How Information System Investment Evaluation Being Initiated: An Actor Network Theory Perspective

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Abstract

Determining whether investments in information technology (IT) have an impact on firm performance has been and continues to be a major problem for information systems researchers and practitioners. To better understand the often far-reaching implications associated with technology investment and interrelated IS evaluation, this study follows actor-network theory (ANT) as a lens and interpretive case study as a methodology to understand how Information System investment ideas being initiated in the developing country context of Jordan.The purpose of applying ANT is to produce an initial functional outline of the different actors—human, nonhuman, technical, social and cultural—that interact in the actor network. With respect to IS investment, examination of the interactions surrounding the idea of IS investment will provide information on many important issues and on the relationships between human and nonhuman actors. This paper seeks to make a contribution through exploring IS system idea initiations from the perspective of actor-network theory. In addressing the above issues the study serves an important objective which is to provide valuable insights regarding the way that investments ideas are initiated, which is currently lacking in both the information systems and the management literature.

Keywords: actor-network theory, Information systems, Information technology, IS investment, IS Evaluation

1. Introduction

Managers today consider IS an issue of serious concern. The performance of organisations has been greatly affected by the substantial growth of information technology (IT), which is seen to have an immense potential for enhancing capabilities further. However, to justify the enormous investment made in IS, great pressure has been put on management to quantify its business value. Organisations face many challenges concerning IS investment. While much research indicates (Mukhopadhyay et al., 1995b, Brynjolfsson and Hitt, 1996, Kohli and Devaraj, 2003) that IS may contribute to the improvement of performance, there has been inconsistent evidence in the literature, leaving some observers sceptical as to whether IS investment has indeed increased business value (Thatcher and Oliver, 2001, Tanriverdi and Uysal, 2010). The fact remains that an understanding of where the potential value of IS investment lies and a demonstration of its benefits have proven extremely elusive (Dorantes and Clark, 2010, Davern and Kauffman, 2000, Mahmood and Mann, 2000).

Despite the fact that studies in the field of IS investment have been motivated by fundamentally different objectives, they have tended to focus on three levels: organisational, industrial and national (Delone and McLean, 2004). Some studies focus on how IT adoption spreads, some examine characteristics of technologies, while others focus on the characteristics of the decision-making process, yet little is known about how and why these decisions are made in developing countries and on what basis the IS evaluation process operates (Jayawardhena and Foley, 2000, Tarafdar, 2005, Almeida and Fernandes, 2008). As technology is becoming a more inseparable part of the structure of organisations, choosing the right technology, compatible with business imperatives, is more important than ever. Given that decisions regarding IS investment can often affect business design, work processes and future business prosperity, IS investment evaluation is becoming one of the most important organisational activities (Shrafat and Heinze, 2011, Bannister et al., 2002, Doherty and King, 2005, Remenyi and Sherwood-Smith, 1999).

The literature indicates that the decision-making responses of individuals and organisations may be predicted and therefore may also be accommodated or redirected through proper strategies (Rogers, 2003). On the other hand, according to Remenyi and Sherwood-Smith (1999), to select the proper IS project requires a thorough IS evaluation process, which provides an assessment of how organisational funds are utilised within the overall management of its investment strategy. This view is shared by others (Cline et al., 2011, Faswheng and Eck, 2000, Ballantine and Stray, 1998), suggesting that IS evaluation provides management with the information to make an effective choice between a number of different projects competing to be chosen. Such information must be related to the short- and long-term objectives of the organisation (Eilat et al., 2008). The choice made will be critical in determining the outcomes of the IS investment selection process; making such decisions in the rapidly changing environment of IS is a difficult and complex process (Light and Howcroft, 2006). Initially, the decision makers are confronted with constraints such as time, resources and established IS evaluation methodology. The constant improvement and development of IS applications are putting more pressure on

organisations to invest, build and acquire the most advanced and suitable applications to achieve the desired objectives (Lin and Pervan, 2003, Peppard and Ward, 2004, Radhakrishnan et al., 2008). This trend in IS investment, as IS continues to take up larger portions of organisational budgets, makes it increasingly conspicuous to managers, who place ever greater emphasis on the IS evaluation effort. Thus, Lin and Pervan (2001b) argue that the evaluation of IS is becoming an important activity because of the increasing levels of IS investment and the significance of IS in organisations. Murphy and Simon (2002) agree that growing IS investment has made the justification of related decisions all the more critical, while the visibility of the importance of IS to management and the perceived need for IS investment have increased greatly.

On one hand, it has been argued that acquiring suitable applications will make a significant contribution to business in developed countries in terms of such key measures as quality of service, profitability, productivity, customer satisfaction, shareholder value and process improvement. However, there are ambiguities as to how IS contributes to business in developing countries (Chau et al., 2007, Brynjolfsson and Hitt, 1996, Kohli and Devaraj, 2003, Mukhopadhyay et al., 1995a, Hulland, 2004, Melville et al., 2004, Prasad, 2008). The existing literature documents some of the factors that contribute to IS investment evaluation in developed countries (Chau, 1995, Cragg, 1993, Drew, 2003, Dutta, 1999, Fink, 1998, Thong and Yap, 1995, Walczuch et al., 2000, Thiam, 2011). Meanwhile, a few (Al-Gahtani, 2003, Tarafdar, 2005, Khalfan and Alshawaf, 2004, Manian et al., 2011) have focused on IS investment evaluation in developing or less developed countries such as Saudi Arabia, Oman and India, further highlighting the need for work examining the Jordanian context. Unfortunately, not much has been done in this critical field, especially in Jordan, where most of the few existing publications on IS investment concentrate on e-banking and on drivers of and barriers to IS investment (Mashhour and Zaatreh, 2008, Siam, 2006, Ciborra and Navarra, 2005, Araj and Khdairi, 2006, Titi, 2005), while paying little attention to how IS investments are evaluated.

