

**SUPPLIERS' QUALITY PRACTICES IN SIX COUNTRIES:
CHINA, TAIWAN, INDIA, KOREA, MEXICO AND COSTA RICA**

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ABSTRACT:

In this paper we report suppliers' quality practices in six countries —China, Taiwan, India, Korea, Mexico and Costa Rica. The practices include suppliers' education, technical assistances, involvement in product development and long-term relationships. India, China, Korea and Taiwan are four major countries in Asia that have shown substantial economic growth over the years. Mexico is a member of NAFTA. Costa Rica is a growing country in Central America. Differences in terms of quality results are explored as well. In general, supplier quality practices are related to the overall quality management practices. Supplier quality practices affect the internal and external quality results. However, the length of quality experience in the organizations turns out to be a discriminating factor for choosing particular supplier quality practices. The implication of these results confirms that supplier quality practices are important practices for both internal and external quality results.

INTRODUCTION:

Many case studies and other empirical research on quality practices have been conducted over the years [4] [5] [6] [7]. Through theoretical and empirical analyses these researchers have provided better understanding of quality practices. One of the important practices identified has been supplier quality practices. Increasingly, supply chain management includes a worldwide network of suppliers. Effective supply chain management includes strategic, operational and tactical decisions in relation to suppliers' quality practices. In the global market economy, sourcing decisions are important and the quality of products depends upon the supplier's quality and supplier quality practices [1] [2] [3]. The countries of Asia like China and India with their large populations and sizeable burgeoning middle classes are candidates for the products of the industrialized countries as well as the locations for production and supplier sources. Understanding the quality and supplier practices in the context of these and other developing countries is necessary for the producers in the industrialized countries. We find that there are not many studies in this area. There is a need of research in this area since many conceptual and practical questions about supply chain management (i.e., global chain network) need to be answered.

ANALYSIS

Data was collected in six countries (Korea, Taiwan, China, Mexico, Costa Rica and India) as part of an ongoing study on International Quality Practices at the university of Toledo. Statistical analyses, which explore the supplier quality practices and their relationship to quality results, are presented in this paper. "Supplier quality practices" was one of the constructs of this study [5]. Table 1 provides industry classification of the organizations responding to the survey. In all six countries, the top or middle managers responded except Costa Rica. Workforce median age is between 31-37. The majority of respondents are from small or medium size companies except Korea and India. The status of ISO 9000 suggests that China and Mexico are relatively new while Korea and Taiwan are more experienced in implementing quality management practices according to the international standards.

TABLE 1: Characteristics of the study sample

	Korea	Mexico	Taiwan	China	India	Costa Rica
Title of Respondents (%)						
Top Manager (%)	30	39	29	33	69	55
Middle Manager	60	34	52	47	30	12
Other (%)	10	27	19	20	11	33
Workforce Age (median)	31	30	33	35	37	N/A
Number of employees						
Fewer than 500(%)	35	70	41	43	19	42
Between 500-1000(%)	30	8	31	9	18	28
More than 1000(%)	45	22	27	48	63	30
ISO 9000 certified (%)	65	10	54	6	34	30

Table 2 shows the mean, standard deviation of quality management constructs of six countries. In all constructs, China's score is consistently high compared to all other nations. This might be due to the perceptual differences related to their experiences of quality management practices. Countries with longer experiences with quality management practices tend to be a little more

modest in their assessment. In the case of China, with strong initial enthusiasm of implementing quality practices, they seem to respond quite positively about their overall quality management experiences.

