Exploring a "Gap" Model of Information Services Quality

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Due to the growth of end-user computing, information technology (IT) decentralization and alternative sources of supply, the information systems (IS) function now serves customers that possess substantial discretion in their use and purchase of IS services. To continue to effectively deliver systems and services that IS customers perceive valuable, IS management must become expert in determining and assessing IS customers' expectations and perceptions. One important source of guidance in such a market-driven environment is to look to the service marketing and operations literature for frameworks that may permit IS to more effectively determine and convey customer value of IS services and IT. This paper outlines IS service quality improvement as a means to cope with this customer-driven IS environment. Specifically, it adapts a widely accepted conceptual "gap" model from the marketing field as a framework for IS service quality management. This model has as its premise that service quality improvement is a continual process of determining and comparing customer expectations and perceptions and, then, modifying products and services based on the results of this assessment. Applications of this model in both research and practice are discussed.

The inability of the Information Systems (IS) department to deliver systems on a timely basis, combined with the rise of personal computing and networking, have caused many firms to fundamentally question past IS deployment and management practices. These factors coupled with poor economic conditions and corporate mergers have forced many firms to make drastic cut-backs in central IS resources. In the extreme view, some argue that there may no longer be a role for a formal IS function (Dearden, 1987). Ironically, while industry and internal factors have encouraged such "downsizing" and decentralization, the need for strong enterprise information capabilities is recognized to be of premier importance (Niederman, Brancheau, and Wetherbe, 1991). This recognition is manifested in high demand for responsive information systems that can quickly change the nature of business operations to meet new market conditions. These trends seem to suggest that for the IS function to prosper, it must adopt a proactive posture that better meets *customers' expectations.*

Over the past decade, business has come to recognize *external* customer satisfaction as the key competitive performance measure (Kumar & Sharman, 1992). More recently, the combination of this customer focus with a process view of the business has focused attention on *internal* customer satisfaction throughout a product's value-chain to ensure product quality. Representative of this new orientation, Bhote (1991, p.14) states:

> There is a growing realization that the main objective of a business is not merely profit, but customer satisfaction! Industry tends to respect (if not worship) the external or final customer. But internal customers are at best taken

for granted... The internal customer needs to be cultivated and his needs, requirements, and future expectations determined... if the external customer is king, the internal customer is at least a prince.

As both a vital support service and product delivery platform, IS can be viewed within an external and internal customer context. Treating "service recipients" as "customers" is not an entirely new idea for IS, nor is the emphasis on internal customer satisfaction in the chain of quality improvement. However, a customer focus has taken on an increased relevance in the emerging "free market" era of IS service delivery. As IS moves to this free market, customers may pick and choose those products that best meet their needs, at the best price (Boynton & Zmud, 1988; Cash, McFarlan, & McKenney, 1992; Loh & Venkatraman, 1992). Often, these customers may purchase IS services from outside the firm (out-sourcing) if expectations for quality and cost are not met by internal IS. In addition, alternative sources of supply within a firm (in-sourcing) are directly competing with traditional centralized IS. A critical issue facing IS management is how to respond to these changes.

This paper outlines IS service quality improvement as a means to cope with this customer-driven IS environment. This approach is based on several assumptions: 1) IS should be viewed as a service enterprise responsible for providing business solutions rather than solely technical support (sometimes these solutions may be strategic to a firm). 2) Individuals and groups serviced by IS should be viewed as *customers* rather than as *users*. 3) IS customers wield substantial influence concerning IS resource allocation decisions including the potential of out-sourcing, in-sourcing, "managed services" or "shared services"[*1]. 4) An awareness is needed, within IS, of marketing and quality improvement concepts to more effectively determine and convey the value of IS services. 5) Service quality improvement is a continual process of determining customer expectations and modifying services appropriately.

Based on these assumptions, we hope to contribute to the IS field by applying quality concepts from service marketing and operations in the IS context. In general, this article will present a framework for continuous improvement in IS service quality that should be beneficial both to IS management and to the firm as a whole. This will be accomplished by first discussing IS as a customer-driven service enterprise. Next, this article will outline why service marketing and operations concepts of quality improvement meet current IS management challenges. This will be followed by a presentation of a conceptual model of IS service quality. Finally, implications and conclusions for the IS practitioner and researcher are presented.

IS As a Customer-Driven Enterprise

Through the years, researchers have attempted to define a service enterprise (Chase & Tansik, 1983; Heskett, 1987;

Parasuraman, Zeithaml & Berry , 1985; Sasser Olsen, & Wyekoff, 1978; Shosatack, 1977; Snyder, Cox, & Jesses 1982). Typically, in contrast to manufacturing processes, services processes possess some, but not necessarily all, of the following characteristics: intangible and perishable output, that is frequently variable or nonstandard in nature; high customer contact, with customers participating in the service process; labor intensive and typically not mass-produced; measurement that tends to be subjective, with quality control being primarily limited to controlling the service delivery process; and more complex pricing options. Many of these characteristics can be readily applied to the IS services context. First, IS services are basically intangible: they tend to produce actions or performances rather than objects. Second, IS services are heterogeneous: their performance often varies from user to user, from system to system, and from day to day. Third, IS service evaluation tends to be subjective and may have complex pricing schemes.

As early as 1974, Lucas (1974) recognized the importance of service quality as a major determinant of a user's positive reaction toward computerization. Many early IS innovators, such as Citibank, changed their "backroom" IS functions to a more decentralized customer service orientation (Matteis, 1979). Additionally, much IS research on user satisfaction (Bailey & Pearson, 1983; Baroudi & Orlikowski, 1988; Doll & Torkzadeh, 1988; Ives, Olson, & Baroudi, 1983) and equity models (Joshi, 1990) identified service delivery as vital. However, while much of this earlier IS research served to raise awareness of the customer satisfaction paradigm, it did not have as its major focus the changing nature of the IS/customer relationship or the growing importance of marketing-oriented IS management.

