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### **Emerald Article: The relationship between employee involvement, partnership management and supply performance: Findings from a developing country**

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# The relationship between employee involvement, partnership management and supply performance

## Findings from a developing country

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### Abstract

**Purpose** – This research aims to investigate the relationships among employee involvement, partnership management, and a firm's supply performance in the automotive industry in Thailand.

**Design/methodology/approach** – The measurement instruments for employee involvement, partnership management and a firm's supply performance were developed based on an extensive literature review, and validated by experts. They were pilot-tested, and analyzed using various statistical techniques to ensure reliability and validity in structural equation modeling constructs. A hypothesized model was tested through path analysis.

**Findings** – The study found that the measurements of employee involvement, partnership management, and a firm's supply performance are reliable and valid for Thailand's automotive industry. Employee involvement has not only a significant direct positive impact on partnership management and firm's supply performance, but also a significant indirect positive impact on a firm's supply performance through partnership management.

**Research limitations/implications** – The distribution of paper-based questionnaires was a convenience sample. Although data from a sample of 211 companies was collected, only 19 percent of them provided more than one response. Future research should apply different random sampling methods, and investigate the reasons for and ways to improve the low multiple-response rate.

**Practical implications** – The findings are beneficial to managers in the automotive industry in developing countries who want to improve partnership management and supply performance through employee involvement.

**Originality/value** – This study is one of the first to examine the linkage among internal employee involvement, external partnership management, and a firm's supply performance in the automotive industry in a newly industrialized country such as Thailand. It can be used in further research on the new concept of supply chain quality management.

**Keywords** Employees involvement, Partnership, Total quality management, Supply chain management, Supply performance, Supply chain quality management, Automotive, Thailand

**Paper type** Research paper



### 1. Introduction

Supply chain management (SCM) and total quality management (TQM) provide unique frameworks to develop involvement from all business stakeholders (Gimenez, 2004; Sohal and Anderson, 1999; Dean and Bowen, 1994). They have evolved along similar paths which diverged in terms of the degree of stakeholders' participation. Both

emerged in response to the need to develop tactical strategies for operational functions (logistics for SCM and inspection for TQM), and then have been broadened in scope to gain synergy by integrating the concerns of all interrelated parties, including all internal functions and external business partners (Vanichchinchai and Igel, 2009). However, SCM focuses more on relationships with external business partners (Croom *et al.*, 2000; Mills *et al.*, 2004), while TQM places more emphasis on internal participation by employees (Yeung and Armstrong, 2003). Similarity in their ultimate integration and difference in their primary focus can result in synergy or conflict when implementing them simultaneously, and more research is needed to explore these implications (Vanichchinchai and Igel, 2009).

This study aims to investigate the relationships among internal employee involvement in TQM, external partner management in SCM, and a firm's supply performance. The automotive industry in Thailand was studied because its supply chain is very complex and active in both SCM and TQM. Also, it is one of the major globally competitive industries of Thailand.

## 2. Literature review

### 2.1 Partnership management in SCM

SCM requires integration within the organization and among supply chain members (Halldorsson *et al.*, 2008). Its effectiveness and efficiency depend significantly on the degree of integration across the whole supply chain (Chin *et al.*, 2004; Bagchi and Skjoett-Larsen, 2005). Some researchers have defined levels of SCM development in organizations. For example, Stevens (1989) introduced four levels of SCM maturity: baseline, functional integration, internal integration, and external integration. Lockamy and McCormack (2004) identified four stages of SCM maturity, comprising *ad hoc*, defined, linked, integrated and extended. The stages within these maturity levels begin with weak coordination among the internal functions and then mature into integration with external business partners. Ideally the entire supply chain should be viewed as a single system, called a "seamless supply chain." This is defined as "the state of total integration in which all players think and act as one" (Towill *et al.*, 2002, p.89). Although SCM requires both internal and external integration (Gimenez, 2004; Towill *et al.*, 2002), it places more emphasis on relationships with external business partners (Croom *et al.*, 2000; Mills *et al.*, 2004). Various terms are often used in SCM literature to describe external business partnership, such as supplier and customer relationship, strategic partnership, long-term relationship, and collaboration. Most SCM frameworks include business partner issues but almost ignore the internal employee component, such as the SCM frameworks proposed by the Global Supply Chain Forum (GSCF) (Lambert *et al.*, 2005), Li *et al.* (2006), Tan *et al.* (2002), Lee and Kincaid (2003), and Chin *et al.* (2004). The external focus of SCM is due to the fact that the organization must work with the customers and the suppliers within the same supply chain (Holmberg, 2000; Golicic *et al.*, 2002 in Mentzer *et al.*, 2001). Although SCM emphasizes external integration, the actual implementation must begin by integrating internal functions and then moving to external integration among business partners. Therefore, human resource and employee involvement issues within the organization should be critical in achieving SCM excellence (Halldorsson *et al.*, 2008; Gowen and Tallon, 2003; Shub and Stonebraker, 2009).

