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DEVELOPMENT AND VALIDATION OF TQM CONSTRUCTS
The Philippine Experience

*Ma. Gloria V. Talavera**

This study was conducted to determine the critical components of a Total Quality Management program (referred to as TQM constructs) and the specific strategies, policies and programs that should comprise each TQM construct (referred to as TQM elements); and to validate these TQM constructs in selected companies in the Philippines. Development of the TQM constructs involved the theoretical derivation of the TQM constructs from literature. Validation of the TQM constructs involved a two-stage survey determining the critical components perceived important by managers and assessing the extent by which these critical TQM program components are adopted. Assessment of the instrument's reliability was done through the Internal Consistency Method with Cronbach coefficient alpha as the relevant coefficient while content and construct validity were done through panel review and Exploratory Factor Analyses, respectively.

Results of the first survey indicate a slight deviation in what is perceived as critical components of a quality management system vis-a-vis the original 72 TQM elements. In general, the elements pertaining to a TQM construct as theoretically derived no longer formed part of such construct but merged with other elements in another TQM construct where it shared similarity in functions. This implies that under Philippine context, especially when using perception of importance as the basis for scale development, the integration of activities, strategies and functions associated with TQM program adoption is perceived by respondent managers as more critical. The study presented the multi-functional and multi-dimensional aspects of the TQM constructs. The resulting 35 critical TQM items were further validated in Survey 2. The TQM factors pertaining to the adoption of quantitative techniques in quality management as well as the incentive and reward system were rated lowest in terms of adoption.

Keywords: construct development; construct validation; integrated quality management system; reliability; TQM constructs; TQM elements, validity

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Introduction

The world of manufacturing has changed dramatically over the past 20 years. The challenge for firms to become and to remain competitive had never been more pronounced. Bases for competition no longer just focus on cost, but on other key success factors such as quality, flexibility, delivery, service and innovation. Along this line, the Japanese introduced a competitive strategy in the early 1980s that involved producing high quality products at a lower cost (Ishikawa 1985). This emphasis on quality has become more prevalent due to the perceived and quantifiable value derived from managing quality that usually translates its impact on the firm's business performance. One of the contributing factors in the success of the Japanese in their competitive strategy is the adoption of Total Quality Control (TQC), which later on has been referred to as Total Quality Management (TQM). Powell (1995) cited the role of TQM in leading Japan to global economic power as well as in restoring the industrial competitiveness of the United States.

However, as a field of discipline, there exists no single, standard definition of what constitutes a TQM Program. It is referred to as an approach, a system, a tool, a technique, and / or a philosophy aimed at achieving a certain quality target. The teachings of TQM are, to a large extent, associated with the teachings gurus associated with the quality movement like Taylor, Shewhart, Deming, and Juran (Juran 1988). And since the teachings of TQM had been founded on various disciplines like scientific management principles, statistics and the behavioral school of thought of management, various strategies are arbitrarily referred to as components of TQM. For example, the adoption of quality circles, or the utilization of statistical quality control, or the advocacy of a zero defect policy, or the combination of all could indicate that TQM is present in the company. There seems to be no complete and comprehensive list that could indicate that indeed a company is implementing TQM, the real and complete TQM program.

This lack of a coherent and comprehensive definition of TQM, in effect, indicates the lack of a specific and explicit theory supporting the adoption of TQM. The absence of this explicit theory on TQM is probably the reason business practitioners seem to have some difficulty in comprehending its power and usefulness in meeting targeted quality and business performance. There is also a perception in the business community that TQM is not intellectually substantial (Grant et al. 1994). While there may be various case studies on the successes and failures of TQM adoption mostly in US manufacturing companies, very limited studies have been conducted to truly probe and scrutinize the real meaning and scope of the term "Total Quality Management" (Ahire et al. 1995). Most of the TQM literature had been oriented towards case studies and empirical work on TQM implementation. Limited efforts had been done to truly develop conceptual framework of the Total Quality Management theory. As such, it is sometimes looked at just as a fad and not a strategic decision area for the company.

Literature Review

The review of related literature, however, indicates that there had been efforts to generate and put together the critical components that should a TQM program (otherwise referred to as "TQM Con-

structs"). The first major research attempt on TQM construct development aimed to systematically organize and synthesize various TQM prescriptions and to propose measures of organizational quality management for critical elements of TQM (Saraph et al. 1989). Their studies showed that most of the research work on TQM focused on case studies with limited emphasis on a systematic attempt to put together the prescriptions in these case studies on how to implement TQM effectively. As a response to this finding, the authors synthesized the quality literature; identified eight factors of quality management; and developed operational measures for these factors, which will then be used in the assessment of the status of a quality management program.

Ahire et al. (1996) also noted that most of the researches conducted in the field of Quality Management have dealt with conceptual, practitioner-oriented, case types of studies with very limited studies done to balance both the conceptual and empirical sides of it. They developed and validated ten TQM constructs to include "Customer Focus" and "Benchmarking" which were note included in the study by Saraph, et al. (1989). Their study also analyzed the impact of the prescribed quality management strategies on the "Product Quality" of selected manufacturing firms in the US.

This lack of a single model that will serve as a basis for the TQM theory was also mentioned in another TQM research done in a European setting (Black and Porter, 1996). They noted the lack of scientifically derived industry standards for making diagnostic assessments of TQM programs. They developed and validated nine critical factors of TQM. But despite these various prescriptions, still there seems to be no single, coherent, and definitive theory on Total Quality Management that synthesize these prescriptions making it appear that TQM is nothing but a fad, a philosophy, short of being considered a field of discipline.

Two studies made an attempt to identify the factors comprising TQM. The study of Powell (1995) examined the role of TQM as a strategic resource and its potential as a source of competitive advantage for firms. He identified twelve TQM factors. Two constructs which were not found explicitly in the studies of Saraph, et. al. (1989) and Ahire et al. (1996) are "Open Organization" and "Zero Defects Mentality," which both reflect the corporate culture which needs to be present for an effective implementation of TQM. The study of Flynn et al. (1995), on the other hand, is one study that empirically investigated the relationship of specific quality management practices to quality performance. It also proposed an integrated, interfunctional quality management system to achieve and sustain competitive advantage. The authors proposed eight components of an integrated quality management system.