In this regard, the IS/customer relationship may roughly be conceived as evolving through four phases. During the 1960s, data processing was predominantly a backroom function with little customer interaction. The principal responsibility of IS was to ensure high reliability of transaction-based systems. The 1970s saw a period of distributive computing and decision support technology requiring an increased level of user interaction and involvement. In addition, the identification of information and technology as resources of the firm gave greater exposure to IS and, in return, elevated the level of expectation for results (Edelman, 1981).

The 1980s might be described as a period of decentralization and end-user computing, as individuals and departments grew proficient in the use of PCs and client-server technologies. The combination of higher demand expectations with alternative sources of supply dictated that the IS function begin to act as a "business within a business," providing a marketing mix of services (Cash et al., 1992, p. 255). The scope of technologies to be coordinated by the IT business also expanded tremendously as computers, telecommunications, and office technologies merged, and as product offerings moved into new consumer services such as electronic mail, publishing, networking, and computer-aided de-
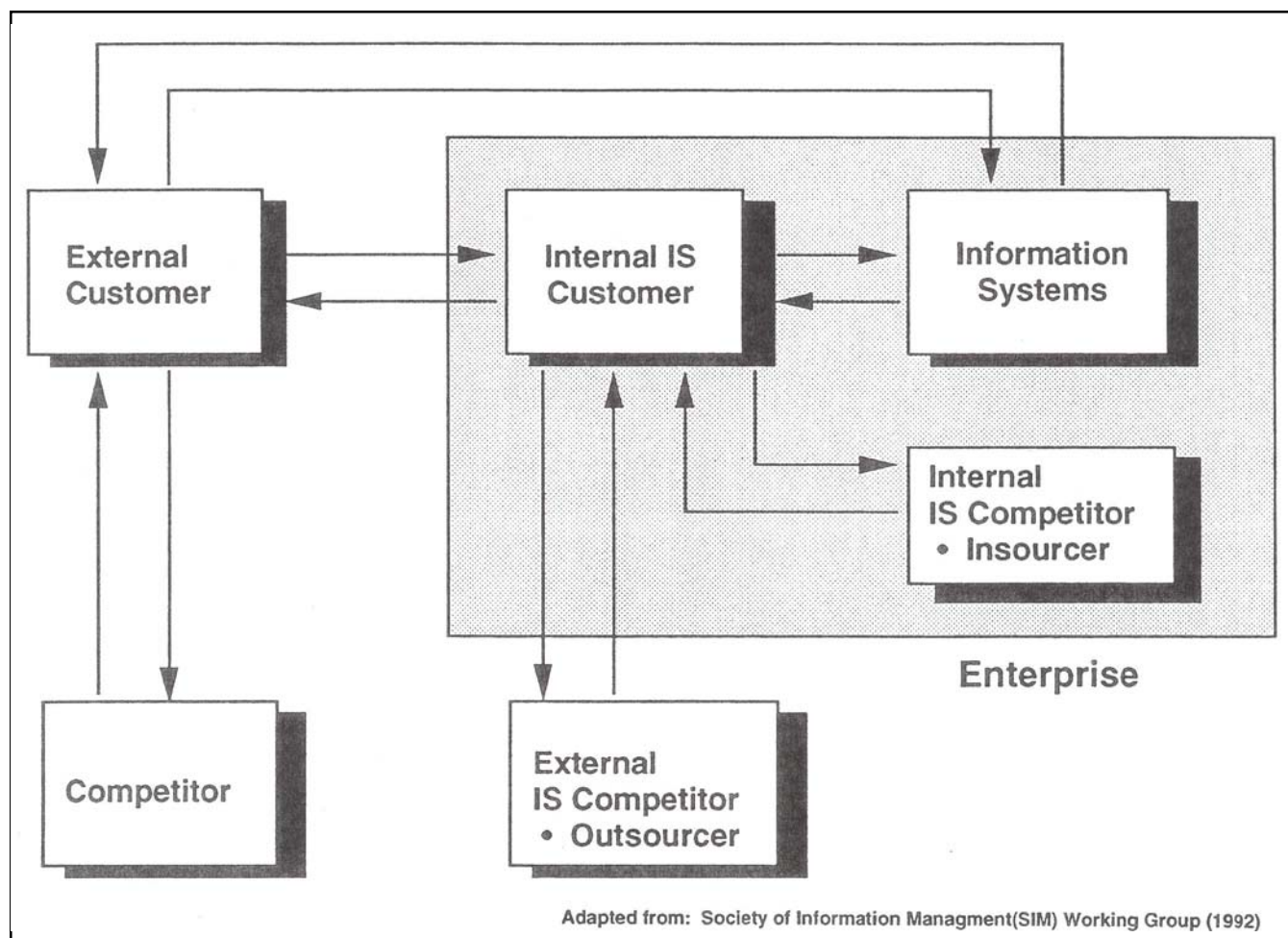
Figure 1. IS Service Provider Model

sign and manufacturing (Cash et al., 1992). Newer service roles included those of strategic and architectural planner, consultant, coordinator, trainer, and network provider in addition to, or instead of, information systems developer and operator (Boynton, Jacobs & Zmud, 1992; Leithesier & Wetherbe, 1986; McLean, 1979).

