

# **Measuring Quality of Information System Services in Manufacturing Organizations in Riyadh**

**Sulaiman A. Al-Hudhaif**

*Associate Professor*

*College of Business Administration*

*King Saud University, Riyadh, Saudi Arabia*

(Received 07.03.1429H., and Accepted 16.07.1429H.)

*Abstract.* The research aims to measure the customers' perception of quality provided by information systems services in manufacturing organization in Riyadh. Based on a comprehensive literature review, the theoretical framework was developed utilizing a well known service quality measurement model called "SERVQUAL". A modified version of SERVQUAL measurement called "SERVPERF" was adopted in this paper following the recommendations made by some researchers. The empirical evidence in this research is based on primary data collected from 142 employees of the 58 manufacturing organizations to investigate factors that are more likely to influence the perception of IS services quality. The study results highlighted that there is a high relation between the organization size (in terms of the investment) and information systems service quality level. The study confirmed that the quality of IS services offered by Saudi manufacturing organizations is a concern and need to be further addressed by those organizations who would like to use IS services as competitive advantages.

## **1. Introduction**

### ***1.1 Background***

Manufacturing organizations in Saudi Arabia have been growing for the last two decades. In 1980, there were only 500 manufacturing companies while in 2006 the number of factories increased to 5000. During those decades, many changes have occurred in their way of managing manufacturing organizations, such as the ideas of just in time and continuous improvement, automation, and extensive use of information systems. The Saudi organizations' reaction towards

these changes is expected to be in line with what is happening, or they will not be in a position of competitive advantage.

It seems there is a gap or mismatch between the priorities expressed by customers and levels of quality delivered by companies. It was argued that a major contributor to the gap is the change in emphasis in a service environment from how the product performs to how people perform in the delivery of the product.

This study focuses on measuring the customers' perception of the quality of IS services provided by the Saudi manufacturing organizations. Further, the study determines the main factors that most influence customers' perception of the quality of IS services provided by these organizations and provides insights into the effect of these organizations on the service quality perception.

### ***1.2 Problem Definition***

Information systems nowadays play a major role in developing manufacturing organizations and helping the establishment of reliable databases. In those organizations it is not enough just to have an information system; it has to be up to date and easy to use, and must really facilitate the computation and flow of information. One attribute for judging the goodness of an information system is by measuring the service quality provided to the users. Therefore it is important for the manufacturing organization to measure the service quality of its information system in order to enhance its decision about the necessity of further development.

The manufacturing organizations in Riyadh vary in size and type of industry. Thus, each type of industry may use common information systems like an accounting information system, human resources information system, and payroll information system. On the other hand, they may use different information systems (IS) especially those that are directly related to the production facilities. Therefore, the complexity, size, training and expenditure on information system vary according to the requirements of a specific system.

The problem definition of this paper can be limited to the following:

- 1- Can we measure the information system service quality?
- 2- If yes, what is the IS service quality in manufacturing organizations?
- 3- What are the factors that affect the level of service quality?

To answer these questions, this study was conducted in early 2007 with some variables that are established in the literature to be used here, including the tangibility of IS, responsiveness of IS, reliability, assurance and empathy. Other variables that have been used include organization total investment, industry type, caring efforts, training, user age and level of education. The

dependent variable here is the service quality, while the independent variables are the others mentioned above. The industry type, age, and level of education may be considered as moderate variables. The unit of analysis here is the individual users.

In the result section, it will be stated what the service quality level of the information system in manufacturing organizations is. In addition, some of the factors that could affect the level of service quality in those organizations will also be stated.

### ***1.3 Study Objectives***

The purpose of this study is to measure and investigate the quality of IS services provided by the Saudi manufacturing organizations with the objective of:

- Reviewing the service quality literature to determine the fundamental principles of IS service quality;

- Assessing and investigating the overall quality of IS services provided by the Saudi manufacturing organizations as well as the five quality dimensions, as perceived by internal customers.

- Providing managers with practical strategies for improving IS service quality in manufacturing organizations in Saudi Arabia

## **2. Rationale of Study**

### ***2.1 The Importance of the Study***

The IS department not only provides the traditional IT services such as: designing, constructing and implementing systems, but also provides assistance to users on hardware and software selection, acquisition and installation, trouble-shooting, connecting to networks, training, and maintenance. Furthermore, IS professionals assist users in collecting, analyzing, and retrieving data and producing information in a form that is meaningful for decision makers. These services require a customized, personal interaction with a user (Jiang, 2002).

Cronin & Taylor (Cronin, 1992) points that the delivery of higher levels of service quality is the strategy that is increasingly being offered as a key to service providers' efforts to position themselves more effectively in the marketplace.

As the information system is one of the tools that is expected to improve and facilitate the work procedures and flow, it is necessary to investigate whether the manufacturing organizations use any information system or not. Moreover, it is important to find out the level of information system service

quality, because that will enhance any improvement required in the information systems of those organizations.

