울산대학교 경영학 연구논문집 제4권 2호 pp 171~189, 1997
Journal of Management Vol 4, No 2, pp 171~189, 1997
University of Ulsan

A Study on Total Quality Management for Information Systems Management[1)]

Myun Joong Cheon
Professor of Management Information Systems School of Business Administration

<Abstract>

In recent years, there has been an interesting amount of attention paid to total quality management (TQM) for information systems management (ISM). In spite of a number of articles describing the experiences of individual companies in other countries, little is known in Korea. This paper attempts to provide a benchmark of current TQM practice for ISM in Korea. A detailed exploratory analysis of survey responses from 142 Korean companies indicates the awareness, usage, length of experience, and the extent of top management support for TQM for ISM The study also provides information on the realized benefits from TQM and the implemented TQM concepts/tools and tests their relationships. In addition, this study also tests the relationship between the extent of top management support and the realized benefits from TQM for ISM

정보시스템관리를 위한 종합적 품질경영에 관한 연구

천면중
경영학부 경영정보학 전공

<요 약>

최근 정보시스템 관리를 위한 종합적 품질경영(TQM)에 많은 관심을 가져오고 있다 외국 기업들의 적용 실태에 관한 논문들은 많은 반면에, 한국 기업들에 관한 것은 거의 없는

1) 이 논문은 1996년도 대학학술연구비 일반과제 지원에 의하여 연구되었음

실정이다 따라서, 본 논문은 한국 기업에서의 정보시스템관리를 위한 종합적 품질 경영의 적용 실태를 파악하고자 한다. 142개의 기업을 대상으로, 종합적 품질 경영에 대한 인식도, 적용하는 기업의 수, 적용기간 등을 파악하며, 기업에서 적용하고 있는 종합적 품질경영의 개념/도구와 그것들의 이점의 정도를 조사하고 또한 그들 사이의 관계를 알아보며, 최고 경영층의 지원의 정도와 종합적 품질경영의 이점과의 관계도 아울러 알아본다

INTRODUCTION

During the past decade, quality improvement has become one of the most important organizational strategies for providing better products/services and maintaining competitive advantage Improving the quality with which an organization can deliver its products and services is critical for competing in an expanding global market. Subsequently, total quality management (TQM) has emerged as the new paradigm for the management of product and service quality in organizations (Ayers, 1993; Juran, 1993; Kendrix, 1993: Schonberger, 1992) . In recent years there has been an increasing amount of attention paid to TQM for information systems management (ISM) in organizations Quality-centered organizations are quick to emphasize the important role that information systems (IS) have had in the TQM process TQM for ISM provides a comprehensive and integrated approach by which an organization can offer better products and services and achieve competitive advantage (Jones, 1988, Keith, Jr , 1994, Rivard and Kaiser, 1989, Pitman, 1992)

Organizations that have had success with TQM have found that newly and accurate information Employees must be able to communicate across organizational levels, functions, product lines, and locations to solve interdepartmental problems and to manage the changes mandated by a TQM implementation effectively (Brownstone, 1990, Jones, 1988, Zadrozny and Ferrazzi, 1992) Because of this increased demand for information within the quality-based organization, information systems (IS) professionals should expect a greater focus on the quality and value of services provided by the IS function The transformation of information systems to those that can support TQM can be achieved only by IS managers who (1) understand the concepts, tools, and techniques upon which TQM is based (i.e , top management leadership, benchmarking, employee empowerment, etc), (2) realize that TQM is a necessary operational strategy for future competitiveness, and (3) recognize the TQM opportunities in his/her own function and organization (Premkumar and King, 1994, Pitman, 1992).

