Diversity of Information Technology Management Sophistication in Financial Service Industry

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---**ABSTRACT**---

This paper is aimed at understanding and proving a valuable foundation for exploring the impact of IT management sophistication namely planning, controlling, organizing and leading in financial service industry and summarizing a review of the literature which identified many definitions of IT management Sophistication. The management literature indicated a contingency framework for considering IT Management Adoption. This paper will look into the key aspects of IT Management concepts contributing to the characterization of the study.

Keywords **- Management Concepts, IT Management, IT Management sophistication, financial service industry.**

I. INTRODUCTION

IT management is the process of overseeing all matters related to Information technology operations and resources within an IT Organization. Effective IT management enables an organization to optimize resource and staffing, improve business processes and communication and enforce best practices. Although the significance of IT management in the context of financial service firms has been emphasized in the IT Literature, so far a consensus has not been reached with respect to the definition of this construct. At present, we have a poor understanding of the concept of IT management, particularly in the firm environment.

This study aimed to characterize 'IT Management' in the context of financial service industry with a view to exploring the concept of 'IT management sophistication' that is, of some firms being more sophisticated than others in their approach to IT management. For example, a firm that had no agreed IT plan would be considered less sophisticated in terms of IT management than a firm that had an agreed IT Plan. Similarly, a firm that did not review its IT plan would be considered less sophisticated than a firm that reviewed its IT plan annually.

This paper is organized under five sections. The literature review is presented next and then research approach of Data regarding various aspects of IT management sophistication methodologies. This is followed by Summary and conclusion and limitations are also presented.

II. LITERATURE REVIEW

This study focuses on the concept of IT management. As different authors define the term IT management in different ways, we start by clarifying the term IT management before proceeding to discuss the concept of IT management sophistication. In this study IT management is viewed as a broad concept incorporating topics like managing the IT resources as a competitive weapon as well as the development and operation of Information systems (Luftman, 2004). Thus it includes the management of IT resources including personnel and technical infrastructure and management of information systems. The definition recognizes that some of these management processes are not carried out by IT personnel. This was particularly important for the study's focus on financial service industry as small firms have no IT department (Cragg, 2002).

There have been a number of attempts by IS researchers to characterize IT management. For example, as early as 1973, Nolan referred to the important IT management activities of planning, organizing and control. Planning, organizing and controlling are common to many frameworks characterizing IT management (Earl, 1998; Raymond and Pare, 1992; Gupta et al, 1997).However, some studies include aspects not shared by other frameworks. For example, IS/IT leadership, relationship building and business systems thinking are identified as core IS capabilities by Feeny and willocks (1998), but these aspects were not incorporated by others. Thus researcher have adopted a range of different dimensions to characterize IT management, indicating that there is no commonly accepted characterization of the term IT management.

With a lack of a consensus within the IT Literature, we turned to the Management literature for clarification of the concept of "IT Management". The management literature also shows a range of definitions of what is meant by management. However, many authors refer to the 'functions of management' as IT Management. For example, (Daft, 2000) refers to the four Management functions as "The four management functions of: planning, organizing, controlling and leading". Schermerhorn (1989) uses exactly the same framework.

Some researchers have referred to IT Management in as few as three dimensions. Others view IT Management having many more dimensions. However, many frameworks incorporate three dimensions that reflect the three management functions of planning, organizing and controlling. The management literature agrees with this topology but adds 'leading' as a fourth function. The study thus initially viewed IT management as the four functions of IT planning, IT organizing, IT controlling and IT leading. The following brief definitions from Schermerhorn (1989) proved useful in clarifying what each function referred to.

Planning- determining what is to be achieved, setting goals and identifying appropriate action steps. Planning centers on determine goals and the means to achieve them.

Organizing- allocating and arranging human and material resources in appropriate combinations to implement plans. Organizing turns plans into action potential by defining tasks, assigning personnel and supporting them with resources.

Controlling- monitoring performance, comparing results to goals and taking corrective action. Controlling is a process of gathering and interpreting performance feedback as a basis for constructive action and change.

Leading- guiding the work efforts of other people in directions appropriate to action plans. Leading involves building commitment and encouraging work efforts that support goal attainment.

