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TQM ADOPTION AND FIRM PERFORMANCE IN THE PHILIPPINES

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This study looked into the extent of adoption of Total Quality Management (TQM) in the Philippines. Using the Quality Management Input-Output system as the framework of analysis, the study also examined the relationship of TQM adoption on quality, business, and organizational performance of Philippine manufacturing companies. Sixty-four (64) manufacturing companies comprised the sample. Results show that TQM adoption works in a third world environment like the Philippines. TQM adoption was found to be highly associated with performance. Significant improvements in organizational performance were observed indicating the critical role of TQM in influencing human behavior. This study contributes to the body of knowledge on TQM, especially on how it can be a source of competitive advantage.

I. INTRODUCTION

Total Quality Management (TQM) is a business philosophy that emphasizes a systems approach to quality (Rao et al., 1996). TQM utilizes techniques that improve product quality and processes, thereby, helping a firm improve its competitive performance (Grant et al., 1994). TQM derived its teachings mainly from Statistics, Organizational Theory, Strategic Management, and Industrial Organization (Vinzant and Vinzant, 1996). It also draws from the principles promoted by notables such as Taylor, Deming, Shewhart, and Ishikawa. Hackman and Wageman (1995) summarized the strategies common among these personalities: (1) determination of customer requirements; (2) strategic alliances with suppliers; (3) use of cross-functional teams to identify and address quality problems; (4) use of scientific methods to monitor performance; and (5) use of process-management techniques to improve team effectiveness. TQM utilizes management techniques, productivity improvement initiatives, and various problem solving tools with the ultimate objective of achieving customer satisfaction all the time. TQM adoption also involves changing values, orientations, and mindset focusing on teamwork and cooperation. TQM adoption is expected to lead to productivity improvement, reduction in cost, and overall change in the way employees value their work and organization, thereby, resulting in significant improvements in performance.

Several studies have been written on TQM adoption. Some of those studies that looked into the development of TQM constructs and explored the relationship of TQM and performance included the studies of Saraph et al. (1989), Flynn et al. (1995); Powell (1995) and Ahire et al., 1996a). These studies focused on TQM adoption in the setting of developed economies. However, in the late 1990s up to the present, more researches have been conducted to determine the extent of adoption of TQM practices in other developing countries such as Korea (Yoo, 1998); Malaysia (Agus and Abdullah, 2000); China (Lee, 2004); and Singapore

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(Brah and Lim, 2006). The extent of TQM adoption in a third world country like the Philippines has never been fully explored. It would be interesting to find out if TQM can also work in a third world setting generally characterized by poverty, high birth rates, limited factors of production, and economic dependence on advanced nations. The study was conducted to answer the following research questions:

1. What is the extent of adoption of TQM practices by selected Philippine manufacturing companies?
2. Is there a difference in the extent of TQM adoption between manufacturing companies that have a formal TQM program and those that do not have a formal TQM program?
3. Is there a relationship between TQM adoption and performance (quality, business and organizational performance)?

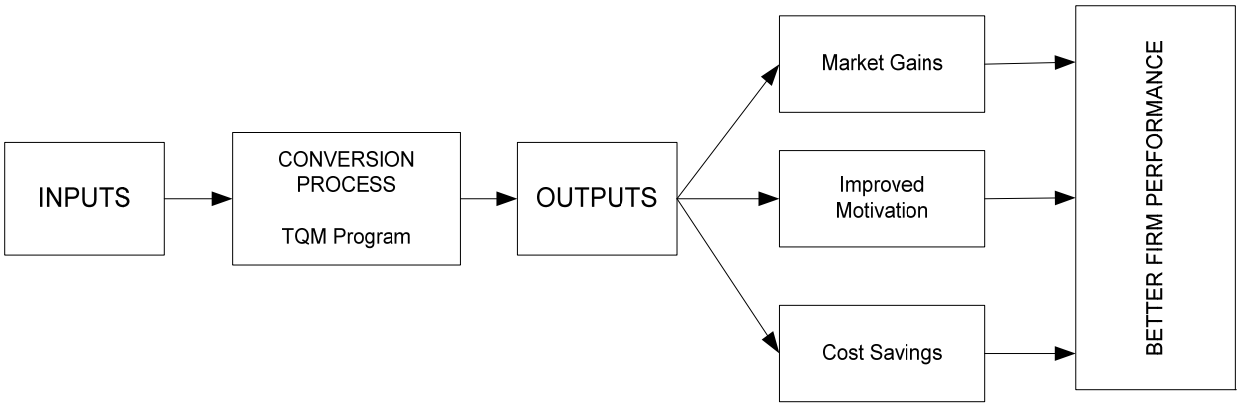
This study contributes to TQM literature by presenting empirical data on the TQM strategies that work in the Philippines and how TQM can be utilized to be a source of competitive advantage.

II. CONCEPTUAL FRAMEWORK

Quality Management Input-Output System

Figure 1 illustrates the framework used in the study on the relationship of TQM with performance. TQM serves as the core business strategy that will convert the set of inputs to achieve its expected outcomes in terms of performance level. The inputs include the materials, manpower, machinery, methods, and measurement system needed to implement a TQM program. The output or expected outcomes, on the other hand, is the improvement in firm performance, where performance is measured in terms of quality, business, and organizational performance.

