy. We recorded interviews and later transcribed them. Table 1. summarized the cases, sectors, respondents and the duration of the interviews. By analyzing, we divided the core meanings into three categories: final (planning, control, and evaluation) that had already been set, intermediate (items in each dimension – e.g. definition, prioritization, tools and process) and initial (definitions, characteristics, examples and how ITPM is related) and based on them categories were determined.

**Table-1.** Cases, sectors, respondents and duration of the interviews

Case	Sector	Respondent	Working in IT/ current company	Duration of interview
Pilot	Many	IT corporate manager of the group	8 years/11 months	1 h and 35 min
1	Petrochemical industry	Chief information manager—one of the top CIOs	8 years	2 h
		IT infrastructure supervisor	7 years	
2	Financial services	Managing and IT director – one of the top CIOs	9 years/5 years	One h and 25 min
3	Steel	IT management and planning executive	5 years/3 years	1 h and 20 min
4	Automotive	CIO – one of the top CIOs and IT coordinator	8 years/5 years	1 h
		Project Management Office	7 years/3 years	

The pilot case study was carry out in a business group in the south and east of Iran with the operations in the agricultural, food and commercial sectors, which ranks among the 98 largest companies in Iran. This company was attempting to use ITPM techniques to help IT investments. By means of an interview with the IT group corporate manager having prior experience with the technique, Information pertains to its ITPM implementation was acquired. To improve clarity and changes to the order of some questions, adjustments in the data collection instrument, such as changes in the questions have to be considered in the pilot case study.

#### **4. ITPM CASES**

In this section we to elucidate how IT investments are managed and how the ITPM technique is applied in this process. The companies studied are starting to apply the technique or have already begun its implementation. The depiction of how the ITPM technique is applied with regard to IT investment planning, control and evaluation are included in each. We first separately analyzed these cases are and then presented as a joint analysis. In the following section, the cases are discussed.

##### **4.1. Case Study 1**

The first case is a company in the petrochemical industry sector, which was beginning to apply the technique along with ITPM concepts to improve its investments in technology. We conducted four interviews with the IT infrastructure supervisor and the chief information manager lasting generally one hour and a half for each. Moreover, through various data sources containing a document called capital expense proposal (CEP) as well as information and examples which helped in the ITPM analysis, the researchers be appraised of IT investment in the company. We used content analysis for analyzing the transcriptions of interviews produced 18 initial categories(e.g. first source of IT investments, the difference between IT investment and IT expense), 7 intermediate categories (e.g. investments approval, evaluations before investments)and 2 final categories (e.g. planning). Based on three basic origins, Planning was defined as dynamic nature, technological opportunities understood by the IT personnel and technology brought to the IT team by users in other businesses. The ITPM technique has used recently to improve IT investment visibility and assist the company in its IT investment planning. We used ITPM dimensions to define different IT investments and facilitate greater control and better alignment between organizational and IT objectives. Also, investments are evaluated through using information contained in CEP, which is accessible at any time. It is useful for verifying if the investments met proposed goals.

##### **4.2. Case Study 2**

The second case is a company in the financial service sector using The ITPM technique where the IT area, encompassing the classification of its expenses and investments, are structured based on ITPM's four dimensions. The IT director and the IT specialist were the respondents. The transactional, informational and strategic aspects are referred to as "solution", "information management" and "executive and strategic", respectively. The interviews and a number of reports and documents regarding IT investments that complement the interviews were our data sources. Through using content analysis of the interview transcripts 18 initial categories (e.g. structuring of the IT sector based on ITPM dimensions, use of ITPM to follow-up on the investments), 4 intermediate categories (e.g. IT investments definition, the existence of IT committee) and 2 final categories (e.g. control) were identified. Since IT planning must be flexible in order to meet business demand and to have the ability to classify IT investments and expenses quickly and due to the special characteristics of the financial market, the company take account of the IT portfolio structure. The planning of IT investments in the company is accomplished as a part of the organizational strategic planning process. In order to help IT planning, we used both ITPM technique and information about each dimension. Rather than having a specific IT investment budget, IT requirements are predicted within the budgets of other sectors. Furthermore, in helping the company to better control the investments it makes, and the use of ITPM assists in

monitoring these investments, the structuring of the IT sector based on ITPM dimensions could be helpful. The ITPM technique is considered as a way to help the managers to do the task of evaluating IT investments through the initiatives the organization has undertaken.