However, many organizations have not recognized the important role that IS must have in quality improvement programs such as TQM (Mathieson and Wharton, 1993, Rowe and Neal, 1993) Laplante (1992) has suggested four specific reasons why the IS function has not assumed a leadership role in the quality initiative of many

organizations: (1) few IS functions actually know their customers, (2) quality techniques or measures have not yet been adapted to the IS function, (3) IS tends to focus on individual performance and craft versus group efforts and functional processes; and (4) IS is still perceived as being more concerned with technology than overall business efficiency

Studies from several countries (e.g., US and Europe) have added to our understanding of TQM for ISM. However, TQM for ISM by Korean companies is very limited Given a lack of research on TQM for ISM in Korea, the purpose of this study is to explore the TQM for ISM phenomenon in a general manner. Specially, the study explores the general descriptions of TQM for ISM in Korea, the top management support for TQM for ISM, the TQM concepts and tools implemented, the perceived benefits of TQM for ISM, and whether these benefits are related to top management support as well as TQM concepts/tools implemented.

GENERAL BACKGROUND ON TQM CONCEPTS/TOOLS

Four components frequently cited as critical to a successful TQM strategy are customer satisfaction, employee involvement, managerial leadership, and process improvement and control Marketing theory has long recognized the importance of customer satisfaction to the business organization. Quality-focused organizations must identify their customers (both internal and external), determine the specific needs of these customers, integrate all activities of the organization (including marketing, production, finance, human resource management and information systems) to satisfy the needs of these customers, and finally, follow up to ensure the customers have been satisfied (Crosby, 1979, Feigenbaum, 1991; LaBarbara and Mazursky, 1983, Tenner and DeToro, 1992)

TQM incorporates a progressive perspective of the use of employees. Employee involvement through self-managed teams, quality improvement teams, management teams, and executive steering committees allow organizations to benefit from the knowledge and skills that individuals bring to the organizational work place. Empowered employees at all levels are charged to review and change their work processes in an effort to improve the overall quality of the finished product and service (Shrednick, Shutt, and Weiss, 1992).

Managerial leadership requires all levels of management to shift their roles from authoritarian decision-maker to coaching facilitator Gitlow and Gitlow (1994) suggest that the traditional hierarchical pyramid structure of the organization will be replaced by the inverted pyramid, in which top and lower-level managers support the front line employees in delivering quality products and/or services to the customer.

Process improvement and control is the continuous improvement of all processes

critical to organizational quality Empowered employees are responsible for monitoring the state of control within their processes Once a process is in statistical control, then employees, with encouragement and coaching from managers, develop and implement process improvement to reduce the variation of the process continuously, thus improving the quality of the product or service

The successful implementation of these TQM components potentially provides many significant benefits (i.e, increased market share, decreased customer complaints, decreased products defects, increased on-time delivery rates) to the organization and the IS function. Additional benefits frequently achieved include improved customer satisfaction, enhanced quality of products and services, lower maintenance costs, greater productivity, reduced application development time, increased flexibility in meeting customer demands, better utilization of human resources, and better management control. Schonberger (1992) has suggested that TQM should be a critical component of strategic planning and the integration of TQM into the strategic plan can lead to organizational growth, competitive advantage, and increased profitability

Based on the general background of TQM, the specific objectives of this study is to explore the following areas of TQM for ISM in Korean companies

(1) the awareness, usage, and length of experience of TQM for ISM,

(2) the extent of top management support for TQM for ISM

(3) the extent of benefits realized by TQM,

(4) the extent of TQM concepts/tools implemented,

(5) the relationship between TQM benefits and top management support for TQM,

(6) the relationship between TQM benefits realized and TQM concepts/tools implemented

METHODOLOGY

Data Collection

The data for the study were gathered via a mail survey questionnaire The questionnaire for the study was partially adopted from a similar US-based study (Pearson, McCahon & Hightoewer, 1995) and modified suitable to Korean companies Survey methods provide probability sampling, standardized measurement, and information available from no other sources (Fowler, 1988) and is an appropriate form for this stage of research in TQM for ISM.