## ***2.2 Literature Review***

Information system function can be defined as production and service activities performed by a centralized information system department in the organization (Kettinger, 1995). IS has gone through many phases. In the 1960s data processing was a backroom function with little customer interaction. The main purpose at that time was to develop and maintain a highly reliable transaction-based system. In the 1970's, the role of IS was a distributive computing and decision support technology, which requires an increased level of user interaction and participation. In the 1980's the IS was known to be decentralized with nine subfunctions: delivery system, system development, support center, information center, R&D, technology diffusion, planning, internal auditing, and administration. Recently, IS has come to handle business transactions between IS service providers and customers. Therefore, IS roles have changed from manufacturing activity to distribution and technology transfer that require higher levels of user interactions and service delivery. It is wise for IS developers to refer to the corporate business plan and corporate culture before developing MIS (Adhikari, 1994) as IS is related to the business strategic plan (Lewis, 1999).

Although the role of IS changes, it can still be found in many sectors like financial institutions, consulting firms, information services firms and in manufacturing organizations (Pitt, 1997). The level of IS in each type of organization depends on many factors, including the size of the organization, the availability of resources, and integration among departments. Information systems are used and applied in many types of businesses including manufacturing organizations. For example, in the glass industry the software program allows glass technologies to access 85,000 glasses and 700,000 property values in seconds (Mazurin, 1998).

As the level of IS varies from one organization to another, it is necessary to measure the level of services quality of IS through a known scale measurement in order to take a decision about the development of IS services. To have a proper measure, an understanding of what should be measured is essential (Davis, 1999). Research in defining and measuring quality has been developed mainly in manufacturing (Liosa, 1998). However, SERVQUAL, which is a well-known scale of measurement for service quality from marketing literature (Pitt, 1995), is suggested for measuring IS service quality by a number of researchers. The scale, which is the most widely used measure of service quality (Davis, 1999), was improved to measure the service quality in marketing literature by

Parasuraman *et al.* (Parasuraman, 1991, 1994). The scale in its final shape contains 44 variables divided into five dimensions (Pitt, 1995):

1. Tangibles: Items included are physical facilities, equipment and appearance of personnel.
2. Reliability: The ability to perform the promised service dependably and accurately.
3. Responsiveness: The willingness to help customers and provide prompt service.
4. Assurance: The knowledge and courtesy of employees and their ability to convey trust and confidence.
5. Empathy: The provision of caring individualized attention to customers.

The quality of services for each dimension is measured by the difference between the average rating for perception and expectation of service quality (Pitt, 1995). An equation can be written in this regard:

$$G = P - E$$

*G*: The service quality of each dimension

*P*: Average rating of dimension corresponding to perception.

*E*: Average rating of dimension corresponding to expectation.

SERVQUAL was applied to IT services in higher education institutions in the United Arab Emirates. Because of the many concerns and reservations raised with regard to using perception scores or gap scores, the appropriateness of the SERVQUAL measure to verify the anticipated structure of the instrument was also examined. SERVQUAL was found to be a useful indicator for IT center service quality in institutions of higher education (Badri, 2005).

A number of studies criticized the SERVQUAL measure (Davis, 1999), but it was still used. Some researchers raised problems regarding using SERVQUAL as a scale of measurement of IS service quality in particular. Dyke stated that two types of problems are associated with SERVQUAL in measuring IS service quality (Dyke, 1997). The first type is conceptual problems that include operationalization of perceived service quality as difference gap scores, the ambiguity of the expectation construct and the unsuitability of using a single measure of service quality across different industries. The empirical problems as stated in his research were reduced reliability, poor convergent validity and poor predictive validity. To measure IS service quality Dyke suggested the following points (Dyke, 1997):

1. It is preferred to use an alternative method to the difference score method.

2. If SERVQUAL is used, then caution should be exercised in the interpretation of the IS-SERVQUAL difference score.
3. Further work is needed in the development of measures for assessing the quality of IS service.

Despite these problems, however, other researchers concluded that SERVQUAL is an appropriate instrument for measuring IS service quality (Pitt, 1995). Pitt found that the service quality perception-expectations subtraction in SERVQUAL is far more rigorously grounded than Dyke suggested (Dyke, 1997). The expectation construct, while potentially ambiguous, is generally a vector in the case of the IS department and the dimension of service quality seems to be as applicable to the IS department as to any other organizational setting. He also showed that high reliability is obtained using this scale.

Although SERVQUAL is a good measure of service quality, it is too long (22 variables for perception and 22 variables for expectations) to be answered by the respondents. Cronin & Taylor tested what is known as be SERVPERF, a performance-based scale that measures service quality (Cronin, 1992). Their study shows that SERVPERF is efficient in comparison to SERVQUAL, specially in that it reduces the questionnaire by 50% (from 44 variables to 22 variables).

Overall, SERVQUAL and SERVPERF are equally valid predictors of service quality. Adapting the SERVQUAL scale to the measurement context improves its predictive validity; conversely, the predictive validity of SERVPERF is not improved by context adjustments (Carrillat, 2007).

Landrum found that Magal's instrument on information center success was effective within a service context because of its service orientation. One of the important results of their study was to support the use of Magal's instrument as an alternative to SERVQUAL for researchers and managers interested in service quality assessment (Landrum, 2007).