Table [1] summarizes the existing frameworks that suggest key aspects of IT Management. These frameworks provide useful insights for identifying potential areas and sub-functions of IT management that could be adapted for this study.

The diversity of IT management dimensions identified in table [1] shows that there is no commonly accepted definition of the term 'IT management'. Planning, organizing and controlling are common to many of the frameworks characterizing IT management, although some include aspects not shared by the others. For exampleFeeny and willocks (1998) identify IS/IT leadership, relationship building and business systems thinking as core IS capabilities, but not Earl (1989), Nolan (1973) and Gupta et al., (1997). Furthermore, while large firms are concerned with IT management issues such as architecture planning, contract monitoring and IS function management (Feeny&Willocks, 1998), small firms deal with issues such as educating the users, involvement of external consultants and implication of top management (Pollard & Hayne, 1998). The importance of external expertise in the management and implementation of information systems, especially in the small business sector has been highlighted by several researchers (e.g. .Fink, 1998; Gable, 1996; Thong et al., 1996).

Table [1] Key aspects of IT Management

Earl (1989)	Nolan (1973)	Boynton et al. (1994)	Galliers & Sutherland (1991)	Davis et al. (1995)
• Planning • Organizing • Control	• Planning • Organizing • control	• Project Management • Strategic Management • Service Control • Service Planning • Resource Planning • IS Service • IS Function Management • Development Maintenance	• Strategy • Structure • Systems • Staff • Skills • Super ordinated goals	• IS & Business Alignment • IS Staff Skills • Competitive advantage • End user computing • Telecommunications • Security & Control • Identifying projects • Measuring IS • Open Systems • Application proliferation
Feeny & Willcocks (1998)	**Gupta et al (1997)**	**Sabherwal & Kris (1994)**	**Raymond & Pare (1992)**	**Pollard & Hayne (1998)**
• IS/IT Leadership • Business systems Thinking • Relationship building • Architecture planning • Making technology work • Informed buying • Contract facilitation • Contract monitoring • Vendor development	• IT Planning mode • IT Control mode • IT Organization • IT Integration	• IS Planning • Top Management involved(in planning) • IS Performance evaluation • IS Manager's knowledge of business plans • Top managements knowledge of IT	• Organizational Objectives • Top management implications • IT investment • IT adoption • Presence of consultants • IT Planning • IT Control • IT evaluation • IS personnel • Role of IS function • Decision level • Type of development Position of IS	• IS for competitive advantage • IS Project Management • Software development • Responsive IT infrastructure • Aligning IS • Technological Change • Communication networks • Business process redesign • Educating users IS Human resource

Table [1] showed little agreement with respect to major issues contributing to the characterization of IT management

III. IT SOPHISTICATION DIMENSION

Previously, research on IT adoption in an organization started from the study conducted by Nolan in early 70's. The study examined the relationship between the stages and the preceding stage, also known as stages of the electronic data processing growth model or Nolan Model. The Nolan's study encouraged other researchers to validate the Nolan model. This study of IT adoption in an organization was then carry forwarded by Raymond and pare 1992 and successfully integrated the aspects of IT usage including the type of technology used and the nature of the applications portfolio and management information system which also include organization, the IS plan and control (Raymond and Pare, 1992). In the next step, many researchers continue to investigate the characteristics of information system within organizations, especially IT sophistication (Raymond and Pare, 1992).

Similarly, researchers like Keen (1991) and Weill and Broadbent (1998) viewed IT Sophistication as an essential resource of an organization. Raymond (1998), defined the IT Sophistication as processing model, type of operation, application portfolio, decision level, the position of IS function. Cheney and Dickson (1998) categorized IT sophistication into three main criteria:(1) Technological sophistication that reflects the hardware and software systems and nature of application. (2) Organizational sophistication that reflects the information resources for management activities, and (3) System performance. Based on previous studies, it can be concluded that the concept of IT sophistication is a multidimensional concept. In order to integrate these concepts, Raymond & Pare (1992) asserted that IT sophistication may be characterized under two major dimensions: IT usage and IT management (See figure [1]). And proposed the integration of IT sophistications variables like information content, technology support, functional support, management information system.
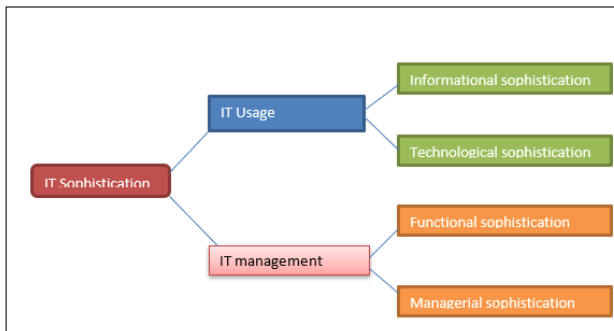
Figure [1] Dimensions of IT Sophistication (Raymond & Pare, 1992, p.7)