Powell (1995) noted the institution of the Malcolm Baldrige Quality Award (MBNQA) in 1987 by the U.S. Department of Commerce as a mechanism to reward TQM initiatives. Similar efforts have also been done in Europe with the emergence of the European Quality Award (EQA). In the Philippines, the Philippine Quality Award Foundation (PQA) has also been instituted. These award-giving bodies have their own criteria to determine the presence of a quality management system in a company.

Ishikawa (1989) noted that the differences in the quality management systems of the US, Western Europe, and the Japanese were related to the differences in their

Table 1. **A Comparative Listing of Total Quality Management Constructs as Derived from Literature, Quality Management Frameworks, and Japanese Teachings**

Previous Works on TQM Construct Development					Quality Management Awards Frameworks*			
Sarah et al. (1989)	**Powell (1995)**	**Flynn et al. (1996)**	**Ahire et al. (1996)**	**Black & Porter (1996)**	**MBNQA**	**EQA**	**PQA**	**TQM Constructs**
Role of Management Leadership	Executive Commitment	Top Management Support	Top Management Commitment	Corporate Quality Culture	Leadership	Leadership	Leadership	*Top Management Commitment*
Quality Policy	Adopting the Philosophy		Strategic Quality Management					
Quality Policy	Adopting the Philosophy			Stratregic Quality Management	Strategic Planning	Policy and Strategy	Strategic Planning	*Strategic Quality Planning*
Training	Training		Employee Training					*Employee Education and Training*
Product/Service Design	Flexible Manufacturing	Product Design Process	Design Quality Management	External Interface Management				*Product/Service Design*
Supplier Quality Management (Supplier of Goods and/or Services)	Closer Supplier Relationships	Supplier Relationship	Supplier Quality Management	Supplier Parnerships				*Supplier Quality Management*
Process Management/ Operating Procedures	Process Improvement	Process Flow Management	SPC Usage		Process Management	Process	Process Management	*Process Management and Control*

*) Taken from the websites of MBNQA, EQA, and PQA (1999)

Continued from Table 1. **A Comparative Listing of Total Quality Management Constructs as Derived from Literature, Quality Management Frameworks, and Japanese Teachings**

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Quality Data and Reporting	Measurement	Statistial Control/ Feedback	Internal Quality Information Usage	Quality Improvement Measurement Systems Communication of Improvement Information	Measurement, Analysis, and Knowledge Management	Resources	Information and Analysis	*Quality Information Managemenrt*
Employee Relations	Adoption and Communication of TQM	Workforce Management	Employee Involvement	Teamwork Structures	Human Resource Focus	People (Employee) Management People (Employee) Satisfaction	Human Resource Focus	*Employee Involvement*
	Open Organization Zero Defects Mentality	Work Attitudes						*Corporate Culture*

Continued from Table 1. **A Comparative Listing of Total Quality Management Constructs as Derived from Literature, Quality Management Frameworks, and Japanese Teachings**

Previous Works on TQM Construct Development					Quality Management Awards Frameworks			
Sarah et al. (1989)	**Powell (1995)**	**Flynn et al. (1996)**	**Ahire et al. (1996)**	**Black & Porter (1996)**	**MBNQA**	**EQA**	**PQA**	**TQM Constructs**
	Closer Customer Relationships	Customer Relationship	Customer Focus	Customer Satisfaction Orientation People and Customer Management	Customer and Market Focus	Customer Satisfaction	Customer and Market Focus	*Customer Focus*
	Benchmarking		Benchmarking					*Benchmarking*
	Employee Empowerment		Employee Empowerment					*Employee Empowerment*
								*Workplace Organization Orderliness***
								*Kaizen (Continuous Improvement Orientation)***

**) Shingo (1996), Ishikawa (1985)

culture, politics and company philosophy. The Japanese emphasize collective efforts in the pursuit of quality management and is geared towards kaizen (continuous improvement). Shingo (1986) also presented the importance of cleanliness and organization of tools and housekeeping principles as a TQM dimension.

A comparative description of the TQM constructs derived from these previous studies, the quality management program components in the MBNQA, EQA, and PQA frameworks, and the Japanese's Companywide Quality Control (CWQC) program is depicted in Table 1.

These previous works on TQM construct development utilized generally the same procedure in developing multi-item scale as prescribed by Churchill (1979) and Malhotra (1981), which consists of (1) a construct development through a thorough literature review; (2) development of the scale; and (3) refinement of the scale through the assessment of the reliability and validity of the instrument. However, they differed in terms of industry focus, sampling frame, and the methodologies to test for validity and reliability of the instrument. The studies cited also evaluated the validity by asking the respondents on the extent of practice of these TQM constructs. The studies were also found to focus on the assembly type of production system based in the US and North America, where the Malcolm Baldrige National Quality Award criteria framework is currently being recognized.

Based on this literature review, the study considered the following gaps in the development of the proposed TQM constructs: (1) the TQM constructs generated from the literature review were compared with the quality management frameworks such as the MBNQA, EQA, and PQA criteria to ensure that the TQM constructs more or less conform the quality management program components indicated in these awards; (2) important Japanese quality and productivity initiatives such as the 5S program (Workplace Organization and Orderliness) and Kaizen (Continuous Improvement Orientation) were likewise included considering the significant contribution of the Japanese in the quality movement; (3) the concepts of Employee Empowerment and Employee Education and Training were lumped together in the Human Resource Focus; and (4) the study also focused on the quality management techniques used in Product/Service Designing.

Previous studies cited evaluated the validity by asking the respondents on the "extent of practice" of these TQM constructs. This study utilized two different bases for scale development (1) perception of importance, (2) extent of practice. It should also be noted that no other study has ever been done concerning Asian or Asian-based manufacturing firms.

