OPERATIONAL QUALITY ISSUES IN THE FINANCIAL SECTOR: AN EXPLORATORY STUDY ON PERCEPTION AND PRESCRIPTION FOR INFORMATION TECHNOLOGY

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ABSTRACT

The problem to be addressed in this paper is what impact the quality of IT services has on the quality of the output of the Operations function. "Quality" is used in the sense of customer satisfaction; "Operations" refers to the processing of customer transactions. A group of operations managers from the financial services sector was assembled and asked to explore the issues of quality. GroupSystems, a collaborative group support system tool, was used to identify, categorize, and rank quality issues. The paper summarizes the findings, discusses the importance of the results, and provides a framework for quality improvement in Information Technology.

INTRODUCTION

Quality in the business sector is the topic of a profusion of research. One prominent area of concentration is that of service quality as it relates to customer satisfaction (Berkley and Gupta, 1995; Broetzmann, et. al., 1995, Fram, 1995, and Skellett, 1995). The customers involved in these studies are usually external to the company and recipients of services such as marketing, retail sales, and financial. Broetzmann et. al. (1995) have found that quantitative research has been done that provides a benchmark of customer satisfaction and determines key areas of customer dissatisfaction, and qualitative research has been done that assesses company policies and procedures that impede customer satisfaction and complaint handling. The purpose of much of this research is to provide opportunities and means to solve the problems leading to low customer satisfaction (Carpenter, 1993; DuPont, 1997; Hochstrasser, 1993; Melville, 1995; and Stauss, 1992).

Jackson and Humble (1994) studied the role of information technology in providing service excellence. However, this study and the previously mentioned quality research have been done with external customers. The importance and implications of much of it can perhaps be transferred to internal customers as well. According to Baer, (1995), "A customer is a customer is a customer." He states that although various service providers have different customers, they have many of the same goals and headaches that are associated with providing customer satisfaction. The needs and expectations of

external customers, therefore, may be generalizable to those of the internal customers. As important as the internal customer is, little research has been done dealing with the quality of services provided to the internal customers. This paper will explore that topic from the perspective of quality of services provided to the Operations function of the organization by the Information Technology department.

In this paper, quality is defined as customer satisfaction, i.e., meeting and/or exceeding customer expectations. This customer-based definition is the most pervasive definition of quality currently in use (Reeves and Bedner, 1994). Operations are those activities that process customer transactions. Information Technology (IT) departments provide support to many areas of the organization by collecting, processing, storing and communicating information to further the goals of the organization (Cats-Baril and Thompson, 1997). Naturally, the quality of these services can have a direct impact on the organization's effectiveness. With the rapid changes in technology and the increasing power of issues such as the Internet/Internet, down-sizing, outsourcing, and reengineering, we must periodically assess IT quality in order to ensure that existing quality improvement efforts are sustained and others, if necessary, are begun. The problem to be examined in this paper is what impact the quality of IT services has on the quality of the output of the Operations function.

All activities in all organizations are subject to errors, delays, and other forms of poor quality. The IT function is no exception. Pinter (1992) cites some sobering evidence:

- 15% of all IT projects never deliver anything.
- Cost overruns of 100% to 200% are not uncommon.
- Staffs to perform rework are generally more than double the size of those who build computer information systems.

Poor quality is costly in terms of time and money, but the impact of poor quality is often hard to measure (Wang and Strong, 1996). In order to explore the issues of quality as they impact the functional areas, we report here on a preliminary study with one area that is a recipient of IT services--Operations.

Studies have shown that electronic meeting systems (EMS) improve the productivity of group meetings (Tyran et. al., 1992; George et. al., 1990; and McGoff, et. al., 1990). To gather as much beneficial information as possible from a group of Operations managers, we employed GroupSystems, a group support system (GSS). This collaborative tool played a significant role in identifying and categorizing quality issues.

This paper will first discuss group support systems with an emphasis on GroupSystems. The next section identifies the sample of participants followed by research questions and then methodology and results. We conclude with a framework for quality improvement in Information Technology.