The service quality scale is used by many business sectors but, unfortunately, few articles were found about measuring information systems service quality in manufacturing organizations. However, two longitudinal cases were found about the measurement of information system service quality using the SERVQUAL scale (Pitt, 1995). They were measured in an information management consulting firm and in an information service business. The case showed that SERVQUAL was used in a period of two years and the study concluded that to improve service quality of IS, it should be linked to the business strategy, training and reward system. It also concluded that IS service quality requires ongoing attention.

In Saudi Arabia, no studies were found about the measurement of information system service quality in general and specifically in manufacturing organizations. Indeed, only one article was found about the use of information technology in contractors firms (Shash, 1997), The article showed the percentages of contractors firms that use computers, but that research did not measure the level of service quality. Therefore, IS service quality will be measured in manufacturing organizations in Riyadh using the SERVPERF. It is important for the decision makers in manufacturing organizations to know the level of the service quality of their information system in order to enhance further development to provide the employees with all the facilities that will help to do the job required as efficiently as possible, which could increase productivity (Mazurin, 1998) and hence profitability. Information systems can potentially increase productivity in a number of ways: providing services dependably and accurately; giving service promptly and willingly; employing knowledgeable and affable service personnel; and, finally, providing individualized attention. In addition, effective service enables the users to accomplish their work more efficiently (Watson, 1998).

This subject of measuring information systems service quality was not covered in the research before and therefore the purpose of this paper is to measure the service quality of information systems in manufacturing organizations in Riyadh.

### ***2.3 Theoretical Framework***

The objectives of the research are to measure the level of the information systems service quality in manufacturing organizations in Riyadh and to find the factors that could effect this service level.

Before the information systems service quality is measured, the availability of information systems in manufacturing organizations should be determined. This will be measured through direct questions that can be answered by either yes or no. This measurement will be useful from two points of view. First, it will give an indication of the percentage of those organizations that have information systems or do not. Second, it will save time for the respondents to ignore answering irrelevant questions if information systems are not available.

To measure the service quality of information systems a SERVPERF scale, which is proven in the literature to be a valid scale, will be used in this research. The service quality will be measured through the SERVPERF scale, which contains 22 items, divided into five dimensions as follows:

**A) Tangible**

- 1) Up-to-date hardware and software.
- 2) Physical facilities visually appealing.
- 3) Neat and well dressed employees.
- 4) Appearance of physical facilities.

**B) Reliability:**

- 5) Keeping promised deadlines.
- 6) Interest in solving problems.
- 7) Dependable.
- 8) Time keeping.
- 9) Error-free records.

**C) Responsiveness:**

- 10) Notice in advance.
- 11) Prompt service to users.
- 12) Willingness to help users.
- 13) Never too busy to respond.

**D) Assurance:**

- 14) Confidence in users.
- 15) Safe transactions.
- 16) Courteous with users.
- 17) Knowledge to do the job.

**E) Empathy:**

- 18) Individual attention.
- 19) Convenient operating hours.
- 20) Giving user personal attention.
- 21) Having the user's best interest at heart.
- 22) Understanding the specific needs of the users.

Each item mentioned above will be measured in a Likert scale with seven points, where one is the worst and seven is the best. The average then will be taken to give the SERVPERF level.

As shown in the literature review, some factors are recommended to be linked to the information systems service quality including training, caring efforts and organization size. Therefore, several items will be measured in this regard.

First, training, which is a difficult variable to measure objectively, will be measured subjectively through a direct question of having training or not. It is difficult to measure objectively for two reasons. First, the training programs vary with the resources of each organization. Second, the training requirement



varies among organizations due to the difference in size and complexity of the available information system. In addition, this is an exploratory study in that field and asking about it in a subjective way will give only an indication, which could be the basis of further studies.

Second, the caring effort variable will find who is taking care of the information systems in those organizations. This is important because information systems should be linked to the corporate strategy, as was shown in the literature review and, unless there is a concerned department or division, the linkage cannot exist. This variable will be measured through four categories, of which the respondent has to select one. The categories are divisions, personal efforts, contracted services and others (if they exist).

Third, the organization size will be measured by two issues: the total investment and the number of employees. This measurement will highlight whether there is a relation between information systems service quality and the organization size. Unfortunately, both variables will not be measured precisely, due to the confidentiality of this information from the organization point of view. Therefore, both will be measured through categorical ranges and the respondent will be asked to select one range only.

In addition to the above mentioned variables, the type of industries, which were limited to 14 types, will be measured to see if there is a difference of the above factors in those industries. Finally, some demographic variables will be measured, such as age and level of education.

### **3. Research Plan**

#### ***3.1 Hypotheses***

From the literature review it was found that the specific objectives of this paper have not been searched before. Some researchers have stated that the information systems level has an effect on the productivity and hence the profitability. Information systems also have a relation with business strategic planning. It would be a good indication if a relation between organization size and information systems service quality is found. The organization size is considered one factor that may affect the service quality of information systems. The service quality of information system will be measured using SERVPERF scale while the organization size will be measured by both the investment and the number of employees. The null hypothesis that could reflect this fact can be stated as the following:

H<sub>0</sub>1: The level of service quality of IS in manufacturing organizations in Riyadh is not related to the organization size.