Figure 1
Quality Management Input-Output System



The TQM program components used in the study include the following:

1. *Commitment to Quality* – It is important in implementing a TQM program to get the commitment to the program of top management and the company's key stakeholders.
2. *Employee Involvement* – The quality management efforts of the organization should be fully supported by the members of the organization, especially the rank and file employees and middle management. Top management should be involved in planning, designing, implementing and monitoring the program.
3. *Customer Focus* – The ultimate objective of TQM is to satisfy and delight the customers. It is important, therefore, to implement strategies to determine customer needs and requirements, to monitor their level of customer satisfaction, and to respond to their concerns.
4. *Fact-based Management* – Employees need to be educated on the use of quantitative and statistical techniques to monitor and improve the quality of products and processes.
5. *Process Monitoring and Control* - The effectiveness of the firm's process strategies and quality management program should be regularly monitored to ensure that targeted quality performance outcomes are met.
6. *Incentive and Recognition System* – Since quality management programs will promote teamwork and process-based approaches, appropriate incentives and recognition systems need to be designed to continuously motivate employees to support the program.
7. *Continuous Improvement* – The quest for quality should be continuing. Employees need to be encouraged to adopt productivity improvement programs.

The 35 TQM strategies associated with these seven TQM program components (Talavera, 2004) are shown in Table 1.

Table 1
Validated TQM Program Components

FACTOR	Factor Name	Description	Factor Loading	Scale Reliability (Cronbach Alpha)
1	Commitment to Quality	1. Primary consideration of quality in product design	.579	0.83
		2. Getting feedback from technical experts	.559	
		3. Inclusion of customer feedback	.488	
		4. Multi-functional review of product / service design	.471	
		5. Ensuring benchmarking activities result to improvement	.359	
2	Employee Involvement	1. Organization of regular meetings	.521	0.86
		2. Encouragement of employees	.382	
		3. Clarity and formality in goals	.373	
		4. Top management involvement in planning & implementing quality management programs	.369	
		5. Presence of multi-functional teams	.328	
		6. Presence of quality circles	.300	
3	Customer Focus	1. Program to implement customer service	.527	0.82
		2. Top management involvement in planning quality	.401	
		3. Integration of training lessons to work processes	.378	
		4. Inclusion of customer feedback	.359	
		5. Techniques to determine customer satisfaction	.348	
		6. Provision of financial support by top management	.341	
4	Fact-based Management	1. Utilization of quantitative techniques in process	.543	0.76
		2. Utilization of quantitative techniques in production design	.510	
		3. Training on problem-solving techniques	.497	
		4. Training on quality control	.417	
5	Process Monitoring and Control	1. Adoption of repair and preventive maintenance	.527	0.82
		2. Employee compliance to regulations	.431	
		3. Periodic quality audits	.407	
		4. Review of departmental targets	.387	
		5. Quality as primary consideration in supplier selection	.376	
6	Incentive & Recognition System	1. Application for ISO 9000 certification	.552	0.75
		2. Company application for recognition	.514	
		3. Incentives to employees	.506	
		4. Involvement in quality management association	.347	
7	Continuous Improvement Orientation	1. System on item segregation	.567	0.86
		2. Signboards and labels	.497	
		3. Records management system	.477	
		4. Cleanliness	.386	
		5. Programs on waste elimination	.376	

Source: Talavera, G. V. (2004), "TQM Constructs Development and Validation: The Philippine Experience," *Gadja Mada International Journal of Business*, 6(3), pp. 355 - 381.

Measures

Dependent Variable

TQM adoption was the dependent variable and was measured by computing the TQM adoption index. The average of five responses for each TQM program component shown in Table 1 represented company score. The total average scores for the 35 components served as the index.

Independent Variables

There were three firm performance categories considered as independent variables. These include quality, business and organizational performance indices. The quality performance index was computed by getting the average company score of seven (7) quality performance measures, namely, reduction in defects rate, rework, cost per product, customer complaints, cycle time, and delivery time. The respondent firms were also asked about their perception of their relative product quality vis-à-vis their main competitor. Business performance, on the other hand, was computed by getting the average company score of four (4) business performance measures, namely, improvement in market share, total sales and net profits; and reduction in total production costs.

The last performance category, the organizational performance index was computed by getting the average company score of 16 organizational performance measures. These measures include reduction in absenteeism rate, tardiness rate, employee turnover, and occurrence of accidents; and improvement in the following: skills level of employees, suggestion system, teamwork and cooperation among employees within a team/department and among different work teams or departments, communication between management and rank and file and between departments, employees' attitude towards quality and employee's pride in one's work, flow of information among departments, quality of product/service provided by one department to another department, and quality of product/service provided by our employees to our customer and provided to us by our suppliers

The author was not able to utilize actual performance measures, but instead used management perceptions due to difficulty of respondents to obtain permission to declare actual performance measures. The selected manufacturing companies also came from different industries making it difficult to have standard and comparable performance measures. Several authors like Powell (1995), Ahire et al. (1996b) and Prajogo and Brown (2004) have also used perceptual performance data. However, it should be noted that while perceptual data may be retrieved relatively easier from respondents, these are susceptible to respondent bias.

