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USER INFORMATION SATISFACTION: TOWARD CONCEPTUAL CLARITY

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ABSTRACT

User information satisfaction (UIS) has been generally recognized by management information systems (MIS) researchers as one of the more important indicators of success in designing and implementing MIS. However, the existence of various UIS measures using different definitions of UIS has resulted in the use of inconsistent theoretical constructs and an inability to interpret across studies. Using consumer satisfaction research as a reference theory, this paper develops a conceptual model of UIS to clarify the concept. In the model, UIS is considered a function of organizational factors and the discrepancy between expected information service quality and perceived information service quality. This discrepancy, in turn, is a result of a series of gaps which are related to the MIS development and information service delivery processes. The implications of this model for future research and practice are discussed.

1. INTRODUCTION

Measuring the effectiveness of management information systems (MIS) is a perplexing issue that has generated much debate and subsequent research over the years. Measuring MIS effectiveness is an intricate task because of the difficulties of tracing and sorting out the effects of MIS through a web of intermediate impacts upon organizational effectiveness. Thus, MIS researchers have developed surrogate measures for MIS effectiveness such as user information satisfaction (UIS).

UIS is generally recognized by many MIS researchers as one of the more important indicators of MIS effectiveness (Ives, Olson and Baroudi 1983; Swanson 1974). UIS is considered a meaningful surrogate for MIS effectiveness in that it measures satisfaction of organization members who actually use the MIS output to meet their organizational responsibilities. This approach considers the relationship between the MIS and its environment (i.e., the organization) and emphasizes the extent to which the MIS provides meaningful and useful information.

However, MIS research in the area of UIS has been criticized for inconsistent theoretical constructs by many researchers. For example, Iivari (1987, p. 58) stated that

> different constructs for UIS often include, quite implicitly, different assumptions.... They also may unwarrantably be considered commensurate, which naturally leads to confusion and inconsistency in UIS research.

This criticism is evidenced by various UIS measures encompassing a wide range of factors from input procedures, computer processing and output characteristics, through organizational factors, to MIS effectiveness. Thus, what is needed is the development of a conceptual model of UIS clarifying the factors involved and their relationships.

Another weakness in prior research is that UIS has been studied only as a post-implementation phenomenon. As a result, most UIS measures focused on the quality of established MIS, which was typically measured by various system characteristics such as output quality. However, it has been found in neighbor disciplines such as consumer satisfaction or job satisfaction that *expectations* play an important role in determining the level of satisfaction (e.g., Parasuraman, Zeithaml and Berry 1985; Petty, McGee and Cavender 1984). The neighbor disciplines conclude that satisfaction is related to the size and direction of the disconfirmation experience where disconfirmation is related to initial expectations. Previous studies of MIS implementation have also suggested that users' pre-implementation expectations may play a significant role in MIS implementation success (Ginzberg 1981b). Further, it has been argued that user expectations are formed in the early stage of the system development life cycle (SDLC) during which information systems are developed and implemented to meet user expectations. Therefore, UIS is not only a post-implementation phenomenon, but related to the whole SDLC.

The primary objective of this paper is to clarify the concept of UIS by formulating a conceptual framework for UIS, which includes user expectations as a key factor in explaining user satisfaction. The model is extended to encompass the system development life cycle. The proposed model also attempts to show how the various factors included in existing UIS measures are related to user satisfaction.

Propositions are developed to stimulate future UIS research and empirical evidence in support of these propositions is synthesized from previous research findings.

2. REVIEW OF UIS LITERATURE

UIS has been defined in many different ways and researchers have made rigorous attempts to develop valid and reliable measures of UIS. A brief survey of existing UIS measures is presented in Figure 1, which classifies these measures with reference to system theory.

A system is a set of subsystems that interact with one another to accomplish a goal (Boulding 1956). A general model of a system consists of *inputs* into a system and *outputs* from the system. Inputs are *processed* into outputs as a result of the interaction among subsystems. An additional dimension in systems theory is the use of *feedback* for system control. Feedback from the environment is concerned with system effectiveness. Feedback is the process that measures current performance and guides it toward a predetermined goal.

MIS, as a system, *processes inputs* such as data, requests for information, and organizational resources into *outputs* such as information, training, and documentation (Nolan and Wetherbe 1980). MIS effectiveness as *feedback* from the organization is constantly evaluated to allow systems to recognize and adapt to environmental changes. Thus, general systems theory can be utilized to analyze existing UIS measures.