Methods

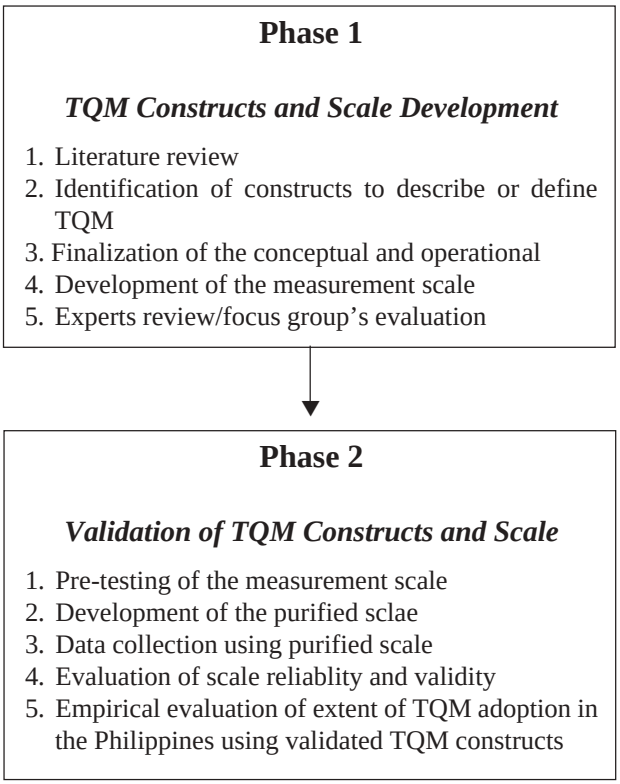
Research Phases

The study consists of two phases: (1) Part 1—TQM Constructs and Scale Development, and (2) Part 2—Validation of TQM Constructs and Scale (refer to Figure 1).

Phase 1—TQM Constructs and Scale Development

This part involved the conduct of a literature review to determine the extent of work done on defining the term "TQM." The programs and strategies which are associated with TQM implementation had been referred to as the "TQM constructs." This part was conducted to ensure that the

Figure 1. **Research Phases**



definition of each quality management variable is brought down to its operational level so that respondents would have the same level of understanding of such a variable.

The instrument generated from this part was then subjected to an "Experts Review" to determine the face or content validity of the instrument. The content validity specifies the degree to which the scale items represent the domain or universe of the concept under investigation. Specifically, this panel review was done to determine the comprehensiveness as well as the relevance of the identified constructs under Philippine setting. The members of the Review Team included the President of the Philippine Quality Awards Foundation, the President of the Quality Circles Practitioners' Association, members from the Academe and selected MBA students. After gathering the experts' opinions and comments, the instrument was then revised accordingly and was then subjected to empirical testing. The final output of this phase was the development of the twelve constructs of TQM (which could be considered as the "Comprehensive Components of a TQM Program").

PART 2—Empirical Validation of the TQM Constructs

The study involved two major stages of refinement. Survey 1 was conducted to

determine the perception of respondent managers belonging to several manufacturing companies as to the critical strategies that should define a particular TQM construct. Reliability and validity tests using "perception of importance" were then done to validate these developed constructs and scales. The validated TQM constructs from Survey 1 were then subjected to a second round of survey to determine the extent to which these validated TQM constructs components are implemented in selected Philippine companies.

Sampling Design

There were two sets of sampling designs for the study. Respondent firms were predominantly manufacturing companies belonging to the following industries such as semiconductor/electronics, food processing, toiletry, automotive, pharmaceutical, cement, among others. Survey 1 involved 63 firms consisting of 347 managers while the second survey was participated by 64 manufacturing companies representing 323 managers. Coordination was done with the following associations: (1) the Philippine Quality Awards Foundation, (2) Quality Circle Practitioners' Association, (3) UP Manufacturing Linkage Program, (4) Personnel Management Association of the Philippines, and the Philippine Society for Quality for the participation of their member firms and the distribution and retrieval of questionnaires from the respondent managers. The details of the sampling design, particularly the sampling frame and techniques used are shown in Table 2.

The Measures

The TQM constructs identified in the literature review (refer back to Table 1) had been defined conceptually and their definitions had been brought down into their operational level through descriptions of the quality management strategies associated with them. These were referred to as "TQM Elements." Six elements that would describe each construct had been listed, after which the list was subjected to an Experts' Review to determine which among these items accurately and completely depict the construct being described.

Each firm was given five sets of a questionnaire consisting of 72 questions. Respondent managers come from selected departments, namely, HRD, Quality, Marketing, Manufacturing, and other departments such as Finance, Purchasing, Inventory Control, etc. Each respondent was made to rate 6 statements for a particular component of quality management in terms of the level of criticality of such strategy with respect to the component being described.

A 5-point Likert Scale was utilized for Survey 1 with 5 = the strategy is a very critical aspect of the component being described, and 1 = the strategy is not a critical aspect of that component. The respondents were made to rank as well each item in terms of order of importance. The Survey 2 instrument also involved a 5-point Likert Scale but this time was dealing with the extent of implementation of the validated TQM constructs from Survey 1 with 5= the strategy is implemented to a large extent, 4=implemented to a

Table 2. **Sampling Design**

Phase of Data Collection	Specific Activities	Target Population	Sampling Frame	Targeted Sample Size	Sampling Technique	Actual No. of Respondent Firms
1	Expert's Review for Content Validity	TQM experts from academe and industry	Philippine Quality AwardsFoundation, UP College ofBusiness Administration, Quality Circle Practitioners' Association (QCPA)	10 experts	Purposive sampling	10
2	Survey 1-to determine scale reability and validity using perception of importance as basis)	*Element-5* managers from different departments *Sampling unit*-Manufacturing plants *Extent*-Firms belonging to various industries *Time*-Firm is operational for a period of not less than three years	QCPA Personnel Management Association of the Philippines (PMAP) Philippine Society for Quality (PSQ)	60 firms	Complete enumeration for selection of firms Random sampling for choice of respondent manager	63 firms 347 managers
3	Survey 2-to further test validity of instrument using extent of practices as basis	Same as Survey 1		60 firms	Complete enumeration for selection of firms Random sampling for choice of respondent manager	64 firms 323 managers

moderate extent, 3=implemented to limited extent, 2=plan to implement, 1=no plan of implementation.