The 1980s saw demands to change IS from a cost center function into a profit center with a flexible budget and a systematic way to price its services (Allen, 1987; Stretch, 1988; Ward & Ward, 1987). Concerns for cost efficiencies, the complexity of implementing projects, and the scarcity of IS human resources forced the IT business away from primarily a product manufacturing model (development of systems) to one in which a significant percentage of its work involved coordination of services, many of which were being purchased from the outside. Boynton and Zmud (1988) termed this IT environment an "information economy;" approximating a free market system in which organizational sub-units satisfy their IT needs by acquiring resources from a variety of sources, including the organization's IS function, external suppliers, or through their own actions.

This shift forced changes in IS management to deal effectively with this new service function. Gerrity and Rockart (1986) proposed a "business-driven strategy" that defined appropriate levels of responsibility in the "managed free economy" (p. 30). Other suggested approaches included central IS use of alternative service management levels based on differing user needs (Leithesier & Wetherbe, 1986). Finally, a "transaction cost" (Malone, 1987) or "agency theory" view of IS management (Gurbaxani & Kemerer, 1990) emerged, with IS products and services acquired in market fashion with IS customers looking for flexible, high-quality services at the best price. The upsurge in out-sourcing all or part of the IS function is the outcome of this economic approach to balancing IS provider and customer relationships (Loh & Venkatraman, 1992).

With the 1990s came the dawn of full integration of IT into business processes but also increased IS turbulence. Management seeking to cut costs and refocus on high value-adding business processes has given functional departments or reengineering teams the increased responsibility of rethinking business operations, processes, systems and work relationships. Fedorowicz and Konsynski (1992) term this emerging environment as a "Regulated Free Market" where cross-

functional systems assist the coordination of business processes, and inter-organizational systems realign competitive relationships (p. 8). When enacted, this business transformation may lead to IS downsizing, de-layering, and out-sourcing (Hendersen & Venkatraman, 1992).

Today, the delivery of IS may best be viewed as a business transaction between an IS service provider and customer. The *user* is no longer a helpless beneficiary of IS but rather the highly demanding *customer*. Typical of leading IS management within Fortune 500 firms, a Society of Information Management's (SIM) Working Group on Quality (1992), made up of CIOs from such multi-national firms as Bose, Carrier, Corning, Connecticut Mutual Life, Eastman Kodak, General Foods, GTE, Olin, Pratt & Whitney, Wang, Winhall Group, and Xerox, defined their current IS managerial focus as being directed at providing effective service enterprises. Figure 1 outlines the "IS Service Provider Model" which delineates the interaction between the IS department, internal IS customers (IS consumer internal to the enterprise), external customers (customers external to the enterprise) and IS competitors both inside and outside the enterprise.

In the future we can expect continued evolution of this hybrid IT function, striving to take a customer focus (Hendersen, 1990). As Benjamin and Blunt (1992, p. 17) state, "Learning how to work effectively with all the stakeholders, to accomplish these necessary changes will be a major task of the decade (1990s)." A key factor in the evolution toward an *IS Service Quality Model* seems to be the establishment of effective feedback linkages and quality measures that form the foundation for communication and evaluation necessary in sustaining well managed customer services. With a continued focus on service quality and effective communication, IS and its customers may over time move closer to strategic alliances as collaborators and partners. Based on literature and experience gained in service marketing and operations, this focus on feedback and continuous measurement of "service quality," as applied to IS, is further discussed in the following section.

IS Service Quality: A Key Dimension of IS Management

As the IS function has changed, so has the need to measure IS as an effective service provider. Such techniques as cost/benefit analysis, information economics, critical success factors, system usage, and management by results have been used to gauge the contribution that IS makes to the firm and to individuals. While these approaches have each made significant contributions, even the more popular User Information Satisfaction (UIS) measure has been cited as having problems (Galletta & Lederer, 1989; Joshi, 1990; Melone, 1990; Srinivasan, 1985). However, as Baroudi and Orlikowski (1988) point out, the original development and subsequent refinement of the UIS measure tended to be in a climate of traditional IS: typically, concentrating on measurement of only those information system processing characteristics remi-

niscent of large transaction processing systems rather than an environment that included PC or end-user services. In a study of the extent to which formal UIS measurement is used in practice, Conrath & Mignen (1990) found that the prime concern of those firms that use UIS is "to improve the services they provide and to establish better relations with the users of these services" (p. 18).

While these earlier measures point to the importance of monitoring IS service, they tended not to provide an overall picture of IS customer service management. In 1990, Kim (1990) proposed that understanding user information systems satisfaction requires new conceptual clarity in light of the shift of IS toward increased service functions. He suggests that the IS field look to the marketing and consumer satisfaction research which "has long been concerned with the relationship between service quality and consumer satisfaction" (p. 184). It now seems prudent that IS seek to develop *a comprehensive IS service management model that can not only show how IS service providers are doing, but also shows which aspects of IS services must be considered to improve IS service quality.*

At the national and industrial levels, the measurement of service quality has emerged as an issue of the highest order. This interest has been driven by the fact that a developed country such as the U.S. employs 76 percent of its workforce in the service sector, which accounts for 68 percent of its real GNP (Chase & Hayes, 1991). Leading service providers have come to see quality as a strategic weapon. As competition continues to stiffen, strategies that focus on quality naturally evolve into strategies based on customer service (Eccles, 1991). For example, both marketing research (Thompson, DeSouza, & Bradley, 1985) and company experience (Rudie & Wansley, 1985) reveal that delivering high service quality produces measurable benefits in profit, cost savings, and market share.