2. IS investment

IT investment has increased significantly over the past three decades. Avram (2001) reports that a decade ago, worldwide IT spending was growing faster than worldwide GDP, while Gwillim et al. (2005) suggested five years later that global IT spending exceeded $1 trillion per annum. According to Agarwal and Lucas (2005), IT is one of the most important drivers of business in the 21st century. From late in 2008 to 2010 the world underwent a major economic downturn, beginning in the United States but extending throughout the world, which necessitated reductions in corporate budgets and improved information coordination between businesses in a more hostile environment. Universal IS spending fell by 8.9 percent in 2009, but increased by 8.1 percent in 2010, to more than $1.6 trillion. Software and computer hardware underwent the strongest growth. After a challenging 2009, the technology sector was expected to see a recovery in 2010 as businesses and governments around the world began spending again on information technology, according to a report by Forrester Research. In addition, IT expenditure was expected to rise into 2011, growing by 4.2 percent on sales of more than $3.5 trillion, according to a report by industry research firm Gartner on April 12. IT expenditure worldwide was expected to increase by 5.3 percent in 2010 over 2009, reaching $3.4 trillion, according to the same source. Gartner forecasts that worldwide dollar-valued IT spending will grow 3.2% in 2014 or 3.7% when measured in constant currency, reaching $3.8 trillion as the world economy gradually recovers.

If an organisation wishes to reduce its IS investment expenditure while enhancing information flow, it must make prudent IS project investments within a controlled budget. To this end, decision makers must fully employ investment methodology to protect financial resources while improving IS capabilities (Jadhav and Sonar, 2011). Lin & Pervan (2001) state that to invest is to commit resources with the purpose of realizing future benefits. In other words, the aim is to identify and quantify the costs and benefits of an IS/IT investment (Remenyi and Sherwood-Smith, 1999, Serafeimidis et al., 1996, Wu and Liou, 2011). In any economic environment, it is always prudent for an organisation to minimise costs and maximise investment in its IS choices. Wang (2006) argues that IT investment and IT spending are not the same, in that the former is designed to achieve defined objectives, while the latter does not necessarily involve such objectives. Milis and Mercken (2004) identify various stakeholders in the IS investment process, each having a particular set of objectives and expectations.

The commitment of resources to any project with specific objectives implies an investment. IS investments, where there is a substantial human and organisational interface, are thus different in nature from other capital investments (Irani and Love, 2001). Some authors, such as Tingling and Parent (2004), suggest that IS investment is essentially different because of problems associated with identifying and quantifying costs and benefits, including intangibles. The situation is complicated by the fact that the IS may have not been subject to the accurate evaluations associated with other capital investments, as a result of which its impact may remain unknown and its potential unrealised. Reports of unsuccessful IS projects, undisclosed costs, unidentified benefits, budget overruns, inadequate returns and inconsistency between expected and materialised benefits are common in the literature; examples are the works of Al-Shehab et al (2005) and Willcocks and Lester (1999b).

Moreover, IS investment is characterised by challenges such as high risk, unpredictable timing of cash flows and significant intangible costs (Milis and Mercken, 2004). Willcocks and Lester (1999b) mention the risks associated with issues such as technological change, the level of technological involvedness and unexpected costs, while other authors warn of the difficulties related to project structure, cultural, political and economic factors (Mitev, 2003, Orlikowski, 1992, Toraskar and Lee, 2006, Chapman, 2006, Stockdale and Standing, 2006). Regardless of these challenges, which ought to ensure that IS investments are treated quite differently from other capital investments, IS projects are in practice often evaluated using the same traditional appraisal techniques. For example, IS spending on creating new products should be considered an investment in capital assets (Applegate et al., 1996, Weill and Broadbent, 1998). New products are considered crucial in satisfying the needs of customers and therefore demand more and faster access to banking products (Earl and Khan, 2001). Traditional appraisal techniques are commonly used to evaluate IS investment and this can be considered the main challenge to IS investment evaluation. Decision makers usually depend heavily on appraisal techniques that are part of a broader capital budgeting process to sustain their evaluation of an investment project. Irani and Love (2002) list some reasons for IS investments being evaluated in this way:

- To compare different projects;
- To rank projects in terms of organisational priorities;
- To justify investment requests by management;
- To control expenditure, benefits, risk, development and implementation of projects;
- To provide a framework that facilitates organisational learning; and
- To decide whether to fund, postpone or reject investment requests.

While these issues clearly demonstrate the significance of the IS evaluation process, Wang (2006) points out that as with other capital investments with which many managers regularly have to deal, IT investment has been a particularly critical issue in today's business environment. (Hallikainen and Chen, 2005) state that there were no important unexpected changes in the business environment that would have caused a significant modification to IS investment evaluation.

Regardless of what could be said about the importance of IS investment, as being essential to develop the organisation's capabilities at operational, tactical and strategic levels, it is not likely to be possible to produce a clear and comprehensive definition of an IT investment. Thus, each researcher defines IT/IS investment differently, although the definition given by Bacon (1992) seems to be particularly useful:

Any acquisition of computer hardware, network facilities, or pre-developed software, or any 'in-house' systems development project, that is expected to add to or enhance an organisation's information systems capabilities and produce benefits.

Bacon's suggestion that any acquisition is an investment if it is expected to enhance the organisation's capabilities and produce benefits is supported by many other authors, who have stressed the potential of IS investment. For example, according to Williams & Schubert (2010), the benefits expected from IT investments constitute the second most critical issue overall for organisations of different sizes, especially the larger ones; Crowston and Myers (2004) state that IS can fundamentally change the shape of organisations and industries; Hirschheim and Smithson (1998) list the potential financial, organisational, managerial and social outcomes of the introduction of new IS/IT; and Piccoli and Ives (2005) assert that competitive advantage can be attained by the utilisation of IS, prompting efficiency improvements at different levels.

The ongoing evolution of IS presents a crucial challenge to organisations, few of which are able to sustain a competitive advantage from IS, since continuous developments will enhance their competitors' ability to attain similar or more advanced applications. Khalifa et al. (2005) emphasise the importance of solving business problems through increased IS investment as way to gain competitive advantage. Many argue that it is reactive to conduct IS investment in such a manner and that the potential innovative and strategic value of IT is often lost in reactive investment practice (Maritan, 2001). According to Baskerville (2003), the lifecycle of IS solutions is restricted unless they are improved and customised in the dynamic business environment.

3. IS investment objectives

According to Weill and Olson (1989), Weill (1991) and O'Connor and Frew (2004), IS investment across multiple industries can be grouped into five categories: strategic, informational, transactional, infrastructural and threshold, as outlined in Table 1.