Group Support Systems

Various communication technologies can be used to support collaborative systems. These include electronic mail, videoconferencing, and computer conferencing, which we now refer to as group support systems. A GSS can be defined as a collection of hardware, software and procedures designed for the automated support of group work in solving unstructured problems (Aiken and Martin, 1994; Morrison and Liu Sheng, 1992). The aim of GSS is to reduce the process losses associated with traditional group meetings such as disorganized and unfocused activity, dominance of the group by a few, and the social pressures to conform. GSS should help a more democratic decision process to emerge.

A typical session using GSS consists of four phases of work: 1) *Gather the ideas*--this phase consists of activities such as listing key issues, defining changing trends, listing proposals for new products or services, or developing a strengths, weaknesses, opportunities, threats (SWOT) analysis, 2) *Edit the ideas*--the information is reviewed in order to eliminate redundancies and group similar ideas, 3) *Evaluate the results*--the team discusses the edited ideas and ranks them for action, and 4) *Implement the solutions*--the team decides what needs to be done and by whom (Thornton and Lockhart, 1994).

Advantages of Group Support Systems. There are a number of potential advantages of using GSS over traditional meetings: 1) More structure--GSS structures the meeting thus keeping participants focused on the topic and making it less likely a premature decision will be made, 2) Increased participation--automated meetings provide anonymity which enables participants to participate without the fear of reprisal or "saying something foolish." This increased participation encourages more brainstorming and creativity. All group members have equal time thus restraining those that tend to monopolize the meeting and encouraging those that seldom speak, 3) Automated recordkeeping--notetaking is not necessary, and at any point during the meeting, review of previous discussions is available, 4) Less restriction on group size--larger groups can effectively meet thus increasing the knowledge and skill base from which to

work, 5) Parallel contributions--allowing simultaneous involvement on the same task, 6) Increased group satisfaction--group members are more satisfied with the meeting process, and 7) Increased concentration and enjoyment of the task--leading to increased creativity and productivity (Dennis and Valacich, 1994; Tyran, Dennis et. al., 1992; Alavi, 1993).

Disadvantages of Group Support Systems. Although GSS has many positive characteristics, it also has some negative ones. The GSS hardware and software must be learned before a meeting can effectively take place. This is a disadvantage only in the early stages of GSS usage for a particular person or group. A good user interface can help compensate for low levels of participant computer literacy and typing skills. A study by Chidambaram and Bostrom (1993), however, found that groups that are new to group technologies need repeated exposure to GSS before they can effectively make high-quality decisions. The experiences of the participants in this study reinforce this finding. One participant felt that the group "needs more practice to be effective" and another commented that the group "needs more exposure" to the system.

GroupSystems. GroupSystems was developed at the University of Arizona. It is a LAN-based set of flexible software tools, which incorporates basic problem-solving techniques (Aiken and Martin, 1994). The software can be accessed from either a decision support meeting room or from the participant's own desk using a local area network (LAN). The system has each participant using a computer and, when in the decision support meeting room, sharing a public display screen. Participants enter information into the computer themselves, and the information can be projected onto the public display. The goal of this computer-based system is to manage the process of meetings that generate large amounts of data and to alleviate the communication breakdowns that occur in groups.

The capabilities included in GroupSystems are as follows: 1) *Electronic brainstorming* which is used to gather ideas and comments in an unstructured manner. 2) *Topic commenter* which is used to generated ideas in a structure format. 3) *Categorizer* which enables group members to manipulate items in a file. 4) *Vote* which supports consensus development. Group members are asked to respond in a variety of ways such as multiple choice, yes/no, true/false, and ten-point scale. Results of responses can be tabulated and displayed in textual or graphical form.

The following sections will describe the sample and the methodology used in this study. Also included in the methodology section are the results of the various activities described using GroupSystems.

Sample of Participants in the Research Study

A group of 13 Operations managers from the financial services sector were brought together in an electronic meeting room. The organizations included banking, investment banking, credit card processing, and insurance. Participating companies were Chase Manhattan Bank, Equifax Corp., First Florida Auto and Home Insurance, First Union National Bank, NationsBank, Salomon Brothers, and Sun Trust Bank. "Operations" activities are those activities that process customer transactions including both direct contact with the external customer and "backroom" activities which do not involve direct contact. All participants in this study were middle managers from the front lines of Operations activities.