Four aspects of system characteristics are assessed in existing UIS measures: input procedures, processing capabilities, output quality, and MIS effectiveness evaluation. In addition to these dimensions, some MIS measures include a fifth dimension, that is, user satisfaction with organizational factors such as top management support, vendor support, user participation.

Input procedure characteristics are measured by ease of input procedure, input error proneness, and quality of input medium (Bailey and Pearson 1983; Jenkins and Ricketts 1985; Lucas 1973; and Maish 1979). System processing characteristics are gauged by stability of systems, error recovery, and flexibility of systems (Bailey and Pearson 1983; Miller and Doyle 1987; and Raymond 1987). With regard to system outputs, an important distinction was made by Ives, Olson and Baroudi (1983) between information system product and general system support. The product dimension mainly focuses on information attributes such as relevance, timeliness and accuracy (Epstein and King 1982; Nolan and Seward 1974; and Swanson 1974). The system support dimension contains items concerned with training, documentation, and systems maintenance (Lucas 1973; Maish 1979). The effectiveness of the MIS is measured by the extent to which the MIS contributes to organizational effectiveness, i.e., organizational goals and internal organizational health (Price 1972). Organizational goals might be expressed in terms of decision-making performance, productivity, or corporate procedures (Sanders 1984; Shultz and Slevin 1975; and Welsh 1986). Internal organizational health is gauged in terms of interpersonal relations, job satisfaction, self esteem, etc. (Sanders 1984; Shultz and Slevin 1975; and Welsh 1986). Finally, user satisfaction with organizational factors such as top management support and vendor support is included in Bailey and Pearson (1983), Lucas (1973), Maish (1979), Miller and Doyle (1987), and Raymond (1987).

As one can see from the discussion above, a wide range of factors are included in different UIS measures. The existence of various UIS measures would be desirable in that those measures make the MIS field rich and become stepping stones to advance the field. However, the wide variations in the scope of the concept have led to conflicting results and an inability to generate cumulative evidence across studies (for example, see Cerveny and Sanders 1986; Swanson 1982). Further, it has led to overuse of the concept, loading it with various unnecessary connotations, for example, as an MIS effectiveness measure (Chismar and Kriebel 1985). Thus, a movement toward conceptual clarity is important before any meaningful progress can be made in empirical work.

3. CONSUMER SATISFACTION RESEARCH: A REFERENCE DISCIPLINE

MIS is increasingly viewed as a *service* function, as opposed to simple data processing, which manages the computing resources for the firm (Ives, Olson and Baroudi 1983; Rockart and Scott Morton 1984). In a 1982 survey of the participants (about 300 people from over 100 organizations) at the Annual Society for Management Information Systems Conference, Rockart and Scott Morton (1984) reported that a majority of the organizations dropped the term "Data Processing" and replaced it with "Information Services" for their information systems function. Thus, UIS deals with the overall quality of information services provided by an information service function.

Consumer satisfaction research has long been concerned with the relationship between service quality and consumer satisfaction. Since the focus of this paper is on the relationship between information service quality and user satisfaction, there is much to be learned from consumer satisfaction research.

4. EXPECTATIONS AS A KEY FACTOR FOR UIS

Examination of the consumer satisfaction literature suggests two underlying themes. First, researchers in consumer satisfaction concur that service quality involves a comparison of expectations with performance:

	Quality of MIS					
			Output		Organizational	MIS
	Input	Processing	Product	Support	Factors	Effectiveness
Lucas (1973)	*	*	*	*	*	
Gallagher (1974)			*			
Nolan and Steward (1974)			*			
Swanson (1974)		*	*			
Schultz and Sleven (1975)						*
Schewe (1976)						*
Maish (1979)	*	*	*	*	*	
Larcker and Lessig (1980)			*			
Epstein and King (1982)			*			
O'Reilly (1982)			*			
Bailey and Pearson (1983)	*	*	*	*	*	
Ives, Olson and Baroudi (1983)			*	*	*	
Sanders (1984)					*	
Jenkins and Ricketts (1979)	*	*	*			
Welsch (1986)				*		
Miller and Doyle (1987)		*	*	*	*	
Raymond (1987)		*	*	*	*	

Figure 1. Dimensions Included in Various UIS Measures

> Service quality is a measure of how well the service level delivered matches customer expectations. Delivering quality service means conforming to customer expectations on a consistent basis. (Lewis and Booms 1982)

Smith and Houston (1982) also based their research on the disconfirmation paradigm, which maintains that satisfaction is related to the size and direction of the disconfirmation experience where disconfirmation is related to the person's initial expectations.