Table 1: A simplified approach to IT investment analysis

Investment Category	Description	Prevailing Measures
Strategic IT	IT decisions designed to alter a firm's products and services or change the way a firm competes in its industry to create competitive advantage and build market share; the overall objective is to drive sales.	Revenue and market share growth rates to capture long-term goals related to competitive advantage.
Informational IT	IT geared towards the development of a firm's information and communications infrastructure to provide better information for its decision makers to manage and control the business.	Return on assets to measure medium-term goals for improved decision making and firm performance.
Transactional IT	IT that supports the firm's operations and typically involves repetitive transactions; the primary foci are cost reduction, productivity, efficiencies and labour savings.	Indirect labour to capture reductions in labour resulting from the use of IT; productivity and efficiency metrics.
Infrastructural IT	IT that provides the foundation and support infrastructure necessary for shared information technology services and capabilities. The evaluation criteria are typically based on the investment's utilitarian attributes.	Focus tends to emphasize the IT infrastructure's utility, cost savings, and/or [strategic] enabling capabilities. Traditional accounting measures (e.g. NPV*, IRR** and payback) are used and often coupled with subjective evaluations.
Threshold IT	IT investment required to compete in a given industry, without which a firm cannot survive; the investment is mandatory or a competitive necessity.	No measure is suggested, since the investment is required for a firm to enter, compete, or remain in a marketplace; the investment should be treated as a sunk cost.

* NPV = Net present value; ** IRR = Internal rate of return

Sources: Weill and Olson (1989), Weill (1991), O'Connor and Frew (2004)

These authors recommend that decision making should follow a contingency theory approach, where the context and type of investment determine the criteria to be used in its evaluation. Generally, they consider that there is one measure for each category (see Table 1), whereas other authors have argued that dependence on only one measure can be deceptive because it cannot cover all of the complexities of IT. Additionally, IS investments may span multiple categories.

Weill and Broadbent (1999b) are among those who propose that management objectives in organisational IS investment can be grouped into just four of the above categories: strategic, informational, transactional and infrastructural, as illustrated in Figure 1.
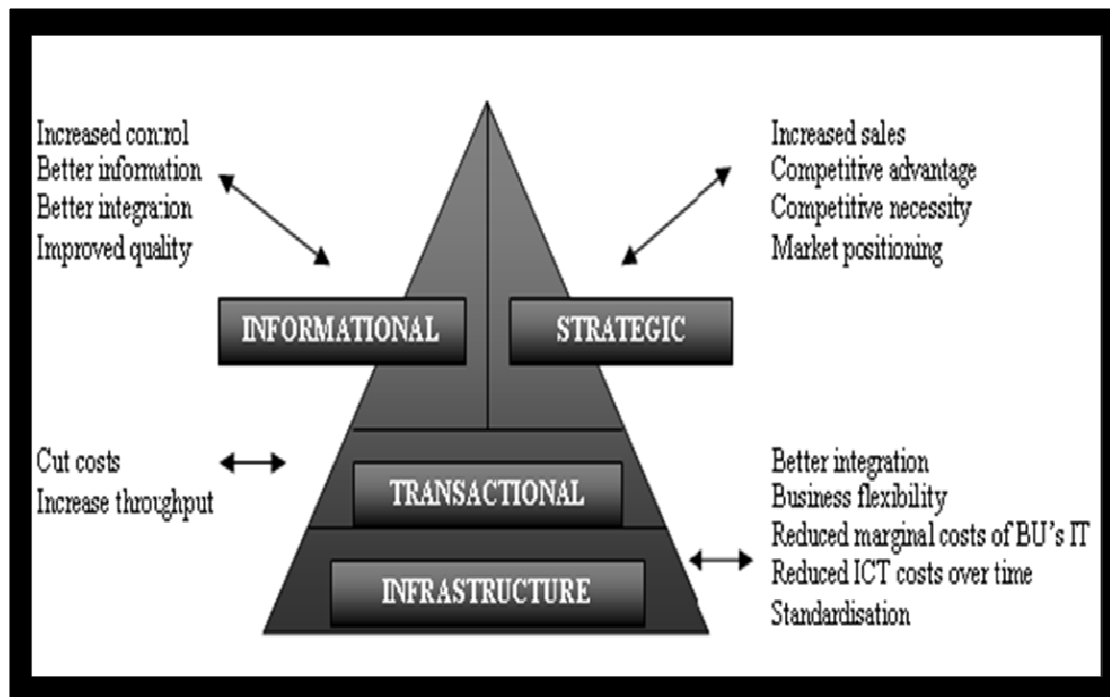
Figure 1: Management objectives of IT (Weill and Broadbent, 1999)

Strategic systems are described as linked with competitive advantage or market share gain for the sake of business development. Gregor et al (2006) and Weill and Broadbent (1999a) recommend that strategic systems be used to improve the organisation's position in the market through costs reduction, growth in sales and market share etc. Informational systems are mainly implemented to provide the information infrastructure needed to conduct the organisation's operations. They are concerned with enabling management functions such as control, planning, analysis, communication and accounting. In addition, IT enhances information quality and accuracy, which can be used for integration and improved strategic planning; informational systems are intended to deliver the appropriate information so that managers can make better decisions and so that communication can take place at the right time and place (Weill and Broadbent, 1999a, Gregor et al., 2006). Transactional systems support operational management by undertaking basic, repetitive tasks. Their primary objective is to reduce costs by replacing labour with capital (Gregor et al., 2006, Weill and Broadbent, 1999a). This type of IT is often used to automate business processes and is justified on efficiency or cost displacement grounds. It also fulfils a record keeping function, which is a fundamental legal requirement. Finally, the functioning of strategic, informational and transactional systems are all enhanced by the implementation of large infrastructural IT systems within the organisation (Weill and Broadbent, 1999a). IT infrastructure also facilitates shared services such as organisation-wide communication networks, help services and corporate databases.

Grover et al. (1998, 1997) present another IS investment approach in the financial and manufacturing sectors, where they studied corporate investment priorities and defined six categories of investment (Connolly, 2000). The main objective of these authors was to study how investment prioritisation was carried out, on what basis and using which criteria. The six categories which they identify are:
1) Strategic Systems: Systems that support and influence current strategy.
2) Traditional Development: Applications that support transaction processing and reporting.
3) Decision Support Systems: Systems that support managerial decision making.
4) Infrastructure Investment: Corporate-wide technology such as data networks.
5) Business Process Redesign: Applications that radically change business processes.
6) Maintenance and Enhancement: Developments required by existing systems.