#### 4.3. Case Study 3

The third case studied was a business group in the steel sector located in the south of Iran. IT management and planning executive, who is beginning to apply the concepts of ITPM to IT investment management were respondents. Respondents stated that the ITPM technique is known within the company but still not widely used. On account of the company's information security policy, the additional documents presented during the interview could not be revealed. Through the content analysis of the interview transcriptions 16 initial categories (e.g. information sharing between IT and its customers, IT committee composition), 5 intermediate categories (means to help IT investment management, means to help IT investment control) and 2 final categories (e.g. evaluation) are identified. Planning is done based on the users' and areas' requirement along with the annual expenses and investments budget. Expansion of the organization brings its own Problems, so ITPM technique as an aid to organizational integration with other companies was suggested. The technique is firstly used to produce an initial IT portfolio and is helpful in monitoring IT investments across the company, ensuring the use of the same systems throughout the organization and declining the heterogeneity created by the expansion. Furthermore, it facilitates an overview of the IT area, helps the organization's members sensible of the different systems used in the organization, and develop an improvement in the alignment between organizational and IT strategy. As there are no systematic evaluations of IT investments, the ITPM is beginning to be applied as a technique for evaluating IT investments.

#### 4.4. Case Study 4

A company in the automotive sector was the fourth case study. CIO and the IT coordinator–Project Management Office were interviewed. Both respondents were knowledgeable about the technique and the concepts of ITPM, and the organization has been applying ITPM dimensions to help the IT investment process. Due to the company's information security policy, as other case studies, other documents presented in the interview could not be revealed; instead, the respondents referenced some examples and allowed them to be seen during the interview. Using content analysis of the interview transcripts, we identified 14 initial categories (e.g. IT investments defined by the global company, satisfaction research), 5 intermediate categories (e.g. IT investments definition, previous evaluation) and 2 final categories (e.g. planning and evaluation). The company's global organization determines these investments regarding IT investment planning and the Iranian subsidiary communicates its requirements and priorities to the global company, which then analyzes them and weighs them against the needs and priorities of the other subsidiaries. To help IT investment, management, justification and prioritization, ITPM is applied that is referred to as TISI (transactional, infrastructure, strategic and informational). There are two phases – before and after technology acquisition in IT investment evaluation and the ITPM technique is not applied to evaluate investments in either of these phases.

#### 4.5. Cross Case Summary

Investigating how this technique could assist the companies in IT investment management, we conduct a cross-case analysis summarizing the three processes (IT investment planning, control, and evaluation) in the four cases and how ITPM was applied in the companies. It was observed that ITPM is used frequently in the most discussed and used process in the four companies, IT investment planning and there was a relationship between the planning stage and the strategic goals of the companies. The ITPM technique is found to be helpful for the companies in this aspect. Although several organizations are still in initial stages of implementation and have begun initiatives and, others are making robust use of the technique. Considering the findings, the suggestion of [Kumar et al. \(2008\)](#) that the ITPM