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## 2.2 *Employee involvement in TQM*

In TQM, the word “total” refers to every department and every person at every level in an organization (Lakhe and Mohanty, 1994 in Oakland, 1989). Employees in TQM organizations are viewed as internal customers (Khan, 2003). If the internal customers are not satisfied, external customer satisfaction will be difficult. Therefore, TQM emphasizes internal people issues (Vanichchinchai and Igel, 2009; Khan, 2003). Accordingly, Hoang *et al.* (2006) concluded that human resource management received the highest coverage in TQM frameworks. Robinson and Malhotra (2005) also found that traditional quality management has an intra-organizational focus. Consequently, several terms are often used in TQM literature to refer to the methods and philosophies of internal people management: employee involvement/participation, internal customer, cross-functional, empowerment, and “the next process is our customer”. Most TQM frameworks emphasize human resource issues but focus less on external partnerships, especially on the supplier side: for example, the frameworks of Malcolm Baldrige National Quality Award criteria, Hoang *et al.* (2006), and Pun (2002). Yeung and Armstrong (2003) reported that external focus receives less attention in TQM. Quality management efforts only concentrate on internal matters. This leads to difficulty in modern management, which needs to build quality into the whole supply chain to achieve customer satisfaction (Robinson and Malhotra, 2005; Kuei *et al.*, 2001).

## 2.3 *Research in people and partnership management in SCM*

Little empirical research has studied the linkage between human resource activities and SCM (Gowen and Tallon, 2003; Shub and Stonebraker, 2009) because the initial SCM research emphasizes “hard” operational issues. Most SCM research is still transaction-based, focusing on areas such as information technology and logistics management, rather than being relationship-based, emphasizing “soft” aspects such as employee and relationship management (Shub and Stonebraker, 2009). However, several SCM researchers have suggested that investment and development in employees are fundamental and more important than those in hard components (Halldorsson *et al.*, 2008; Gowen and Tallon, 2003; Skjoett-Larsen *et al.*, 2003; Shub and Stonebraker, 2009). Russell and Hoag (2004) commented that soft factors, such as the user’s perception of the technology and leadership, affect the success of information technology implementation in the supply chain. Winfield and Hay (1997) studied the attitudes of management and employee relations among companies in Toyota’s UK supply chain. They found that in selecting suppliers, Toyota focuses not only on product quality and ability to meet just-in-time supply, but also on employee change and organizational learning – that is, the attitude of the staff and their willingness to learn and change. Thus, companies in Toyota’s supply chain had a wider range of employee training, involvement, empowerment and trust.

Individual functional leaders perceive that they are barons of their own territories (Skjoett-Larsen *et al.*, 2003 in Christopher, 1998). A change in SCM toward a more process-oriented structure may cause a loss of their power, so they may not fully support or may even obstruct that change. Halldorsson *et al.* (2008) surveyed perceptions of supply chain managers and found that, in SCM implementation, internal resistance from employees is a more substantial barrier than that from external customers and suppliers. External integration will become easier when an organization is successful in internal employee management and involvement. The main obstacles