Further, production and use of many services are inseparable (Carman and Langeard 1980; Upah 1980). In labor intensive services, for example, quality occurs during service delivery, usually in an interaction between the client and the contact person from the service firm (Lehtinen and Lehtinen 1982). In these situations, the consumer's input becomes critical to the service quality.

Applying the above arguments to MIS, user satisfaction with information services is related to confirmation or disconfirmation of expectations. User expectations are communicated to systems analysts in the form of user information needs during the early stage of the system development process. Throughout the development process, system development personnel are supposed to build an information system that best meets user information needs. After the proposed system is developed, information service is delivered to users who evaluate the service level delivered on the basis of their expectations. Meanwhile, user participation in the design of MIS is critical to the service quality.

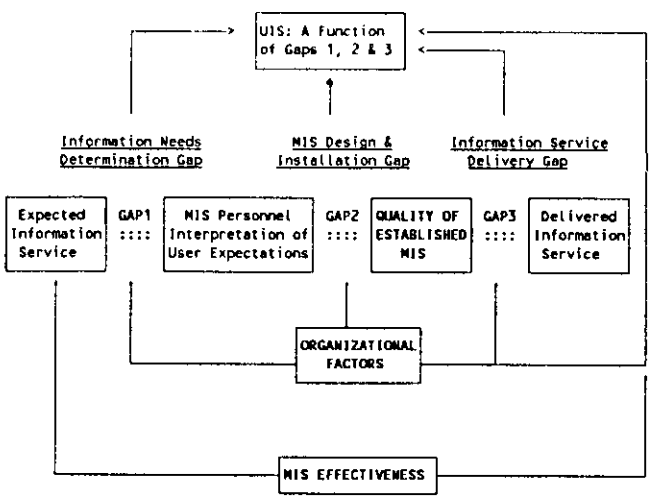
Second, quality evaluations are not made solely on the outcome of a service; they also involve evaluations of the process of service delivery. The basic premise of the Lehtinen and Lehtinen (1982) study is that service quality is produced in the interaction between a user and elements in the service organization. They further differentiate between the quality associated with the process of service and the quality associated with the outcome of the service. Gronroos (1982) also postulated that two types of service quality exist: technical quality, which involves what the customer is actually receiving from the service, and functional quality, which involves the manner in which the service is delivered.

In MIS, the importance of the information service delivery process has received significant attention in recent years. Research in this area is frequently characterized as *User Interface* or *Human Factors Engineering*. The user interface means the way in which information service is

delivered to users. There are many different methods by which to develop a user interface design, and a well-designed user interface is important to the system effectiveness (Davis and Olson 1985).

5. A CONCEPTUAL MODEL OF USER INFORMATION SATISFACTION

This section develops a conceptual model of UIS, applying the relationships observed in consumer satisfaction research. In this model, presented in Figure 2, UIS is considered a function of the gap between user expectations and delivered information service quality. This gap, in turn, is determined by a series of gaps which are related to the MIS development process (GAP1 and GAP2) and the information service delivery process (GAP3). The MIS development process can be decomposed into two processes: information requirements determination process (GAP1) and MIS design and installation process (GAP2). The remainder of this section discusses these gaps and presents propositions implied by the gaps.



Note: Capitalized boxes represent the dimensions included in existing UIS measures.

Figure 2. A Conceptual Model of User Information Satisfaction

5.1 Information Requirements Determination Gap (GAP1)

GAP1 is related to the first stage of the MIS development process, information requirements determination. This stage focuses on determining what kinds of information users need from the proposed MIS to meet their organizational responsibilities. Determining a correct and complete set of user information needs is generally recognized to be one of the most critical factors to MIS success (Davis 1982). However, there are some reasons for the difficulties in obtaining a correct and complete set of information needs. Davis and Olson (1985) summarized the reasons as

1. The constraints on humans as information processors
2. The variety and complexity of information requirements
3. The complex patterns of interaction among users and analysts
4. The unwillingness of some users to provide requirements (for political or behavioral reasons)

For these reasons, MIS development personnel may not understand what features connote high quality information to users in advance, what features information must have to meet user information needs, and what levels of performance on those features are needed to provide high quality information (Munro and Davis 1977; Ross and Shoman 1977). Thus, there could be a discrepancy between user expectations and MIS personnel interpretations of user expectations, which influences users' satisfaction with information quality.