Table 2: IT Sophistication Indicators

Dimension	Indicator
Informational Sophistication	Application portfolio Integration of Application
Technological Sophistication	Variety of IT used Hardware Characteristics Development tools Man-Machine interface Processing mode Types of Operation
Functional Sophistication	IS personnel specialization The role of the IS function Decision level Type of development The position of the IS function User participation
Managerial sophistication	Organizational objective Top management implication IT investment IT adoption process Presence of consultants IT planning process Control of IT Evaluation of IT

Table 2, presents several indicators of each IT sophistication variables. Raymond and Pare (1992) defined IT sophistication as the nature, complexity and interdependence of the use of IT (Information content and technological support) and IT management (Functional support and managerial support) in the organization. Another definition proposed by Wang et al. (2004) that IT sophistication is the extent of IT Use, Intensity of IS use and IT integration. Thus, IT sophistication includes several platform technologies such as hardware and software, networking and telecommunication technologies, database and various shared services such as electronic data interchange, e-mail, universal file access, video conferencing and teleconferencing services (Al-Eqab and Adel, 2013).

IT Literature provides various ways to define IT sophistication and uses variety of characteristics. Informational dimensions of IT sophistication includes the type of application portfolio(advanced application) such as order entry, budget variance, production variance, budgeting, production planning and control , and activity based-costing and integration of these applications (Al-Eqab and Adel, 2013). The use of these advanced applications will lead to more information available and faster to retrieve (Al-Eqab and Adel, 2013). Meanwhile, several researchers have used many dimensions such as decision level and user participation to represent functional sophistication (Raymond and Pare, 1992; Al-

Eqab and Adel, 2013). Raymond and Pare, (1992) and Choe (1996) found a significant positive relationship between user participation and information system implementation.

The user participation in an information system implementation may consists of participation in programming , participation in system maintenance and problem solving, elaboration of development schedule, elaboration of development budget and training of new users on available system (Al-Eqab and Adel, 2013).The managerial sophistication has been utilized in the literature in certain ways such as top management support, IT investment , IT adoption process, control of IT , and evaluation of IT (Al-Eqab and Adel , 2013; Al-Eqab and Ismail, 2011).The top management support is the most dominant managerial sophistication dimension that have a significant implication on information system implementation (Al-Eqab and Ismail, 2011).

Further, Top management may determine the success of an information system projects because they play an important role in information system planning such as financial resource planning, human resource planning, information requirement planning, implementation planning, and post implementation planning (Al-Eqab and Ismail, 2011).

The IT sophistication dimensions that have been proposed by Raymond and Pare (1992) was originally developed in the SME context. However, several recent studies have attempted to apply the dimensions of IT sophistication in different contexts, such as health care organization context (Pare and Sicotte, 2001), manufacturing listed on the stock exchange (Al-Eqab and Adel, 2013), Cooperative context (Alannita and Suaryana, 2014) manufacturing SMEs (Raymond et al., 2014) and listed companies (Al-Eqab and Ismail, 2011). This is accordance with Raymond and Pare (1992) suggestion, that the dimensions of IT sophistication are not only limited to small and medium organization but also large scale business may also use these dimensions. It is based on this assumption that almost all financial service organizations(small, medium & large) have used technology and computer-based information systems hence IT sophistication is a multidimensional concept and provides a comprehensive IT characterization for accounting information system research in financial service organizations (Al-Eqab and Adel,2013;Ismail, 2004).