III. HYPOTHESES

The adoption of a quality management system, such as a TQM program, is expected to improve firm performance. In 1984, Garvin argued that quality can lead to better firm performance in two ways, (1) by improving product and process reliability/conformance, and (2) by improving market performance. The first avenue focuses on reducing costs through improvement in production efficiency resulting in fewer defects and lower costs. Through product design and process improvements, quality improvements are expected to lead to profitability from experience-based cost savings. Hackman and Wageman (1995) noted that improvement in quality performance is an expected outcome from TQM adoption given its focus on process improvement. In 2004, Lee observed significant reduction in production stoppages and defects rate due to the improved internal processes brought about by adopting a TQM

program. The same findings were observed by Prajogo and Brown (2004) in their analysis of the relationship of quality management in Australian organizations. Thus, it is hypothesized that:

H1: Firms with a large extent of TQM adoption have better quality performance.

According to Garvin (1984), the second avenue wherein TQM can improve firm performance is through better product features leading to increased sales and higher market share. With regard to business performance, Powell (1995) observed a reduction in total costs due to TQM adoption, strengthening the claim that TQM can produce an economic value for the firm. However, Elkidson (1995) and Powell (1995) emphasized that while TQM adoption could provide firms with strategic value, TQM adoption is not enough to promote competitive advantage. Studies in the late 1990s, however, point to more encouraging results on TQM adoption and business performance. Easton and Jarrell (1998) noted that the long-term performance of their respondent firms improved significantly as measured by the excess unexpected performance of accounting variables and excess cumulative stock returns. They also observed that improvement in financial performance is associated with those firms with advanced and formal TQM programs. Agus and Abdullah (2000) likewise noted among Malaysian firms, a linkage between TQM, customer satisfaction and financial performance. They reported that long-term TQM adopters have better business performance than short-term TQM adopters. Douglas and Judge (2001) also supported the strong link between TQM implementation and business performance (measured through perceived financial performance and industry expert rating of performance).

H2: Firms with a large extent of TQM adoption have better business performance.

A fundamental change that TQM adoption brings is the systemic modification in management practices, including redesign of work, role definition, organizational restructuring, skills improvement, and realignment of goals (Grant et al., 1994). These modifications will definitely change the way people will operate and behave in their respective work areas. It is expected that firms that adopt TQM programs would have better communication, coordination and teamwork, thus, improving overall organizational performance. Kumar and Gupta (1991) highlighted the role of cross-functional teams, an important organizational intervention when implementing a TQM program, on the morale of employees. Through the brainstorming sessions conducted by the teams, the shop floor workers were able to participate in solving production line problems that frequently had impact on production yield. A TQM program, when implemented with learning organizations and reengineering initiatives, is expected to lead to quality improvement and cost reduction due to improved communication and teamwork (Dervitsiotis, 1998). In 2005, Prajogo and McDermott also highlighted the role of improvement in organizational culture as a critical successfully implementing a TQM program.

H3: Firms with a large extent of TQM adoption have better organizational performance.

IV. DATA COLLECTION AND METHODS

A total of 100 manufacturing firms were targeted. The Philippine Quality Awards Foundation (PQAF), the Quality Circle Practitioners' Association, Inc. (QCPA), the UP Manufacturing Linkage Program (UP-MLP), the Personnel Management Association of the Philippines (PMAP), and the Philippine Society for Quality (PSQ) were contacted for the participation of their members. Purposive sampling was used in the selection of the 100 respondents with equal representation per industry. Ultimately, 64 companies joined the study. The survey instrument was a 5-point Likert Scale asking the respondent to rate the extent to which each of the 35 TQM strategies is being implemented (please refer to Exhibit 1 for details of the survey instrument). The companies were not segregated as "TQM" or "non-TQM" adopter firms. Instead, the respondents were made to rate the extent of implementation of the 35 TQM strategies. The respondents from different departments (Production, Marketing, HRD, Quality, Materials Management, and others) were then asked about their perception on their firm's business, quality and organizational performance from 1996 to 1999.

The early 1990s were considered by the industry experts interviewed in the study as the period when TQM started to be implemented in the Philippines, therefore the period "1996–1999" would be an appropriate period to evaluate the impact of adopting certain quality management strategies. The respondents were asked to note the percentage improvement in selected performance measures during this three-year period. The t-test analysis and regression analysis were conducted to test the hypotheses.

V. RESULTS AND DISCUSSION

Profile of Respondent Firms

The 64-firm respondent base involved 324 managers. There were five manager respondents per company representing any five of the marketing, finance, purchasing, HR, operations/manufacturing, quality departments as identified by the coordinator for each respondent firm (see Table 2). The semiconductor and electronics industry comprised the bulk (21.88%), followed by the food and processing industry (20.31%), automotive and automotive parts industry (15.63%), and others (pharmaceutical, packaging, cement, ceramics, etc. (42.18%). Firm size was measured in terms of number of employees and the company's total assets. Majority (60.32%) of the respondents had employees less than 500. About 20% had more than 2000 employees.

In terms of total assets, 48.44% of the firms had assets beyond P1 billion and are thereby considered large-scale, while 18.75% had assets ranging from P500 million to P1 billion (medium-scale), and the remaining 29.69% had assets below P500 million (small-scale). Around 29.69% of the companies were owned 100% by foreigners and only 9.37% were owned 100% by Filipinos. About 60.94% of the respondent firms had joint ventures with foreign companies, mostly American, Japanese, Korean and Swiss corporations. Manufacturing companies that sold 100 % domestically and 100% for exports were about 34.38% and 20.31%, respectively. The other 45.31% sold in both domestic and foreign markets. Considering that the companies came from various industries, it was expected that they would exhibit

different technology levels. A significant portion of the respondents had a combination of assembly line system and Flexible Manufacturing System (FMS) (32.81%); while the other 67.19% of the respondent firms utilized equipment and computer-based production systems indicating high technology orientation. Despite this high technology level, labor was still utilized significantly as shown by the large percentage of firms engaged in partially automated operations (70.31%).