It was concluded from the literature that training should be linked to the information systems service quality. As mentioned before the training varies from one organization to another depending on the organization size and the complexity and the size of the information system. Therefore, the training in this research will be canvassed subjectively. The research will try to see if there is a relation between the training and the service quality level in the manufacturing organizations measured by SERVPERF. A hypothesis in that regard could be established as the following:

H<sub>0</sub>2: The level of service quality of IS in manufacturing organizations in Riyadh is not related to training.

Another factor concluded from the literature review to be linked with the information system service quality is the corporate strategy. Information systems cannot be linked to the corporate strategy unless there is a department or a division that is taking care of it. Therefore, a relation between having a department and the level of the information service quality may also exist. A hypothesis that will measure this relation could be stated as follows:

H<sub>0</sub>3: The level of service quality of IS in manufacturing organizations in Riyadh is not related to the caring effort.

Each of the above hypotheses may be affected by a moderate variable that is the type of the industry, which will be measured directly through categorizing the organizations into 14 types of industries.

### **3.2 Sampling Procedures**

The target population is all employees in manufacturing organizations in Second Industrial City at Riyadh. It is estimated that the total number of these employees is 25,600 distributed in 640 (Chamber of Commerce map) manufacturing organizations. The organizations are classified into 14 different industries including: Food, Medical, Textile, Furniture, Chemical, Building Materials, Plastic, Jewelry, Aluminum, Electrical, Pipe & Pumps, Structural, Foundry and Heavy Industry.

The sample will be selected on the basis of the following systematic random sampling. From each industry sector 10% of the organizations will be selected randomly. Between 20-15 questionnaires will be dropped off in each organization selected. These questionnaires are to be distributed among employees and managers who are using Information Systems inside the organizations. This sample is considered a probability sample because every member (employee or manager) in the population has known, nonzero probability selection.

### **3.3 Data Collection Methodology**

Questionnaires were dropped at each selected factory. In each factory, we had to see either the general manager or one of the middle managers to explain to him the nature of the survey and to get the agreement to participate in the survey. We prepared a large envelope containing 16 questionnaires (half in Arabic and half in English). The envelope is stapled with a covering letter from the chairman of the department directed to whom it may concern to cooperate in providing the required information. Also, we had extra copies of the questionnaires for them if requested.

The selected sample included 58 factories from different industries. Unfortunately, only 24 factories cooperated and participated in the research, which represents 41% of the sample. However, the unit of analysis in the research is the individual users. The number of returned questionnaires was 152, where 142 were usable. Therefore, the response rate of usable questionnaires in this research was 15%.

The variables that were measured can be operationalized as follows:

- 1) Availability of information system: This variable is to see if there is an information system in the organization or not.
- 2) SERVPERF: the level of the information system service quality, which will be measured by the afore-mentioned five dimensions
- 3) Organization size: this variable will be measured by the investment of the organization and the number of the employees. The investment will be obtained through categorical variables as follows:
  - 1- Less than SR 5 millions
  - 2- SR 5 millions to less than SR 15 millions
  - 3- SR 15 millions to less than SR 25 millions
  - 4- SR 25 millions to less than SR 35 millions
  - 5- SR 35 millions and more.

On the other hand, the number of employees will be measured by the following categories:

- 1- Less than 50 persons
  - 2- 50 to less than 100 employees
  - 3- 100 to less than 150 employees
  - 4- 150 to less than 200 employees
  - 5- 200 employees and more.
- 4) Training: the training will be measured through a direct question of whether the user had training or not.

- 5) Caring efforts: this variable will be measured by the categories of the following:
- 1- Department or division
  - 2- Personal efforts
  - 3- Contracted service
  - 4- Others.
- 6) Type of Industry: based on 14 different classifications mentioned previously.

Univariate statistics will be applied to the questionnaire. In addition, cross-tabulation will be applied to find a relation between service quality and size of organization. Chi-square test will be applied to test the relation between organization size and information system service quality level. In addition, percentages and cross-tabulation will be performed on the various variables in the research.

#### **4. Discussion of the Results and Findings**

One way of approaching the assessment of factors is to ask a variety of questions that we think address the factor, give each response a score and add them up. When items are used to form a scale in this way they need to have internal consistency, that is, be measuring the same sort of thing. Coefficient alpha, also known as Cronbach's alpha ( $\alpha$ ), measures internal consistency. The calculation of  $\alpha$  is based on the average correlation among pairs of items making up the scale. Cronbach's alpha ( $\alpha$ ) will have a value between 0 and 1. If the items are perfectly correlated then  $\alpha = 1$ ; if the items are completely unrelated then  $\alpha = 0$ . If  $\alpha$  is high, that is near to 1, then this indicates a high degree of internal consistency. A commonly adopted convention is to claim satisfactory internal consistency if  $\alpha$  is greater than 0.7. The original scales have been found to have high Cronbach alpha coefficients ranging from 0.90 for IS gives prompt service to the users, to 0.94 for IS employees are well dressed and appear neat, indicating good reliability.

This section will focus on the research main results and findings. Some of these findings are related to the hypothesis and the others to the objectives of the research.