4. Understanding evaluation
The two subsections above have examined IS investment; in order to complete the theoretical groundwork for an understanding of IS investment evaluation, the present subsection turns to evaluation itself. Evaluation research is intended to provide a better understanding of how evaluation is to be used and how this could influence both people and organisations. (Stufflebeam, 2001) explains that the field where evaluation research has developed is the need to evaluate public programmes of social change in order to show if services and improvement efforts are succeeding. Farbey et al. (1999b) point out that evaluation research can improve IS evaluation to a great extent:

If IS are complex and pervasive socio-technical systems whose life extends over several months or years then IS investments can be seen as social action, based on complex technology and taking place in substantial periods of time. They are thus like programmes of social action which are the subjects of evaluation research.

Henry and Mark (2003) question whether social improvement is the ultimate purpose of evaluations and refer to enhancement of the social environment. The desire for social improvement stands behind the general purposes of evaluation: to inform decision making and to improve the subject or programme under study. Alkin (2004) describes evaluation in social science as a multifaceted concept concerning various categories of evaluation that can be set up for different purposes. The three main categories are use (description), methods (measurement) and valuing (judgment). On another dimension, evaluation is considered to be either summative or formative: summative evaluation is performed to assess the outcome of a project and whether it is able to achieve its objectives, whereas formative evaluation is described as offering better feedback and learning, to provide information that uses several methods and supports evaluation continuously. Meta-evaluation is explained as the evaluation of evaluation (Alkin, 2004) . Guba and Lincoln (1989) make observations on evaluation which appear to have had a significant influence on a number of studies of IS evaluation. They call for an unrestricted structure of evaluation, drawing attention to the significance of multiple stakeholders being involved in the process of evaluation.

A number of authors have considered the ways in which the findings of evaluation (in the evaluation report) can be used. The traditional evaluation literature tended to consider only direct instrumental use: the perception that evaluation findings would lead to immediate and specific actions, such as the continuation, expansion, revision or termination of a programme or project (Caracelli, 2000). Conceptual use or enlightenment (Weiss, 1998) refers not to immediate decision making and action related to the programme or policy being evaluated, but to more general learning that takes place as a result of evaluation. A third type of use is symbolic, referring to the way that evaluation can be used to rationalise a pre-existing arrangement or simply to indicate the purported rationality of an agency (Mark and Henry, 2004). Finally, Russ-Eft, Atwood et al. (2002) have drawn attention to process use, the most important addition to the list of categories of use. Process use is distinguished from earlier categories in that it is not inspired by the findings of an evaluation, but rather by stockholder participation in the process of evaluation. It also specifies the perception of evaluation as an interference with its own set of processes, outputs and outcomes.

It is important to understand what is meant by evaluation in order to be able to understand IS evaluation, given that there is potential confusion regarding the perception of evaluation itself. According to Remenyi et al (1997), evaluation is "a series of activities incorporating understanding, measurement and assessment. It is either a conscious or tacit process, which aims to establish the value of, or the contribution made by, a particular situation". Trying to reach a consensual definition of evaluation is a difficult task, since there are different views, some drawn from the fieldwork and others originating in academia, in isolation from practice. According to Patton (1986), the main purpose of evaluation is to reduce uncertainties, enhance effectiveness and thus make appropriate decisions. To this end, evaluation is a process of systematically gathering information about activities, their characteristics and outcomes for use by specific people. Patton's definition of evaluation has four main points: the systematic collection of information, a broad range of topics, use by specific people and for a variety of purposes (ibid).

According to Dressel (1976), "an evaluation is both the worth or impact of a program, procedure, or individual, and the process whereby judgment is made." Symons & Walsham (1988) assert that the rationalisation of decision making is the main function of the evaluation process. The Merriam-Webster Dictionary explains evaluation as an appraisal process, usually by careful study of an object's condition, or to determine the worth or significance of something. Thus, for Willcocks (1992), the worth of IT to an organisation can be examined by deploying quantitative or qualitative evaluation methods. Love et al (2005) argue that evaluation is a process to be understood and that such an understanding should include an awareness of why it is undertaken, the nature of the process which is undertaken and its inherent complexity (i.e. limitations and problems). Ballantine & Stray (1998) discuss the problem of distinguishing evaluation from appraisal:

the terms "appraisal" and "evaluation" are frequently used within the IS literature in a synonymous manner. Although there appears to be no general agreement as to their exact meaning, we use the term "appraisal" here to imply an ex-ante consideration of IS/IT investments. Thus the activities carried out during the feasibility study stage of systems development would be included within our definition of appraisal. "Evaluation", on the other hand, is more frequently used in the literature to imply a much wider consideration of investments at different times; for example, evaluation might be carried out as the project is being developed, implemented or indeed after implementation. However, we would like to stress that appraisal and evaluation are viewed as aspects of the same decision-making process, in addition to recognising that both activities are intrinsically linked within that decision-making process.

5. Theoretical Foundation

5.1 Methodology

This study uses an interpretive case study approach to look into the complexity and the dynamic character of the interrelated elements of the IT/IS investment initiation and evaluation process in the Jordanian banking system. IT/IS investment and IT/IS evaluation involves a high level of complex interrelation among disparate entities: IT, people and organisational factors. Since IS represents a social process that is dynamic, it cannot be put into a model to be understood using a positivist approach, which has always been engaged in developing fixed and predictive relationships and elements, regardless of the context (Myers, 1994a). As the present study deals with the socio-technical complexity of IT/IS investment and evaluation, the interpretive positivist approach was deemed most appropriate. Most of the data was collected from a Jordanian bank, which will be referred to anonymously as CRBA, indicating its status as a commercial and retail bank. Some of the data was drawn from documents which were supplied by participants at the bank. These were collected while I was engaged in conducting interviews; this ongoing access to documentation provided the means to triangulate interview data with observed behaviour and evaluation process. Interviewees were staff from a cross-section of bank departments, in what follows, participants are referred to as CRBP1, CRBP2, etc, to distinguish them anonymously. As addressing the research problem required in-depth information, data was gathered by means of semi-structured interviews, which are seen as one of the most important sources of evidence in creating a case study database.