Researchers focusing on service quality, have found that traditional quality control practices, relating to the evaluation of production quality, are inadequate for understanding and improving service quality (Chase & Hayes, 1991; Shosatack, 1977). Because services tend to be qualitative and subjective in nature, the manufacturing definitions of quality (conformance to specification) is not equally applicable in the service context. Marketing researchers (e.g., Crosby, 1979; Sasser et al., 1978; Gronroos, 1982; Lehtinen & Lehtinen, 1982; Lewis & Booms, 1983) and practitioners (e.g., Bhote, 1991; Turney, 1992) have taken a more market- and customer-oriented approach to service quality management and *define quality as conformance to the customers' expectations.* Specifically, this approach involves a comparison of consumer expectations with perceptions of actual service performance. In this sense, if perceptions exceed expectations one can say that a customer considers the service to be of high quality. Likewise, if perceptions are below the expectations of the customer, one could say that the customer considers the service to be of poorer quality. Unfortunately, all too often customers' perceptions of service quality differ from providers' perception of
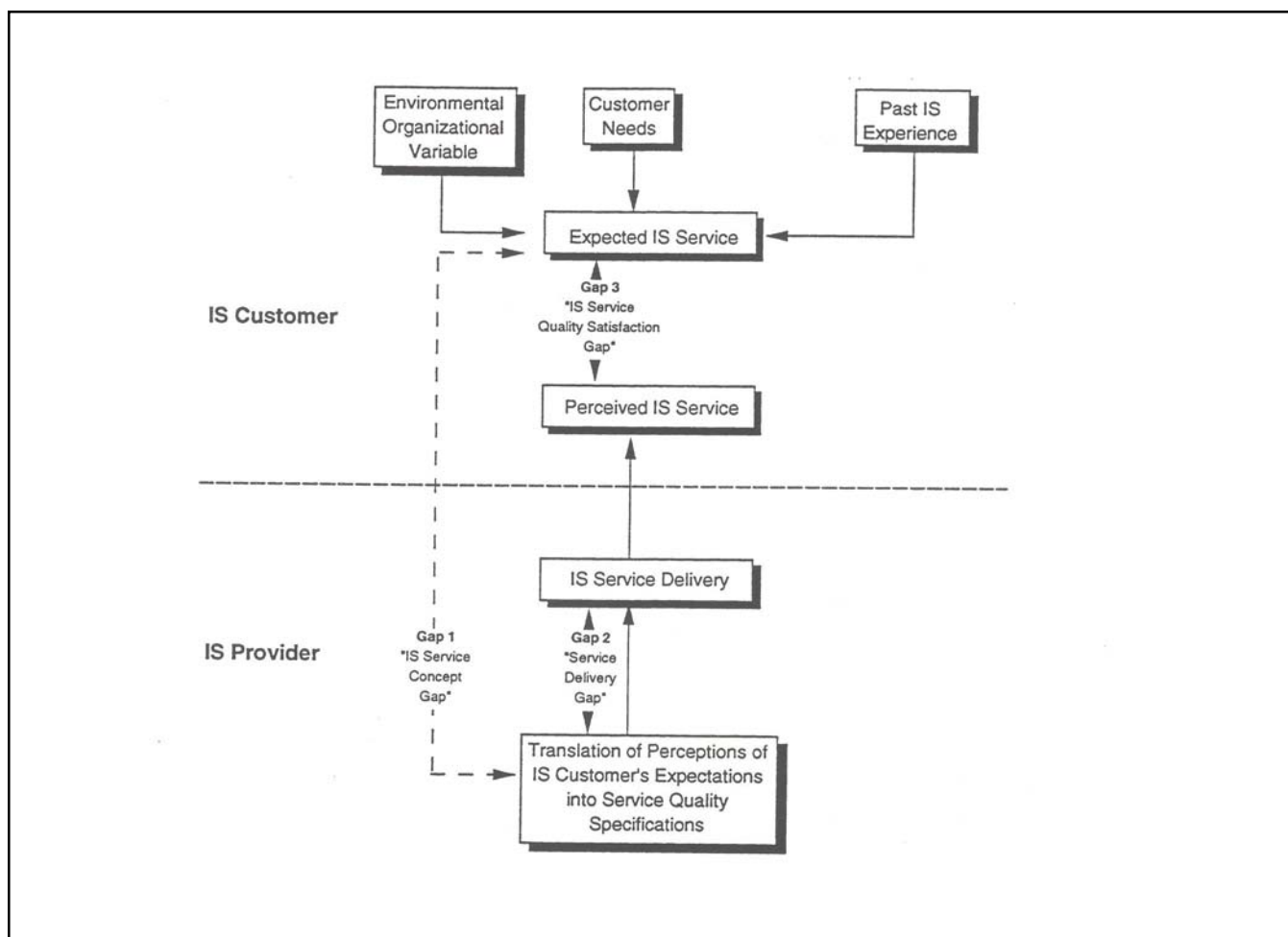
Figure 2. IS Service Quality Gap Model

the customers' wants and needs.

Past service operations and marketing literature (Sasser et al., 1978; Chase & Tansik, 1983; Heskett, 1987) has outlined a service quality strategy as possessing three common dimensions: 1) *a service concept* (What do customers require?), 2) *a service delivery system* (How do we meet customer requirements?), and 3) *a service quality satisfaction measure* (How well did we meet the customers' requirements?). Problems arise when service providers and customers have different perceptions of a service and/or when providers do not deliver the service to meet customers' requirements. Both problems will reflect negatively in customer perceived service quality.