to SCM implementation are: “functional silos,” which represent barriers to innovation due to inward focus within an organization; lack of a common SCM perspective; and inadequate employee skills. These problems are related to inadequate employee knowledge, and can be resolved by using more cross-functional training, which would include customers and suppliers as well. Gowen and Tallon (2003) conducted an exploratory study of US service and manufacturing firms and found that management and employee involvement can improve supplier partnerships, supplier quality evaluations, customer satisfaction evaluations, continuous improvement teams, and competitive benchmarking. Vanichchinchai and Igel (2011) also studied the relationship between TQM and SCM in the automotive industry in Thailand and found that human resource management and involvement are important for SCM implementation. Then, they suggested that training in quality awareness, communication, involvement, goal alignment or adopting industry-specific quality management systems such as ISO/TS 16949 are recommended prior to SCM implementation. Wellins and Rioux (2000) advised that effective internal people management should be applied in SCM. Croxton *et al.* (2001) and Skjoett-Larsen *et al.* (2003) agreed that SCM requires the involvement and coordination of activities within the organization and between partners in the supply chain. Based on an extensive literature review of the soft aspects of SCM, Shub and Stonebraker (2009) proposed a theoretical framework to study the relationship of human resource and organization variables with supply chain integration and performance, and suggested further empirical study. Without providing empirical evidence, Gunasekaran and McGaughey (2003) also suggested studying the role of education and training in SCM for employees.

Although there is a common belief that the more supply chain integration, the better supply chain performance, Fabbe-Costes and Jahre (2008) concluded from a literature review that more supply chain integration does not always improve supply chain performance. More obvious definitions and measures of integration and performance are needed before making this conclusion. There is still no common perspective or definition of SCM (Halldorsson *et al.*, 2008). Handfield and Bechtel (2002) found that greater trust with key suppliers can improve supply chain responsiveness. However, investment in human-specific assets such as visiting suppliers’ facilities, sharing sensitive information, and interacting on a daily basis had no significant influence on trust and supplier responsiveness. These arguments led to the following hypotheses of this study: that SCM integration extends to soft aspects of internal employee and external partner issues.

- H1.* Employee involvement has a significant direct positive impact on partnership management.
- H2.* Employee involvement has a significant direct positive impact on firm’s supply performance
- H3.* Employee involvement has a significant indirect positive impact on firm’s supply performance through partnership management.

### 3. Measures

A partnership management measurement for the automotive industry in Thailand was developed based on the research of Li *et al.* (2006), Min and Mentzer (2004), Tan *et al.*

(2002), Lee and Kincade (2003), and GSCF in Lambert *et al.* (2005). The TQM framework developed by Hoang *et al.* (2006) was the basis for employee involvement measurements. This was because, the framework emphasizes the soft people practices of TQM, and covers various quality award criteria widely accepted by TQM experts. It also was designed for industries in developing countries and then tested in Vietnamese industries. Supply chain performance measurements proposed by Min and Mentzer (2004), Li *et al.* (2006) and Gunasekaran *et al.* (2001) were applied to develop a measurement instrument for a firm's supply performance. To improve the content validity, these measurement items were assessed by four academic experts in SCM, and by three experts in the automotive industry in Thailand. The resulting partnership management measurements included seven items. Employee involvement measurements comprised seven items as well. Measurement of a firm's supply performance consisted of four sub-constructs:

- (1) cost (three items);
- (2) flexibility (three items);
- (3) relationship (four items); and
- (4) responsiveness (three items).

A six-point Likert scale was applied to evaluate the employee involvement, partnership management, and supply performance in the companies surveyed.

Back-translation of the questionnaire from English to Thai and back into English was conducted to avoid linguistic differences in Thai and English technical vocabulary. Then, a pilot survey was conducted to ensure that the respondents had no difficulties in completing the questionnaire. Twelve companies were selected from the database of the Thai Auto Part Manufacturer Association (TAPMA) and the Thailand Automotive Industry Directory. The key informants were executives in each company's SCM system. Since both paper-based and electronic questionnaires were planned to be used for the large-scale survey, the pilot questionnaire was prepared in electronic form to be delivered via e-mail in order to test the applicability of the electronic questionnaire. After receiving the returned questionnaires, the researcher contacted the respondents for comments. Overall, there were no negative comments about the length, format, content or clarity of the questionnaire. The measurement items are shown in the Appendix.