5.2 Actor-network theory a Theoretical lens

In this research, interpretive philosophy have been chosen to guide the researcher in understanding IS investment idea initiation process that are characterized by contextual diversity that influence the perceptions of their stockholders. However, In the Interpretive tradition, there are no correct or incorrect theories but there are interesting and less interesting ways to view the world (Walsham, 1993). Therefore, in IS interpretive research as Walsham (2006) noted, the choice of a particular theory is subjective and rely on whether that this theory are interesting to their interpreters or not. As a result, the researcher found ANT interesting and chose it in this study to trace the practices of IS idea initiation process thought out the investment process. this section discusses ANT's research approach and its selection as the theory for this study.

5.3 How ANT handles complexity

IS evaluation is a complex socio-technical phenomenon (McMaster and Kautz, 2002, Herrmann et al., 2004, Luna-Reyes et al., 2005), since it involves a wide range of situations and entities including human and nonhuman actors: software, technical hardware, resources, vendors, system design, business cases, requests for proposals, etc. These elements are expected to interact with each other to achieve the strategic aims of the organisation concerned. To handle this kind of complexity and the interrelated phenomenon of the IT/IS investment initiation process in the Jordanian banking system, I considered that actor-network theory was a preferable option as a method of analysis and an interpretive lens to understand the dynamics of IS use, as highlighted in previous studies (Walsham, 1993, Monteiro and Hanseth, 1996, Latour, 2004).

The ANT approach appeared to be suitable for this study because it has the ability to treat individuals and technology from the same standpoint and to negotiate the interrelationships that occur in the complicated networks in which they exist. ANT has informed IS research by being used as a framework to analyse human and nonhuman entities in any context. It uses the same conceptual apparatus throughout and a symmetrical approach that is essentially semiotic; thus "the term actant is symmetrical, it applies indifferently to both humans and non-humans" (Latour, 1991). IS research uses this theory as a powerful methodology to collect and analyse data. It analyses the social and technical sides of any information system issue in the same manner. The theory treats human and nonhuman actors as equal, sharing the same objectives and associations of heterogeneous elements, themselves constituting a network which is formed and sustained to achieve special objectives, for example IT/IS investment initiation process in the banking industry.

> Within ANT, technology receives exactly the same (explanatory) status as human actors; the distinction between human and nonhuman actors is systematically removed. ANT takes the fact that, in a number of situations, technical artefacts in practice play the same role as human actors very seriously: the glue which keeps a social order in place is a heterogeneous network of human and nonhuman actors. A theoretical framework which makes an a priori distinction between the two is less likely to manage to keep its focus on the aim of a social arrangement regardless of whether the means for achieving this are technical or non-technical. The consequence of this is that ANT supports an inquiry which traces the social process of negotiating, redefining and appropriating interests back and forth between an articulate explicit form and a form where they are inscribed within a technical artefact (Hanseth, 1996).

ANT presents itself as a common element within the interpretive epistemology to interpret the role of IT and the process that outlines the relational consequences of the interconnection between IT and individuals

through the meanings that people assign to them (Myers and Walsham, 1998). It has achieved a permanent acceptance among scholars who investigate information systems (Walsham, 1997) and social informatics researchers (Walsham and Sahay, 1999), as a social theory and an interdisciplinary approach to the study of technology and society. Law (2004) defines ANT as "an approach to socio-technical analysis that treats entities and materialities as enacted and relational effects, and explores the configuration and reconfiguration of those relations" (p. 157).

Critics of ANT have expressed conflicting views concerning the assumptions of actors, depending on whether they are human or nonhuman; however, this is the distinctive attribute of the theory. The other main arguments directed against ANT are that it uses the same conceptual apparatus for analysing human and nonhuman actors in a heterogeneous network (Shoib and Jones, 2006) and that there is insufficient distinction in the way that it treats technological and social elements. The difference between ANT and other theories is that "technology is an actor because it has been endowed with the ability to act through its position in the network" (Holmström and Stalder, 2001). All entities are treated in the same way to bring about the formation of the network.

Beside its use in many IS studies, ANT has also been used by some to develop theoretical foundations (Latour, 1999, Walsham, 1997, Rose et al., 2005a) and by others to present their empirical data (Lanzara and Morner, 2005, Beekhuyzen and Hellens, 2006, Shoib and Jones, 2006). Latour (1992) claims several advantages for this approach: it grants respect to the actors and their individual differences; it allows for all entities; it pays respect to the outcomes; failures have the same explanations as successes, so no hierarchy of dominance is produced; all links in the network are accounted for; and when information is translated from one form to another it can still be credited to its origins.

6. Data Analysis and Findings

The purpose of applying ANT is to produce an initial functional outline of the different actors—human, nonhuman, technical, social and cultural—that interact in the actor network. With respect to IS investment, examination of the interactions surrounding the idea of IS investment will provide information on many important actors and on the relationships between human and nonhuman actors. The important point here is to recognize the links between the social and technical factors that comprise the IS investment actor network. The idea of IS investment always started somewhere in the bank, motivated by the actors or various reasons. These actors subsequently motivated the initiator, called the IS Idea Champion, to develop the interest in IS investment by introducing IS idea document which embody the interest and vision of the IS champion.
CRBP5 offered this account:

> The IT idea starts when a request is issued by a department of the bank requesting an upgrade to their systems or to have them renewed. They have to construct their thoughts to convince their superiors of their intention, so it either has to be dealt with right away or can be postponed to the next budget. If not, this recommendation will be presented to the executive committee, who will ask some big questions regarding cost benefits, return on investment and other measurements and these have to be answered by the project sponsor in order to get endorsement for the project.

The above quotation summarises the whole process of new IS investment in the bank. The IS idea, incorporating the vision and interests of its promoter, would be presented in the form of debates and negotiation. At this stage the argument would be weak and easily rejected unless the initiator of the IS investment idea was able to make it seem indispensable (Callon, 1986) to the proposed allies at the obligatory passage point (OPP) for them to realise their interests. This idea, which in the ANT lexicon is considered a nonhuman actor, demonstrates the ability to take action due to the reputation of its initiator and the power of the vision invested in the idea. Most ideas related to IS investment would begin with the initiator approaching other actors to convince them to accept it as an opportunity to realise their interests. The interested department must then address the necessity level of the proposed technology by presenting a solid argument that clarifies the need for such a system.