In general, lessons from this line of research suggest that in service management "a customer-first philosophy" is vital. To achieve this focus requires the regular gathering of information from customers. This approach assumes that customers are able to articulate their expectation and that skillful probing can get to the root of service quality failure. Second, quality does not improve unless you measure it. Since service enterprises do not hold customers captive, the only way they

can prevent defections is to continually outperform the competition by developing a greater understanding of customers' needs. Third, by applying a conceptual framework, researchers and managers can better understand and perform effective service quality management.

Applying these research efforts to a firm's IS service management begs some important questions: How can general service quality management theories and frameworks be applied in IS? Which dimensions of IS service quality should it be considered? Are the services or products offered by IS compatible with customer expectations? In attempting to address these questions, IS managers must recognize the inherent complications in improving IS service quality. In the next section a conceptual model for improving the quality of IS services is presented.

Building a Model of IS Service Quality

While several important service quality frameworks have emerged from the literature, including: the "customer contact

model" (Chase & Tansik, 1983), "operating characteristics in a service environment" (Sasser et al., 1978) and the "strategic service vision model" (Heskett, 1987), the most widely researched and applied model of perceived service quality is the "Gap Model" (1985) and SERVQUAL (1988) measures developed by Parasuraman, Zeithaml and Berry. In 1985, Parasuraman, Zeithaml and Berry (PZB) recognized the fundamental "gap" between customer expectations and delivered service quality. They defined this difference as "service quality." Their model and scales have been the focus of considerable research as a measure of both external and internal customer perceived service quality (Carman, 1990; PZB, 1991; Zeithaml, Parasuraman, & Berry, 1990). In this paper we adapt the PZB (1985) service quality gap model into the IS context. Our gap model, entitled "the IS Service Quality Gap Model" (IS Quality Gap Model) as depicted in Figure 2, is designed to provide feedback directed at the following IS problems: (1) when IS providers and IS customers have different perceptions and expectations concerning IS services (GAP 1); when IS providers do not deliver IS services based on their perception of IS customers requirements (GAP 2); and (3) when IS customers perceptions of IS services do not meet their expectations (GAP 3).

Gap 1: The "Service Concept Gap"
The "Service Concept Gap" (Gap 1) outlines the gap between IS customer expectations and the IS service provider's translation of these customer requirements into service quality *specifications*. Marketing literature suggests that the service concept must be designed either with the customer in mind or by the customers themselves. Defining the service concept requires an assessment of customer needs and expectations and the translation of this quality definition into concise and executable specifications. This quality definition may be multidimensional and dynamic, changing with customers' needs and the competitive environment. Translating customer quality definitions into requirements is a difficult task that typically involves an iterative process between customers and service providers. The expectations of the IS customer may be influenced by personal and job needs (information and communication requirements); past personal experience with the IS provider; word of mouth; and environmental variables (internal and external) such as organizational structure, location, budgets, culture, and economic factors.

IS providers may have differing perceptions of IS customer expectation based on a number of reasons. First, IS providers, due to technical bias or lack of sensitivity, may simply not seek major input from customers in developing an IS service concept (Bostrom & Heinen, 1977). Past literature concerning the importance of user involvement in information requirements determination has shown significant problems with such a cavalier approach (Ives & Olson, 1984). Second, even when IS providers seek out customer involvement, the IS customer may not be knowledgeable or capable of clearly identifying available information technologies, systems or

services to meet their needs (Ackoff, 1967). This may be particularly true given the variety and complexity of information service requirements. Third, there may be no continuous lines of communications between the IS service provider and IS customers. Without a continuous dialogue through such communications mechanisms as project teams, focus groups or survey method, the specifics of customers' service requirements may not be pinned down. Finally, the complex patterns of interactions (both political and behavioral) among IS customers and IS providers may distort communications (Markus, 1983). Examples of gap 1 problems include:

- In the specification of a new enterprise-wide E-mail systems, the corporate IS group of a large multinational company paid little attention to privacy or confidentiality issues and did not solicit internal IS customer input. After implementation, the corporate IS group could not understand the slow adoption rate of the E-mail software. At the first meeting of IS/Division users network steering group, privacy and confidentiality were raised as pivotal concerns of IS customers.

- Senior management at a southeastern U.S.A. electrical utility recognized that their existing IS systems and services were incapable of meeting customer needs. They hired two well known business process reengineering consultants and charged them with the responsibility to: create a customer-focused IS organization and to initiate a corporate information resources plan focused on customer service. In a first step to change the IS culture towards greater honesty and trust of IS customers, the new IS management established regular informal meetings, formed a management council to enhance IS marketing and education company-wide, conducted senior management briefings, and used cross-functional reengineering work teams to define an IS service vision.

- In bridging two different LAN management systems, one in the manufacturing division (UNIX) and one in the marketing division (Novell), the IS department of a U.S.A. farm equipment manufacturer received many complaints about the incompatibility between the two systems. The engineers in the manufacturing division found fault with the slow speed of the bridge in transmitting machine data from remote production facilities, and the marketing division demanded easier user interfaces and better compatibility with the e-mail systems that they were previously using. In both cases customers stated that their needs were not being met.

In general, such techniques as brainstorming, bench marking, and quality function deployment (QFD) have been used to compare alternative, and sometime competing, quality attributes to arrive at clear service specifications. In the IS context, structured analysis, prototyping, modeling, cognitive mapping, decision analysis, and similar requirements definition methodologies have been used to capture IS customer

service quality specifications. Unlike more production oriented services (e.g., automobile repair, dry cleaning), the IS customers often interacts with IS service providers during the IS service specification process as well as during IS service delivery. As a result, the IS customers begins establishing perceptions of IS service quality early in the service specification process. Even when the IS provider has a clear understanding of what the customer wants and defines these customers' requirement (satisfying gap 1), high IS quality performance may not be accomplished unless the IS department correctly delivers (gap 2) what IS customer's desire. This problem leads to the second gap.

