Critical Factors Influencing the Service Quality of Information Systems: An Organizational View

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ABSTRACT
Information systems have been a well researched topic based on their development, implementation, effectiveness, success and, more recently, business-IT alignment. A literature review has revealed that one domain (i.e., the IS service quality and its measurement) has gained considerable prominence in the last one and a half decades, after the recognition of significance of IS service quality in measuring IS effectiveness. However, there are still only few studies which identify the critical factors influencing the IS service quality from an organizational perspective. In this paper, using Giddens’ theory of structuration, we identify the factors affecting the IS service quality and organize them into a conceptual integrative analytical framework. After presenting the conceptual framework, we discuss a case study to explain how the framework can be used to improve the quality of IT services in an organization. The proposed framework will facilitate organizations to judge the present state of their IT ecosystem and guide them to improve their IT service quality.

Keywords
Information Systems, Service Quality, SERVQUAL.

INTRODUCTION
Service quality was proposed as a measure of Information Systems (IS) effectiveness by Pitt et al (1995). They argued that leaving out service quality while measuring the effectiveness of IS might lead to its improper measurement (Pitt et al. 1995). Since then, IS service quality has been an important antecedent of IS effectiveness in IS research. According to DeLone and McLean (2003), service quality may become the most important component while measuring the overall success of the IS department. Further, the huge amount of literature (Jiang et al. 2002; Jiang et al. 2000; Stylianou et al. 2000) that service quality of IS has been made subject to highlights its importance. However, most of these studies (Dyke et al. 1997; Jiang et al. 2002; Pitt et al. 1995) have investigated how to measure the IS service quality. But what about the factors which influence service quality? What are the antecedents of service quality? Are they inside the IS department only? How do they interact with each other? How do they influence each dimension of service quality defined in SERVQUAL1 method? Not many studies address the issue of antecedents of IT (Information Technology) service quality, and answers to above questions still remain largely unanswered. Since the measurement of IS service quality is very critical to the IS managers in order to evaluate and maintain the consistency of high quality IS services (Watson ‘98), an understanding of factors which affect IS service quality, finding the best combination of such factors, and discerning the relationships among them will serve to help researchers, IS managers, and business firms.

In this study, drawing from Giddens’ Structuration Theory (1984), we propose a conceptual integrative analytical framework that categorizes the factors related to IS service quality into five groups: External Environment, Business-IT Alignment, Organizational Management, IS Competencies and IS Behavior. After identifying the factors influencing IS service quality,

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1 SERVQUAL was developed by in marketing research (Parasuraman, et al., 1985) to measure general service quality. It has been used for measuring the quality of IS services.
this study demonstrate how each of the factors may influence or improve the five dimensions of service quality as defined in SERVQUAL model.

SERVQUAL is an instrument method for measuring service quality developed in the marketing research (Parasuraman et al. 1985). SERVQUAL defines service as a multi-dimensional construct and measures it based on five dimensions: tangibles, responsiveness, reliability, assurance and empathy. In the IS service domain, Pitt et al. (1995) argued that the service quality of IS is an important function of an IS department and should be included while measuring IS effectiveness. For measuring service quality, they proposed using SERVQUAL. Pitt et al. (1995) carried out empirical experiments and found out reliability coefficients for the five service dimensions. After Pitt’s paper many studies (Badri et al. 2005; Dyke et al. 1997; Jiang et al. 2002; Kettinger et al. 1997; Richard Watson et al. 1998) were carried out on the appropriateness of using SERVQUAL to measure IS service quality.

GIDDENS’S THEORY OF STRUCTURATION

Anthony Giddens (1984) argued that a social system cannot be explained at micro level alone. Its interaction and relationship with the macro level produces and reproduces structures which explain the outcome of a social system. He introduced “theory of structuration” that tries to harmonize the dichotomies of social systems such as agency/structure, micro/macro perspective and so on. According to the theory, a social system can be well explained using an example of structure and agency. Agency can be defined as capacity of individuals to act independently (Giddens 1984). Structure refers to the rules, regulations, social class, and religion and so on which influences the agency. Theory of structuration proposes that agency is influenced by pre-existing social structure and thus performs actions within or limited by these structures. Along with acting under a set of norms defined by existing structures, agency also influences the structures and thus leads to formation of new structures (Giddens 1984). This form of reciprocal action of agency and structure is termed as “duality of structure” by the theory.