technique is beginning to be used by organizations is confirmed. Since the organization of the IT area in the company is structured according to ITPM dimensions, the ITPM technique is used more substantively in Company 2 than the rest. This organization does plan according to the four ITPM dimensions providing more flexibility to respond to rapid changes in the market. The ITPM process, in the other cases, is found to be applied only in its initial stages primarily to define the IT portfolio and help investment management. The respondents observed that ITPM is relatively accessible even in this primary phase encouraging its dissemination and utilization in organizations. In Case 3, practical utilization of ITPM technique from the beginning to generate a preliminary IT portfolio was identified. ITPM in Case 4 (or TISI, in the terminology of the respondents) is found to be used in an earlier process to explain the portfolios of individual IT departments. ITPM is used In Case 1, and in the other three (Cases 2, 3 and 4), to define the IT portfolio based on technology investments and expenses, and to assist IT investment prioritization, respectively. But it was pointed out that this process is still at an early stage. To prioritize and justify the investments, these organizations analyzed apply other tools such as a business case. ITPM in Case 1, rather, is applied to define the ITPM dimensions and provide investment visibility has still not been used to prioritize the investments. ITPM as an indispensable communication tool is found to be helpful for business executives to better understand IT investment (Cameron, 2009) and manage it. Although IT investment control is a part of the process within every company, there is no formal process to fill the gap. ITPM was considered to help organizations to improve their investment control. The Cases 2 and 3 used markets benchmarking to adjust and improve the IT portfolio of the studied companies, but on account of the difficulty in collecting company data, a small number of researchers apply this type of analysis. These companies studied the parameter emanated from American studies (Weill and Broadbent, 1998; Aral and Weill, 2007) for analysis and due to contextual differences in the Iranian cases; these should be analyzed in depth. The formal elements of IT investment control were not found in Case 4 and ITPM could aid this organization in enabling the visibility and monitoring of these investments.

**Table-2.** ITPM and planning, control and evaluation in the analyzed cases

	<b>IT investments planning</b>	<b>IT investments control</b>	<b>IT investments, evaluation</b>
Case 1	ITPM is used, initially, to define the IT portfolio according to technology investments and expenses. Because of this, it was not still used for the prioritization of investments, but to provide greater visibility of investments	ITPM dimensions have been used to IT investments, and analyzing IT resources expenditures within the company, enabling a better control. This technique assists in identifying where the resources are being allocated	ITPM has still not been used to evaluate IT investments; instead, technology investments are evaluated by formal documents created within the company for each new investment in IT area
Case 2	ITPM is used more in Company 2 than in the other cases, there is analysis, portfolio structuring using the dimensions. ITPM use to prioritize the investments and improve the understanding of IT expenses and investments	IT portfolio benchmarking was used as a reference for adjusting and improving the control of IT portfolio	There are not formal IT investment evaluations and ITPM has shown this gap. ITPM was indicated to perform an evaluation of IT investments, providing better understanding of these investments
Case 3	ITPM process was used only in its early stages, in order to define the IT portfolio using the ITPM dimension to elaborate an annual IT investment plan.	IT portfolio benchmarking was used as a reference for adjusting and improving the control of IT portfolio	There are not formal IT investments evaluations and ITPM is beginning to use to supplement IT investment monitoring
Case 4	ITPM use to structuring dimensions to assist in IT investment planning. Initial process to elaborate the portfolios of individual IT departments for contribution to a final portfolio	IT was not found formal elements of control of IT investments and ITPM can help in this process	There are not formal IT investments evaluations and ITPM has shown this gap. This technique was indicated to perform an evaluation of IT investments, providing greater visibility and better understanding of these investments

In Case 1, ITPM dimensions have been applied not to assess but to classify IT investments that are allowing an analysis of IT resources expenditures within the company and the managers could apply ITPM to better evaluate IT investment and expenditures. Via the formal documents, including different types of technical and financial information generated within the company for each new investment in IT area, technology investments are assessed. In this case, we can observe that IT investment evaluation has not been accomplished in a formal way, but initiatives have been moved forward to close this gap. As a tool to assess IT investments, ITPM provides more visibility for these investments in Cases 2 and 4 (Maizlish and Handler, 2005).

Provides a consolidated source of information regarding IT investments (Over, 2009) Portfolio structuring support business strategies and plans to improve the IT investments via feedback from these investments.