Research Questions

Although research exists concerning the dimensions of IT quality with respect to external customers, there is a lack of research that studies the specific dimensions of IT quality that impact the internal customers of an organization (Jackson and Humble, 1994; Broetzmann, et. al., 1995). This research examines the perceived impact of the quality of IT services on the quality of the Operations function. Specifically, the following research questions were asked:

- Question 1. Which IT services are provided to the Operations area?
- Question 2. Which issues, related to IT services, impact the quality of Operations output?
- Question 3. Which specific IT issues are most crucial to the Operations function?

First, the outputs from the IT department were identified; then the issues related to IT services and their impact on the quality of Operations output were determined, categorized, and ranked in order of perceived importance. Finally, the IT issues that were deemed the most critical within the three most important categories were identified. A post-hoc examination of the results was then conducted and a framework proposed for quality improvement in IT.

Research Question 1: Which IT services are provided to the Operations area?

Before the quality issues could be addressed, it was necessary to have the group identify the outputs from the IT department. The participants were asked "Which services are provided to your area by the IT department?"

A total of 102 responses were recorded as crucial to the Operations function. Such services clearly have an impact on the effectiveness of the Operations area. These responses can be grouped into the following categories listed in the order of frequency of response as illustrated in Table 1.

Response Category	Examples
Provide reports	Summary of sales activities, list of "at risk" accounts
Provide hardware and software support	Personal computer support services, guidance on hardware and software purchasing
Record information	Posting to accounts, current rate information
Provide data communications support	LAN connections and software access, data security
Provide for system availability and maintenance	On-line availability of all systems, ensure e-mail systems are up and running
Provide on-line information	Automatic teller machine on-line, customer account information
Provide support for data processing	Download all accounts for customer information; download all workplace banking customers and their profiles
Develop new systems	Application development for new systems; systems development, testing, and design
Implement new systems	Assist in the development of testing plans and rollout, implementation of new systems
Provide programming support	Provide programming support
Provide training	Software training

Table 1. IT Services Provided to Operations

After identifying the IT services provided to the operations area, the participants were then asked to relate these services to the quality of the Operations output.

Research Question 2: Which issues related to IT services impact the quality of Operations output?

Participants were asked to list those issues that related to the quality of IT services. Participants were given five minutes to anonymously enter their issues as they were displayed on a common screen. Most participants reacted favorably to the use of GroupSystems as a means of exploring this topic. Comments included "The software leads to free group communications" and "A good tool for brainstorming." This sentiment is similar to that found in other studies (Tyran, et. al., 1992).

The participants identified a total of 125 issues. After deleting duplicate responses, 115 unique issues were identified--some general such as "downtime" and others quite specific such as "Can't hire enough C++ programmers fast enough to keep up with user demand." The large number of responses was consistent with the increase of process effectiveness and efficiency through the use of GroupSystems in other studies (McGoff, et. al., 1990). The variety of responses indicated the need to group the individual items into categories of similar items for further analysis.

This activity examined the list of issues generated in order to identify similar issues. The activity was completed using a discussion format. With the help of the facilitator, the participants examined each issue and identified the appropriate category. The identified categories with the number of issues assigned to each category are listed in Table 2. While identifying categories, the discussion indicated that the categories were not of equal importance. In the next activity, an

electronic voting process resulted in listing the categories in order of perceived importance.

Category	Number of Issues
Timeliness	10
Systems performance	30
Interactive communication	19
Quality	6
Individual performance	14
Training	21
Outside vendors	5
Staffing	20

Table 2. Categories of IT Issues

Research Question 3: Which specific IT issues are most crucial to the Operations function?

In this activity the participants rank ordered the categories based on their perceived importance and then the results were compiled to determine an overall ranking. Working anonymously, each participant started with the original list of categories that was created in the previous activity and was asked to rank order the categories from most important (10) to least important (1). The rank sum represents the total weighted score for each category. The compiled results are listed in Table 3.