Although this discussion seems to imply an unfavorable gap as a typical case, a favorable gap is also possible. For example, an experienced systems analyst who has developed MIS for similar tasks may be able to deliver more than what the users expect from the proposed system by utilizing advanced technology (a combination of voice and image processing technologies).

Learning effects may occur during the interaction among users and systems analysts. For example, users who held unrealistic expectations may modify their expectation levels as a result of the interaction with systems analysts. Thus, with respect to the proper time for the measurement of expectations, it would be appropriate to measure user expectations after users and system analysts agree upon the scope of the system and its objectives.[1] This agreement forms the basis of the phased development of the system.

For some application systems, users may not have concrete expectations on MIS outcome due to the lack of experience or expertise. DSS users frequently experience difficulty in anticipating or articulating their requirements because the identification of information requirements for unstructured decisions is very difficult. For these types of systems, the prototyping approach, a trial-and-error process for developing the whole system, is advocated (Davis and Olson 1985). Throughout the development of prototyping, learning effects may occur through an interactive dialogue between the system and the user and, thereby, users form their expectations for the subsequent use of the system. In this case, it would be appropriate to measure user expectations after the prototype is developed.

As an example of empirical research studying this gap, Ginzberg (1981b), in a longitudinal study of user expectations as predictors of project success or failure, found that the differences between the user expectations and the MIS

expert expectations in an early stage of MIS development were significantly correlated with the users' post implementation satisfaction. However, it must be noted that the research setting was a single system (on-line portfolio management system) in a single organization. Another example can be found in Edmundson and Jeffery (1984). They investigated the relationship between the performance of information requirements determination and post-implementation satisfaction with the software acquired. The results revealed little support for the hypothesized relationships. The authors speculated that end-user expectations might play a significant role as a confounding factor for the hypothesized relationships.

Proposition 1: The gap between user expectations and MIS personnel interpretations of the user expectations will influence UIS.

5.2 MIS Design and Installation Gap (GAP2)

GAP2 is related to the MIS design and installation stage of the MIS development process, which translates the MIS interpretation of user expectations into physical MIS. Constraints which prevent MIS from delivering what the user expects may exist in both organizational resources (Ein-Dor and Segev 1978; Lucas 1982) and top management commitment (Garvin 1983; Ginzberg 1981c). For example, the MIS function has to compete with other functions in the organization for whatever resources are available. A major difficulty in this regard is the fact that the typical way of justifying budgetary allocations, cost-benefit analysis, is difficult to apply to MIS because the benefits from the MIS tend to be difficult to estimate in monetary terms (Davis and Olson 1985). Resource constraints may result in a discrepancy between MIS employees' interpretations of user expectations and the actual information systems established.

Apart from resource constraints, another reason for the MIS design and installation gap is the absence of total management commitment to information systems development. Ginzberg (1981c, p. 54) emphasized the importance of top management commitment to the project, which means "doing what is necessary throughout the stages of [SDLC] to assure that the problem is understood and that the system developed solves the problem." Top management should develop this commitment, as this increases the odds that they will take appropriate actions at each project stage to assure the project's success. However, Garvin (1983, p. 68) stated that

> the seriousness that management attached to quality problems [varies]. It's one thing to say you believe in defect-free products, but quite another to take time from a busy schedule to act on that belief and stay informed.

Garvin's observations are likely to apply to information services as well.

In short, a variety of factors – resource constraints, market conditions, and/or management indifference – may result in a discrepancy between MIS employees' interpretations of user expectations and the actual information systems established. Although an unfavorable gap would be the typical situation in practice, the reverse case is also possible. For example, when top management selects the information services as a strategic area, they will provide sufficient organizational resources for the MIS project. Therefore, MIS personnel can develop better systems than initially proposed.

This discrepancy is predicted to affect users' satisfaction with information service quality.[2]

Proposition 2: The gap between MIS personnel interpretations of expectations and the quality of established MIS will influence UIS.