Table 2
Profile of Respondent Firms

Classification	No. of Firms	% to Total
INDUSTRY CATEGORY		
Semiconductor and Electronics Industry	14	21.88
Food Processing Industry	13	20.31
Automotive and Automotive Parts Industry	10	15.62
Others	27	42.19
EMPLOYEE SIZE		
< 500	38	59.38
500 –1,000	13	20.31
> 1,000	13	20.31
ASSET SIZE (Total Assets in Million Pesos)		
< 500 M	19	29.69
500 – 1 B	12	18.75
1 B – 2 B	8	12.50
2 B – 3 B	10	15.62
> 3 B	15	23.44
OWNERSHIP STRUCTURE		
100 % locally – owned	6	9.37
Combination of local and foreign ownerships	39	60.94
100 % foreign – owned	19	29.69
EXPORT ORIENTATION		
100 % domestic sales	22	34.38
Combination of domestic and foreign sales	29	45.31
100 % export sales	13	20.31
PRODUCTION SYSTEM		
Batch Production	12	18.75
Assembly Line	11	17.19
Flexible Manufacturing System	11	17.19
Continuous Flow	9	14.06
Combination (Assembly Line & FMS)	21	32.81
LEVEL OF TECHNOLOGY		
Mechanized Operations	7	10.94
Partially Automated Operations	45	70.31
Fully Automated Operations	4	6.25
Combination (Partial Automation & Batch Production)	8	12.50

Extent of TQM Adoption

The extent of adoption of the 35 validated TQM strategies is shown in Table 3. Around 21.88% of the respondent firms reflected very high extent of TQM adoption with adoption indices ranging from 91-100; 39.06% (81-90); and 26.56% (71-80).

Table 3
Breakdown of Respondent Firms According to TQM Adoption Index

TQM Adoption Index (in %)	No. of Firms	% to Total
91 – 100	14	21.88
81 – 90	25	39.06
71 – 80	17	26.56
61 – 70	7	10.94
Below 61	1	1.56
Total	**64**	**100.00**

In terms of industry category, the pharmaceutical industry reflected the highest TQM adoption index (87.01); followed by the toiletry industry (86.75), and by the semiconductor/electronics industry. Those industries with adoption indices below 80% were the Food Processing and Packaging industries (79.06 and 78.21, respectively). The respondents were asked regarding the presence of formal quality management systems in their organizations. Table 4 shows that 31.2% had a TQM program implemented while 39.1% had a formal QMS's but these were not called TQM. About 85.8% of those companies that reflected a high extent of TQM adoption were those companies that had formal quality management systems in place, whether or not called TQM.

Table 4
TQM Adoption Index by Type of Quality Management System (QMS)

QMS Classification	TQM Adoption Index									
	91 – 100 [a]		81 – 90 [b]		71 – 80 [c]		Below 71 [d]		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
TQM Program	6	42.86	12	48.00	2	12.50	0	-	20	31.25
Formal QMS – Not TQM	6	42.86	8	32.00	7	43.75	4	44.44	25	39.06
No Formal QMS	2	14.28	1	4.00	3	18.75	4	44.44	10	15.62
Has only ISO 9000	0	-	4	16.00	4	25.00	1	11.12	9	14.06
Total	**14**	**100.00**	**25**	**100.00**	**16**	**100.00**	**9**	**100.0**	**64**	**100.00**

[a] Large extent of TQM adoption [b] Moderate extent of TQM adoption [c] Low extent of TQM adoption [d] Very low extent of TQM adoption

The TQM adoption indices of the respondents that had formal TQM programs (20 firms) and those that had other quality management systems (but not called TQM) (25 firms) were compared (refer to Table 5). Firms that had formal TQM programs registered higher TQM adoption indices (averaging 87.83) as compared to 81.67 average index of the non-TQM firms.

Table 5
TQM Adoption Index of TQM Firms and Non-TQM Firms

Quality Management System Classification	No.	Mean	SD	t - val	Prob
Firms with TQM program	20	87.83	5.43	2.52	0.015
Firms with no TQM Program	25	81.67	9.77		

The t-test analysis shows that there is a significant difference in the extent of TQM adoption between TQM firms and non-TQM firms at $p \leq 0.05$. This is expected since a formal TQM program includes a more comprehensive list of TQM strategies and the adoption process is more planned and organized usually by a TQM steering committee. The TQM program activities are also more coordinated and communicated formally to the employees and stakeholders.

Tests of Hypotheses

Table 6 shows the results of the regression analysis on the relationship of TQM adoption and firm performance. Results indicate that the performance of the respondent firms in terms of the three firm performance categories was strongly related with their extent of TQM adoption. The regression analyses show that about 10% and 19% of the variation in quality and business performance, respectively, can be explained by TQM adoption. On the other hand, a significant variation (42%) in organizational performance can be explained by the adoption of the TQM program. This means that as the extent of the TQM adoption of the respondent firms in Philippine manufacturing increases, the respondent managers perceived that the improvement in human behavior-related variables such as communication, teamwork, skills, employee pride, among others, is largely explained by the adoption of the TQM program. Exhibits 1a to 1c present the association of TQM adoption with each of the performance measures included in the three firm performance index categories.