First, the level of information systems service quality is measured by the SERVPERF scale. The scale is divided into seven points, where one is the worst and seven is the best. The scales contain 22 variables that are divided into five dimensions: Tangible (4 variables), reliability (5 variables), responsiveness (4 variables), assurance(4 variables) and empathy (5 variables). The results show

that the overall service quality level is 5.37 out of 7. In addition, the level of each dimension is given in Table 1.

**Table 1.**

<b>Variable</b>	<b>Level</b>
Tangible	5.03
Reliable	5.47
Responsiveness	5.34
Assurance	5.61
Empathy	5.36
SERVPERF	5.37

From these values, it can be stated that the level of information system service quality is between good and very good. Further, the five dimensions do not vary much in their values, which indicates that there is no one dimension that tremendously affects the level of information system service quality, although the highest dimension score was for assurance, which reflects that information systems employees can be trusted, knowledgeable and courteous. On the other hand, the lowest score, 5.03, was obtained in the tangible dimension of information system in those organizations. This means that the information systems service level, in terms of having up-to-date hardware and software and the neatness of information systems employees, is lower: only good.

The detail measure of each variable is shown in Table 2.

Second, the first hypothesis stated that there is no relation between IS service quality and the organization size. The following results regarding this hypothesis are shown in Table 3.

The size of the organizations was measured by the investment of the organization, divided into five categories as shown below. The percentages of participant organizations are also shown as follows:

- 1- Less than SR 5 millions 14.8%
- 2- SR 5 millions to less than SR 15 millions 32.4%
- 3- SR 15 millions to less than SR 25 millions 15.5%
- 4- SR 25 millions to less than SR 35 millions 4.2%
- 5- SR 35 millions and more: 33.1%

The service quality for each investment category was found as follows:

- 1- Less than SR 5 millions 5.01
- 2- SR 5 millions to less than SR 15 millions 5.40
- 3- SR 15 millions to less than SR 25 millions 4.95
- 4- SR 25 millions to less than SR 35 millions 5.03
- 5- SR 35 millions and more: 5.60

**Table 2.**

	<b>Variable</b>	<b>Mean</b>	<b>Std Dev</b>	<b>N</b>	<b>Label</b>
	TAN1	5.08	1.58	108	Up to date hardware and software
	TAN2	4.44	1.69	108	Physical facilities visually appealing
	TAN3	5.65	5.16	108	Employees well dressed
	TAN4	4.93	1.68	108	Appearance of Physical facilities
A)	TANG	5.03	1.72	108	
	REL1	5.41	1.58	108	Keeping promised deadlines
	REL2	5.91	1.36	108	Interest in solveing problems
	REL3	5.53	1.59	108	Depandable
	REL4	5.26	1.58	108	Time Keeping
	REL5	5.27	1.71	108	error-free record
B)	REL	5.47	1.30	108	
	RESP1	5.37	1.61	108	In advance notice
	RESP2	5.28	1.68	108	Prompt service to users
	RESP3	5.71	1.44	108	Willingness to help users
	RESP4	4.99	1.66	108	Never too busy to respond
C)	RESP	5.34	1.32	108	
	ASS1	5.69	1.45	108	Confidence in users
	ASS2	5.68	1.51	108	Safe transactions
	ASS3	5.54	1.69	108	Courteous with users
	ASS4	5.55	1.56	108	knowledge to do the Job
D)	ASSR	5.61	1.20	108	
	EMP1	5.01	1.72	108	Individual attention
	EMP2	5.22	1.54	108	Convenient operating hours
	EMP3	5.52	1.41	108	Giving user Personal attention
	EMP4	5.52	1.52	108	Having the user's best interest at heart
	EMP5	5.55	1.63	108	Understanding the specific needs of the users
E)	EMP	5.36	1.23	108	
	SERVPE RF	5.37	1.12	108	