Gap 2: The "IS Service Delivery Gap"
The "IS Service Delivery Gap" (Gap 2) indicates the discrepancy in the ability of the IS service providers to transform customer requirement specifications (delineated in gap 1) into "tangible" IS product and service deliverables. This is the process of building and executing IS systems and services. Service delivery involves the process of efficiently and consistently meeting the customer requirements. In the IS context, this is accomplished by such approaches as operational standardization, system engineering, consulting (e.g., individual software problem solving), or technical service delivery (e.g., hardware preventive maintenance programs).

There are many factors that may impact this gap. First, resource restrictions (both financial and human) may prevent IS from delivering services as originally specified. In the past, IS providers have become notorious for not delivering systems on time and within budget.

Secondly, IS may not have the technical or business expertise to effectively deliver a service. Clearly, lack of IS personnel productivity and coordination may contribute greatly to this problem. Third, changing customer requirements and/ or business conditions may render a delivered services suboptimal. Finally, as Plewa and Lyman (1992) state, the delivery of quality IS services is often dependent on such operational procedural capabilities as the capacity to provide error-free operations and the attain of formal service levels. Examples of this gap include:

• Due to IS budget-cutting, the inventory of spare parts of a West Coast U.S.A. university's hardware repair shop were depleted and hardware technicians were forced to order parts at the point-of-repair. This resulted in a 2-3 week period in which IS customers were without their own PCs. A group of these IS customers appealed to the President to move this service to a computer outsourcing vendor instead of the existing IS technical support group.

• To address a growing application backlog, a CIO in a northeastern U.S.A. insurance company recognized the need to expeditiously establish a CASE environment. Senior management, however, was overwhelmed by the cost of this transition. They insisted on spreading the cost of this move

in a gradual step-by-step approach, first purchasing a code generator, then purchasing an analysis tool and so on. This slow transition resulted in little reduction in the systems bottlenecks with application development turnaround showing only modest improvement.

In addition to the examples above, several companies were identified as taking a more proactive approach to alleviating gap 2. For example, a leading Texas-based insurance company solicits customer inputs at every phase of IS service design and delivery. Each IS project is reviewed by its own management (customer) advisory council, which is also responsible for making final decisions in the trade-off between cost overruns and compliance with predefined IS service quality specifications. A world-class manufacturer in audio equipment has adopted the IS quality matrix developed by the SIM Working Group on Quality (1992) that rates the level of quality of particular IS processes. One component of this matrix focuses on the design review and validation process for new IS products and services, gauging the level of formality, customer involvement and number of quality metrics used during service design.

However, even when IS services are designed effectively and delivered based on well-documented specifications, the IS customers' expectation, on which these service were based, may change over time. The marketing literature is filled with accounts of the "fickle customer" whose desires change rapidly with the newest trends and fashion. Continuing to please IS customers demands continuous monitoring of their perceptions and expectations to minimize dissatisfaction. This leads us to evaluate Gap 3.

Gap 3: "Service Quality Satisfaction Measure Gap"
Service quality from the perspective of the IS customer is a function of gap 1 and gap 2. In this way problems related to poor perceived service conceptualization or perceived service delivery may be amplified to create very unsatisfied IS customers. For example:

• A production control manager within a manufacturing division of a multi-national electronic firms states of the central IS division: "We were very unhappy with the quality of the services they were providing and we had become very adept at bypassing the IS organization to obtain the information we needed. We have gone so far as to hire local college students to write report programs, give training and answer computer questions. "We use to joke that we'd see the MIS people once a year, when they came out to cancel our work requests because they were too old to work on (resulting from a tremendous backlog). Other than maintaining the data center, they (the central IS division) did not meet our needs and they were not adding any value to us. We felt they must be doing work for someone else in the organization. In fact, we strongly suspected that the people they were supporting

weren't even in our plant."

While specific problem areas within gaps 1 and 2 should be investigated as previously discussed, marketing literature advises that a determinant of service quality should be checked periodically to sense changes in customer satisfaction (e.g., Gronroos, 1982; Lehtinen & Lehtinen, 1982). In this way the measurement of gap 3 is similar to the use of a barometer, offering an overall indicator of customer satisfaction that accompanies the IS service process (Kettinger and Lee, 1994). This measurement is done to confirm whether IS customers' expectation levels match requirements and to provide feedback so IS service providers can take corrective actions. For example:

• Seeking additional input beyond user group meetings to determine customer satisfaction, a CIO from a northeastern U.S.A. university enhanced her service requirements and evaluation capability by requesting help desk workers collect detailed information on customer desires for new services as well as their perceptions of the services delivered.

Thus, the Service Quality Satisfaction Measure Gap" is defined as the difference between the IS customers' expected IS service and their perception of the IS service delivered.

IS Spiral of Quality

Beyond merely theoretical description, the application of "IS Quality Gap Model" may begin to provide an IS service quality framework for practice. In this way, the "IS Quality Gap Model" would be directed toward continuous improvement in IS service quality— *consistently performing above customers' expectations.* This approach would be based on regular measurement of gap 3 (IS service quality satisfaction gap). This measurement would continue at regular time intervals to determine whether IS customer perceptions of service delivery exceed their expectations.