The questionnaire items are written in the form of statements to which respondents rate strongly disagree or strongly agree according to a 7-point Likert-type scale in the case of both the perceived benefits from TQM and the implemented TQM concepts/tools. Likert-type summated rating scales have advantages of economy, less

administration time, ability to obtain maximum information when all items are answered, and applicability of statistical analyses (Kerlinger, 1986)

The survey questionnaire was mailed to the 500 largest Korean companies with respect to their total sales. The second following-up questionnaire was mailed to those who had not responded about three weeks later. The third following-up questionnaire was mailed to those who had not responded about six weeks later. The questionnaire was addressed to the top manager in charge of IS department Despite follow-up efforts, 15 questionnaires were undeliverable because of bad addresses. 142 usable responses were received representing a response rate of 29%. As shown in Table 1, non-response bias was checked by comparing the answers provided by the first responding individuals with the answers provided by the second and the third respondents (Fowler, 1988). Analysis indicated no statistically significant differences at the level of 0.05 among these three groups with respect to their total sales and number of employees, thus indicating non-response bias was not a problem in this research This lack of non-response bias implies that the results from the study sample can be generalized to the larger population

Table 1 The Result of F-Tests for Non-Response Bias

Variables	F-value	p-value
Total sales	0.65	0.5263
Number of Employees	2.19	0.1164
IS Budgets	1.03	0.3589
Number of IS Employees	1.69	0.1886

Responding Sample Characteristics

The industry representation of respondent companies, as shown Table 2, indicates that a large proportion of these companies are manufacturers (38%) or involve in banking and insurance (21%). Further, the responding companies represent a wide variance in size, with 40 of 131 companies having an annual sales of 650 billion won or above, and 12 having sales below 200 billion won Also, 30 of 137 companies have 3500 or more employees, and 19 have fewer than 500.

Table 2 General Profile of the Responding Companies

Characteristics		Frequency		Percent	
Industry Type	Manufacturing	54	142	38 0	100
	Finance/Insurance	31		21 8	
	Retail/Wholesale	15		10 6	
	Construction	18		12.7	
	Transportation/Warehousing	4		2 8	
	Technology/Service	8		5.6	
	Other	8		5 6	
	Unanswered	4		2 8	
Total Sales (100 million won)	Less than 500	2	142	1 4	100
	500 to below 2000	10		7 0	
	2000 to below 3500	44		31 0	
	3500 to below 5000	19		13 4	
	5000 to below 6500	16		11 3	
	6500 to below 8000	5		3 5	
	8000 and above	35		24 6	
	Unanswered	11		7 7	
Number Total Employees	Less than 500	19	142	13 4	100
	500 to below 1500	50		35.2	
	1500 to below 2500	38		26 8	
	2500 to below 3500	9		6 3	
	3500 to below 4500	6		4 2	
	4500 to below 5500	4		2 8	
	5500 and above	11		7.7	
	Unanswered	5		3 5	

The IS departments in these companies, as shown Table 3, exhibit similar variance 41 of 126 companies have an IS budgets of 1 billion won or less, and 21 have 10 billion won or above Also, 27 of 133 companies have 45 or more IS employees, and 39 of 142 companies have fewer than 15

Table 3 IS Department Profile of Responding Companies

Characteristics		Frequency		Percent	
IS Budget (10 million won)	Less than 50	23	142	16.2	100
	50 to below 200	48		33.8	
	200 to below 350	18		12.7	
	350 to below 500	4		2.8	
	500 to below 650	8		5.6	
	650 to below 800	2		1.4	
	800 and above	23		16.2	
	Unanswered	16		11.3	
Number of IS Employees	Less than 5	2	142	1.4	100
	5 to below 15	37		26.1	
	15 to below 25	30		21.1	
	25 to below 35	22		15.5	
	35 to below 45	15		10.6	
	45 to below 55	7		4.9	
	55 and above	20		14.1	
	Unanswered	9		6.3	

RELIABILITY AND VALIDITY ANALYSES

Reliability

Reliability is the degree to which an instrument measures the same way each time it is used under the same conditions with the same subjects. That is, reliability refers to the accuracy (consistency and stability) of measurement by the instrument (Isaac and Michael, 1981) or repeatability of an assessment over a variety of conditions (Nunnally, 1978).