Data Analysis

Measurement for reliability was conducted to determine whether the measurement scale that had been developed would have consistent results if measurements if done on a repeated basis. This needs to be established to ensure the consistency and stability of a score from a measurement scale. The study used the Internal Consistency Method in determining the instrument's reliability with the Cronbach Coefficient Alpha as the relevant coefficient to evaluate. Measurement for validity, on the other hand, is important to determine the extent to which the developed instrument measures what it was designed to measure (Emory and Cooper 1993). Content Validity was evaluated through the Experts' Review while the Construct Validity of the instrument was determined by conducting Exploratory Factor Analysis (through Common Factor Analysis) using SAS software.

Results

Profile of Respondent Firms

A total of 63 manufacturing firms consisting of 347 managers participated in Survey 1 while another 64 companies composed of 324 managers joined the second survey. The managers belonged to various departments such as — Production, Marketing, HRD, Quality, Materials Management, and others. Eighty percent of the participating firms from Survey 1 joined as well in the second survey. The breakdown of firms by categories is presented in Table 3.

In terms of industry category, 24 percent of respondents for Survey 1 represented the food processing industry; followed by the semiconductor industry (19 percent), automotive and parts industry (14 percent), and 44 percent by other industries such as switch gear, primary cells, insulated wires, fluorescent lamp, toiletry products, ceramics, glass, chemicals, pharmaceuticals, packaging, tire and TV and radio receivers. On the other hand, the semiconductor and electronics industry comprised the bulk (26.56 percent) of respondents for the second survey; followed by the food and processing industry (18.75 percent), and the other industries.

Firm size was measured in terms of the number of employees and the company's total assets. Majority of the respondents have employees less than 500, at 53.97 percent for Survey 1 and 60.32 percent for Survey 2. About 20 percent of the respondents for both surveys have employee size above 2000. In terms of the company's total assets, approximately 53 percent of the participating firms have total assets beyond P 1 billion and are thus considered large-scale companies, while 20 percent have asset size ranging from *P* 500 million to *P* 1 billion (considered medium-scale companies), and the remaining 27 percent have assets below *P* 500 million (referred to as small-scale companies).

The bulk (41 percent) of the participating companies for both surveys is owned 100 percent by Filipinos while 31 percent are joint venture firms with foreign companies. The balance consists of multinational corporations. Local firms have joint ventures basically with American, Japanese, Korean and Swiss firms. Only 35 percent sell 100 percent locally and majority have export sales.

Table 3. **Respondent Firms By Category (Surveys 1 and 2)**

	Survey 1		Survey 2	
Classification	**No. of Firms**	**% to Total**	**No. of Firms**	**% to Total**
Industry Category*				
Food Processing	15	23.8	12	18.8
Switch Gear, Primary Cells, Lamps	7	11.1	3	4.7
Semicon, Electronics	12	19.0	17	26.5
Automotive / Parts	9	14.3	9	14.1
Others	20	31.8	23	35.9
Employee Size				
< 500	34	54.0	38	60.3
500 -1,000	11	17.5	13	20.6
1,000 - 1,500	5	7.9	3	4.8
1,500 - 2,000	1	1.6	2	3.2
> 2,000	12	19.0	7	11.1
Asset Size (Total Assets as of 1997), In Million Pesos				
< 500	17	27.0	19	29.7
500 - 1,000	13	20.6	12	18.8
1,000 - 2,000	6	9.5	8	12.5
2,000 - 3,000	11	17.5	10	15.6
> 3,000	16	25.4	15	23.4
Ownership Structure				
100% Locally - Owned	26	41.3	6	40.6
80 - 99% Local	3	4.7	3	4.7
60 - 79% Local	10	15.9	7	10.9
40 - 59% Local	1	1.6	1	1.6
1 - 19% Local	6	9.5	8	12.5
100% Foreign - Owned	17	27.0	19	29.7
Export Orientation				
100% Local Sales	22	34.9	22	34.4
80 - 99% Local"	22	34.2	18	28.2
60 - 79% Local	1	1.6	4	6.2
20 - 39% Local	3	4.8	3	4.7
1 - 19% Local	5	7.9	4	6.2
100% Export Sales	10	15.9	13	20.3
Production System				
Job Shop	1	1.6	1	1.6
Batch Production	14	22.2	11	17.2
Operator-Based Assembly Line	5	7.9	3	4.7
Equipment-Based Assembly Line	9	14.3	8	12.5
Flexible Manufacturing System	4	6.3	11	17.2
Continuous Flow	10	15.9	9	14.1
Combination (Assembly Line and FMS)	20	31.8	21	32.8

Continoued from Table 3

Classification	Survey 1		Survey 2	
	No. of Firms	% to Total	No. of Firms	% to Total
Level of Technology				
Manual Operations	1	1.6	0	-
Mechanized Operations	10	15.9	7	10.9
Partially Automated Operations	35	55.6	45	70.3
Fully Automated Operations	4	6.3	4	6.2
Combination (Partial Automation and Batch Production)	13	20.6	8	12.5

* The percent representation of the sub-industries to the total number of firms in their respective industries are as follows a) Food Processing (10%), b) Switch Gear, Primary Cells , Lamps (5%), c) Semicon/Electronics/Electrical (20%), d) Automotive and Automotive Parts (10%), and e) Other industries —each sub-industry accounting for about 5 perecent of the total population of their sub-industry.

Considering that the companies have come from various industries, it was expected that they would exhibit different technology levels. A significant portion of the respondents for both surveys have a combination of assembly line system and flexible manufacturing system (FMS) (32 percent); while about 70 percent to 75 percent of the respondent firms utilize equipment and computer-based production systems indicating the high technology orientation of the respondent firms. The number of firms using pure FMS increased from 4 in Survey 1 to 11 in the second Survey. Most of the firms exhibiting this came from the Semiconductor and Electronics industries. Despite this high technology level of respondent firms, labor is still largely utilized in their operations as shown by the large percentage of firms engaging in partially automated operations (56 percent in Survey 1 and 70 percent in Survey 2).

The TQM Constructs

The proposed TQM constructs are shown in Table 4. Appendix 1 presents the complete listing of the 72 items associated with these constructs.

Survey 1 results show that majority of the elements included in the 72-item instrument were generally perceived important by 347 managers from 63 companies. Results indicate that, in general, respondents consider most critical those components related to shop-floor quality control and those that utilized techniques in generating information and monitoring quality. While the literature emphasized the need for top management support, customer orientation, and employee empowerment to support TQM success, results indicate that still managers in Philippine manufacturing companies have positioned them in the latter part in terms of level of criticality.