Table 6
Association of TQM Adoption and Performance

Model	Performance Index Category	Unstandardized Beta Coefficient		t-val	Prob.	R^2
1	Quality Performance Index [a]	Constant	3.003	2.66	0.010 ***	0.10
		TQM AI	0.022			
2	Business Performance Index [b]	Constant	0.436	3.79	0.000 ***	0.19
		TQM AI	0.009			
3	Organizational Performance Index [c]	Constant	1.963	6.72	0.000***	0.42
		TQM AI	0.024			

*** $p \leq 0.01$

[a] Quality performance index was computed by getting the average company score of seven (7) quality performance measures; scale reliability: Cronbach alpha = 0.82

[b] Business performance index was computed by getting the average company score of four (4) business performance measures; Scale Reliability: Cronbach alpha = 0.76

[c] Organizational performance index was computed by getting the average company score of 16 organizational performance measures; Scale Reliability: Cronbach alpha = 0.76

The significant association of organizational performance improvement with TQM adoption is expected to be true under Philippine manufacturing setting as TQM is introduced to companies initially as a human resource management intervention tool rather than as an operations management initiative. This can be seen in ownership and management of TQM programs by the human resource departments of manufacturing organizations, and the formation of self-directed work teams such as quality circles, productivity improvement circles as initial organizational interventions to promote team-based approaches in the workplace. This significant linkage of TQM adoption with organizational performance confirms Powell's (1995) contention that the advantage derived from TQM is really from the human behavior aspect of the program, i.e., the ability to motivate employees to improve their performance; and that programs like TQM can be a source of competitive advantage not really from their ability to reduce defect rates or other quantitative variables but their ability to improve organizational performance in organizations.

VI. CONCLUSION AND RECOMMENDATIONS

In this study, the association of the firms' quality, business and organizational performance with their TQM Adoption Index was investigated. Survey results show that marginal improvements in quality and financial performance may be attributed to TQM adoption while significant changes in organizational performance were greatly associated with TQM. A review of the TQM practices that had an impact on performance showed a combination of technique and human resource management-related strategies. This supports the findings of Douglas and Judge (2001) who noted that organizations that exhibited strong emphasis on structural control (e.g., procedures, operations, work activities, facts) as well as those that reflected high structural exploration (e.g., empowerment, access to key information, etc.) exhibited a stronger

relationship between their TQM implementation and financial performance.

TQM adoption in the Philippines is utilized more as a human resource intervention to motivate employees to work as a team as they identify and solve operations and quality-related problems. Initial implementation of TQM in the country can be seen through the conduct of workplace organization activities and the establishment of empowered work teams like quality circles and productivity improvement programs. This high association of organizational performance with TQM adoption indicates that when a company implements a business strategy like TQM, the initial and immediate results may be observed more evidently in changes in human resource-related parameters. On the other hand, the relatively low R^2 values associated with these associations indicate that there are other factors other than TQM adoption which could have led to these quality and business performance. Performance parameters with more objective measures such as quality and profitability would also be reflected much later in its implementation.

It is recommended that manufacturing companies in the Philippines be oriented through seminars and forums on the critical components of TQM. Firms that proclaim themselves as TQM adopters may not be adopting the complete, comprehensive, and real components of TQM as their original proponents (American and Japanese TQM gurus) had conceived them. Implementation of just a limited portion of the real TQM could miss out on the more important components. They should likewise be oriented on the business value of TQM adoption, particularly on how it affects critical performance indicators. TQM training programs should be directed towards the companies' top management (preferably including the head of the company or the manufacturing operations), given the strategic requirements and impact of TQM adoption.

Top management should also be made aware of the realistic time frame of TQM implementation. Sometimes, TQM adopter firms get dismayed because their TQM efforts did not meet their expected results after several months. Some manufacturing companies may have a limited understanding of the scope and coverage of TQM implementation. They could have just been enticed to adopt TQM due to the "bandwagon effect". Such a limited understanding of how TQM must be implemented and the extent to which it can improve the firm's performance create unrealistic expectations about TQM. A closer look at the TQM program components shows that a lot of these strategies like customer orientation and supplier quality management will require years to be successfully implemented.

The study was able to show that in a Third World country like the Philippines, which generally has labor intensive and partially automated operations, employee motivation and empowerment is one significant result of TQM adoption. This means, that when adopting TQM, companies should also ensure that the people who will be involved and benefited by the program should be trained not only on the technical aspects of TQM but also on its behavioral and organizational implications. Lastly, companies that adopted or seek to adopt TQM should ensure a regular monitoring of the implementation to determine its impact on critical performance indicators. They should evaluate the impact of TQM vis-à-vis the contribution of the other business strategies or initiatives implemented by organizations during a particular period.