The theory defines structure in three different ways: Signification, Domination, and Legitimization. Signification can be thought as an interpretive scheme and can be defined as rules and resources or a set of transformation relations. In organizational sense, signification can be an entity or a group of entities which leads an organization (i.e. provides motivation) to undergo transformation for better actualization of goals. Domination can be thought of as facility and refers to the relations between actors and collectivizes. For example, a management will provide resources to employees and set up the rules by which to the employees must use the resources. Legitimization or norms are conditions which facilitate continuation of transmutation of structures and therefore reproduction of social systems. The decision to adopt a new technology is contingent on several considerations such as security of the new technology, success of past attempts of technology adoption, compatibility of the technology with the current systems etc. Such considerations combine and become protocols over time and help the continuity of transformation (which is initiated by signification).

RESEARCH FRAMEWORK

IS service quality is an outcome of a socio-technical system. We propose that this socio-technical system demonstrates a duality of structure, which can be explained as follows; the main function of IS department is conversion of data and resources into information which can be used meaningfully by end users. This conversion process can be influenced at two levels i) at organizational level (macro level) and ii) at IS departmental level (micro level), as shown by a number of studies (Hirschheim et al. 2003; Kanungo et al. 1998; Luftman et al. 1993; Motjolopane et al. 2004; Weill et al. 1989). IS service quality can be defined as providing a certain level of performance to the flow of information. This implies that service quality is also influenced at organizational and IS departmental level. The IS department’s actions to provide a good service quality are influenced by various structural components internal (organizational support, organization size etc.) and external (viz. technical trends) to the organization. The interaction of IS department with these structural components lead to changes to existing structures and formation of new structures. Thus, based on the theory of structuration, the IS department is similar to agency. The organizational management serves to provide structure which influences the agency. Based on this, we categorize the literature into five groups: external environment, business-IT alignment, organizational management, IS competencies and IS behavior. Figure 1 shows a conceptual framework that integrates factors affecting IS service quality dimensions as the outcome of the socio-technical systems. This framework applies to organizations having in house IS department as against those which outsource their IT requirements.

In the framework, the three types of structures (as defined by structuration theory) are provided by “External Environment,” “Business-IT Alignment,” and “Organizational Environment.” External environment (i.e. external to the organization) is defined as the technological environment outside the organization and provides the signification. A new technology will lead to new ways of providing service quality and hence a motivation for change (transformation). Business-IT alignment defines rules and conditions as to how and which new technology should be used for good service quality and ultimately achieving business goals. Thus, it defines legitimization for our framework. Organizational management possesses influence; power
and control to introduce change, use resources, and bring about innovation for better service quality. Thus, it defines domination for the framework. Agency is defined by two constructs in the IS department: “IS Competency” and “IS Behavior”.

IS Competency

The present research defines the IS department to have three competencies which plan how the IS department will work, define interaction with structures etc. The three competencies are: IS leadership, IS management, and HR competency. IS competency along with the IS behavior will define the patterns of actions of the IS department (similar to the agency in structuration theory).

IS Leadership Competency: IT Leadership is one of the most demanding and compelling components of any organization. Earl and Vivian (1999), based on the literature on skill sets required by CIO, summarize that a CIO must possess technological expertise and experience, business know-how and judgment, and behavioral skills in leadership, communication, teamwork and facilitating change, which is termed as CIO competency by Nelson (2003), and Edington et al. (2006). Competence of IT leadership is further supported by Weill and Vitale (2002), who state that a CIO must possess technological knowledge to direct IT infrastructure with IT services and functionalities. Sambamurthy et al. (2003) emphasize the necessity of CIOs being business strategists in order to work with CEO (Chief Executive Officer) and senior organizational management so as to shape IT-enabled competitive moves. Armstrong and Sambamurthy (1999) found that competency of CIO has a positive effect on the successful deployment of IT in an organization. So, a competent IT leadership, being a technological expert, would be able to garner top management support and hence funds for the required infrastructure; having equal level of business knowledge, it will implement the IT services duly; being a good leader, it would be able to provide proper technological direction to IT as well as to motivate and inspire IT staff; and being a good communicator, it would be able to hold the IT department as a close-knit unit. Thus, we categorize competency of IT leadership as an important internal factor influencing IT service quality in an organization.