Category	Rank Sum	Mean	Standard Deviation
System performance	71	6.92	2.23
Training	70	6.83	1.95
Quality	62	6.17	2.08
Staffing	60	6.00	2.49
Interactive communications	57	5.75	1.54
Individual performance	51	5.25	2.09
Timeliness	47	4.92	1.44
Outside vendors	14	2.17	0.39

Table 3. Categories of IT Issues in Rank Order of Perceived Importance

As can be seen in Table 3, participants ranked System Performance as the most important category of IT issues and Outside Vendors as the least important. The standard deviation for each issue gives a rough indication as to the degree to which the participants agreed on the relative importance of each category. The low standard deviation for Outside Vendors (0.39) indicates a high degree of agreement while the higher deviation for Staffing (2.49) indicates less agreement. The differences may be attributed to a lack of precise definition for each category or to differences in quality of IT among the various companies represented.

This activity provided a broad indication of the relative importance of IT issues with respect to the Operations function; however, it did not indicate which specific IT issues were the most important within each category.

We next explored which specific IT issues within the three most important categories were deemed most critical to the Operations function. Participants were provided a list of the 57 issues that were originally identified as being related to System Performance, Training, and Quality and were asked to score each of the items on a scale of 1 to 10 where 10 was the "most important" and 1 was the "least important." The participants used GroupSystems to submit their scores anonymously. At the end of the activity, the results were compiled into a group ranking. The results identified quality-related issues as the two most important specific issues that impact the Operations area followed by System Performance issues.

As indicated in Table 4 the Operations personnel rated quality of information as more important than system performance or training.

The three most important categories of issues were Quality, System Performance, and Training. When participants were asked to evaluate the importance of specific issues within these three categories, they identified quality-related issues (accuracy of information and thorough testing) and various issues involving system performance--particularly downtime--as the key issues (See Table 4). If quality is defined as customer satisfaction, then all of these issues are quality related.

Category	Issue	Mean	Total	Standard Deviation
Quality	Accuracy of information	9.33	112	2.14
	Thorough testing--both IT and users need to be involved	8.08	97	1.40
System Performance	System downtime	8.92	107	2.36
	System response time	8.58	103	1.78
	Network reliability	8.42	101	1.72
	Hardware performance	8.09	89	1.37
	Hardware problems	7.92	95	7.92
Training	Level of expertise	8.17	98	1.54
	Lack of training	7.75	93	7.75

Table 4. Top Ten Quality Issues by Category

The Operations managers in this study deal with large volumes of financial data that have been processed by the IT department (see Table 1). The accuracy and timeliness of this information is crucial to these managers. Upon reexamination of the 115 issues that have been categorized in Table 2, these issues can be interpreted as either causes or effects of the problem. Of the 115 issues, 101 were classified as causes (e.g., system downtime and untrained computer staff) and 14 as effects (e.g., poor response time and accuracy of information). Several of the responses from the activity summarized in Table 2 point directly to this relationship. For example, "System downtime causes production delays and backlogs" and "IT makes incorrect assumptions sometimes without checking with users" which in turn affects the "Appropriateness of information." The following section provides a framework for quality improvement that examines the effects (evidence of poor quality) in order to identify and correct the causes of poor quality.

A Framework for Quality Improvement in Information Systems

One measure of quality is the cost-of-poor-quality (COPQ) which is the monetary loss due to errors, delays, and other forms of poor quality. Studies on the size of COPQ have shown it to be about 15% of sales income per year, varying from about 5% to 35% depending on product complexity. For service organizations, the average is about 30% of operating expenses, varying from 25% to 40% depending on service complexity. These costs cover the major functions in an organization that delivers goods or services to external customers, i.e., design, manufacturing/operations, and service (Juran and Gryna, 1993). The existence of IT help desks, problem-tracking processes, and problem severity classifications are evidence of the costs involved with these problems. Perceptions provided by Operations managers (as users of IT services) in this study confirm the gravity of the problems.