Because the study focused on different industries, it was difficult to standardize the measurement of quality performance. This could explain why in terms of the three performance categories, quality performance showed lower association with TQM. Hence,

it is recommended that similar studies focus on a particular manufacturing industry. The utilization of objective performance measures such as publicly-listed financial data and other quality and operations data, instead of perceptual data, would have also given a more definitive association of TQM adoption and performance. Accordingly, future studies should include the conduct of a longitudinal study to truly determine the impact of TQM considering that implementation of a TQM program has time lag effects. The association of performance and TQM adoption in the service industries as well as in small and medium scale enterprises could also be explored.

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Exhibit 1 A
Relationship of TQM Adoption and Specific Performance Measures
(Quality Performance Index)

QPI	Performance Measures	Mean	Std. Dev.	Unstandardized Beta coefficient		t-val	Prob.	R^2
1	Relative Product Quality	4.38	0.48	Constant TQM AI	3.00 0.02	2.88	0.005***	0.12
2	Reduction in Defects Rate	5.15	1.01	Constant TQM AI	3.32 0.02	1.73	0.089*	0.05
3	Reduction in Rework	5.08	1.04	Constant TQM AI	2.74 0.03	2.17	0.034**	0.07
4	Reduction in Production Costs	4.57	1.10	Constant TQM AI	1.61 0.04	2.63	0.011**	0.10
5	Reduction in Customer Complaints	5.25	0.88	Constant TQM AI	5.33 -0.001	-0.090	0.929 ns	0.00
6	Reduction in Cycle Time	4.88	1.12	Constant TQM AI	2.56 0.03	2.01	0.049**	0.06
7	Reduction in Delivery Time	4.41	0.99	Constant TQM AI	2.45 0.02	1.88	0.064*	0.05

* $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$, ns- Not Significant

Exhibit 1 B
Relationship of TQM Adoption and Specific Performance Measures
(Quality Performance Index)

QPI	Performance Measures	Mean	Std. Dev.	Unstandardized Beta coefficient		t-val	Prob.	R^2
1	Increase in market Share	3.58	0.99	Constant TQM AI	0.68 0.04	2.90	0.005***	0.12
2	Increase in total sales	3.59	1.12	Constant TQM AI	-0.21 0.05	3.44	0.001***	0.16
3	Increase in net profit	3.31	1.11	Constant TQM AI	-0.32 0.04	3.29	0.002***	0.15
4	Reduction in total costs	2.73	0.85	Constant TQM AI	1.59 0.01	1.26	0.210 ns	0.02

* $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$, ns- Not Significant

Exhibit 1 C
Relationship of TQM Adoption and Specific Performance Measures
(Organizational Performance Index)

OPI	Performance Measures	Mean	Std. Dev.	Unstandardized Beta coefficient		t-val	Prob.	R^2
OPI	Reduction in absenteeism	3.56	0.63	Constant	2.08	2.26	.027**	0.08
				TQM AI	0.02			
OPI	Reduction in tardiness rate	3.65	0.63	Constant	1.87	2.77	.007***	0.11
				TQM AI	0.02			
OPI	Reduction in turnover rate	3.09	0.67	Constant	1.68	2.01	.049**	0.06
				TQM AI	0.02			
OPI	Improvement in suggestion system	3.91	0.54	Constant	1.48	4.88	.000***	0.27
				TQM AI	0.03			
OPI	Improvement in skills level	4.13	0.50	Constant	1.84	5.04	.000***	0.29
				TQM AI	0.03			
OPI	Reduction in Accidents	3.71	0.82	Constant	3.51	0.23	0.819 ns	0.00
				TQM AI	0.002			
OPI	Improvement in teamwork (within team)	4.17	0.47	Constant	2.52	3.64	0.001 ***	0.18
				TQM AI	0.02			
OPI	Improvement in teamwork (among teams)	4.00	0.42	Constant	2.38	4.02	0.000 ***	0.21
				TQM AI	0.02			
OPI	Improvement in communication between management and rank and file	4.03	0.55	Constant	1.47	5.24	.000 ***	0..31
				TQM AI	0.03			
OPI	Improvement in communication between departments	4.08	0.47	Constant	1.88	5.24	.000 ***	0.31
				TQM AI	0.03			
OPI	Improvement in employees' attitude towards quality	4.17	0.48	Constant	2.04	4.86	.000 ***	0.28
				TQM AI	0.03			
OPI	Improvement in employee's pride in one's work	4.05	0.51	Constant	1.65	5.34	.000 ***	0.32
				TQM AI	0.03			
OPI	Improvement of the flow of information among departments	4.00	0.54	Constant	1.60	4.95	.000 ***	0.28
				TQM AI	0.03			
OPI	Improvement in quality of product / service provided by one department to another department	4.02	0.47	Constant	1.78	5.43	.000 ***	0.32
				TQM AI	0.03			
OPI	Improvement of quality of product / service provided by our employees to our customer	4..09	0.44	Constant	2.22	4.53	.000 ***	0.25
				TQM AI	0.02			
OPI	Improvement in quality of product / service provided to us by our suppliers	3.87	0.52	Constant	1.39	5.40	.000 ***	0.32
				TQM AI	0.03			

* $p \leq 0.10$, ** $p \leq 0.05$, *** $p \leq 0.01$, ns- Not Significant

APPENDIX 1
Survey Instrument

PART 1 – EXTENT OF ADOPTION OF THE 35 VALIDATED TQM CONSTRUCTS

Survey Instructions

1. The following statements below relate to the principles, strategies, programs, and policies associated with the implementation of the various components of a quality management system. For each statement, kindly encircle the appropriate response which you think best describes the presence of such a program in your organization, using the scales below:

   5 - LARGE EXTENT (This means that the TQM strategy being described is implemented to a full or great extent in the company; i.e., it is being practised basically by the whole organization and such a particular program or policy is in its full or advanced stage of implementation)

   4 - MODERATE EXTENT (This means that the TQM strategy being described is implemented to a partial or moderate extent in the company; i.e., it is being practised in few or selected departments of the organization and such a particular policy or program is in its moderately advanced stage of implementation)

   3 - LIMITED EXTENT (This means that the TQM strategy being described is still in the planning or initial stage of implementation)

   2 - LATER (This means that the TQM strategy being described has not been implemented yet in the company but the firm intends to implement it later on)

   1- NO PLANS (This means that the company does not have any plans of adopting / implementing the statement being described)

2. Should you have any comments as to the extent of implementation of such a particular program in your company, place them under the "Remarks" portion

TQM Program Component 1: Commitment to Quality						**Remarks**
1. The company prioritizes quality considerations as early as the product / service development phase.	1	2	3	4	5	
2. Inputs from the technical experts, manufacturing and process engineers as to the manufacturability of products are solicited in the product / service development phase.	1	2	3	4	5	
3. Customers' requirements and suppliers' feedback are incorporated in product / service development.	1	2	3	4	5	
4. New product / service designs are reviewed by a cross-functional team.	1	2	3	4	5	
5. The company ensures its benchmarking activities result to significant improvement in the company's quality performance.	1	2	3	4	5	
TQM Program Component 2: Employee Involvement						
6. Top management organizes regular meetings and information campaigns to communicate company quality goals to all departments.	1	2	3	4	5	

TQM Program Component 2: Employee Involvement *(cont'd)*						
7. Top management organizes cross-functional teams to get employees involved in the company's quality management programs.	1	2	3	4	5	
8. The quality goals of the company are clearly and formally written in a Quality Policy.	1	2	3	4	5	
9. Top management is involved in the implementation and follow-up of its quality management program.	1	2	3	4	5	
10. The company organizes cross-functional teams when developing programs to improve quality.	1	2	3	4	5	
11. Quality circles are in place in the company to enable workers to actively participate in quality and productivity improvement programs.	1	2	3	4	5	
TQM Program Component 3: Customer Focus						
12. The company has a program / system to improve customer service	1	2	3	4	5	
13. Top management is personally involved in planning quality management programs.	1	2	3	4	5	
14. Lessons learned from the training programs are integrated in the work processes.	1	2	3	4	5	
15. Customer feedback serves as an important input in improving the quality of the company's products / services / processes.	1	2	3	4	5	

TQM Program Component 3: Customer Focus						**Remarks**
16. The company conducts the following to determine and measure external customer satisfaction (current and future) about its products and services: (Note: Please give separate response for each option)	1	2	3	4	5	
❑ Customer feedback system	1	2	3	4	5	
❑ Customer satisfaction survey	1	2	3	4	5	
❑ Market researches / surveys	1	2	3	4	5	
❑ Customer dialogues	1	2	3	4	5	
❑ Others (specify) _____						
17. Top management provides substantial financial support for the company's quality management and productivity improvement programs.	1	2	3	4	5	
TQM Program Component 4: Fact – based Management						
18. The firm utilizes the techniques to diagnose quality problems and improve production processes: (Note: Please give separate response for each option)						
❑ Pareto Analysis	1	2	3	4	5	
❑ Control Charts	1	2	3	4	5	
❑ Brainstorming	1	2	3	4	5	
❑ Cause and Effect Diagrams (a.k.a. Fishbone, Ishikawa)	1	2	3	4	5	
❑ Others (specify) _____	1	2	3	4	5	

TQM Program Component 4: Fact – based Management (cont'd)						**Remarks**
19. The company utilizes the following techniques in the design of the products: (Note: Please give separate response for each option)	1	2	3	4	5	
❑ Taguchi Methods	1	2	3	4	5	
❑ Quality Function Deployment (QFD)	1	2	3	4	5	
❑ Design for Quality	1	2	3	4	5	
❑ Design for Manufacturability (DFM)	1	2	3	4	5	
❑ Design for Assembly	1	2	3	4	5	
❑ Shingo's error-proofing techniques	1	2	3	4	5	
❑ Concurrent Engineering (CE)	1	2	3	4	5	
❑ Others (specify) _____						
20. Training programs on various problem solving techniques such as cause and effect diagrams, flowcharting, etc. are provided to employees.	1	2	3	4	5	
21. Training programs on Quality Control (e.g., Statistical Process Control) are provided to employees to develop skills in monitoring and improving quality.	1	2	3	4	5	
TQM Program Component 5: Process Monitoring and Control						
22. The company adopts regular repair and preventive maintenance to ensure plants operate efficiently with minimal occurrence of breakdowns and repairs.	1	2	3	4	5	
23. The company regularly monitors and evaluates the employees' compliance with the housekeeping rules and regulations.	1	2	3	4	5	
24. Periodic quality audits (internal and external) are regularly conducted in the company to monitor effectiveness of the quality management system.	1	2	3	4	5	
25. The quality targets and strategies prepared by each department in the company are regularly reviewed and monitored for congruence to overall company quality policy/plan.	1	2	3	4	5	
26. Supplier selection (suppliers, subcontractors, and sub-suppliers) is primarily based on quality.	1	2	3	4	5	
TQM Program Component 6: Incentive and Recognition System						
27. The company applies for ISO 9000 certification to adhere to international quality standards.	1	2	3	4	5	
28. The company vies for awards / citations given to organizations with excellent quality management system.	1	2	3	4	5	
29. Employees are regularly provided with incentives for any suggestion given to improve.	1	2	3	4	5	
30. The company is actively involved in a TQM organization network to have better access to quality information and product / process innovations.	1	2	3	4	5	