5.3 Information Service Delivery Gap (GAP3)

GAP3 is related to the information delivery process. After an MIS is developed and installed, information service is delivered to users primarily through the user interface process – interaction between the human user and the MIS. The interface consists of hardware devices (screens, keyboards), languages, and other means by which the human user and the computer system exchange inputs and outputs (Davis and Olson 1985). There are many options in user interface design, and the choice of appropriate options depends on user characteristics such as the type of user (primary versus secondary user), the amount of expertise, the frequency of use, and the type of tasks to be performed. Since systems are more commonly used directly by those who benefit from their outputs and who may know very little about their internal aspects, a well-designed interface is critical to the success of a system. For example, a novice who is unfamiliar with both the system's syntax and generalizable knowledge about use of computers should be able to get explanations or assistance through the system (Shneiderman 1980). On the other hand, an expert with considerable knowledge about computers should not be held up by detailed explanations that are required only by the novice. Another example can be found in a natural language interface which is appropriate for novice users with no technical knowledge and no previous training. Conversely, such an interface may not be suitable for expert users or for repeated queries, since natural language is very verbose and the query requires a great deal of typing relative to any other type of interface. Thus, the interfaces (information service delivery process) influence users' satisfaction with information service quality and are important to the effective use of a system.

Recently, much work has been reported in the literature on human factors related to the design of user-system interface. For example, Meadow (1983), in a study of a database system, investigated user satisfaction for users of three different levels using three user interface styles: menu, command, and command with Boolean operations. The results showed that the novice users using the least complex interface and the most experienced users using the most complex interface performed the best. In studying the error messages given by a COBOL compiler, Shneiderman (1982) experimentally demonstrated that the phrasing and contents of system messages significantly impacted user satisfaction. Dzida, Herda and Itzfeltd (1978), in their examination of user evaluation of the user interface, found seven factors that contributed to perceptions of quality. The study concluded that the categories of identified factors provided an empirical model for assessing user-perceived quality.

Proposition 3: The gap between the quality of established MIS and delivered information services will influence UIS.

5.4 Organizational Factors

During the MIS development and information service delivery processes, organizational factors can play a significant role in UIS by influencing the gaps. For example, the discrepancy between user expectations and system development personnel interpretations of user expectations (GAP1) can be reduced through extensive user participation in the information requirements determination process (Baroudi, Olson and Ives 1986; Ives and Olson 1984). Top management support for MIS may reduce the gap between system analysts' interpretations of user expectations and the quality of established MIS, GAP2, by providing sufficient organizational resources (Swanson 1974; Maish 1979). Proper user training is an important factor for the efficient use of the system and thus the reduction of GAP3 (Lucas 1973; Zmud 1979). In addition, user satisfaction may be directly influenced by organizational factors. For example, Lucas (1973) stated that high levels of management support for and participation in information systems activities result in favorable user attitudes and perceptions of information services. In short, organizational factors significantly influence the size and direction of gaps in the MIS development and information services delivery processes.

Proposition 4: Organizational factors will influence UIS both directly and indirectly through the gaps associated with the MIS development and information services delivery processes.

5.5 User Information Satisfaction

It appears that judgments of high and low information quality depend on how well the information service level delivered matches user expectations. In other words, UIS means the discrepancy between user expectations and perceptions of information service quality, which in turn depends on the nature of the gaps associated with information needs determination, MIS design and installation, and delivery of information service processes. In addition, organizational factors influence UIS both directly and indirectly through those gaps.

Proposition 5. UIS = f(GAP1, GAP2, GAP3, and Organizational Factors).

It is important to note that the gaps can be favorable or unfavorable from a user's perspective. That is, the *magnitude* and *direction* of each gap will have an impact on UIS. Although Proposition 5 suggests a relationship between UIS and the gaps occurring during the MIS development and information delivery processes, the functional form of the relationship needs to be investigated.

Learning effects may occur through MIS effectiveness. After users receive information services from the MIS and utilize it for their decision-making, they may modify their expectations and/or perceptions of information service quality according to how well the MIS supports their organizational responsibilities. For example, users who continue to make decisions based on the information provided by their MIS with which they are dissatisfied will experience dissonance. To justify continuing decision-making based on the MIS output, the user may re-evaluate the system more positively to reduce the dissonance. Thus, the feedback loop from MIS effectiveness to user expectations implies that MIS effectiveness becomes a part of the user's experience base and thereby influences the user's future expectations on information service quality. Meanwhile, a highly effective MIS may reinforce favorable user perceptions of information services and thereby influence UIS.