## 4. Research method

### 4.1 Data collection and sample

Multiple responses from each company were encouraged by asking at least two respondents in SCM-related functions per company to answer the questionnaire, in order to improve the reliability of the information obtained. Carr *et al.* (2000) experienced that many Asian firms are reluctant to cooperate in research surveys without first developing a relationship with the researchers. To overcome such potential obstacles, various methods such as personal requests via telephone, supportive requests from professional organizations, and reward for respondents were used to obtain a high response rate.

For the electronic questionnaire distribution, target companies were identified through the Thailand Automotive Industry Directory, and the databases of TAPMA,

the Thailand Automotive Institute (TAI), the Federation of Thai Industries, and the Industrial Estate Authority of Thailand (IEAT). Several professional organizations in the automotive industry in Thailand helped distribute the electronic questionnaires to their members: TAPMA, TAI, and the human resource clubs of the Amata Industrial Estate, the Laem Chabang Industrial Estate, and the Eastern Seaboard Industrial Estate. Paper-based questionnaires were manually distributed during public seminars about the automotive industry organized by TAI and the Thailand Productivity Institute. Once an e-book was sent via e-mail as a reward to the respondents, they also were requested to distribute the attached electronic questionnaire to their friends to increase the multiple responses rate.

The total number of returned questionnaires was 415 and of these 277 were paper-based. Of the total, 146 questionnaires were excluded due to missing data or inappropriate respondent profile. Almost all of the excluded questionnaires were paper-based questionnaires distributed during public seminars. Single and multiple responses were obtained from 171 and 40 companies, respectively. Including multiple responses, the final number of valid sampled companies was 211. Organizational characteristics of the sample firms are classified as shown in Table I.

The profiles of 35 non-respondent companies were checked via telephone, the company's web site, or the IEAT database. A chi-square test was applied to compare the organizational characteristics between the respondent and non-respondent companies, as shown in Table II. No significant differences between respondent and non-respondent samples were found for any organizational characteristics. Given the

| Characteristics and description                       | Company | Percentage (%)* |
|---|---------|-----------------|
| <i>Position</i>                                       |         |                 |
| Managing director/President/CEO                       | 13      | 6.2             |
| Director/Deputy managing director/Vice-president      | 93      | 44.1            |
| Manager   | 105     | 49.8            |
| <i>Ownership</i>                                      |         |                 |
| Thai  | 75      | 35.9            |
| Japanese  | 104     | 49.8            |
| Other nationality                                     | 30      | 14.3            |
| Missing   | 2       |                 |
| <i>Company size</i>                                   |         |                 |
| Small to medium < = 200                               | 54      | 25.6            |
| Large > 200   | 157     | 74.4            |
| <i>Tier in the supply chain</i>                       |         |                 |
| First-tier suppliers                                  | 177     | 87.2            |
| Other tier suppliers                                  | 26      | 12.8            |
| Missing   | 8       |                 |
| <i>Management system</i>                              |         |                 |
| ISO 9000  | 92      | 43.6            |
| ISO/TS 16949  | 155     | 73.5            |
| JIT or lean manufacturing or Toyota production system | 45      | 21.3            |

**Table I.**  
Organizational  
characteristics

**Note:** \* Not including missing responses

chi-square value of company ownership at 3.11 with two degrees of freedom, the chi-square value of company size and tier in the supply chain were 0.71 and 0.48 with one degree of freedom. All *p*-values were higher than 0.05, confirming the similarity between respondent and non-respondent samples. Moreover, mean *t*-test scores of all items between single and multiple responding companies showed a *p*-value of 0.68 with a 0.05 significance level, confirming no significant difference between single and multiple responding companies.