Variables with composite measures were evaluated for their internal consistency through the Cronbach's Alpha measure. The higher the Cronbach's Alpha value, the greater is the internal consistency of the items making up a composite measure. Nunnally (1978) suggests that a value of 0.6 or higher is acceptable. The Alpha's for the variables with composite measures ranged from 0.92 to 0.93. These scores are shown in Table 4.

Table 4 Reliability Analysis for Composite Measures

Construct measured	Number of Items	Cronbach alpha
TQM benefits	9	0.923404
TQM concepts/tools implemented	12	0.929153

Validity

A construct is a mental or conceptual variable. Because a construct is conceptual, it is necessary to create an empirical definition of that construct, one which can be measured and recorded, before conducting research. Construct validity is the degree to which the empirical definition of a construct corresponds with a conceptual definition of the construct (Churchill, 1979; Kerlinger, 1986). It consists of two major validity concepts: convergent validity and discriminant validity.

Convergent validity is the degree to which multiple attempts to measure the same concept are in agreement (Campbell and Fiske, 1959). In this research convergent validity is evaluated by measuring the correlation of each item representing the construct with the aggregate measure for that construct less the focal item (Ives, Olson and Baroudi, 1983; Kerlinger, 1986). This approach assumes the total score to be valid; thus the extent to which the item correlations with the total score is indicative of construct validity for the item. Table 5 shows the inter-item correlations within each of research variables. All of the correlations are positive and significant at the 0.001 level.

Table 5 Inter-Item Correlations

Construct measured	Deleted Items	Correlation with Total
TQM benefits	Lower maintenance in developed applications	0.810521
	Better IS management control	0.742794
	Enhanced quality of services delivered	0.729513
	Improved customer satisfaction	0.781311
	Greater productivity of IS personnel	0.740414
	Reduced product development time	0.540189
	Enhanced quality of products delivered	0.801953
	Better utilization of human resources	0.750719
	Increased flexibility in meeting customer demands	0.693102
TQM concepts/tools	Top management leadership	0.538686
	Customer-focused IS development	0.630184
	IS supplier quality management	0.592606
	IS design quality management	0.622917
	Benchmarking	0.719314
	Statistical process control usage	0.678316
	Internal IS quality information usage	0.707545
	IS employee empowerment	0.876941
	IS employee involvement	0.849375
	IS employee training	0.760553
	IS product quality performance	0.750072
	IS supplier performance	0.692846

Discriminant validity is the degree to which a construct differs from other constructs and is usually verified through factor analysis (Kerlinger, 1986) Factor analyses for discriminant validity were performed with respect to each construct of this research. The cut-off for the number of factors is the widely accepted criteria of an eigenvalue of one. In each case, discriminant validity is confirmed if items for each variable load onto a single factor The significance of item loadings is chosen as at least 0.50 (Hair, Anderson, Tatham, and Grablowsky, 1984). Items which have loadings of less than 0.50 on any factor or loadings of more than 0.50 on more than one factor are dropped from

subsequent measures of the construct Nine items are used to measure TQM benefits Factor analysis with varimax rotation reveals only one factor as shown in Table 6

Table 6 Factor Analysis of TQM Benefits

Factor	Items	Loadings
TQM benefits	Lower maintenance in developed applications	0 86322
	Better IS management control	0.80277
	Enhanced quality of services delivered	0 79939
	Improved customer satisfaction	0.83931
	Greater productivity of IS personnel	0 79752
	Reduced product development time	0 61403
	Enhanced quality of products delivered	0 85431
	Better utilization of human resources	0 81122
	Increased flexibility in meeting customer demands	0 75902