6. IMPLICATIONS OF THE CONCEPTUAL UIS MODEL

The proposed UIS model (Figure 2) provides a conceptual framework in an area where prior research has suffered from inconsistent theoretical constructs. This paper has developed a new model which defines UIS as how well the information service level delivered matches pre-implementation user expectations. The discrepancy, in turn, is determined by a series of gaps which are related to MIS development and information service delivery processes. The proposed UIS model is an attempt to clarify the UIS concept and its relationship with other relevant concepts. The research implications from this model are discussed in the remainder of this section.

First, the main thesis of the UIS model is that UIS is influenced by a series of distinct gaps occurring during the MIS development and information service delivery processes. A key challenge for researchers is to devise

methods to measure these gaps accurately. Reliable and valid measures of these gaps are necessary for empirically testing the propositions suggested by the model. Further research is needed to examine the nature of the association between UIS and its determinants (GAPS 1, 2 and 3 and organizational factors). Research questions may include:

- Are one or more of these gaps more critical than the others in affecting UIS?
- Can creating one favorable gap offset unfavorable user perceptions stemming from other gaps?
- What is the functional form of the relationship between UIS and its determinants (e.g., additive or multiplicative)?
- Which organizational factors are more important in affecting GAP1, GAP2, or GAP3?

Second, the proposed UIS model sheds new light on conflicting results that previous research studies have reported using UIS as a research variable. One example that has been of interest to many MIS scholars is the relationship between MIS usage and UIS. These are the two most widely used surrogate measures for MIS effectiveness. However, these studies have generally found mixed results. Robey (1979) found a strong relationship between MIS usage and attitudes, while Schewe (1976) and Srinivasan (1985) found no significant relationship between actual use and UIS. In a similar vein, Ginzberg (1981a) found that UIS and usage have low correlation and in some instances are negatively correlated. Another example can be found in an extensive review by Cerveny and Sanders (1986) on the relationship between organizational contexts and user satisfaction. In their review, they concluded that empirical studies were inconclusive on the effects of the organizational contexts on user satisfaction. One reason for the mixed findings could be different user expectation levels in various research contexts. For example, low UIS could be observed because of a user's unrealistic expectations even when information services provided by the MIS are high. Another reason would be the variations in the scope of the concept concerning the system characteristics to be assessed. The system characteristics assessed in existing UIS measures vary from quite direct features of the system to the effects and value of the system. Thus, Swanson (1982) concluded that variations in the user satisfaction measures themselves appeared to explain much of the variation in research results reported to date.

Third, future research is needed to identify the factors influencing user expectations. In a discussion of research programs for information systems, Mason and Mitroff (1973) suggested that an information system serves an individual with a certain cognitive style faced with a particular decision problem in some organizational setting. Their definition of MIS implies some important contextual factors for MIS users such as type of decisions, individual differences, and organizational settings. These factors are considered to affect user expectations by influencing the way information is searched and used to solve problems. Further, research focusing on the relative impact of these factors on user expectations of information service quality will have useful managerial implications.

Some implications for practicing managers can also be derived from the proposed model. The model defines UIS as the discrepancy between user expectations and delivered information service quality. If expectations play a significant role in users' satisfaction with information quality, the MIS must be certain not to promise more in communications than it can deliver in reality. Promising more than can be delivered will raise initial expectations but lower perceptions of quality when the promises are not fulfilled. The model also suggests that UIS is influenced not only by the MIS output, but also by the system development and information service delivery processes. Thus, these processes should be carefully managed. MIS personnel and users differ along several dimensions, including language, training, and goals, but have some commonality of interests in successfully applying information technology. Practicing managers should take into account these differences to manage the MIS development and information delivery processes successfully.

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8. REFERENCES

Bailey, J. E., and Pearson, S. W. "Development of a Tool for Measuring and Analyzing Computer User Satisfaction." *Management Science*, Volume 29, 1983, pp. 530-545.

Baroudi, J.; Olson, M.; and Ives, B. "An Empirical Study of the Impact of User Involvement on System Usage and Information Satisfaction." *Communications of the ACM*, Volume 29, March 1986, pp. 232-238.

Boulding, K. "General Systems Theory – The Skeleton of Science." *Management Science*, Volume 5, 1956, pp. 197-208.

Carman, J., and Langeard, E. "Growth Strategies of Service Firms." *Strategic Management Journal*, Volume 1, 1980, pp. 7-22.

Cerveny, J., and Sanders, L. "Implementation and Structural Variables." *Information & Management*, Volume 11, 1986, pp. 191-198.