IT Management Competency: Information technology is not cheap and an organization has to decide when and which IT to implement so as to gain benefits from the investment as well as to remain competitive. Managers of IT play a pivotal role in determining the technological direction that an organization takes. A few responsibilities of managers include constructing

![Figure 1: A Conceptual Framework Integrating Factors Affecting IS Service Quality]
business plans, providing technological directions, determining network security, directing the system analysts, computer programmers and so forth. Thus, competency of IT Management in such tasks is important to improve the IT service quality. The organizational management has some expectations from the IT organization. Proper reporting by IT management to organizational management, regarding the goals achieved by IT services will help to increase faith of organizational management in IT services, thus establishing organizational management support (Edington et al. 2006). Also, a competent IT management will enable business-IT alignment.

**HR Competency:** HR factors play a key role in management of any organization. Communication and commitment form important sub-factors of HR. Proper communication with the end users may help to provide exhaustive services. Absolute commitment to provide the best service to customers will increase the perceived quality of IT services. Competency of HR management in communicating with users about security threats, emerging technologies, and newly available services reflects good quality of IT services. Proper training of IT staff increases the IT staff behavioral competency which in turns increases the IS quality of service.

**IS Behavior**

The IS competencies are manifested in IS behavior. The competencies design the plans for providing quality IT service, whereas the behavior actually implements the plans. The IS behavior is shown by three constructs: security management, infrastructure management and IT help desk.

**Security Management:** Information security is a major IT related concern in organizations today (Eloff et al. 2000; Loch et al. 1992; Meall 1989). Organizations are connected to the outside world through their own networks and Internet. Networks and Internet connection makes an organization vulnerable to outside attacks. A disruption of an organization’s networks may lead to disruption of processes and activities of the organization, which may in turn disrupt the IT service quality. Many non-profit organizations like educational and research organizations may prefer to keep open connections which mean that they relax the rules regarding the nature of data coming in and going out of an organization. Poor security in such cases may compromise IS service quality.

**Infrastructure Management:** Typically, infrastructure in an organization includes computer services, telecommunications, web services, wired networks, wireless LANs, and server-clients etc. Proper management of infrastructure is very essential for good quality of IS services in an organization. In our model, we group the issues of *system integration* and *application complexity* (most discussed in literature) under infrastructure management. Having the right mix of the various infrastructure components by proper planning of integrating system improves IS service quality. Raghunathan et.al (1991) consider *improving systems integration* as one of the major planning objectives; the level of which eventually determines the IS effectiveness. Kanungo et al. (1998), in their model evaluating the IS effectiveness, proclaim that system integration was the factor having the highest driver power for IS effectiveness. This signifies the level of dependence of other factors (factors affecting IT service) on system integration.

Infrastructure Management also involves integration of new system into the existing infrastructure. Addition of new technology to existing infrastructure may cause problems due to incompatibility issues. This has been termed as *application complexity* in literature (Barki et al. 1993). Therefore, competency of infrastructure management in planning systems integration and reducing application complexity will improve the quality of IT services. Infrastructure management should keep track of new technologies and should have a plan to incorporate them into the existing infrastructure.