Therefore, whenever a new idea attracted the attention of any human actors, they had to raise the level of debate inside their departments before taking it any further, spreading knowledge of the idea so that it would be widely discussed and analysed, thus gathering support for the idea by engaging with others from related business areas. As has been stated in different situations, key actors should be approached to enrich the idea and they should be enrolled into an actor network of IS investment. It is crucial to have the relevant actors engaged, because there is a need for people who are able to justify the idea and appreciate what kind of impact the new IS would have on the business. The IS investment idea should therefore attract both IT specialists, who would be able to improve the idea further in terms of its IT implications, and other human actors, who are initially attracted because they have a possible interest in the progression of the idea and would be influenced if it were launched. As part of the interessement process (Callon, 1986), the initiator must also convince the actors to

accept the interests earlier attributed to the IS to help form the IS investment network.

An alternative perception sees the role which business people play as being mobilised by the initiator of the IS idea and motivated by the technology to participate in introducing and supporting any innovative idea. CRBP4 explained the background to this important development:

> The change used to be supported by IT people, while business people were more or less silent participants. They would be involved but did not really understand the technology and they would undertake new IT projects because the IT people told them that it was possible and that it was best for the business.

CRBP12 explained the change as follows:

> Many things have changed now in the way we do things. Most IT change is now guided by business people and that's just happened recently.

Thus, there had been a change in the attitudes of business people, whereby the process of facing technical challenges used to be led by IT people, but business people had recently become more closely involved with serious IT initiatives to enhance their businesses. Over the years, business leaders have become more technologically experienced and IT specialists have become more business-oriented. As CRBP6 pointed out,

> It is now essential to know who the people are who you are going to approach and what is the possibility of having them participate in forming the idea of adopting new IT.

Many issues would have to be drawn together in this argument in order for it to be presented to various businesses areas, which would review it and subject it to intensive evaluation before any decision was made to support the idea. Unlike earlier IS evaluation practices, in which change was led by IT people, business areas were now seen as playing a crucial role in driving IS initiatives.

The need to have the right actors engaged in the actor network was centrally directed to develop the idea and make it grow, which had to be based on the solid justification that only relevant key actors were able to provide. Thus, the IT idea must be presented in the form of written documents so that it could be seen by other business and IT actors in the bank. There was thus a set of procedures to be followed to have an idea for IT investment positioned on the right track. The idea might be turned down; actors would not necessarily be successful in creating a strong network able to produce tangible results. CRBP3 made a relevant remark:

> Absolutely, the perception of technology in the bank can influence how much credence is given to the technological viewpoint. Operationally, it can be a very hostile view, so there is a lot of blaming, instead of working together to fix it. You can get situations like that which can have a lot of effect on the effectiveness of the technology operation and investment.

This explains the socio-technical environment surrounding the network, which was characterized by conflict, power struggles, marginalisation and exclusion between business and other departments in the bank. Although all actors were treated the same, they were not of the same size. The difference between actors was therefore an effect of this network, where it was not only humans who made a difference in the network, but also the strategies, plans, procedures, knowledge, opportunities and challenges. It is important to stress that an actor in such a network is not just a human inspired with intentionality. CRBP1 mentioned the importance of departments and ideas:

> Each department within the bank, through its executives, tries to make a substantial contribution to the wellbeing of the bank. They do this by making efforts to speed up and strengthen their case so as to gain support for the investment in IS projects. And since it has always been like this, there is competition between the business people in terms of who gets the most support for their ideas from other key individuals.

It follows from this point that approaching various potential actors would be beneficial in gathering the support needed for an idea when it was still fragile and needed to be strengthened by engaging the support of other actors to participate in developing it and to pool their thoughts. No individual actor could act on his own, because he would need to enrol the energy of other actors in order to have an effect. It is therefore only actors within the network of enrolled actors who were able to act. The idea must be brought into the light; in other words, other stakeholders must be informed and convinced of the idea. At this stage, the very idea of investing new IT would become a nonhuman actor symbolising the interest, knowledge and vision of the initiator. It was very important at this stage to start circulating the idea and discussing it tentatively with others in order to begin to enrol them in an actor network. Next, in order to enlarge such networks, they should be merged and shaped by aligning more actors. It is in this way that an actor network can grow. CRBP3 put this very succinctly:

> It's not a one-man show, but rather combined efforts by everybody in the process to make the business flourish and grow.

The importance of an actor network depends, therefore, on the number of actors who can be employed for a specific purpose. These actors then persuade or enrol others in the network which they want to dominate, and are influenced by them in turn. An actor is any element which creates space around itself and makes other elements dependent on it, translating their will into a language of its own. Thus, for CRBP1,

> *It's quite clear that at the end of the day it's only the powerful actors with great ideas who will get a big share of support to make their ideas prosper in order to make more business for the bank, since they are capable of making IT changes that improve performance.*

An actor is not merely the frequency of a law, a potential, or an intermediary which does nothing on its own. Thus, once the idea has been propagated, it might attract the interest of other human actors, especially if it relates to their business interests; otherwise, the focal actor will need to try to convince them of the benefits of the idea to their business and to align their interests with his. Individuals perceive an idea as they see it, which is not necessarily the same as originally intended. The reason for aligning the actors' interests in spreading an idea at CRBA was seen as very important and the potentiality of having other actors affected by the idea was evident if it was launched and exposed widely in the bank's environment. CRBP6 pointed this out by saying:

> *When business people try to present their IT ideas they should be very aware of how to align IT applications with their business goals, otherwise nobody will listen to their ideas.*

At this very important stage it is strongly recommended to start the enrolment and mobilisation of those actors who are seen to be interested in the idea and to try to influence them in order to secure their support for the idea in the forthcoming stages. In this process the project champions (initiators) at CRBA tended to focus on what was good for their own departments. They had to make a great effort to mobilise interested actors, to generate the support needed for the idea and to influence the relevant actors so that they would take the important step of building a network to foster the IS idea. The possibility of having a complex network to provide support for their effort to invest in IS was very tempting, but they encountered problems and restraints in embracing IS investment. Therefore, to bring other human actors in and to align their interests, it was not sufficient to make the idea clear by presenting it with emphasis on what it would bring to their departments in terms of benefits; rather, they needed to broaden the concept to cover the expected benefits of IS at the organisational level. CRBP8 explained further:

> *Managers have different attitudes when it comes to convincing the top management of new ideas. Basically, the relationship that is built with other key decision makers is crucial in what approach they might take to proceeding with their idea.*

Managers might describe this as getting management support, and there was a clear awareness of the importance of senior management support. Senior managers consistently expressed their vision of the need to change. However, such management support was not built overnight. All senior managers were enrolled in the network of IT investment and this was underpinned by all of the managers' attending IS investment presentations. There are no independent entities in ANT networks, only relations between different actors which make things happen. The relations between actors within a network are what generated each IT/IS investment project at CRBA and made it apparent. Hence the following observation by CRBP2:

> *Some of the managers depend on their charisma and personality attributes to approach other decision makers and other members of staff before making any IS case official.*

According to the interviewees there were many ways to enlist the support and the enrolment of a key actant, by involving and mobilising people in an actor network. The first approach was structured in fixed steps and involved incorporating the idea into a document that identified the IS perspective in future banking and the expected benefits, which could then be presented for further approval by decision makers. The other approach was to bypass some of these routine procedures and rely on charisma, personal skills and experience to carry the idea to other actors in the bank, then to work hard to clarify the idea and have it justified for them as well as other potential actors. The impact of any departmental executive or senior manager on the IS investment could be revealed and dissected through an examination of their activities and the way that they had mobilized support for those activities in the past. Some were prepared to adopt a different plan when their first attempts to accelerate IS investment at the bank were unsuccessful. However, a different approach was needed to explore the idea. Having the idea laid out and justified before being transcribed in a short document would make it clear that the first approach sought to determine the size of reaction to the justifications put forward for discussion before the initial draft document. The other approach did it the other way round, by having it written, then justified afterwards. CRBP20 said:

> *The bad relations between stakeholders and lack of communication are what make some ideas not have the ability to stay on track but rather get rejected and not able to gather support.*

It seems safe to assume from this is that poor communication between the IT champion and other stakeholders could further retard the process of acceptance, as neither partner would be informing the other of exactly what was needed. At this stage, IT/IS investment would lack the energy to go further, so the network might weaken and start to disintegrate. With the pressures that were accumulating it seemed that the network of aligned interests was becoming too weak to withstand these destructive forces. However, this was not necessarily the end, as CRBP19 explained:

> *The idea might come round again if the concerned party has found out how to reach out to other partners in the bank who could help him to make the idea look more attractive to the*

others.

Strengthening the network was then an obvious decision to be made by the IT champion; an actor within the bank who was not part of the network might offer the opportunity to rebuild it, benefiting from his experience in this field. However, if progress was to be made it might be that a new network would need to be built. It can be said that no idea dies, but rather some are put aside for a while, until a new network emerges and is shaped by aligning more and more actors. In this way an old idea can grow again. But if no actors are sufficiently interested, eventually the network will be destabilised. In the case of the bank under study, there might happen to be an actor, such as the operations or development manager, whose interest must be enrolled for the idea to survive and gain support. Sometimes it would not be possible to overcome the absence of such essential actors who needed to be enrolled in the network to carry decisions through. This could be inscribed in an official document stating the procedures which must be followed in preparing IS proposals, which would exert agency on the actors to have certain other actors enrolled in the network at the outset. Participants suggested that having such experienced actors enrolled in the network was very important because they had an awareness of the whole process of IS proposals and how to progress them, knowing very well who needed to be engaged in the network and how to convince them to be fully involved and enthusiastic in order to stabilise the network.

CRBP15 described the next step:

> *Developing an IS proposal is the next step after having IS investment drafted in main headlines in a short written document, which will need experienced people to deal with it in order to have it sponsored.*

The champion would need to start again to find a new way of approaching other business partners, to have them meet and discusses the idea again and to justify their ideas. These might not be the same actors as those who were previously in favour of the idea, so the champion would need to communicate with them to convince them and interest them in the idea. Meanwhile, it might be possible to promote the idea and enhance it by modifying it to make it stronger and more appealing to the others. The actor would be generating interest in further promoting the technology and providing access to it though the IT investment, by aligning other actors to the idea of the investment. Thus, he would be slowly but surely involving everyone so that they would become engaged in and subscribed to an interest in the common cause.

What is more significant for the future success of the IT investment is that they would have set out arguments presenting the most important evidence that it was worthwhile, showing through their document that there were organisational rewards in adopting the IT. As CRBP10 stated:

> *The impact of IT is so obvious on different functional aspects and cannot be ignored. That impact is very strong but mostly linked to a strong relationship with how to exploit IT and gain these advantages at the highest level.*

By trying to convince as many others as possible in the bank of the advantages of IT investment, it is clear that actors could influence or enrol other actors in their network, being influenced in turn. Even techniques, ideas and processes were likely to be affected by the remarks that the actors made when aligning their interests around the idea that was articulated. People and things would be influenced by seeing things differently from how they had seen them at the beginning. Thus actors, both human and nonhuman, were simultaneously translated into networks that would begin to work towards the common goal of IT investment in the bank. CRBP12 justified this goal by referring to customer demand:

> *Bank customers demand quality in the services offered by the bank, so in order to deliver those services a new technology is assumed to be fundamentally important to solve this issue. Since highly advanced technologies have a great impact on service quality and can help the bank to address this issue, more IT investment could solve this matter and enhance the quality of services and products provided by the bank.*

As the actor concerned was generating interest in further promoting the technology and providing access to it though the IT investment, the attitude alluded to by interviewees was mainly driven by the high expectation of what IT/IS investment could do in terms of organisational impact. There would seem to be little doubt that if pre-investment evaluation has shown that IT/IS will present financial and other qualitative benefits, then the chance of more IT/IS investment will increase.

CRBP10 mentioned the importance of political support for a project in which he was involved:

> *Holding meetings and putting ideas that supported the IS project was not restricted to schedules or timetables and this needs to be remembered. Important ideas might be undermined if they were not politically supported.*

Discussion of ideas was thus not limited to deadlines or timetables that might restrict the effort of the IT champion to approach other actors in the organisation. Producing a mature document was essential for project approval and was given close attention, since the tensions which existed between actors in different departments were undeniable, so that more meetings needed to be arranged. The linking was formal and procedural in that definitive guidance was given as to how the documentation and timing of the two were related. The attempts in

this regard were successful and the translation was achieved. Over a period of weeks the IT investment document was carefully revised, drafted and redrafted; it seems that there was a positive effort to convince other actors that adoption of IT was a necessity if performance was to be ensured. When the document was reviewed, some shortcomings were spotted and the necessary improvements were made.