TABLE 2: Mean, standard deviation of quality management constructs

Construct (# of items, Reliability*)	Country	Mean	Standard Deviation	Construct (# of items, Reliability*)	Country	Mean	Standard Deviation
Leadership (7, 0.95)	Korea	3.8545	0.6468	Suppliers' Quality (6, 0.87)	Korea	3.4321	0.5715
	Mexico	3.5461	1.1063		Mexico	3.1799	1.5379
	Taiwan	3.9055	0.8427		Taiwan	3.5941	1.2022
	China	3.9726	0.8275		China	4.3262	1.8621
	India	3.9429	0.6345		India	3.2712	0.8325
	Costa Rica	3.9337	0.8352		Costa Rica	3.8981	1.5504
Strategic Quality Planning (4, 0.92)	Korea	3.6743	0.7042	Customer Focus and Satisfaction (8, 0.87)	Korea	3.6365	0.6530
	Mexico	3.6150	1.0111		Mexico	3.5498	0.9956
	Taiwan	3.9275	0.9201		Taiwan	3.9905	1.0530
	China	3.7899	0.8241		China	3.9839	1.1790
	India	3.8389	0.7662		India	3.6952	0.6813
	Costa Rica	3.8700	0.8820		Costa Rica	3.9722	1.0713
Quality of Information Analysis (3, 0.86)	Korea	3.4343	0.6797	Quality Citizenship (4, 0.86)	Korea	3.5573	0.7341
	Mexico	3.3510	1.0791		Mexico	3.2035	1.4766
	Taiwan	3.7888	0.9228		Taiwan	3.9828	1.1377
	China	3.6738	1.0323		China	3.9176	1.6360
	India	3.6851	0.8056		India	3.6925	0.9889
	Costa Rica	3.7407	0.9695		Costa Rica	3.9828	1.1377
Quality of Information Use (3, 0.92)	Korea	3.4495	0.6780	Benchmarking (4, 0.92)	Korea	3.6307	0.6860
	Mexico	3.1445	1.1170		Mexico	2.9912	1.3705
	Taiwan	3.5318	1.0142		Taiwan	3.8473	1.1625
	China	3.8688	1.2493		China	3.7793	1.1305
	India	3.2449	0.8690		India	3.3153	0.9743
	Costa Rica	3.6726	1.1282		Costa Rica	3.8244	1.1355
Employee Training (4, 0.80)	Korea	3.4060	0.7199	Internal Quality Results (5, 0.87)	Korea	3.5259	0.6106
	Mexico	2.9159	1.0772		Mexico	3.0956	1.4378
	Taiwan	3.5744	0.9368		Taiwan	3.7405	1.0094
	China	3.5452	1.4434		China	3.9383	1.6174
	India	3.3310	0.9040		India	3.2485	0.9336
	Costa Rica	3.5978	1.2188		Costa Rica	3.7405	1.0094
Employee Involvement (5, 0.87)	Korea	3.1648	0.6258	External Quality Results (4, 0.83)	Korea	3.6147	0.5769
	Mexico	2.8655	1.1459		Mexico	3.3584	1.5225
	Taiwan	3.2183	0.9140		Taiwan	3.8798	0.9968
	China	3.4894	1.4174		China	3.7713	1.0787
	India	3.0345	0.8204		India	3.5056	0.9282
	Costa Rica	3.3316	1.1562		Costa Rica	3.9278	1.2085
Quality Assurance of Products and Services	Korea	3.7596	0.6814	Note: [1] # of items are all the same for all countries. [2] Reliability (α) is from USA data, representative of similar results of other countries.)			
	Mexico	3.3646	1.1443				
	Taiwan	3.9252	1.0004				
	China	4.2340	1.6234				
	India	3.5563	0.8427				
	Costa Rica	4.0542	1.3032				

Table 3 shows correlation between supplier quality practices and the other quality management practices constructs for which the correlation coefficient is 0.5 or higher suggesting considerable relationship. In Table 4, the results of stepwise multiple regressions with internal quality results as the dependent variable are shown. Table 4 shows similar results with external quality results as the dependent variable. In four countries (Korea, Mexico, China, and India) supplier quality is shown as a significant predictor of internal quality results. However, supplier quality is a significant predictor in Taiwan, Mexico, India, and Costa Rica for external quality practices and not in Korea and China. This is a little surprising and it needs further investigation. Further examination of the size of the regression coefficients shows that the coefficients of external quality results are smaller compared to those for internal quality results except in the case of Taiwan. A plausible explanation may be the export orientation of Taiwanese companies to other countries. However, this also needs further analysis. To examine the differences among the effects of the individual supplier quality practices on internal quality results and external quality results, stepwise regression analyses were carried out. Table 5 shows the results of such an analysis for internal quality results as well as external quality results. In Korea, Taiwan and Cost Rica, supplier selection is a common important practice for both internal quality results and external quality results. In Taiwan, China, India, Mexico and Costa Rica, clarity of specification to suppliers is important for both internal quality results and external quality results while in Korea providing technical assistance to suppliers appears to be important for external quality results.