**IT Help Desk:** Competency of IT staff includes the ability of IT staff to provide adequate and timely support to the customers. A call center, on-site service, walk-ins, telephone, computer repair work, software issues, programs for training end users in various technologies and so on may be part of IT services provided by an organization. A well trained courteous IT staff would lead to increase in perceived service quality. Studies have shown that courtesy and politeness by staff are more valued by customers than availability of infrastructure (Parasuraman et al. 1991; Pitt et al. 1995). Good and timely support by the IT staff would lead to a good service quality. IT help desk staff will work as directed by HR management. Thus, we have duly included “IT Help Desk” as a behavior in our framework.

**External Environment**

External environment is defined as the technology and business environment present outside the organization, such as, the emerging technologies, IT consultants and vendors, and technical trends in other organizations. The technological developments are of significant importance to organizations. Emerging technologies like Enterprise Resource Systems (ERP) and Inter-organizational systems (IOS) can lead to smoother organizations operations, which will be reflected in the service.
quality. End users will expect that they be provided with the latest technologies (for ex: operating system) in market. This coupled with reviews of emerging technologies, suggestions of IT vendors and consultants, technical trends prevalent at other organizations lead the IS department to start making changes to the existing systems. Thus, external environment provides a new direction (signification) to an organization.

**Business-IT Alignment**

Although new technologies or external environment provide motivation for organization to undergo radical changes, they do not always dictate the decisions concerning the use of new technology. The choice of emerging technologies depends upon many factors such as, its compatibility with the existing systems, and the knowledge of employees regarding the new technology (Markus 2000) and so on. These protocols are a part of business-IT alignment and undergo continuous adoption and change (Henderson et al. 1993).

Business-IT alignment involves rules of using IT based on the choices made by an organization over time, its subsequent experiences etc. These rules will evoke imitative actions over time and will necessitate subsequent responses. Thus, these rules provide structures which lead to a process of continuous adaptation and change. Business-IT alignment borrows from external environment, concurs with organizational management and provides a plan for the implementation of IT services. Thus, it corresponds to the legitimization of the theory of structuration. In addition, business-IT alignment would increase the involvement of organizational management in the IS initiatives.

**Organizational Management**

Bender (1986) in the study of insurance companies states that investing in IT below certain optimum level lowers the firm's performance whereas, investing above this optimum may add to costs unnecessarily without adding to the performance. Also, previous studies (Weill et al. 1988) provide evidence of uncertainty of improvement of performance of an organization by IT investment. So organizational managers are wary of how much to invest in IT and may be reluctant to champion the initiatives of the IS department. Extant literature posits that without top management involvement in IT projects, the projects are worthless (Ewusi-Mensah 1997). Thus, the organizational management possesses the power which structures the way communication between the agency (IS department) and collectivizes (external structures) take effect.

Weill and Olson (1988) found that organizational management can effectively convert the investment in IT to useful output. Better organizational support and organizational commitment to IT initiatives lead to improved performance (Chang et al. 2000). Thus, with its power of investing in resources and utilizing them, organizational management serves to be an important influential factor for IS service quality.

**Dimensions of IS Service Quality**

The service quality measurement instrument i.e. SERVQUAL developed by Parsuraman et. al.(Parasuraman et al. 1985) has been applied in numerous fields like hospitality, education, banking etc. Similarly, SERVQUAL has been profusely used to measure the service quality of information systems. Although there have been controversies regarding suitability of use of SERVQUAL for measuring IS service quality, there is enough evidence provided by researchers that SERVQUAL indeed provides appropriate measurement of IS service quality (Kittenger et al. 1997; Parasuraman et al. 1985; Pitt et al. 1995). Thus, this framework defines service quality as having five dimensions mentioned in SERVQUAL: tangibles, reliability, responsiveness, assurance and empathy. This section describes how these dimensions of service quality are influenced by antecedents of service quality identified in the above sections.