The TQM elements rated not critical belong to the following TQM constructs —Supplier Quality Management, Customer Orientation, Human Resources Management and Benchmarking. Investment in up-to-date technology as the way to build in quality into the process was rated not as critical as the other items

Table 4. **Description of each TQM Construct**

TQM Construct	Code	Description
Top Management Commitment	TMC	Extent by which an organization's top management commits time and resources in the planning and design of quality systems and in the continuous implementation of its quality management programs
Strategic Quality Planning	SQP	Refers to the planning process in the company which prioritizes quality and integrates quality planning into the overall strategic planning process of the company
Customer Orientation	CO	Recognizes that quality management efforts must be geared mainly towards the satisfaction of the firm's internal and external customers
Supplier Quality Management	SQM	Extent of involvement of the firms' suppliers in designing and planning for quality since suppliers play critical role in the whole supply chain where the firm belongs to
Human Resource Management	HRM	Various changes related to human resource management policies which need to be in place in the course of implementing TQM such as the use of a team approach through quality circles; changes in the organizational structure; changes in the reward and performance system; and changes in the overall corporate culture in the company; The concepts of worker empowerment (degree of authority and decision making powers given to workers), employee involvement (extent of employee participation in the firm's family efforts) and corporate culture (changes in the company's value and belief system) have been subsumed under this construct.
Employee Education & Training	EET	Training and education on certain techniques and new management philosophies, employees need to be educated and trained on key topics such as teambuilding, empowerment, problem solving, and utilization of statistical and quantitative techniques in planning, designing and monitoring quality
Product / Service Design	PSD	Company's efforts to include quality considerations and market information as early as the product development phase and to involve key departments (marketing, manufacturing, engineering) in product / service designing; extent by which a firm utilizes quantitative techniques in product / service designing
Workplace Organization and Orderliness	WOO	Adoption of the Orderliness and Organization principles being espoused in the 5S program as advocated and promoted by the Japanese
Process Management and Control	PMC	Extent by which quality is built into the process and to which processes are monitored to ensure the production of defect-free products. It also describes the extent of the firm's utilization of quantitative / statistical techniques in monitoring and improving quality

Continued from Table 4

TQM Construct	Code	Description
Quality Information Management	QIM	Presence of a quality performance monitoring and measurement system and the utilization by management of the information derived from the system in improving quality strategies
Benchmarking	BM	Extent to which a firm conducts benchmarking activities with the best practices in the world to ensure that its products/services meets international quality standards; the company's adherence to international quality standards through certification to ISO 9000 and their recognition by quality award giving bodies have been included in this construct
Continuous Improvement	CIO	Refers to the firm's efforts to provide long-term support to its quality management and productivity improvement programs as well as to product/service innovation initiatives

under Process Management and Control. Apparently, majority of the respondents think that an effective quality management system is dependent more on the quality of the firm's labor force. As far as Benchmarking is concerned, it was noted that while it is good to be awarded for one's excellent performance, it is not the reason why firms would adopt a particular quality management system. And while TQM espouses continuous improvement, survey indicated that majority of the respondents perceived the provision of incentives to employees for their quality improvement suggestions not as critical as the provision of financial or technical resources to quality management programs.

Training and education on the need to value internal and external customers as well as the advantages of having strong supplier partnerships are found important. Results also indicated that despite all the trainings and efforts to introduce employee empowerment in the workplace, still the respondent managers perceive that providing the workers with actual authority is not a critical aspect of the human resource management component of a quality management system.

Validation of the TQM Constructs

In terms of instrument reliability, results indicate that overall the 72-item instrument reflected a Cronbach coefficient alpha of 97 percent, with each of the 12 constructs similarly registering high values. The survey instrument was found to have a high reliability indicating that the item scores are consistent from a measurement scale. Using the final communality estimates (FCEs) and the standard deviations and correlation matrix as bases, three SAS runs were done to determine the validity of the instrument. The output of these SAS runs subjected to a thorough analysis as to the relevance of the factors generated and to the congruence of the items that loaded in a particular factor to theory.

Using the latent root criterion, seven factors (consisting of 35 items) were found to be significant (Table 5). These factors

Table 5. **Validated TQM Construct (Using Perception of Importance)**

No.	Eigen value	Pct . of Var.	Items	Description	Item Loading	Remarks
1	13.08	52.07	PDS 1	Primary consideration of quality in product design	.579	- PDS constructs generally validated
			PDS 4	Getting feedback from technical experts	.559	- New Factor Name: *Stakeholders+ Feedback in Designing for Quality*
			PDS 2	Inclusion of customer feedback	.488	
			PDS 3	Multi-functional review of product / service design	.471	
			BM 6	Ensuring benchmarking activities result to improvement	.359	
2	1.99	7.92	CO3	Program to implement customer service	.527	- Merged Customer Focus and TMC constructs as top management commitment is critical in achieving customer orientation - New Factor Name: *Customer Focus: A Strategic Concern*
			TMC 2	Top management involvement in planning quality	.401	
			EET 6	Integration of training lessons to work processes	.378	
			CO 1	Inclusion of customer feedback	.359	
			CO 2	Techniques to determine customer satisfaction	.348	
			TMC 4	Provision of technical support by TM	.341	
3	1.57	6.25	WOO 1	System on item segregation	.567	- WOO construct validated
			WOO 2	Signboards and labels	.497	- Factor Name: *Employment of 5S and Kaizen*
			WOO 3	Records management system	.477	
			WOO 4	Cleanliness	.386	
			CIO 2	Programs on waste elimination	.376	
4	1.35	5.37	PMC 6	Adoption of Repair and Preventive maintenance	.527	- Multi-item construct depicting monitoring and control - Factor Name: *Quality Monitoring and Control*
			WOO 5	Employee compliance to regulations	.431	
			CIO 6	Periodic quality audits	.407	
			SQP 5	Review of departmental targets	.387	
			SQM 1	Quality as primary consideration in supplier selection	.376	