**Table 3. Servperf by investment categories.**

No	Variable	Investment Categories					Overall
		1	2	3	4	5	
1	Tan1	4.25	5.00	4.71	4.67	5.47	<b>5.08</b>
2	Tan2	3.75	3.73	4.59	4.17	5.00	<b>4.44</b>
3	Tan3	4.75	5.43	4.94	4.17	6.38	<b>5.65</b>
4	Tan4	4.62	5.33	5.00	4.17	4.79	<b>4.93</b>
	<b>tang</b>	<b>4.34</b>	<b>4.88</b>	<b>4.81</b>	<b>4.29</b>	<b>5.40</b>	<b>5.03</b>
5	rel1	4.63	5.93	5.06	4.33	5.47	<b>5.41</b>
6	rel2	5.38	6.13	5.18	5.00	6.23	<b>5.91</b>
7	rel3	5.00	5.60	5.12	4.67	5.83	<b>5.53</b>
8	rel4	5.13	5.43	4.82	4.50	5.43	<b>5.26</b>
9	rel5	4.62	5.20	5.17	5.00	5.49	<b>5.27</b>
	<b>Rel</b>	<b>4.95</b>	<b>5.60</b>	<b>5.07</b>	<b>4.70</b>	<b>5.69</b>	<b>5.47</b>
10	resp1	5.62	5.30	4.47	5.83	5.64	<b>5.37</b>
11	resp2	4.63	5.50	4.53	5.33	5.51	<b>5.28</b>
12	resp3	5.75	5.70	5.18	5.33	5.96	<b>5.71</b>
13	resp4	4.50	5.33	4.82	4.17	5.02	<b>4.99</b>
	<b>resp</b>	<b>5.13</b>	<b>5.46</b>	<b>4.75</b>	<b>5.17</b>	<b>5.53</b>	<b>5.34</b>
14	Ass1	5.88	5.37	5.29	5.67	6.00	<b>5.69</b>
15	Ass2	6.00	5.43	5.47	5.67	5.85	<b>5.68</b>
16	Ass3	5.50	5.77	4.64	5.83	5.68	<b>5.54</b>
17	Ass4	5.12	5.73	5.06	5.67	5.66	<b>5.55</b>
	<b>Ass</b>	<b>5.62</b>	<b>5.57</b>	<b>5.12</b>	<b>5.71</b>	<b>5.80</b>	<b>5.61</b>
18	emp1	5.13	4.93	4.41	5.17	5.23	<b>5.01</b>
19	emp2	4.50	5.17	4.94	5.17	5.49	<b>5.22</b>
20	emp3	5.00	5.77	5.29	5.33	5.55	<b>5.52</b>
21	emp4	4.88	5.33	4.88	5.67	5.83	<b>5.52</b>
22	emp5	5.63	5.60	5.24	5.17	5.65	<b>5.55</b>
	<b>emp</b>	<b>5.03</b>	<b>5.40</b>	<b>4.95</b>	<b>5.30</b>	<b>5.55</b>	<b>5.36</b>
	<b>servperf</b>	<b>5.01</b>	<b>5.40</b>	<b>4.95</b>	<b>5.03</b>	<b>5.60</b>	<b>5.37</b>

As can be seen, there is a trend of increasing service quality level with the increasing of organization size. When applying Chi-square test, it shows that the value is 241.84 and the significance is 0.383. Therefore, null hypothesis can be rejected, and the conclusion is that there is a relation between the organization size (in terms of investment) and the information systems service quality level.

The second hypothesis stated that there is no relation between information system service level and training. Summary of the results in this regard is shown in Table 4.

**Table 4.**

<b>Training</b>	<b>SERVPERF</b>	<b>%</b>
Yes	5.63	72%
No	4.7	28%

Applying chi-square test to these results indicated that the value is 68.58 and the significance is 0.161. Therefore, the null hypothesis can be rejected and hence there is a positive relation between training and information systems service quality, considering the limitation on how the training was measured in this research.

The third hypothesis stated that there is no relation between information system service quality and caring efforts. The results in these regards are summarized in Table 5.

**Table 5.**

<b>Caring efforts</b>	<b>SERVPERF</b>	<b>%</b>
Departments	5.53	60%
Personal Efforts	5.12	40%

The results show that the level of information system service quality for organizations with an information systems department is higher than when there is only personal efforts. When applying Chi-square test, the value was 65.22 and the significance was 0.269. Therefore, the null hypothesis can be rejected so the conclusion is that there is a relation between the caring efforts and information system service quality.

A trial was also attempted to relate the level of service quality of information system with the number of employees. They were classified into five categories as shown below, and the percentage of each category participated is also shown.

1- Less than 50 persons	21.8%
2- 50 to less than 100 employees	12.7%
3- 100 to less than 150 employees	12.0%
4- 150 to less than 200 employees	6.3%
5- 200 employees and more	47.2%

The level of information system service quality is given below:

1- Less than 50 persons	4.98
2- 50 to less than 100 employees	5.81
3- 100 to less than 150 employees	5.46
4- 150 to less than 200 employees	5.55
5- 200 employees and more	5.36



As can be seen there is no trend in numbers and hence no relation can be established between the number of employees and information system service quality.

Table 6 shows the level of each variable in each employee number category:

**Table 6. Servperf by number of employee categories.**

No	Variable	Employee Categories					Overall
		1	2	3	4	5	
1	Tan1	3.69	5.73	5.20	4.67	5.32	<b>5.08</b>
2	Tan2	3.00	5.18	3.40	6.33	4.84	<b>4.44</b>
3	tan3	5.31	5.64	5.40	4.00	5.87	<b>5.65</b>
4	tan4	4.63	5.45	5.27	6.00	4.78	<b>4.93</b>
	<b>tang</b>	<b>4.15</b>	<b>5.50</b>	<b>4.82</b>	<b>5.25</b>	<b>5.20</b>	<b>5.03</b>
5	rel1	6.00	5.81	5.60	4.67	5.17	<b>5.41</b>
6	rel2	6.06	6.36	6.07	6.67	5.71	<b>5.91</b>
7	rel3	5.81	6.00	5.60	5.00	5.30	<b>5.53</b>
8	rel4	5.10	6.00	4.90	6.00	5.20	<b>5.26</b>
9	rel5	4.40	5.73	5.60	4.67	5.35	<b>5.27</b>
	<b>rel</b>	<b>5.49</b>	<b>5.98</b>	<b>5.56</b>	<b>5.40</b>	<b>5.36</b>	<b>5.47</b>
10	resp1	4.94	5.82	5.13	6.67	5.40	<b>5.37</b>
11	resp2	4.56	5.73	5.40	6.30	5.30	<b>5.28</b>
12	resp3	5.12	6.27	5.93	5.67	5.71	<b>5.71</b>
13	resp4	4.56	5.73	5.33	5.67	4.86	<b>4.99</b>
	<b>resp</b>	<b>4.79</b>	<b>5.89</b>	<b>5.45</b>	<b>6.08</b>	<b>5.32</b>	<b>5.34</b>
14	ass1	4.88	6.09	5.67	6.00	5.89	<b>5.69</b>
15	ass2	4.94	6.09	5.73	5.67	5.78	<b>5.68</b>
16	ass3	5.31	5.45	6.40	5.30	5.40	<b>5.54</b>
17	ass4	5.69	6.18	5.13	6.30	5.46	<b>5.55</b>
	<b>ass</b>	<b>5.20</b>	<b>5.95</b>	<b>5.73</b>	<b>5.83</b>	<b>5.61</b>	<b>5.61</b>
18	emp1	4.94	5.63	4.53	4.00	5.08	<b>5.01</b>
19	emp2	4.69	5.82	5.80	5.00	5.12	<b>5.22</b>
20	emp3	5.56	6.00	5.60	6.30	5.36	<b>5.52</b>
21	emp4	5.06	6.00	6.20	5.33	5.39	<b>5.52</b>
22	emp5	5.31	5.18	6.13	5.67	5.52	<b>5.55</b>
	<b>emp</b>	<b>5.11</b>	<b>5.73</b>	<b>5.65</b>	<b>5.26</b>	<b>5.29</b>	<b>5.36</b>
	<b>servperf</b>	<b>4.98</b>	<b>5.81</b>	<b>5.46</b>	<b>5.54</b>	<b>5.36</b>	<b>5.37</b>

Finally, Table 7 shows the value of Servperf for different types of industries in the five categories of investments. Unfortunately, there were missing organizations in some investment categories in some types of industries. Therefore, no conclusion can be stated in this regard.

**Table 7. Investment categories.**

Industry Type	1	2	3	4	5	Average
Textile Industry	0	5.95	6.14	0	0	5.97
Building Industry	5.45	6.33	4.92	6.5	6.3	5.75
Medical Industry	0	4.67	6.55	5.08	6.01	5.56
Electrical Industry	0	5.02	5.45	0	6.68	5.49
Food Industry	4.75	5.24	5.17	5.41	5.49	5.25
Plastic Industry	0	4.78	2.73	0	5.35	5.11
Furniture Industry	0	4.55	4.74	3.05	5.17	4.18
Structural Industry	0	0	3.95	0	0	3.95

Frequencies and percentages of some variables are also done as follows:

	Yes	No
Is there an information system	75.40%	24.60%

	Yes	No
Do you use computer outside work	51.40%	48.60%

#### Education Level

less than HS	1.40%
HS	10.60%
Diploma	15.50%
BS	61.30%
MS & PHD	11.30%

### 5. Study Implications

Three managerial applications could be based on this completed research:

- 1- The cost of the information system in manufacturing organizations should be considered from the time of preparing the feasibility study, due to its importance in the organizations.
- 2- The summary of the study will be given to the participating organizations, informing them about the overall information systems service quality in addition to their own ones.
- 3- The business of information systems could take the initiative and offer the manufacturing organizations their programs, hardware and services as well.

## **6. Study Limitations**

The limitation of this study can be considered in the definition of training and the organization size. The training variable was found to be a subjective variable, as was mentioned in the study, due to variance in programs and requirements. These are results of different resources and different information system size and complexity.

In addition, the organization size was determined by asking about the total investment. The total investment was difficult to obtain precisely because that data is considered confidential. Therefore, the investment was obtained through categories that contain ranges of values and the respondents had to select one of them.

## **7. Conclusions & Recommendations**

In conclusion, the service quality is one way of judging the merits of the information systems in any organization. The level of information system service quality of manufacturing organizations in Riyadh has been found affected by the total investment of the organization, training and its caring efforts.

It is recommended that this study should be expanded horizontally to include all manufacturing organizations in Saudi Arabia. In addition, another study could be conducted to find the effect of more factors like the organizations' sales. Finally, a vertical study can be done to establish a relation between the information system service quality and productivity, efficiency and profitability.

## **8. Future Research**

The work done in this research can be extended in the following directions:

- Expand the study horizontally to cover the manufacturing organizations all over Saudi Arabia.
- The study could be extended to include more factors that may effect the level of information service quality, like the sales value.
- A study could go one step further and establish a relation between the level of information system service quality and productivity, efficiency and profitability.