Zeithaml et al. (1996) state that *tangibles* was least ranked service quality attribute. For IS this implies that the availability of proper hardware, latest software and so on, hold least priority. But, as suggested by previous research, in case of IS this may not be the case and this dimension of service quality may be as important as the rest. Tangibles include appearance of physical facilities, equipment etc. Every day, improvements are being achieved in existing IT hardware, software and other equipments, which make life easier. For example, videoconferencing and video bridging can help save time, travel, dynamic meetings, job interviews etc. Users should not be deprived of such tangibles which help them work efficiently and maybe increase productivity. High costs related to hardware acquisition and implementation makes the installation decision crucial. Organizational management has the power of allocating funds and resources. It will implement this power based on the rules provided by business-IT alignment and recommendation of IS leadership or the ability of IS leadership to convince organizational management of the new technologies’ utility. Thus, this dimension of service quality will be influenced by organizational management, IS leadership competency and business-IT alignment.
Reliability is defined in SERVQUAL as ability to perform a promised service dependably and accurately (Parasuraman et al. 1988). Technical requirements of end users do not remain same. The software needs of end users change often, as latest versions of existing software are released, and emergence of new technologies require installation of latest hardware. Thus, in this dynamically changing technical field, it is difficult to provide promised service dependably, let alone accurately. Such rapid changes in IT field increases complexity and is a challenge to the IT management (Benamati et al. 2000). As we mentioned above, with changing IT, the user requirements change too. So, the IT management cannot ignore the new technologies. If there is no proper planning of incorporating new technologies into the existing infrastructure, the lengthy acquisition and implementation may make many new technologies obsolete before they even were used. One of the most service oriented feature of IS department is assisting end users in selecting hardware and software, installation, problem resolution, software education etc (Pitt et al. 1995). These services are usually provided by the IT help desks. The HR management plays an important role in keeping the IT help desk up to the mark, by providing them proper training, scheduling their duties etc. Providing competent services can increase the reliability of IS service quality. Thus, reliability of IS service quality is influenced by IS management competency, HR management competency and IT help desks.

Responsiveness is defined in SERVQUAL as willingness to help customers and provide prompt service (Parasuraman et al. 1988). Literature states that responsiveness increases user satisfaction and that it positively affects the user assessment of the IT service quality (Naylor et al. 2000). Responsiveness means providing a particular service promptly without unreasonable delay. For example, many organizations provide mobility ports so that the employees can connect to some host computers from their offices or residences. Employees may have problems connecting their laptops to the mobile ports, and logging in through these ports. They may send emails to the IT department, or may drop in concerning such problems. Responsiveness includes, answering email queries in a timely manner, attending to the defective mobility ports quickly etc. This dimension is influenced by HR management competency and IT Help desk.

Assurance refers to employees’ knowledge and courtesy and the ability to inspire trust and confidence (Parasuraman et al. 1988). Considering the example above (mobility ports), contemplate that a user is not able to connect to the host computer and do his work, because the IT staff was not able to help him use the mobility port even after repeated attempts. Such cases would lessen the trust of users in the quality of provided service. As is obvious from the definition and our framework, assurance can be improved by the IT staff help desk. Also CIO competency and security management will play a major role in affecting this attribute of service quality.

Empathy is defined as providing individual attention to the customers. The HR management will serve as an important factor for providing empathy along with the IT help desk. Providing individual attention to users amounts to proper utilization of the IT help desk task by the HR management. The level of communication among the users and help desk staff can also be defined as empathy (Pitt et al. 1995). Proper technical training to help desk task might lead to improved communication between users and the help staff which will increase empathy felt by users towards the IS department.

A CASE ANALYSIS: AN EXAMPLE APPLICATION OF THE FRAMEWORK

We present a case of the IS department of a public university in United States as an example of how the conceptual analytical framework can be applied to improve the quality of IS services in an organization. A case analysis is a detailed examination of single example of a class of a phenomenon. Although, it cannot provide reliable information about the broader class, it can be useful in forming initial impression in the preliminary stages of an investigation(Abercrombie et al. 1984). In this case analysis, we compare and contrast the structure components of IS department at the university with the framework of the study. Such a comparison illustrates the practical relationships among various constructs in the research framework.