Twelve items are used to measure TQM concepts/tools implemented Factor analysis with varimax rotation provides three factors (IS personnel management, TQM tools, leadership and IS quality management) as shown in Table 7, even though we expected a single factor. Two items (customer-focused IS development and internal IS quality information usage) are dropped from subsequent measures of the construct, since they have loadings of more than 0 50 on more than one factor

Table 7 Factor Analysis of TQM Concepts/Tools Implemented

Factors	Items	Loadings
IS personnel management	IS product quality performance	0 87444
	IS employee involvement	0 77772
	IS supplier performance	0 77260
	IS employee training	0 74812
	IS employee empowerment	0 65692
TQM tools	Statistical process control usage	0 78307
	IS supplier quality management	0 75786
	Benchmarking	0 73736
Leadership and IS quality management	Top management leadership	0 88035
	IS design quality management	0 57922

RESULTS AND DISCUSSION

IS Manager's TQM awareness

As indicated in Table 8, 86% of the Korean IS managers had heard of TQM Approximately one-half of these suggested they understood the philosophy and concepts associated with TQM a little or very little. Almost 75% believed that TQM could have a moderate or a little impact on the information systems management (ISM).

Table 8 IS Manager's TQM Awareness

Awareness		Frequency		Percent	
Heard of TQM	Yes	122	142	85.9	100
	No	20		14.1	
Understanding of TQM concepts/tools	Very much	3	142	2.1	100
	Much	17		12.0	
	Somewhat	52		36.6	
	A little	41		28.9	
	Very little	29		20.4	
Perception of TQM impact on ISM	Very much	19	142	13.4	100
	Much	63		44.4	
	Moderate	43		30.3	
	A little	6		4.2	
	Very little	3		2.1	
	Unanswered	8		5.6	

Usage of TQM for Information Systems Management

According to Table 9, of the 142 respondents received, only 36 (25%) noted that their companies use TQM for information systems management (ISM). Interest among nonusers of TQM for ISM is high 46 of 106 (43.3%) the nonusers indicated that the potential use of TQM for ISM was being considered at their companies

Table 9. Usage of TQM for ISM

TQM		Frequency		Percent
Users		36		25.4
Nonusers	Potential Users	46	106	32.4
	Potential Nonusers	50		35 2
	Unanswered	10		7 0
Total		142		100

Length of TQM Experience for ISM

As shown in Table 10, of the 36 TQM for ISM users, 15 (42%) have been implementing TQM for ISM for more than 1 year to less than three years 13 (36%) have been doing so for more than 3 years to less than 5 years Thus, the varied experience of these companies can provide insights for firms contemplating TQM for ISM as well as firms doing so already.

Table 10 Length of TQM Experience for ISM

Length (Year)	Frequency	Percent
Less than 1	6	16 7
1 to below 3	15	41 7
3 to below 5	13	36 1
5 and above	2	5 6
Total	36	100

Top Management Support for TQM for ISM

According to Table 11, of the 36 respondents received, 20 (56%) noted that their top management supports TQM for information systems management much or very much 16 (44%) noted that their TQM for ISM has been supported by top management somewhat or less

Table 11 Top Management Support for TQM for ISM

Top Management Support	Frequency	Percent
Very much	4	11.1
Much	16	44.4
Somewhat	13	36 1
A little	2	5 6
Very little	1	2 8
Total	36	100

TQM Benefits for Information Systems Management

Respondents were asked to rate, in the case of realized benefits of TQM for ISM, strongly disagree or strongly agree according to a 7-point Likert-type scale As shown in Table 12, those benefits rated most favorably were enhanced quality of services delivered, enhanced quality of products delivered, better IS management control, and greater productivity of IS personnel