Continued from Table 5

No.	Eigen value	Pct . of Var.	Items	Description	Item Loading	Remarks
5	1.35	4.58	PMC 5	Utilization of Quantitative techniques in process	.543	- Deals on training and provision of quantitative tools and techniques on quality management - Factor Name: *QM Technique Orientation*
			PDS 6	Utilization of Quantitative techniques in product design	.510	
			EET 4	Training on problem solving techniques	.497	
			EET 2	Training on quality control	.417	
6	1.15	4.46	SQP 6	Organization of regular meetings	.521	- A multi-item construct depicting involvement of rank and file, managers, and top management in QM strategy formulation and implementation - Factor Name: *Employee Involvement*
			TMC 5	Encouragement of employees	.382	
			SQP 2	Clarity and formality in goals	.373	
			TMC 6	TM involvement in planning and implementing QM programs	.369	
			HRM 1	Presence of multi-functional teams	.328	
			HRM 2	Presence of quality circles	.300	
7	1.12	4.02	BM 3	Application for ISO 9000 certification	.552	- Refers to provision of incentives, assistance and recognition to QM system; Merged some items under Benchmarking and CIO constructs - Factor Name: *Incentive and Recognition System*
			BM 4	Co. application for recognition	.514	
			CIO 5	Incentives to employees	.506	
			BM 5	Involvement in QM association	.347	

Measures of Sampling Adequacy= 0.893
Eigenvalues of Reduced Correlation Matrix = 25.12
Cumulative Percentage of Variation = 84.67

altogether account for 85 percent of the total percentage variation. Thus, from the original 72 items, only about 50 percent have been retained to constitute those components of a quality management system perceived critical by Philippine manufacturing managers. It can be seen that, in general, the theoretical constructs were validated but noted significant re-grouping in elements indicating multi-elemental and multi-functional aspect of quality management constructs. The difference of groupings with American and European constructs can be explained by the difference in the instrument used, which in this case used percentage of importance as the measurement scale as compared to extent of practice.

While deviations were observed in grouping, the resulting constructs were found to be conceptually meaningful, realistic and in fact present a more comprehensive view of the TQM constructs. The resulting groupings present the multi-dimensional and multi-faceted aspect of TQM adoption. These deviations may be explained by multiindustry grouping of the sample and the multi-functional implementation of these constructs. On the other hand, the low item loadings due to high correlation among constructs may also be due to the social behavior orientation of the variables under study. The instrument, as a whole, has been found to have high content validity as shown in results of Experts Review as well as acceptable construct validity due to the congruence in terms of factors that were derived. Majority (7 out of 12 constructs) were retained after the factor analysis. A clustering of similar items had been observed to constitute the new set of Quality Management constructs that are considered critical by 347 managers belonging to Philippine manufacturing.

In general, therefore, the validated TQM constructs did not invalidate the literature but in fact presented a realistic and comprehensive view of looking at these components of a quality management system. The tests on the measure of sampling adequacy for the whole instrument and even for each construct were found favourable. The other significant findings from the factor analysis conducted include the following: (1) Top Management Commitment was not identified as a separate quality management construct, as it is the important requirement to make these constructs work (the items referring specifically to TQM was not considered critical), and (2) the conduct of inspections to monitor quality was not considered critical due to the fact that employee empowerment is considered to be the more critical component when implementing an effective quality management system. Supplier quality management did not emerge as well as a separate construct as well as investment in high technology were not considered critical by respondents

Extent of Adoption of Validated TQM Constructs

The extent of adoption of these 35 validated items was then conducted. Table 6 shows that majority of the TQM items are implemented to a large extent by the respondent Philippine companies.

Of the seven factors generated from the factor analysis, the factors pertaining to the adoption of quantitative techniques in quality management and the incentive and reward system were rated lowest in terms of extent of practice. This is a very important finding about TQM adoption. The adoption of quality circles had always been the easiest and fastest way to launch a TQM program because this is the mecha-

Table 6. **Extent of Adoption of Validated TQM Constructs***

Factor	New Factor Name	Items Included	Description	Extent of Adoption per Item	Extent of Adoption of Factor*** (%)
1	Getting Feedback in Designing QM Strategies	PDS 1	Primary consideration of quality in product design	4.38	
		PDS 4	Getting feedback from technical experts	4.10	
		PDS 2	Inclusion of customer feedback	4.33	83.20
		PDS 3	Multi-functional review of product / service design	3.96 **	
		BM 6	Ensuring benchmarking activities result to improvement	4.03	
2	Customer Focus (A strategic concern)	CO3	Program to implement customer service	4.02	
		TMC 2	Top management involvement in planning quality	4.39	
		EET 6	Integration of training lessons to work processes	4.04	84.07
		CO 1	Inclusion of customer feedback	4.65	
		CO 2	Techniques to determine customer satisfaction	3.87 **	
		TMC 4	Provision of financial support by top management	4.25	
3	Employment of 5S and Kaizen	WOO 1	System on item segregation	4.17	
		WOO 2	Signboards and labels	4.29	
		WOO 3	Records management system	4.25	84.44
		WOO 4	Cleanliness	4.16	
		CIO 2	Programs on waste elimination	4.24	
4	Quality Monitoring and Control	PMC 6	Adoption of Repair and Preventive maintenance	4.31	
		WOO 5	Employee compliance to regulations	4.23	
		CIO 6	Periodic quality audits	4.28	84.56
		SQP 5	Review of departmental targets	4.14	
		SQM 1	Quality as primary consideration in supplier selection	4.18	

*Continued from Table 6**

Factor	New Factor Name	Items Included	Description	Extent of Adoption per Item	Extent of Adoption of Factor*** (%)
5	QM Technique Orientation	PMC 5	Utilization of Quantitative techniques in process	4.26	
		PDS 6	Utilization of Quantitative techniques in product design	2.84 **	
		EET 4	Training on problem solving techniques	4.15	75.75
		EET 2	Training on quality control	3.90	
6	Employee Involvement	SQP 6	Organization of regular meetings	4.18	
		TMC 5	Encouragement of employees	4.09	
		SQP 2	Clarity and formality in goals	4.59	
		TMC 6	TM involvement in planning and implementing QM programs	4.24	84.27
		HRM 1	Presence of multi-functional teams	4.21	
		HRM 2	Presence of quality circles	3.97 **	
7	Incentive & Recognition System	BM 3	Application for ISO 9000 certification	4.24	
		BM 4	Company application for recognition	3.78 **	
		CIO 5	Incentives to employees	3.43 **	77.45
		BM 5	Involvement in quality management association	4.04	

* Survey 2 utilized the 35 — item generated from Survey 1 and involved different set of company respondents.