The Case 3 applied ITPM to supplement IT investment evaluations. Structuring ITPM dimensions also foster an increased understanding of IT investments and allows evaluation relative to the investments' agreement with expectations and proposals. IT management process in the four analyzed cases and major considerations regarding ITPM was summarized in Table 2.

## 5. RESEARCH SYNTHESIS

A number of companies are applying ITPM differently in some situations and in similar ways in other situations, as we see in the cases. Planning of IT investments is found to be the process that its accomplishment needs more time and resources of the case study companies. Diverse forms and approaches were used in the companies to make these investments. As pointed out in this study, the employment of such techniques as ITPM can help companies to plan their investments. Applying ITPM could create initial IT portfolios to help achieve alignment with other areas, providing visibility of the IT investments and a more efficient communication among companies. ITPM pointed out to be used by all four companies to help in the planning process of IT investments focusing on prioritization and justification of these investments. Since the executives plan their IT base on the company's objectives applying a prioritization and visibility of their IT investments, the link between the strategic values of the technique ITPM in IT management process in this part of the process is more apparent. All companies except for one were in an initial phase of applying the ITPM technique to define and elaborate the IT portfolio. As shown above, defining and preparing the IT portfolio to other stages and achieve a more mature use of the technique is necessary. ITPM helps companies control and monitor the IT investments and check if the resources are being allocated efficiently, and it was used to compare the companies with competitors. IT portfolio benchmarking was carried out by a number of foreign companies with a different context and environment from Iran to improve and adjust the control. It was not feasible to help the Iranian executives to do a benchmarking using national data because the executives of these companies did not find studies applying this technique and their dimensions to investigate the IT portfolio in different sectors. So this study is used as a base to help these companies to better understand ITPM in this context and in the future to collect data from different companies and sectors to provide Iranian metrics to compare. In a survey of 130 Fortune 1,000 CIOs, which is conducted by Jeffery and Leliveld in 2004, 89 percent of the CIOs polled were very aware of ITPM, 57 percent do not have criteria to define project success and 68 percent do not obtain the benefits of projects. These findings show that 59 percent of companies regularly measure the return on investment (ROI) of IT projects before making an investment decision, but only 25 percent measure the realized ROI after a project's completion and also emphasize that although the executives worried more about the planning for the investments, they did not assess them when they completed. There is not a formal evaluation of IT investments for three cases in this study and they did not assess the investments when they completed. It was pointed out that ITPM could aid business strategy to provide feedback to have a better investment and make us unable to identify if they are in agreement with expectations and what was proposed.



## 6. CONCLUSIONS

This research was carried out using case studies in order to analyze the use of ITPM as an assist to the IT investment management of some Iranian companies. To better comprehend the use of ITPM to better manage the IT investments of companies regarding planning, control, and the evaluation process, this study is helpful. The ITPM technique has been either considered as a new technique that has received little attention in IT research (Tu and Shaw, 2011) or as an accessible means for improving communication and allowing planners to schedule resources more efficiently (Cho and Shaw, 2009) which provides increased visibility into IT decision-making ITPM, evaluation into IT spending, alignment between strategic plans and IT expenses. ITPM, as one of the Information assessment categories for identifying the useful innovations in IT, helps IT and business leaders to identify their priorities and companies to better manage their IT investments. So this technique is significant and useful for companies. Due to the limitation of this research, using of few case studies, the conclusions cannot be generalized to the population of companies. The ITPM analysis had to be done across a variety of sectors because there were few companies applying the technique. since comparisons within sectors become difficult, so several suggestions for future research emerge: 1) analyzing companies' ITPM in the same sector to find the differences and similarities; 2) quantitatively analyzing the use of ITPM in Iranian companies to determine how this tool is being used in the country; 3) research using the model presented could be done in different contexts and countries to understand the use of ITPM in IT investment management and; 4) analyzing the impacts of countries' specific features (national, cultural, organizational contexts and technological requirements) on the use of ITPM in IT investment management.

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