When a trend of declining IS customer satisfaction is recognized, a further investigation of gap 1 and gap 2 would be warranted. Problems identified in a service quality audit of gaps 1 and 2 should lead to corrective actions. Continued application of the periodic gap 3 measurement should track the effects of corrective actions made in gap 1 and 2. This continuous process of IS service quality management is similar to the "Spiral of Progress in Quality" outlined by the Juran Institute and now heavily used in the product development life cycle (Juran, Gryna & Bingham, 1974; Kolesar & Godfrey, 1988). It should be noted that while periodic measurement of gap 3 may provide a useful barometer of IS service quality, it is the diagnosis of problems in gaps 1 and 2 that will provide a prescriptive approach to improving IS service quality.

Applying the "IS Quality Gap Model"

In applying the concepts of the IS Quality Gap Model, practitioners may look to the marketing and quality fields for techniques and tools that are potentially useful in the IS context. However, as discussed below, additional issues including the cost of quality and a continued focus on the firm's strategic direction must also be taken into consideration when undertaking an IS service quality improvement initiative.

SERVQUAL as a Measure of Gap 3:
In attempting to measure gap 3, PZB (1988) found that regardless of the type of service, customers used similar criteria in evaluating service quality. They went on to develop the SERVQUAL instrument to measure the gap between customer expectations and perceptions of services delivered. On the basis of analyzing data from four independent samples including internal and external customers (banking service, credit card processing service, repair and maintenance service, and long distance telephone service), their research showed SERVQUAL's scales reliable and valid.

PZB (1988) found that five major service quality dimensions determine the difference between customer expectations and perceptions. These include: *tangibles*— the appearance of physical attributes of the service; *reliability*— the ability to perform the promised service dependably and accurately; *responsiveness* —the willingness to help customers and to provide prompt service; *assurance*—the knowledge and courtesy of employees and their ability to convey trust and confidence; and, *empathy* — the provision of caring individualized attention to customers. To validate this initial SERVQUAL measurement, a series of studies followed (Carmen, 1990; Cronin & Taylor; PZB, 1991). In general, while the number of distinct service quality factors differ slightly across these studies, the validity and reliability of the SERVQUAL (Gap 3 measure), were supported. Kettinger and Lee (1994), demonstrated that these generic determinants of service quality can be adapted to determine reliable and valid measures of IS service quality.

Focus Groups:
While survey based methods (e.g., SERVQUAL, UIS, customer suggestion boxes) are an important means to collect IS user responses, alternative methods can be used. A widely accepted marketing approach, but rarely used in the IS context, for collecting customer information is the focus group. Unlike survey methods, that may not deliver as genuine an evaluation, the focus group has the potential to draw richer opinions from IS customers. For example, a multinational leader in the manufacture and distribution of seasoning and food product keeps close tabs on IS service quality through numerous focus groups conducted during meetings of its "End-user Computing Council," the Payroll Personnel Total Quality Team," the

Electronic Data Interchange Roundtable," and the Electronic Publishing & Graphics Group." Another method is job rotation whereby IS employees are temporarily placed within a user department. This proactive strategy can instill a deeper understanding of an IS customers' everyday business and provide a chance to directly observe problems and opportunities where IS can add value.

Objective Measures of Quality Performance:
Combined with customer-oriented subjective measures of IS service quality, the IS department may continue to use traditional internal standards of technical performance. For example, the same manufacturer and distributor of seasoning and food products mentioned above, employs the traditional IS measures of production-line availability, transaction response time, emergency maintenance hours, system availability, cost per service unit, and system response time as key indicators of technical service quality. Objective data on internal standards of quality performance can also be measured by using popular total quality tools, such as PDCA (plan, do, check, act), check chart, bar graphs and chart, and Ishikawa (fishbone) diagrams. A multinational pharmaceutical company's IS department makes use of such quality tools as Pareto diagrams, flow diagrams, cause-effect diagrams, control charts, histograms, correlation chart, and run chart to measure its IS quality improvement activities.

Benchmarking:
While the IS Quality Gap Model focuses on specifying and delivering IS services to satisfy IS customers, basing service quality solely on customer driven criteria (bounded by customers' knowledge and personal IS experiences) may at times not be a broad enough strategy. Benchmarking[*2] IS services may be one vehicle to broaden the IS service quality viewpoint. In essence, by determining best practice from world-class IS providers, IS may begin to exceed customer expectations as opposed to merely meeting them. Several major consulting firms as well as the International Benchmarking Clearinghouse, a division of the Houston-based American Productivity and Quality Center have begun to compile a database of "IS best practice." In such firms as Corning, Xerox, Kodak, Milliken, Coca-Cola and DuPont, IS processes are using all benchmarking methods to help guide improvements in specifying and delivering IS services (Shrednick, Shutt & Weiss, 1992).

Cost and Strategic Considerations:
 In designing a service strategy there must be some consideration for the cost of IS quality. As the Chief Financial Officer of a Texas based insurance company states "No matter how committed an organization is to TQM, sometimes it must choose between satisfying everyone and doing things that are beneficial from an overall business standpoint...It comes down to how much quality can we afford." To address this trade-off,

some IS organizations have formed management advisory councils that include both company financial sponsors and customers in the decision-making process to arrive at workable solutions.

In addition to attempting to maximize economic benefits, individuals involved with delivering high quality IS services may act with self-serving or political behaviors that may result in resistance to quality initiatives without reasonable justifications (Keen, 1981; Markus, 1983). To ensure the firm's best interests are being served as well as to avoid unfair (political) assessments of IS service quality, their may be times that top management intervention must supersede the "voice of the IS customer." In general, adoption of a customer-oriented IS service quality vision should not be viewed as a replacement for strategic planning, priority setting, or assessment of the competitive environment, but rather as a complementary strategy to help achieve firm-wide objectives while addressing the needs on individual IS customers.