IV. IT MANAGEMENT PRACTICES

New competitive and technological challenges faced by firms have resulted in escalating complexity in IT Management (Applegate and McFarlan, 1996). Effective IT management sophistication requires a set of coordinated efforts associated with Planning, Organizing, Controlling and directing the introduction and use of IT resources within a firm (McNurlin and Sprague, 1997) . A number of other studies have also suggested that the role of IT within a firm significantly influences IT Planning & management control systems and the role of the IT leader (Premkumar and King, 1992) .IT Management practices are defined here as the level of IT Management Sophistication & IT leaders role in a firm.

The following four paragraphs provide the theoretical reference for the four criteria identified for measuring IT management sophistication.

IT Planning

As firms move towards higher sophistication in IT management, the nature of the IT Planning changes from a computational plan with a technology management focus to a large range strategic plan with a data resource management focus (Cron and Sobol, 1983). The Primary objectives of IT planning are then (1) to align the IT Plans with the firms' business plan (2) & to address key aspects of business strategy (Zviran, 1990).

IT Control

As firms move towards higher IT Management sophistication they became more confident in managing complexity as other resources, the application development positively pursue economic benefits & IT managers seek to manage the balance between short-term delivery and investment for the future(Earl, 1989) . Firms with high level of IT Management can derive significant benefit from strategic use of IT by (1) establishing mechanism to permit key line managers to exercise controls over budgeting, priority setting and resource planning for IT function.(2) and clearly defining the role and responsibilities of IT function.

IT Organization:

In the early stages data processing firms could organize IT activities autonomously because early applications were limited to transaction-oriented functions requiring only limited user awareness and involvement, the increasing trends towards distributed client-server computing and ERP systems require that user's idea be given special attention in planning and implementation of IT applications (Orfali and Edwards, 1999).

Consequently, the direction, development and operation may be customized to meet specific business unit needs (Brown and Magill, 1994). IT departments are likely to (1) be much flatter with specialized sub units organized around technologies and business needs (2) respond better to changing user needs by better alignment between user areas and the IT functions (3) leverage IT investment more effectively.

IT Leader's Role:

It is contended that while for some firms IT activities represent an area of great strategic importance, for other firms they play, and appropriately will continue to play a cost–effective, useful but distinctly supportive role(cash and MacFarlan, 1992) . It is inappropriate for firms with supportive IT to expect that the same amount of senior management strategic thinking should be devoted to the IT organization as in firms of the former type. When IT served a strictly supportive function in firms, it was appropriate for the IT leader to be a technical expert and competent manager. In the information era of the 21st century, however, the IT leader has to form the linkage between IT and other executives of a firm (Applegate and Elam, 1992; Watson, 1990).

V. SUMMARY

The most important contribution of this paper is that it identified four dimensions that characterize IT management sophistication in financial service industry viz IT Planning, IT organizing, IT controlling and IT leading. To a large extent this major finding confirms with past research findings. For example IT planning, IT organizing & IT controlling have been identified as three major dimensions that determine IT management in the context of large firms (Earl, 1998; Gupta et al.,1997; Nolan, 1973) and in small firms (Raymond & Pare, 1992). Also leading has been well recognized as a function of management within the Management literature (Schermerhorn, 1998) and within a growing body of IS literature. (Feeny&willocks, 1998; Karahanna& Watson, 2006).

However of the ten studies that attempted to define IT management that were identified in the literature review, only Feeny& Willocks (1998) refer directly to IT leadership as an important dimension of IT management. Thus IT leading has not been regarded as a major sub-dimension of IT Management by past researchers, although others have referred directly or indirectly to this aspect of managing information technology. For e.g. Gupta et al (1997) had a measure related to the leading role of Top management under IT integration. (i.e. " In my firm, top management perceives that future exploitation of IT is of strategic importance ").Although the small firm instrument by Raymond and Pare (1992) has a measure of top management involvement, it did not treat IT leadership as a major factor.

VI. CONCLUSION

The study's major contribution is the characterization of IT management as four dimensions. This understanding can help IS researchers characterize ' IT management sophistication in financial service industry ' and further explore the relationship between this and other related constructs, such as IS success, IT enabled organizational performance and competitive advantages. The characterization may also help practitioners determine strengths and weaknesses of IT management in firms. These results could then be used to help formulate appropriate strategies aimed at improving IT management sophistication.

A major limitation of this research is that it does not focuses on other IT management indicators like personnel specialization, decision level, and Evaluation of IT.

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