Table 12 Benefit of TQM for ISM

Benefits Realized	Mean	Standard Deviation
Lower maintenance in developed applications	4 80000	1 41005
Better IS management control	5.31429	1 10537
Enhanced quality of services delivered	5 40000	1.11672
Improved customer satisfaction	5.20000	1 13241
Greater productivity of IS personnel	5.31429	1 07844
Reduced product development time	4 77143	1 23873
Enhanced quality of products delivered	5.40000	0 88118
Better utilization of human resources	5.17143	1 22440
Increased flexibility in meeting customer demands	5.17143	1 17538

TQM Concepts/Tools Implemented for Information Systems Management

Respondents were asked to rate, in the case of implemented TQM concepts/tools,

strongly disagree or strongly agree according to a 7-point Likert-type scale According to the data in Table 13, those implemented TQM concepts/tools rated most favorably were IS product quality performance, IS design quality management, and IS employee training. It is also interesting to note that from the data in Table 13 leadership and IS quality management was rated most favorably compared to other two factors (IS personnel management and TQM tools)

Table 13 TQM Concepts/Tools Implemented for ISM

Factors	TQM Concepts/Tools Implemented	Mean		Standard Deviation
IS personnel management	IS product quality performance	5 50000	4 95555	1 15882
	IS employee involvement	4.86111		1 29069
	IS supplier performance	4 72222		1 11127
	IS employee training	5 08333		1 33898
	IS employee empowerment	4 61111		1 20185
TQM tools	Statistical process control usage	4 47222	4.72222	1 23024
	IS supplier quality management	4.88889		0 97915
	Benchmarking	4 80556		1.28329
Leadership and IS quality management	Top management leadership	4 83333	5 04166	1 57661
	IS design quality management	5 25000		1 10518

Relationship of Top Management Support and TQM Benefits

or the relationship analysis the amount of top management support is subgrouped as two (high and low) classes High group indicates that the degree of top management support is much or very much. Low group indicates that the amount of top management support is somewhat or less As shown in Table 14, the relationship of top management support and TQM benefits indicates that there is a significant difference between high and low top management support Therefore, the result indicates that top management support is good determinant of an organization's TQM benefits

Table 14 T-Test of Degree of Top Management Support on TQM Benefits

Variable	Top Management Support	Mean	T-value	p-value
TQM Benefits	High (n=20)	5 5528	3 369	0.0019
	Low (n=16)	4 6528		

Relationship of TQM Concepts/Tools and TQM Benefits

According to Table 15 showing the relationship between TQM concepts/tools and TQM benefits, TQM benefits are significantly influenced by TQM concepts/tools As the focus is a test of the overall relationship, the key concern is whether the overall linear equation is significant (Dowy and Wearden, 1991; Green, 1978). Analysis of regression is performed to test the overall significance of the relationship

The general linear equation tested is as follows:
TQM benefits = f(IS personnel management, TQM tools, leadership and IS quality management).

As shown in Table 15, the overall equation is significant at the 0.05 level with an adjusted R square of 0.60.

Table 15 Analysis of Regression of TQM Concepts/Tools on TQM Benefits

Dependent Variable: BENEFITS

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	3	18.16994	6.05665	18.288	0.0001
Error	32	10.59780	0.33118		
C Total	35	28.76775			

Root MSE	0.57548	R-square	0.6316
Dep Mean	5.12278	Adj R-sq	0.5971
C.V.	11.16842		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|
INTERCEP	1	1.528869	0.52324492	2.922	0.0063
FACTOR1	1	0.493065	0.12887798	3.826	0.0006
FACTOR2	1	0.022519	0.13999950	0.161	0.8732
FACTOR3	1	0.213057	0.10541611	2.021	0.0517

Legend Factor1 - IS personnel management
Factor2 - TQM tools
Factor3 - Leadership and IS quality management