Chismar, W., and Kriebel, C. "A Method for Assessing the Economic Impact of Information Systems Technology on Organizations." In L. Gallegos, R. Welke, and J. Wetherbe (eds.), *Proceedings of the Sixth International Conference on Information Systems*, Indianapolis, Indiana, December 1985.

Davis, G. B. "Strategies for Information Requirements Determination." *IBM Systems Journal*, Volume 21, Number 1, 1982, pp. 4-30.

Davis, G. B., and Olson, M. H. *Management Information Systems: Conceptual Foundations, Structure, and Development*, Second Edition. New York, NY: McGraw-Hill, 1985.

Dzida, W.; Herda, S.; and Itzfeltd, W. "User-Perceived Quality of Interactive Systems." *IEEE Transactions on Software Engineering*, Volume 4, July 1978, pp. 270-275.

Edmundson, R., and Jeffery, R. "The Impact of Requirements Analysis Upon User Satisfaction with Packaged Software." *Information & Management*, Volume 7, 1984, pp. 83-90.

Ein-Dor, P., and Segev, P. "Organizational Context and the Success of Management Information Systems." *Management Science*, Volume 24, 1978, pp. 1064-1077.

Epstein, B., and King, W. "An Experimental Study of the Value of Information." *Omega*, Volume 10, Number 3, 1982, pp. 249-258.

Gallagher, C. A. "Perceptions of the Value of a Management Information System." *Academy of Management Journal*, Volume 17, 1974, pp. 46-55.

Garvin, D. "Quality on the Line." *Harvard Business Review*, Volume 61, 1983, pp. 65-73.

Ginzberg, M. "DSS Success: Measurement and Facilitation." Center for Research on Information Systems, Working Paper, New York University, 1981a.

Ginzberg, M. "Early Diagnosis of MIS Implementation Failure." *Management Science*, Volume 27, 1981b, pp. 459-478.

Ginzberg, M. "Key Recurrent Issues in the MIS Implementation Process." *MIS Quarterly*, Volume 5, 1981c, pp. 47-59.

Gronroos, C. *Strategic Management and Marketing in the Service Sector*. Helsingfors: Swedish School of Economics and Business Administration, 1982.

Iivari, J. "User Information Satisfaction (UIS) Reconsidered: An Information System As the Antecedent of UIS." In J. I. DeGross and C. H. Kriebel (eds.), *Proceedings of the Eighth International Conference on Information Systems*, Pittsburgh, Pennsylvania, December 1987.

Ives, B., and Olson, M. "User Involvement and MIS Success: A Review of Research." *Management Science*, Volume 30, 1984, pp. 586-603.

Ives, B.; Olson, M.; and Baroudi, J. "The Measurement of User Information Satisfaction." *Communications of the ACM*, Volume 26, 1983, pp. 785-793.

Jenkins, M., and Ricketts, J. "Development of an MIS Satisfaction Questionnaire: An Instrument for Evaluating User Satisfaction with Turnkey Decision Support Systems." Unpublished Working Paper, Indiana University, Bloomington, August 1985.

Larcker, D. F., and Lessig, V. P. "Perceived Usefulness of Information: A Psychometric Examination." *Decision Sciences*, Volume 11, 1980, pp. 121-134.

Lehtinen, U., and Lehtinen, J. "Service Quality: A Study of Quality Dimensions." Unpublished Working Paper, Helsinki: Service Management Institute, Finland OY, 1982.

Lewis, R., and Booms, B. "The Marketing Aspects of Service Quality." In L. Berry, G. Shostack, and G. Upah (eds.), *Emerging Perspectives on Services Marketing*. Chicago: American Marketing, 1982, pp. 99-107.

Lucas, H. *Information Systems Concepts for Management*. New York: McGraw-Hill, 1982.

Lucas, H. "User Reactions and the Management of Information Services." *Management Informatics*, Volume 2, 1973, pp. 165-172.

Maish, A. M. "A User's Behavior toward His MIS." *MIS Quarterly*, Volume 3, Number 1, 1979, pp. 39-52.

Mason, R., and Mitroff, I. "A Program for Research on Management Information Systems." *Management Science*, Volume 20, 1973, pp. 475-487.

Meadow, C. "User Adaptation in Interactive Information Retrieval." *Journal of American Society of Information Sciences*, Volume 34, No. 4, 1983, pp. 289-291.

Miller, J., and Doyle, B. "Measuring the Effectiveness of Computer-Based Information Systems in the Financial Services Sector." *MIS Quarterly*, Volume 11, Number 1, March 1987, pp. 107-124.