To sum up this stage, aside from his earlier encounter with IS investment practices in a different environment, the initiator's observation of the problems encountered by his department further convinced him that the IS investment opportunity was viable. As a result, a problematised (Callon, 1986) IS investment was seen as an opportunity for the stakeholders to realise their interest in improving the banking experience. As the focal actor (Sarker et al., 2006), the initiator's own interest was to make IS investment indispensable by offering it as the OPP (Callon, 1986) for the business areas to realise their goal of a more convenient banking environment than they had previously experienced. As part of the problematisation process, he identified other actors as potential allies, to help transform the IS investment idea into a stable network. He also defined network roles and interests and attributed them to the potential allies (Callon, 1986). Developing an IS document would be the next step in the process of IS investment evaluation, after having aligned the interests of different actors and expressing their interest in the initial IS investment idea document.

7. Discussion

This section discusses how a heterogeneous collection of human and nonhuman actors contributed to the creation of IS investment initiation process. Most of the benefits of IS investment were built on assumptions, while other evaluation criteria, which might have been more appropriate in delivering more tangible and useful input for decision makers, were not used. Some interviewees had a contradictory view, questioning the ability of certain criteria to add value, since the results were so obvious. IS investment process had to go through any stages in order to minimise the risks when making decisions, by examining the potential benefits of such a system. In this long process, politics and power have been shown to play a potentially decisive role in favour of a project or against it, whatever the formal criteria used in the evaluation. For political reasons and because of the varying views of business units about new technology, it was shown that in some situations the costs of a project were likely to be underestimated and its benefits presented in an unduly favourable light. The literature indicates strongly the presence of such political influence in decision making (Farbey et al., 1992, Weill and Olson, 1989, Kazanjian and Green, 2002, Klecun and Cornford, 2005).

A number of authors (Farbey et al., 1995, Powell, 1992, Willcocks, 1994) have also stated a range of reasons for an organisation to eschew an IS investment plan and depend instead on intuition and gut feeling. When CRBA started to develop a detailed IS investment document, by contrast, the process of investment decision making appeared to be more rational, in line with reports in the literature on traditional IS evaluation methods. Thus, Love and Irani (2004) , Lin & Pervan (2000) and Pennington & Wheeler (1998) found that firms avoided less quantifiable criteria such as political or environmental conflicts, attitudinal and cultural differences among actors. However, as was stated by some of the CRBA interviewees, the process throughout the decision stages was sometimes influenced by political and cultural factors which might reduce the level of rationality. Yet there is little evidence from this research supporting the IS evaluation techniques discussed in the literature.

Irani & Love (2002), Semich (1994) and Wilson & Howcroft (2005) indicate the importance of IS evaluation during the decision making process, where measures are categorized and formally organised so that any IS investment can be more objectively assessed. Actors at the bank understood that IS was considered a strategic option, but not taken for granted, and had to be proven and reasoned as well as to be justified in terms of enhancing the bank's performance. Therefore, no distinctions should be made for a project involving IS, since the goals and objectives should be inseparable from those of the business. This theme was a common one, reiterated by several executives throughout the bank. Decisions on new IS investment based on the experience of others were apparently considered not to be justified, but during the study it became obvious that in practice there were many examples of investment proposals which had managed to avoid going through the standard evaluation process. In the case of small-scale investment, given the time needed to pass through the bureaucratic process, there was sometimes agreement between business areas to find ways of initiating the IS investment work outside the process, for example by developing other existing work structures or practices.

Given the potential influence of political interests and the characteristics of the decision makers, the assumption that investment procedures and decisions are objective and rational is challenged by many (Avison et al., 1995, Ballantine et al., 2000, Symons and Walsham, 1991), while others report that significant IS decisions were taken by relying on gut feeling and instinct (Marshall and McKay, 2002, Bannister et al., 2004). These authors consider that an effective method for understanding decision making issues would be to adopt an interpretivist and economic approach to the investment process. In other words, since IT investments incorporate a significant number of subjective elements, both human and organisational, these must be recognised explicitly if the information system is to produce optimal results (Ryan et al., 2002, Irani et al., 2000, Serafeimidis and Smithson, 2000). Greater participation by relevant stakeholders would increase the awareness of the different

views and interests of all the people affected by the system and would help to avoid possible traps in the decision making process.

Many research studies have found that IS decisions are based on formalised methods (Ballantine and Stray, 1999, Doherty and King, 2001, Irani and Love, 2001, Lin and Pervan, 2001a, Verville and Halingten, 2002), while the findings of this study show that decision making was not necessarily as rational as it appeared to be. Instead, informal methods often took place, on the basis of the previous experience of senior managers, although formal methods was considered an inevitable and common procedure in the case of new IS projects. As decision makers considered a considerable proportion of the benefits of IS investment to be intangible and qualitative, decisions appear to have been seen to a certain extent as too subjective and unreliable for it to be worthwhile to spend time and resources on measuring these benefits, especially since they appeared obvious to experienced senior managers, who had been proven right on many occasions.

8. Conclusion

In order to produce possible ideas for IS investment at CRBA, it was the responsibility of a variety of business areas to scan the business environment and discover any new opportunities. Business actors then formed a bridge between the business areas and the IT department in order to guarantee that adequate collaboration had taken place and that the two partners were in agreement that the investment proposals were both technically feasible and practical from a business perspective. However, one of the weaknesses was that decision makers were sometimes presented with imperfect and irregular representations of business areas, as a number of business units resisted participation in this process. Consequently, some actors did not have a full picture of the Jordanian business environment. The case study of the CRBA bank confirms that during the initiation of an IS document certain ideas were involved while others (intentionally or unintentionally) were not. This was due to the pressure that had been exerted by various actors, based on their ideas and inscriptions. This formed the reality that was embodied in the IS document, a reality represented by the content of the IS document, which was dynamic in nature, evolving as it moved towards the next stage of IT/IS investment.

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