Although the overall relationship is significant, the further regression analysis is performed to identify the key exploratory variables among three factors, since one (TQM tools) of three factors is not significant. The process of identifying key variables serves two major purposes (1) obtaining a simpler relationship which may be subject to further testing with new sets of data; (2) enabling other researchers to build on this work by highlighting the most powerful exploratory variables The results of all possibile 6 regression analyses indicate that two factors (IS personnel management, leadership and IS quality management) are key influence on TQM benefits for information systems management, as shown in Table 16

Table 16. Best Result of Regression Analysis of TQM Concepts/Tools on TQM Benefits

Dependent Variable: BENEFITS

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	18 16137	9 08069	28 253	0 0001
Error	33	10 60637	0 32141		
C Total	35	28.76775			

Root MSE	0 56693	R-square	0 6313
Dep Mean	5 15278	Adj R-sq	0 6090
C V	11 00234		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0 Parameter=0	Pro > |T|
INTERCEP	1	1 554119	0 49171930	3 161	0 0034
FACTOR1	1	0 504125	0.10738223	4 695	0 0001
FACTOR3	1	0 218269	0 09881949	2 209	0 0342

Legend Factor1 = IS personnel management
Factor3 = Leadership and IS quality management

SUMMARY AND RECOMMENDATIONS

The results of this survey indicate that 86% of the Korean top IS managers had heard of total quality management (TQM) and about 75% believed that TQM could have a moderate or much impact on the information systems management (ISM)

However, only 14% suggested that they understood the philosophy and concepts/tools associated with TQM much or very much. Therefore, it is recommended that the Korean top IS managers need an opportunity of learning TQM concepts/tools through TQM seminars or related education.

The study also indicates that only 25% of respondents have implemented TQM for ISM However, interests among nonusers of TQM for ISM is very high. Approximately 43% of the nonusers noted that the potential implementation of TQM for ISM was being considered at their companies Many of the companies implementing TQM for ISM have been doing so for either one to three years or three to five years and have support from their top management for TQM for ISM.

IS managers reported their realized benefits from TQM for ISM. Those benefits rated most favorably are enhanced quality of IS services delivered, enhanced quality of IS products delivered, better IS management control, and greater productivity of IS personnel. IS managers also reported their implemented TQM concepts/tools. Those concepts/tools rated most favorably are IS product quality improvement, IS design quality management, and IS employee training.

The results of this study also indicated that there is a relationship between realized benefits from TQM for ISM and the extent of top management support. The higher top management provides the better TQM benefits. Therefore, top management support is a good determinant of an organization's success from TQM for ISM. The study further indicated that there is a relationship between realized benefits from TQM for ISM and the implemented TQM concepts/tools. IS personnel management factor (i.e., IS employee involvement, IS employee training, IS employee empowerment) and leadership and IS quality management factor (i.e., top management leadership, IS design quality management) are good determinants of the Korean companies' success from TQM for ISM. These results have implications for TQM users. These important factors may be critical success factors from TQM for ISM. Furthermore, what determines success from TQM for ISM is the implementation of TQM philosophy/concepts rather than TQM tools.

REFERENCES

Ashmore, G.M, "Better Information Means Better Quality", The Journal of Business Strategy, January/February 1992, 57-60

Ayers, J.B., "Total Quality Management and Information Technology: Partners for Profit", Information Strategy: The Executive's Journal, Spring 1993, 26-31.

Brownstone, R., "Is TQM Enough?", The Journal of Quality and Participation, July/August 1990, 34-36.