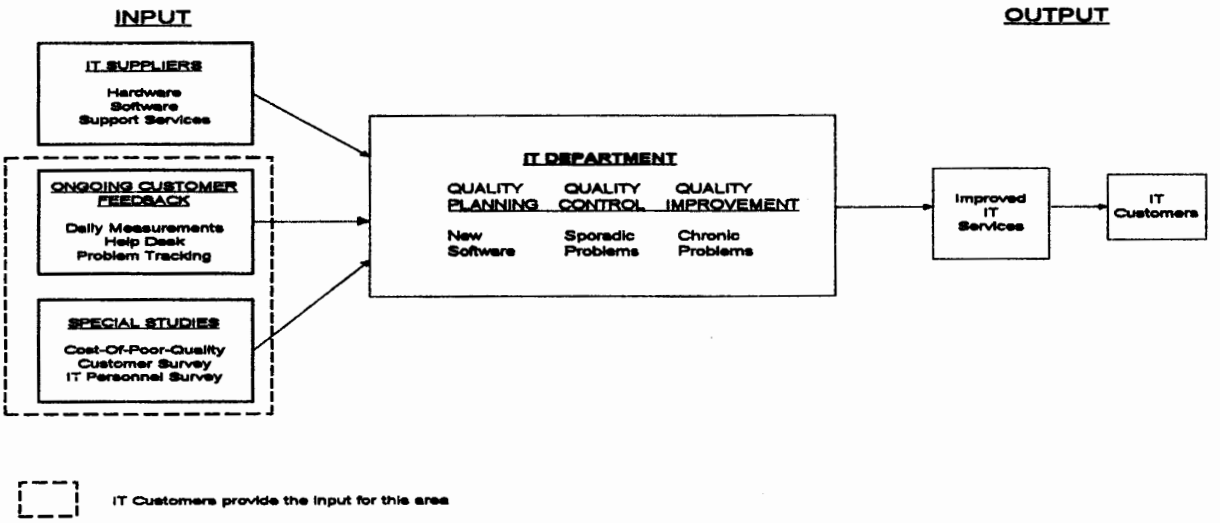

Figure 1. Framework for IT quality

To ensure that quality improvements occur and are sustained requires significant efforts from all concerned. A framework for IT quality is shown in Figure 1. This figure provides a trilogy of quality processes–quality planning for developing new IT products, quality control for sporadic problems, and quality improvement for chronic problems. Note that critical inputs to these processes are continuous feedback such as daily measurements, help desks, and problem tracking and also special studies such as cost-of-poor-quality, customer surveys, and IT personnel surveys. The current study identifies quality-related issues in IT from the viewpoint of 13 Operations managers in seven firms. Of course, each firm must learn from its own customers what issues need to be attacked. Figure 1 provides a broad prescription to address the shortcomings of IT identified by a particular firm.

Juran and Gryna (1993) describe in detail the processes of quality planning, quality control, and quality improvement. A summary of the steps in these processes is shown in Table 5. Issues of the type identified in the current study can be diagnosed and corrected through the quality improvement process. First, it is useful to start with a distinction made in quality management methodology between sporadic and chronic quality problems (See Figure 1).

Universal Processes for Managing Quality		
Quality planning	**Quality control**	**Quality improvement**
Establish quality goals	Choose control subjects	Prove the need
Identify customers	Choose units of measure	Identify projects
Discover customer needs	Set goals	Organize project teams
Develop product features	Create a sensor	Diagnose the causes
Develop process features	Measure actual performance	Provide remedies, prove that the remedies are effective
Establish process controls, transfer to operations	Interpret the difference	Deal with resistance to change
	Take action on the difference	Control to hold the gains

Table 5. Universal Processes for Managing Quality

A sporadic problem is a sudden, unexpected, adverse change in a process. Examples of this in the IT area, as mentioned by the research participants, are unscheduled system downtime and storage limitations. Often, this type of problem is handled by a "help desk" in the IT department. The problem may be logged in a problem tracking system, given a priority based on severity of the problem, and followed until resolved. This approach is frequently called troubleshooting. Troubleshooting looks for the change in some condition that caused a change in a resulting output.

A chronic problem is a long-standing, adverse situation. Our research participants gave IT examples such as inadequate system response time and poor documentation. Most of the issues listed in Tables 4 and 5 are probably chronic problems. Initially, this type of problem often is referred to a "help desk" but as it becomes chronic, it may be escalated in the organization. Chronic problems are usually cross functional in nature and require a team of individuals for achieving resolution. For example, the participants in this study identified 11 issues that were cross-functional in nature such as "Not receiving information on a timely basis", "Lack of detailed MIS reports", and "Limited ad hoc reporting capabilities." The approach to resolving chronic problems, often called improvement, searches for the cause that continues to be present which leads to the chronic condition. Chronic problems are addressed by the project-by-project approach. A project is a chronic, quality-related problem that has been chosen for solution.