Munro, M. C., and Davis, G. B. "Determining Management Information Needs: A Comparison of Methods." *MIS Quarterly*, Volume 1, Number 2, 1977, pp.55-67.

Nolan, R., and Seward, H. "Measuring User Satisfaction to Evaluate Information Systems." In R. L. Nolan (ed.), *Managing the Data Resource Function*. Los Angeles: West Publishing Company, 1974.

Nolan, R., and Wetherbe, J. "Toward a Comprehensive Framework for MIS Research." *MIS Quarterly*, Volume 4, No. 2, 1980, pp. 1-19.

O'Reilly, C. "Variations in Decision Makers' Use of Information Sources: The Impact of Quality and Accessibility of Information." *Academy of Management Journal*, Volume 25, Number 4, 1982, pp. 756-771.

Parasuraman, A.; Zeithaml, V.; and Berry, L. "A Conceptual Model of Service Quality and Its Implications for Future Research." *Journal of Marketing*, Volume 49, 1985, pp. 41-50.

Petty, M.; McGee, G.; and Cavender, J. "A Meta-Analysis of the Relationship between Individual Satisfaction and Individual Performance." *Academy of Management Review*, Volume 9, 1984, pp. 712-721.

Price, J. "The Study of Organizational Effectiveness." *The Sociological Quarterly*, Volume 13, 1972, pp. 3-15.

Raymond, L. "Validating and Applying User Satisfaction as a Measure of MIS Success in Small Organizations." *Information & Management*, Volume 12, 1987, pp. 173-179.

Robey, D. "User Attitudes and Management Information Use." *Academy of Management Journal*, Volume 22, Number 3, 1979, pp. 527-538.

Rockart, J., and Scott Morton, M. "Implications of Changes in Information Technology for Corporate Strategy." *Interfaces*, Volume 14, No. 1, January-February 1984, pp. 84-95.

Ross, D. T., and Schoman, K. Jr. "Structured Analysis for Requirements Definition." *IEEE Transactions on Software Engineering SE-3*, Volume 1, 1977, pp. 6-15.

Sanders, L. "MIS/DSS Success Measure." *Systems, Objectives, Solutions*, Volume 4, 1984, pp. 29-34.

Schewe, C. "The Management Information System User: An Exploratory Behavioral Analysis." *Academy of Management Journal*, Volume 19, Number 4, 1976, pp. 577-590.

Schultz, R., and Slevin, D. "Implementation and Organizational Validity: An Empirical Investigation." In R. Schultz and D. Slevin (eds.), *Implementing Operations Research/ Management Science*. New York: American Elsevier, 1975, pp. 153-182.

Shneiderman, B. *Directions in Human-Computer Interaction*. Norwood, New Jersey: Ablex Publication Corporation, 1982.

Shneiderman, B. *Software Psychology: Human Factors in Computer and Information Systems*. Cambridge, Massachusetts: Winthrop, 1980.

Smith, R., and Houston, M. "Script-Based Evaluations of Satisfaction with Services." In L. Berry, G. Shostack, and G. Upah (eds.), *Emerging Perspectives on Services Marketing*. Chicago: American Marketing, 1982, pp. 59-62.

Srinivasan, A. "Alternative Measures of System Effectiveness: Associations and Implications." *MIS Quarterly*, Volume 9, 1985, pp. 243-253.

Swanson, B. "Management Information Systems: Appreciation and Involvement." *Management Science*, Volume 21, 1974, pp. 178-188.

Swanson, B. "Measuring User Attitudes in MIS Research: A Review." *Omega*, Volume 10, Number 2, 1982, pp. 157-165.

Upah, G. "Mass Marketing in Service Retailing: A Review and Synthesis of Major Methods." *Journal of Retailing*, Volume 56, 1980, pp. 59-76.

Welsch, G. "The Information Transfer Specialist in Successful Implementation of Decision Support Systems." *Data Base*, Fall 1986, pp. 32-40.

Zmud, R. "Individual Difference and MIS Success: A Review of the Empirical Literature." *Management Science*, Volume 25, Number 10, 1979, pp. 966-979.

9. ENDNOTES

1. Learning effects may be measured by comparing user expectation levels before and after the user-analyst interactions. However, UIS is influenced by the user expectation level after the interactions, which is the benchmark users would use in order to evaluate the quality of information services.

2. Little empirical research investigating this gap exists and, thus, further investigation is called for.