Implications for Research and Practice

The application of service quality frameworks and measures provides ripe research topics for further investigation. This article applies a leading marketing service quality model (PZB, 1985) in the IS context. It appears that this model can provide both descriptive and prescriptive direction to future IS service quality related research. One topic requiring immediate attention is to devise reliable and valid measures for each gap of the "IS Quality Gap" model. However, prior to the development of actual measures of these gaps, research is needed to identify those important dimensions that are responsible for the three gaps. Research to accomplish this objective might proceed initially on an exploratory basis using such techniques as case and field study. This exploratory approach may be particularly appropriate for gaps 1 and 2, which thus far have received little research attention. The measurement of gap 3 (IS Service Quality Satisfaction Gap) seems to be further along the research curve in the marketing field (PZB 1991) and in IS (Kettinger & Lee, 1994). Addressing these research questions should lead naturally to further questioning of the relationships between gaps and the relative importance of gaps 1 and 2 in predicting gap 3.

Research is also needed to examine important determinants of IS customers' expectation of IS service quality. The IS customers' expectation is a critical dimension that governs all three gaps of IS service quality. Altering unreasonable expectations or developing more consistent expectations through communication channels between IS and customer may be a key factor in achieving higher IS service quality. One area of important research might examine the relationship between IS customers' expectation and the effectiveness of educational and/or promotional communication channels between these two groups. Another related aspect of expectation building may be the extent to which IS customers' expecta-

tions are altered by learning effects resulting from the interaction between IS service providers and customers. For example, in today's competitive IS environment, IS employees may feel forced to take aggressive positions in selling their services to their internal customers. In this situation, there is a chance for IS employees to over-promise or oversell their IS services, communicating unrealistic customer expectations. Thus, an important topic of research is the relationships between the competitiveness of the IS environment, customer/ IS communication, and IS customer expectations.

A basic premise of marketing is the segmentation of customers to properly design, deliver and price a product. The usefulness of segmenting IS customers on the basis of their service quality expectations is worthy of future research exploration. For example, do certain IS customer groups assign different relative importance to quality criteria and do their expectations of quality service vary by quality dimensions (reliability, responsiveness, empathy, etc.)? Empirical research aimed at determining whether distinct identifiable service quality segments exist will be particularly valuable from the IS service provider's viewpoint. In this regard it might be useful for researcher developing new service quality measurement instruments, to include specific items ascertaining whether, and in what way, customers' expectations differ.

A potentially profitable area of both IS research and practice is to focus on further refinement and adaptation of well-tested quality and customer-oriented techniques and tools in the IS environment. This investigation may examine the extent of use, adaptation and benefits of these tools and techniques in IS practice. For example, one technique that has received considerable attention in production and marketing is Quality Function Deployment[3] (QFD). QFD has particular value in moving the "voice of the customer" upstream to the design stage, which may be further investigated as a prescriptive technique in the IS context to avoid both Gap 1 and Gap 2 problems.

Finally, in order to position IS service quality as a legitimate measurement of IS effectiveness, future studies should investigate the causal relationships among the constructs forming the boundary of IS effectiveness such as IS service quality, user attitude, behavior, and user information satisfaction. As PZB (1985; 1988) suggested, and as Cronin and Taylor's (1992) findings support, service quality appears to be an important antecedent of user satisfaction. The application of these findings in the IS context calls for an empirical investigation of the relationship between UIS and each gap of IS Quality Gap Model.

Conclusion

IS management is now faced with serving customers that possess substantial discretion in their use and purchase of IS services. This market-oriented IS management environment demands an increased sensitivity to IS customers' expectations to effectively deliver IS services that customers perceive

valuable. A key factor in the evolution toward an accepted model of IS service quality seems to be the establishment of effective feedback linkages and quality measures that form the foundation for communication and evaluation necessary in sustaining well managed IS customer services. This paper introduced a widely accepted conceptual "gap" model from the marketing field as a framework for IS service quality management. This model has as it premise that service quality improvement is a continual process of determining customer expectations and perceptions and modifying products and services accordingly. The "Service Quality Gap Model" may be viewed as a descriptive model providing direction for researchers studying the customer/ provider service quality relationship. The model may also begin to serve as a prescriptive model for improving IS practice by allowing the IS department to view IS service quality from both the IS customer's and provider's perspectives. In this regard, IS management might establish a periodical feedback and evaluation system to define IS service concepts and to better assess customer satisfaction with services delivered. As with most new conceptual frameworks, many opportunities for further refinement and research are presented.

Endnotes

[1] As a form of outsourcing, *managed services* provide results oriented services whose management delivery are vendor-controlled within customer guidelines. This typically involves services integration whereby IS services from multiple outsourcing vendors are integrated with customer initiatives striving for seamless service delivery. *Shared Service Organizations* take the form of either insourced or outsourced contract based providers of specific functional applications such as accounting, billing, and order processing for different organizational units which may, or may not, belong to the same umbrella organization.

[2] Benchmarking, as commonly discussed in the quality literature, involves three types of comparisons: 1) internal benchmarks compare performance on similar processes within a business; 2) industry benchmarks compare major "players" within the same industry to determine competitive measurements and "industry best practice"; 3) world class bench marking broadens the horizon of comparison to determine which companies' processes are the "best in process class."

[3] Adopted from the Japanese, QFD is a technique for translating customer requirements (the true quality characteristics) into design requirements (counterpart characteristics). QFD is now not strictly a manufacturing design technique and is be applied to design services (Griffin & Hauser, 1992; Hauser & Griffin, 1993). The QFD methodology is not complex conceptually but requires careful attention to detail in the building up of a series of charts which show how customer requirements and design requirements come together.

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