Setting up the approach is comprised of three main steps:

1. Proving the need for a formal structured improvement approach. This need is often justified by a history of repeat customer (internal or external) complaints or excessive costs and time to resolve problems. The findings of the current study help to establish this "proof of the need."
2. Identifying specific projects. This involves obtaining nominations for projects, deciding priorities for projects, selecting initial projects to demonstrate the approach, and writing a problem and mission statement for each project. The issues discovered in the current study are examples for quality improvement projects. Each firm must learn from its own customers what the priority problem issues are.
3. Organizing project teams. Typically, the team has a leader, members, secretary, and facilitator.

Carrying out each project involves:

- Verifying the project need and mission,
- Diagnosing the causes,
- Providing a remedy and proving its effectiveness,
- Dealing with resistance to change, and
- Instituting controls to hold the gains.

The technical heart of the process consists of two journeys--a diagnostic journey from symptom to cause and a remedial journey from cause to remedy. Our study provides a first step in the diagnostic journey. Quality management methodology has many tools and techniques

for both setting up such an approach and executing specific projects (Juran and Gryna, 1993). For a book that explains the concepts of total quality as applied to information systems, see Woodall, Rebuck, and Voehl (1997).

The structured approach has been applied extensively to all types of quality problems in both the private and public sectors throughout the world. A pioneer in implementing the structured approach in IT is Tektronix. Examples of early projects included computer program execution errors (systems failures, abends, etc.); errors in introducing computer programs in the production environment; timeliness of reports, inter-departmental communications, system design (development time, implementation errors, cost of operations), and unusable reports (Gray, Green, and Lamper, 1986; Green and Lamper, 1987). Although Tektronix did see significant improvement in these areas, notice that the Operations managers in our study are still expressing concern with some of these same issues. IT managers need to continually examine the quality of their outputs and consider a structured quality improvement process to rectify problem areas.

In addition to addressing on-going problems, we also need an instrument to keep in touch with current user perceptions about the quality of services provided by the IT function (See Figure 1). The current research study is an example of a user survey of perceptions of the IT function. For this, the tools of market research can be beneficial. For example, a survey of 292 companies describes practices to learn about user satisfaction with IT services. This survey revealed five methods of obtaining user feedback: (1) formal user satisfactions including written surveys, (2) focus groups with participants from several departments, (3) meetings with individual departments, (4), steering committee meetings, and (5) users--IT contact through a sub-unit of IT dedicated to user service and liaison. GroupSystems could be effectively applied to any of these methods.

Formal user satisfaction surveys were employed by 43% of the companies. Typically, surveys were conducted on an annual basis, but the range ran from monthly to bi-annually. Companies reported that surveys were used to make IT more responsive to users, identify dissatisfied users, pinpoint problem areas in specific IT units, and monitor progress over time. For an explanation of the survey results and examples of survey instruments, see Newman (1989).

Sometimes, the results of a user satisfaction survey can be sobering, Rustogi and Bajawa (1996) report the results of a survey at a hospital in which users from 25 departments were asked to rate the quality of IT services in terms of several dimensions. The overall result: User perception of the IT department failed to meet expectations in any of the dimensions. An analysis of the detailed responses would be a fertile ground for embarking on the improvement journey.

An on-going, iterative process has been recommended by McLeod (1996) to achieve quality from the IT area. This process includes the following steps: 1) identify IT customers, 2) define customer quality needs, 3) establish quality metrics, 4) define IT quality strategy, 5) implement IT quality programs, and 6) monitor IT quality performance.

CONCLUSION

Although IT departments continually strive to improve their effectiveness, this exploratory study indicates that quality of outputs from the IT area is a concern in the Operations functions of the financial sector. Deficiencies in IT services were noted in system performance, training, quality, staffing, interactive communication, individual performance, timeliness, and outside vendors. Although the research results are limited, the Operations function is a key internal customer of IT; and thus, the perceptions documented here are important.

The impact of these eight areas, particularly the quality related issues, on the effectiveness of the Operations functional area is critical and demands action--strong and sustained. Perhaps by using the described framework, we can more formally address and prevent the type of problems identified in this study.

Future research in this area could take several directions such as a larger survey in the financial or other sectors or further study of causes and effects.

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