TQM Program Component 6: Continuous Improvement Orientation						**Remarks**
31. The company has a system for segregating needed items (inventory, machinery and equipment, documents, supplies, parts, etc.) from unneeded items.	1	2	3	4	5	
32. The plant has signboards and labels for easy location and identification of various departments, inventory, machinery and equipment.	1	2	3	4	5	
33. The office has records management system that allow for easy location and retrieval of needed documents.	1	2	3	4	5	
34. The company is clean, orderly, hygienic, and has no unneccessary items, dust or dirt lying on the floors.	1	2	3	4	5	
35. Each department in the company has on-going plans and programs to identify and eliminate all possible sources of wastes in the company's operations.	1	2	3	4	5	

PART 2 – ON YOUR FIRM'S QUALITY MANAGEMENT SYSTEM / PROGRAM AND PERFORMANCE

1. Does your company have a formal quality management program (meaning, it is one of your key corporate strategies)? _____ Yes _____ No, If yes, kindly answer nos. 1a and 1b.
    a. If yes, what is the name of this program? _____
    b. When was this program implemented? _____

2. How would you describe your current quality management program / strategy? (*please encircle appropriate letter)*
    a. Came about due to management initiative
    b. Imposed to us by our client
    c. Part of a regulatory agency requirement
    d. All of the above
    e. Other description _____

3. How does your company measure the quality of your main product line?
    a. Refer to Column A for the performance measures. Please check the performance measure (s) your company is using in column B.
    b. For the quality performance indicators you indicated, how have they behaved over the last three years (1996 – 1999)? Please encircle appropriate number, using the scale below:

DECLINE			NO CHANGE	INCREASE		
> 20%	10-20%	1-10%		1-10%	10-20%	>20%
(1)	(2)	(3)	(4)	(5)	(6)	(7)

Quality Performance Measure (Column A)	**Col. B**							
Defects Rate		1	2	3	4	5	6	7
Rework		1	2	3	4	5	6	7
Cost per product		1	2	3	4	5	6	7
Customer complaints		1	2	3	4	5	6	7
Cycle time		1	2	3	4	5	6	7
Delivery time		1	2	3	4	5	6	7
Others		1	2	3	4	5	6	7

4. Over the period of three years (1996 – 1999), to what extent have the following business performance indicators behaved for your company? Please encircle the appropriate response using the scale below:

Significantly decreased	Slightly decreased	No change	Slightly increased	Significantly increased
(1)	(2)	(3)	(4)	(5)

Business Performance Measure					
Market share	1	2	3	4	5
Total sales	1	2	3	4	5
Net profits	1	2	3	4	5
Production costs	1	2	3	4	5
Others (please specify)	1	2	3	4	5

5. Do you attribute the behavior of your firm's business performance to the implementation of your quality management program? _____ Yes ____ No, If yes, go to no. 6, then proceed to no. 8. If no, go to no. 7, then proceed to no. 8.

6. To what extent did your quality management program / strategy affect your business performance? Please encircle appropriate answer.

No Significant Effect				Significant Effect
(1)	(2)	(3)	(4)	(5)

7. To what other strategies or situations would you attribute such a business performance?

   a. Our marketing program
   b. Our cost – cutting program
   c. Organizational changes
   d. Competition in the industry
   e. Regional economic crisis
   f. Others (please specify) _____

8. With the implementation of your quality management program, to what extent have the following employee and organizational performance measures behaved for your company over the last three years (1996 – 1999)? Please encircle appropriate answer.

For Items 1 to 6, use the following scale

Significantly decreased	Slightly decreased	No change	Slightly increased	Significantly increased
(1)	(2)	(3)	(4)	(5)

Employee / Organization Performance Measure						**Remarks (if any)**
Absenteeism rate	1	2	3	4	5	
Tardiness rate	1	2	3	4	5	
Employee turnover	1	2	3	4	5	
Suggestions from employees	1	2	3	4	5	
Skills levels of employees	1	2	3	4	5	
Occurrence of accidents						

For Items 7 to 16, use the following scale

Employee / Organization Performance Measure						**Remarks (if any)**
Teamwork and cooperation among employees within a team or department	1	2	3	4	5	
Teamwork and cooperation among employees belonging to different work teams or departments	1	2	3	4	5	
Communication between management and rank and file	1	2	3	4	5	
Communication between departments	1	2	3	4	5	
Employees' attitude towards quality	1	2	3	4	5	
Employee's pride in one's work	1	2	3	4	5	
Flow of information among departments	1	2	3	4	5	
Quality of product / service provided by one department to another department	1	2	3	4	5	
Quality of product / service provided by our employees to our customer	1	2	3	4	5	
Quality of product / service provided to us by our suppliers	1	2	3	4	5	