## References

- Adhikari, R.** (1994) "Planning, Testing, Teamwork A Recipe for Quality Apps", *Software Magazine*, **14**(3): 41-52.
- Badri, M.A., Abdulla, M. and Al-Madani, A.** (2005) "Information technology center service quality: Assessment and application of SERVQUAL", *The International Journal of Quality & Reliability Management*, Bradford, **22**(8/9): 819, 30.
- Carrillat, F.A., Jaramillo, F. and Mulki, J.P.** (2007) "The validity of the SERVQUAL and SERVPERF scales; A meta-analytic view of 17 years of research across five continents", *International Journal of Service Industry Management*, Bradford, **18**(5): 472.
- Cronin, J. and Taylor, S.** (1992) "Measuring Service Quality: A Reexamination and Extension", *Journal of Marketing*, **56**: 55-68.
- Davis, B. et al.** (1999) "Measuring and Managing Service Quality" *Marketing Intelligence & Planning*, **17**(1): 33-40.
- Dyke, T. and Kappelman, L.** (1997) "Measuring Information Systems Service Quality: Concerns on the Use of the SERVQUAL Questionnaire", *MIS Quarterly*, **21**(2): 195-208.
- Jiang, J.J., Klein, G. and Carr, C.L.** (2002) "Measuring Information System Service Quality: SERVQUAL From The Other Side", *MIS Quarterly*. Minneapolis: Jun, **26**(2): 145, 22.
- Kettinger, W. and Lee, C.** (1995) "Perceived Service Quality and User Satisfaction with Information Service Function", *Decision Science*, **25**(5/6): 737-766.
- Landrum, H., Prybutok, V.R. and Zhang, X.** (2007) "A Comparison of Magal's service quality instrument with SERVPERF", *Information & Management*, Amsterdam: Jan, **44**(1): 104.
- Lewis, B.** (1999) "Defining the Value of IS to a Business Process is Tricky, But it's Worth a Try", *Inforworld*, **21**(17): 89.
- Llosa, S. et al.** (1998) "An Empirical Study of SERVQUAL's Dimensionality", *The Service Industries Journal*, **18**(2): 16-44.
- Mazurin, O.** (1998) "Glass Information System Offers Productivity Gains for Developing New Materials and Markets", *Ceramic Industry*, **148**(3): 12-15.
- Parasuraman, A. and Berry, L.** (1991) "Refinement and Reassessment of the SERVQUAL Scale", *Journal of Retailing*, **67**(4): 420-450.
- Parasuraman, A., Zeithaml, V., Berry, A. and Leonard, L.** (1994) "Alternative Scales for Measuring Service Quality: A Comparative Assessment Based on Psychometric and Diagnostic Criteria", *Journal of Retailing*, Greenwich, **70**(3): 201-231.
- Pitt, L.F., Watson, R.T. and Kavan, C.B.** (1995) "Service Quality: A Measure of Information Systems Effectiveness", *MIS Quarterly*, **19**(2): 173-187.
- Pitt, L.F., Richard, T.W. and Kavan, C.B.** (1997) "Measuring Information Systems Service Quality: Concerns for a Complete Canvas", *MIS Quarterly*, **21**(2): 209-221.
- Shash, A. and Al-Amir, M.** (1997) "Information Technology in Contractors' Firms in Saudi Arabia", *Construction Management and Economics*, **15**(2): 187-200.
- Watson, R.T., Leyland, P.F. and Kavan, C.B.** (1998) "Measuring Information Systems Service Quality: Lessons From two Longitudinal Case Studies", *MIS Quarterly*, Minneapolis, Mar, **22**(1): 61-80.

## قياس جودة خدمات نظم المعلومات في المنظمات الصناعية بمدينة الرياض

سليمان عبدالله الحضيف

أستاذ مشارك - كلية إدارة الأعمال

جامعة الملك سعود - الرياض - المملكة العربية السعودية

المستخلص. يهدف هذا البحث إلى قياس جودة خدمات نظم المعلومات في المنشآت الصناعية في مدينة الرياض من قبل موظفي تلك المنشآت. وبناء على استعراض الأدبيات في هذا المجال تم إقترح إطار نظري تم من خلاله استخدام أحد النماذج المعروفة لقياس مفهوم الجودة.

وقد بنيت نتائج هذه الدراسة على بيانات أولية تم جمعها من ١٤٢ موظفا يعملون في ٥٨ مصنعاً تم من خلالها فحص أهم العوامل التي تؤثر على المفهوم الإدراكي للجودة. وتشير الدراسة إلى أن هناك علاقة بين حجم المنشأة الصناعية (مقاساً بحجم الاستثمارات) ومستوى جودة الخدمات. كما تشير الدراسة أيضاً إلى أن المنشآت الصناعية التي لديها وحدات خاصة بنظم المعلومات تتفوق على المنشآت التي تعتمد على الجهود الشخصية في تقديم تلك الخدمات. ولقد أوضحت الدراسة أن المستوى العام لجودة الخدمات جيد كما يراه الموظفون في تلك المنشآت، ولكن هناك انخفاضاً في هذا المستوى عند الحديث عن البعد المادي. وهذا يعني أن هذا الانخفاض ناتج عن عدم التحديث المستمر للمكونات المادية والبرمجيات لتلك النظم إضافة إلى عدم الاهتمام الكافي في المظهر والشكل العام لهذه الوحدات وموظفيها. وأخيراً تؤكد الدراسة على ضرورة تحسين جودة خدمات نظم المعلومات في المنشآت الصناعية إذا كانت ترغب في استخدام هذه الخدمات كميزة تنافسية.