In Figure 2, we have organized the IS department hierarchy using the conceptual framework as a template. Constructs from the framework are illustrated in bold. Under each heading, we have grouped together the functions and services of the studied IS department. The IS department studied is consistent with our portrayal IS competency and IS behavior as two separate entities in any IS department. In Figure 2, under IS leadership competency and IS management competency, we have listed positions and committees (such as CIO, IT planning council and so on) who direct the IS behavior which is illustrated as department names (application development, system integration, telephone service, network security and so on) under infrastructure management, IT help desk and security management. We have also shown how the constructs are related in the studied IS department. The IS leadership in this organization includes a CIO and multiple associate CIOs who together direct infrastructure management, IT help desk and security management. The IS management reports to the IS leadership based on activities such as IT planning, security, research and so on.
Based on a quick comparison of the case with the conceptual model, we suggest following points to further improve the service quality of this case organization. As we can see in the figure, there is no HR competency in the IS department of the case organization. As we explained in the conceptual framework, a HR competency can help in reaching out to end users while explaining issues such as security threats, new technologies and so on. In addition to this, the studied organization has a research computing center which among other things indulges itself in development of new technologies and keeps track of new technical trends. Similarly, there is a research planning committee (which we have shown under IS management competency) who reports directly to the CIO (IS leadership). Comparing the mission statements of research planning committee and research computing center, it was found that both are much similar. Yet, there is no link between the two in the IS department studied. Organizing both under a single umbrella (such as business-IT alignment) will definitely serve to improve the service quality.

**DISCUSSION AND CONCLUSION**

The administrators of IS department (IS leadership, management) and to a lower extent top administrators (organizational management) are influenced by the external environment. An organization cannot hope to have all the technical expertise in the IS department itself. From time to time it has to take help from IT consultants and vendors outside the organization. Technology, as we know is developing at an overwhelming speed. Thus, reviews of new technologies, recommendation of consultants and vendors, technical trends adopted by other organizations lead the IS administrators to consider undergoing transformation in their technological setup. New technologies might bring in new methods of implementation and new methods of working things out etc. Thus, external environment provides the motivation or structure for undergoing transformation.

Business-IT alignment will set the conditions for acquiring or modifying new structures based on the past experiences of the IS department and organization, external environment, present technologies present at the organization, the suitability of new technologies of enhancing business goals and so on. Business-IT alignment will lead to governance of present rules (structures) and continuity of evolution of new rules as per new technical developments thus leading to the production and reproduction of this socio-technical system that is, it will act as a structuration agent for IT.
The organizational management’s power, status and rank give them the power to introduce change, invest in technology, and enhance innovation of technology and so on. It determines goals and priorities which can then be initiated by the IS department. But the IS leadership will influence the organizational management to modify or completely change the priorities and goals. Organizational management will borrow from the IS competency, business-IT alignment and external environment and decide upon where to invest, how to use resources which plan to finalize etc. Organization management will provide the structures for utilization of IS systems. The structures provided by external environment, business-IT alignment and organizational management will shape the actions of IS department (i.e. IS competency and IS behavior) towards good service quality.

The IS department consists of two parts: IS competency, which lays out the roadmap for policies, IS behavior manifests and implements these policies. The IS competency, being the expert in technical arena, keeps watch on the external environment, based on which it suggests measures for proper business-IT alignment and convinces organizational management to support its plans for higher service quality. IS competency will decide upon the numerous issues such as directing the IT infrastructure, motivating the IS help staff, planning out security policies etc. which will maximize the service quality provided by the IS department. Being at the top of the ladder in the IS department, the IS leadership will have the position and status to take its view to the organizational management. IS leadership will try to acquire the support of organizational management for proposed initiatives of IS department.

Thus, the IS department strives to work under such structures provided by external environment, business-IT alignment and organizational management and, in turn, will influence the organizational management and determine the business-IT alignment from time to time, thus, restructuring the existing structures. This interaction eventually influences the dimensions of IS service quality which also goes on evolving with the new structures.

This study provides a holistic picture of components influencing IS service quality present inside and outside the IS department. Further, this paper strives to make the interdependencies among the factors visible by putting all the factors in one single context. Organizations can benefit from this paper by having a checklist at hand which will allow them to assure IS service quality.

**SELECTED REFERENCES**