** The following TQM elements were rated the lowest in terms of extent of practice.

*** Σ of item score / total maximum score per factor x 100%

nism by which the employees can be trained to work as a team. However, this needs to be backed up with a good reward and incentive system especially if their productivity outputs are now done as a group. Maybe the limited incentive given to employees for their quality improvement suggestions is one of the reasons why employees are not motivated to join quality circles.

However, there should be a balance between the behavioral orientation as well as technique orientation. While respondent firms rated quantitative technique orientation as critical, the survey on extent of practice showed that this is the lowest rated factor, especially the use of quantitative techniques in product designing. The TQM program, under Philippine context, had been used primarily as a human resource management tool to encourage and motivate employees to work as a team. The study, however, indicates the need for potential TQM adopters to train their employees on statistical process control and quantitative techniques to guide them in problem solving, troubleshooting and in process monitoring and control.

Conclusion

This study was conducted primarily to define, consolidate, and validate the major strategies, policies and programs associated with a TQM Program implementation. The development and validation of the critical components of TQM important (1) to synthesize the fragmented teachings on TQM for a better understanding of its implementation implications; (2) to establish its links with the various disciplines (Statistics, Organizational Theory and Strategic Management) from which TQM draws its teachings; and (3) to link the theoretical teachings and the prescriptions of quality management frameworks —the Malcolm Baldrige National Quality Award, European Quality Award, and Philippine Quality Award.

The empirical validation of these TQM constructs involved two-stage survey. Survey 1 was undertaken to get the perception of Philippine manufacturing managers as to the critical strategies that should comprise a particular TQM program component. The second survey, on the other hand, asked the respondent managers regarding the extent by which these validated TQM-related strategies and policies are being practised in Philippine manufacturing. The Philippine manufacturing industry was represented by the Semiconductor/ Electronic, Automotive, Food Processing, Switch Gear and Primary Lamps, Pharmaceutical, Packaging, Toiletries, and other industries.

Reliability tests show significantly high Cronbach coefficient alpha (90%) for the whole instrument and for each TQM construct indicating the high reliability of the instrument. The analysis of the construct validity using Common Factor Analysis (with perception of importance as basis for scale development) showed a slight deviation in terms of what was perceived as critical components of a quality management system vis-a-vis what had been theoretically defined or developed. However, a closer look on the resulting factors reflects a convergence of certain elements of a construct with another construct where it shares similarity in function. The resulting groupings were found to be relevant, conceptually meaningful and presented the multidimensional aspect of TQM implementation.

In general, the ratings in terms of perception of importance for the TQM constructs were higher than their corresponding scores for extent of practice. The factors pertaining to the adoption of quan-

titative techniques in quality management and the provision of an incentive and reward system were rated lowest in terms of adoption.

Recommendations

The validated TQM constructs consisting of seven factors (35 TQM elements) will provide Philippine manufacturing firms a list of the critical TQM program components that should be part of their quality management programs. The list may be used as a basis for self-evaluation to determine areas for improvement of their existing quality management programs and other productivity improvement initiatives.

The seven factors that were generated from the factor analyses present the critical TQM components that should be prioritized by companies that would like to adopt TQM. Potential TQM adopters need to ensure the presence of these seven factors in their quality management efforts. The critical TQM factors that were rated moderately high by the respondent firms are discussed below (refer back to Table 6).

1. Factor 1 emphasizes the importance of getting feedback of the customers, suppliers, technical experts and key stakeholders on quality as early as the product design stage.
2. Factor 2 presents that customer orientation should be a strategic concern and it should be fully supported by top management as the cornerstone of a TQM program.
3. Factor 3 highlights the need to make facilities clean and well maintained and all forms of wastes are eliminated.
4. Factor 4 presents the need for companies to regularly monitor and audit the organization's compliance to its quality management efforts involving employees, facilities, equipment and processes.
5. Factor 6 shows that employees, particularly those in management and at the shop floor should be involved in the planning, implementation and monitoring of a quality management program.

Factors 5 and 7 were rated low in terms of extent of practice. Potential TQM adopters need to train their employees on the quality management techniques (Factor 5), particularly on problem solving tools and Statistical Process Control. These techniques are useful in problem identification, integration of quality in products and processes, and in monitoring and improving processes. TQM adopters should also design an appropriate incentive and recognition system to reward employees accordingly both for their individual and group quality management efforts. It also highlights the need of firms to strive for continuous improvement so that they can later on be recognized for their company's quality management efforts through awards or ISO certifications.

Future researches on TQM Constructs Development should attempt to work on a single or few industry base to achieve higher internal validity of the instrument. An important construct that can be investigated is the concept of the Internal Customer, which in the study, was subsumed under Customer Orientation.

A larger respondent base needs to be targeted in the future to enable the conduct of more sophisticated statistical analyses. Respondents in future researches should include not only middle managers but representatives as well from the top management and the rank and file to capture the sentiment of the whole organization regarding the extent of TQM adoption in

their company and the extent to which their quality management system has affected their company's performance.

A longitudinal study may also be performed for selected manufacturing or service companies to really look into the stages involved in implementing TQM as well as the impact of TQM in affecting performance vis-a-vis the other company strategies being implemented in the selected companies.

Limitations of the Study

A total of 63 manufacturing companies composed of 347 managers joined Survey 1 while another 63 companies participated in the second survey represented by 323 managers. The respondent managers represent the Manufacturing, Marketing, Human Resources, Purchasing, Finance and Quality Departments.

Given the size of the variables to estimate (72 items), a sample size of 5 per item should have been the appropriate respondent base. However, due to time and budget constraints as well as the lack of response from the other targeted firms, only about 90 percent of the expected sample size had been achieved. The multiple industry mix of the respondent base improved the external validity of the instrument but sacrificed internal validity. And since only 80 percent of the respondent firms from Survey 1 joined the second survey, a direct comparison of the survey results for the two surveys for the same firm was not possible.