TABLE 3: Correlation of supplier quality practices and quality management practices

Country	Quality Assurance of Product and Services	Customer Satisfaction	Internal Quality Results	External Quality Results
Korea	0.625**	0.641**	0.657**	0.619**
Mexico	0.537**	0.331**	0.559**	0.563**
Taiwan	0.528**	0.408**	0.491**	0.498**
China	0.647**	0.598**	0.753**	0.499**
India	0.732**	0.704**	0.688**	0.559**
Costa Rica	0.611**	0.476**	0.491**	0.617**

** All correlation is significant at the 0.01 level (2-tailed)

CONCLUSION

In general, supplier quality practices are related to the overall quality management practices [1] [2]. Supplier quality practices affect the internal and external quality results. However, the length of quality experience in the organizations turns out to be a discriminating factor for what particular supplier quality practices are emphasized. Organizations with longer experiences tend to focus on careful supplier selection and providing technical assistance while organizations with shorter history of quality practices regard clarity of specification for quality work. The implication of these results confirms that supplier quality practices are important practices of overall quality results. From a practitioner point of view, the results of this study suggest that companies planning to locate facilities, or enter into supplier partnership in these countries should consider their experiences of quality practices and design supplier quality program accordingly to avoid the pitfalls in supplier development [3] [8].

TABLE 4: The effects of quality management practices on internal and external quality results

	Internal Quality Results	Coefficients	External Quality Results	Coefficients
Korea	Supplier Quality	0.236**	Customer Focus and Satisfaction	0.201**
	Benchmarking	0.260**	Strategic Quality Planning	
	Quality Assurance of Products and Services	0.262**	Benchmarking	0.263**
	Quality Citizenship		Quality Citizenship	0.243**
Taiwan		0.160**		0.217**
	Customer Focus and Satisfaction	0.329**	Customer Focus and Satisfaction	0.256**
	Quality Information Use		Quality Information Use	
	Quality Citizenship	0.367**	Quality Citizenship	0.339**
		0.347**	Supplier Quality	0.233**
				0.178**
Mexico	Quality Assurance of Products and Services	0.178**	Employee Involvement	0.288**
	Employee Involvement	0.293**	Quality Assurance of Products and Services	0.253**
	Supplier Quality	0.258**	Supplier Quality	0.240**
	Benchmarking	0.260**	Customer Focus and Satisfaction	0.231**
China	Supplier Quality	0.375**	Customer Focus and Satisfaction	0.433**
	Employee Training	0.319**	Employee Training	
	Quality Assurance of Product and Services		Employee Involvement	0.513**
		3.423**		-0.331**
India	Supplier Quality	0.338**	Supplier Quality	0.392**
	Employee Involvement	0.257**	Quality Information Analysis	0.309**
	Quality Citizenship	0.195**		
	Quality Information Analysis	0.154*		
Costa Rica		0.355**	Customer Focus and Satisfaction	0.256**
	Customer Focus and Satisfaction		Quality Information Use	
	Quality Information Use	0.321**	Quality Citizenship	0.339**
	Quality Citizenship	0.296**	Supplier Quality	0.233**
			0.178**	

** All significant at the 0.01 level (2-tailed)

TABLE 5: The Effects of particular supplier quality practices on internal and external quality results

	Internal Quality Results	Coefficients	External Quality Results	Coefficients
Korea	F1 (Supplier selection based on quality)	0.393**	F1 (Supplier selection based on quality)	0.445**
	F2 (Reliance of fewer suppliers)	0.254**		
	F4 (Providing technical assistance to suppliers)	0.267**	F4 (Providing technical assistance to suppliers)	0.334**
Taiwan	F1 (Supplier selection based on quality)	0.264**	F8 (Clarity of specification to suppliers)	0.358**
	F8 (Clarity of specification to suppliers)	0.270**	F1 (Supplier selection based on quality)	0.325**
	F4 (Providing technical assistance to suppliers)	0.169**		
Mexico	F5 (Suppliers involvement in product development)	0.361**	F5 (Suppliers involvement in product Development)	0.358**
	F8 (Clarity of specification to suppliers)	0.268**	F8 (Clarity of specification to suppliers)	0.245**
China	F8 (Clarity of specification to suppliers)	0.567**	F8 (Clarity of specification to suppliers)	0.791**
	F2 (Reliance of fewer suppliers)	0.347**	F7 (Long-term relationships with suppliers)	-0.336**
			F2 (Reliance of fewer suppliers)	0.194**
India	F4 (Providing technical assistance to suppliers)	0.337**	F1 (Supplier selection based on quality)	0.302**
	F8 (Clarity of specification to suppliers)	0.251**	F8 (Clarity of specification to suppliers)	0.265**
	F7 (Long-term relationships with suppliers)	0.238**	F4 (Providing technical assistance to suppliers)	0.157**
Costa Rica	F1 (Supplier selection based on quality)	0.264**	F1 (Supplier selection based on quality)	0.315**
	F8 (Clarity of specification to suppliers)	0.270**	F8 (Clarity of specification to suppliers)	0.371**
	F4 (Providing technical assistance to suppliers)	0.169**	F2 (Reliance of fewer suppliers)	0.144**

** All significant at the 0.01 level (2-tailed)

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