Campbell, D.T. & Fiske, D.F., "Convergent and Discriminant Validation by the

Multitrait Multimethod Matrix", Psychological Bulletin, 56, 1959, 81-105
Churchill, G.A, "A Paradigm for Developing Better Measures of Marketing Constructs", Journal of Marketing, 16(1), 1979, 64-73.
Crosby, P.B, Quality Is Free, New York, NY McGraw-Hill, Inc, 1979.
Feigenbaum, A.V, Total Quality Control, New York, NY: McGraw-Hill, Inc, 1991
Feigenbaum, D S, "Return to control", Quality Progress, 1976, 9(5), 18-21
Fisher, T J, "The Impact of Quality Management on Productivity", International Journal of Quality and Reliability Management, Vol 9, 1992, 44-52
Fowler, F J, Survey Research Methods, Beverly Hills. Sage Publications, 1988
Garvin, D A., "Quality on the line", Harvard Business Review, 1983, 61(5), 65-75
Gitlow, H S & Gitlow, S J, Total Quality Management in Action, Englewood Cliffs, NJ Prentice Hall, 1994.
Gitlow, H S & Hertz, P T, "Product defects and productivity", Harvard Business Review, 1983, 61(5), 131-141
Hair, J, Anderson, R, Tatham, R, & Grablowsky, B, Mutivariate Data Analysis with Readings, Tulsa, OK Petroleum Publishing Company, 1979
Hostage, G M, "Quality control in service business", Harvard Business Review, 1975, 53(4), 98-104
Isaac, S. & Michael, W, Handbook in Research and Evaluation (2nd ed.), San Diego, CA EdITS Publishers, 1981
Ives, B, Olson, M, & Baroudi, J, "The Measurement of User Information Satisfaction", Communication of the ACM, 26(10), 1981, 785-793
Jones, L H, "Information Systems, Organizational Change and Quality Improvement Programs", National Productivity Review, Spring 1988, 165-168.
Juran, J.M, "Made in the U S A A Renaissance in Quality", Harvard Business Review, July-August 1993, 42-50
Keith, Jr, R.B, "MIS + TQM = QIS", Quality Progress, April 1994, 29-31.
Kendrix, J.J, "Total Quality Management Ups Revenue, Productivity, Study Shows", Quality, December 1993, 17.
Kerlinger, F N, Foundations of Behavioral Research, Fort Worth Holt, Rinehart and Winston, Inc, 1986.
LaBarbara, P A & Mazursky, D., "A Longitudinal Assessment of Customer Satisfaction/ Dissatisfaction The Dynamic Aspect of the Cognitive Process", Journal of Marketing Research, November 1983, 393-404
Laplante, A, "For I/S, Quality is Job None", Computerworld, January 6, 1992, 56
Mathieson, K & Wharton, T J, "Are Information Systems a Barrier to Total Quality Management", Journal of Systems Management, September 1993, 34-38
Nunnally, J.C, Psychometric Theory, New York McGraw-Hill, 1978
Reddy, J & Berger, A, "Three essentials of product quality", Harvard Business Review, 1983, 61(4), 153-159
Rivard, E & Kaiser, K, "The Benefit of Quality IS", Datamation, Jan 15, 1989, 53-58

Rowe, J.M. & Neal, R D, "TQM in System Development A Paradigm Without A Sound Foundation", Journal of Systems Management, May 1993, 12-16

Pearson, J.M., McCahon, C S., & Hightower, R.T., "Total Quality Management Are information systems managers ready?", Information & Management, 29, 1995, 252-263.

Pitman, B, "Total Quality Management For Information Services", Journal of Systems Management, July 1992, 18.

Schonberger, R.J., "Total Quality Management Cuts a Broad Swath Through Management and Beyond", Organizational Dynamics, Spring 1992, 16-27

Shrednick, H R., Shutt, R.J., & Weiss, M., "Empowerment Key to IS World-Class Quality", MIS Quarterly, December 1992, 491-505.

Takeuchi, H. & Quelch, J.A., "Quality is more than making a good product", Harvard Business Review, 1983, 61(4), 139-145

Tenner, A.R., & DeToro, I J., Total Quality Management' Three Steps to Continuous Improvement, Addison Wesley, 1992.

Zadrozny, M A & Ferrazzi, K.E., "Building a Technology Base for TQM", Chief Information Officer Journal, Fall 1992, 18-21.