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Appendix 1. **TQM Program Elements**

No.	TQM Construct	Code	Specific Elements of Each TQM Construct
1	***Top Management Commitment***	TMC1	Relative importance given by top management to quality over cost when making business decisions
		TMC2	Top management involvement in planning quality management Program
		TMC3	Evaluation of top and middle management for firm's quality Performance
		TMC4	Provision of technical and financial support to quality improvement activities
		TMC5	Encouragement of employees to participate in quality management program
		TMC6	Top management involvement in implementation and follow-up of quality management program
2	***Strategic Quality Planning***	SQP1	Focus of short-term and long-term strategies on quality performance
		SQP2	Clarity and formality in the writing of quality goals
		SQP3	Prioritization of planning and designing for quality in corporate strategic planning agenda
		SQP4	Departmental preparation of quality targets and strategies
		SQP5	Review of departmental targets and goals for congruence to overall company plan
		SQP6	Organization of regular meetings and information campaigns to communicate quality goals
3	***Customer Orientation***	CO1	Inclusion of customer feedback in improving products / services / processes designs
		CO2	Conduct of specific techniques to determine measure external customer satisfaction
		CO3	Presence of a program to improve customer service
		CO4	Implementation of programs to protect customer rights
		CO5	Understanding customer needs through regular client meeting
		C06	Organization of training programs / information campaign to educate employees on valuing customer
4	***Supplie*r ***Quality Management***	SQM1	Quality as the primary consideration in supplier selection
		SQM2	Reliance to limited but dependable suppliers
		SQM3	Inclusion of supplier's feedback in improving product / service / process designs
		SQM4	Provision of training on quality management to suppliers
		SQM5	Provision of awards / incentives to suppliers for excellent performance
		SQM6	Implementation of a supplier evaluation, certification and accreditation program

Continued from Appendix 1. **TQM Program Elements**

No.	TQM Construct	Code	Specific Elements of Each TQM Construct
5	***Human Resources Management***	HRM1	Organization of multi-functional teams when developing programs to improve quality
		HRM2	Establishment of quality circles in the company to promote employee participation in quality management programs
		HRM3	Regular meetings between supervisors and labor to solicit quality improvement suggestions
		HRM4	Provision of authority to production line workers to inspect product quality; to pull out defective units; and to stop production line (if necessary)
		HRM5	Provision of authority to production line workers in correcting line problems with minimal supervision
		HRM6	Recognition of employees for achieving quality targets
6	***Employee Education and Training***	EET1	Provision of training on Total Quality Management concepts
		EET2	Provision of training on Quality Control
		EET3	Provision of training on Team Building / Group Dynamics
		EET4	Provision of training on problem solving techniques (fishbone diagrams, flowcharting)
		EET5	Regular conduct of training for rank and file and supervisors
		EET6	Integration of training lessons to work processes
7	***Integration of Quality to Product/ Design***	PDS1	Primary consideration of quality in product / service development phase
		PDS2	Inclusion of customers' requirements and suppliers' feedback in product / service development
		PDS3	Multi-functional team review of new product / service designs
		PDS4	Solicitation of feedback from technical experts, manufacturing and process engineers on manufacturability of product designs
		PDS5	Facilitation of product development cycle time for timely response to market needs
		PDS6	Utilization of quality designing techniques (e.g., Taguchi methods, quality function deployment, design for quality, design for manufacturability, etc.)
8	Workplace Organization and Orderlines	WOO1	Presence of a system for segregating needed items (inventory, machinery and equipment, documents, supplies, parts) from unneeded items
		WOO2	Presence of signboards and labels for easy location and identification of various departments, inventory, machinery and equipment
		WOO3	Presence of an effective records management system
		WOO4	Clean, hygienic and orderly facilities and surroundings
		WOO5	Regular monitoring and evaluation of employees' compliance with house-keeping rules and regulations
		WOO6	Employee discipline and initiative in practicing rules on orderliness

Continued from Appendix 1. **TQM Program Elements**

No.	TQM Construct	Code	Specific Elements of Each TQM Construct
9	Integration of Quality to Process and Control	PMC1	Investment in up-to-date machinery, equipment and technology to ensure quality is built into the process
		PMC2	Integration of defect prevention and correction systems into the production processes
		PMC3	Regular conduct of incoming, in-process, and final inspections for materials and products
		PMC4	Extensive utilization of Statistical Quality Control in monitoring product quality
		PMC5	Utilization of the following techniques (e.g., Pareto Analysis, Control Charts, Brainstorming, Cause and Effect Diagrams) in the diagnosis of quality and process problems
		PMC6	Adoption of regular and preventive maintenance
10	***Quality Information Management***	QIM1	Presence of database system to gather, control, and store data from key processes and sub-processes to produce relevant information needed to measure the results of its quality efforts
		QIM2	Measurement of achievement of quality targets from raw materials sourcing to final production stage
		QIM3	Timely production of update and complete quality performance data
		QIM4	Accessibility of quality performance data to all employees
		QIM5	Visibility of quality performance data and progress towards goals
		QIM6	Inclusion of quality performance data and indicators in the development of QM strategies
11	***Benchmarking***	BM1	Studying the business processes of the leading organizations in its industry to improve operations
		BM2	Studying the business processes of leading organizations in other industries to improve operations
		BM3	Application for ISO 9000 certification as adherence to international quality standards
		BM4	Company application for recognition for its excellent quality management system
		BM5	Involvement in a quality management association for better access to quality information and product / service innovations
		BM6	Ensuring that benchmarking activities result to significant improvement in performance
12	***Continous Improvement Orientation***	CIO1	Presence of on-going plans and programs to reduce production cycle time
		CIO2	Presence of on-going plans and programs to identify and eliminate all possible sources of wastes in the company's operations
		CIO3	Presence of on-going plans and programs to think of various ways to improve products / processes
		CIO4	Top management provision of technical, financial and educational assistance to quality management programs of the company
		CIO5	Provision of incentives to employees for their quality improvement suggestions
		CIO6	Conduct of periodic quality audits (internal and external) to monitor effectiveness of quality system