#### 4.2 Reliability and validity

Item-total correlations and Cronbach's alpha used to examine the reliability of the measurement items should exceed 0.5 and 0.7, respectively (Hair *et al.*, 2010, p.125). One item concerning partnership management (PM04) was dropped from the survey because of low item-total correlation value. After its removal, the remaining items had an item-total correlation score above 0.4, and a Cronbach's alpha of 0.75. All employee involvement items had item-total correlation scores well above 0.5, and a Cronbach's alpha of 0.9, as shown in Table III. Also, all firms' supply performance items had item-total correlation scores well above 0.5 and Cronbach's alpha above 0.79. Consequently, all of the remaining items were kept. Composite reliability and average variance extracted confirmed the reliability of the measurement models (Netemeyer *et al.*, 1990), as shown in Table III. Composite reliability of every construct was well above the required value of 0.60, and the average variance extracted exceeded 0.50, except for partnership management. Considering Cronbach's alpha, composite reliability, and average variance extracted together, all sub-constructs were found to be sufficiently reliable.

The validity of each sub-construct was tested by first-order confirmatory factor analysis (CFA) with a maximum likelihood estimate to remove items with weak loading coefficients. Loading coefficients of every item were well above 0.5, and with a high *t*-value, as shown in Table III. As a result, no item had to be deleted. Multiple goodness-of-fit indexes, namely  $\chi^2/df$ , GFI, CFI, NNFI and SRMR, were applied to assess the overall goodness of fit of the constructs. Generally, the  $\chi^2/df$  ratio should be less than 3; GFI, CFI and NNFI should be at least 0.9; and SRMR should be less than 0.1 (Hair *et al.*, 2010, pp. 667-669). As shown in Table III, every construct met these requirements.

A second-order CFA was conducted to confirm that cost, flexibility, relationship and responsiveness were sub-constructs of a firm's supply performance. During the second-order construct validation process, no item was dropped, given that the loading coefficient between a firm's supply performance and its sub-constructs were well above

| Characteristic  | Response |         | Non-response |         | df | Chi-square | <i>p</i> -value |
|-----------------|----------|---------|--------------|---------|----|------------|-----------------|
| Thai            | 75       | (35.9%) | 9            | (25.7%) | 2  | 3.11       | 0.211           |
| Japanese        | 104      | (49.8%) | 23           | (65.7%) |    |            |                 |
| Other ownership | 30       | (14.4%) | 3            | (8.6%)  |    |            |                 |
| Small-to-medium | 54       | (25.6%) | 10           | (28.6%) | 1  | 0.71       | 0.710           |
| Large           | 157      | (74.4%) | 25           | (71.4%) |    |            |                 |
| First-tier      | 177      | (87.2%) | 32           | (91.4%) | 1  | 0.48       | 0.479           |
| Other-tier      | 26       | (12.8%) | 3            | (8.6%)  |    |            |                 |

**Table II.**  
Non-respondent bias test



**Table III.**  
Reliability and multiple  
fit indexes of constructs

| Construct                        | No. of items | Cronbach's alpha | Composite reliability | Average variance extracted | Loading coefficient | $\chi^2/df$ | p-value | GFI  | CFI  | NNFI | SRMR   | SRMEA | IFI  | AGFI |
|----------------------------------|--------------|------------------|-----------------------|----------------------------|---------------------|-------------|---------|------|------|------|--------|-------|------|------|
| Partnership management           | 6            | 0.7541           | 0.77                  | 0.36                       | 0.52-0.71           | 1.358       | 0.2014  | 0.98 | 0.99 | 0.98 | 0.0350 | 0.041 | 0.99 | 0.96 |
| Employee involvement             | 7            | 0.8983           | 0.90                  | 0.57                       | 0.55-0.84           | 1.326       | 0.2094  | 0.98 | 1.00 | 1.00 | 0.0220 | 0.093 | 1.00 | 0.95 |
| <i>Firm's supply performance</i> |              |                  |                       |                            |                     |             |         |      |      |      |        |       |      |      |
| Cost                             | 3            | 0.7962           | 0.81                  | 0.59                       | 0.70-0.83           | 2.180       | 0.1398  | 0.99 | 0.99 | 0.98 | 0.0450 | 0.076 | 0.99 | 0.96 |
| Flexibility                      | 3            | 0.7996           | 0.80                  | 0.58                       | 0.71-0.79           | 0.080       | 0.7772  | 1.00 | 1.00 | 1.00 | 0.0082 | 0.000 | 1.00 | 1.00 |
| Relationship                     | 4            | 0.8460           | 0.84                  | 0.57                       | 0.69-0.85           | 0.860       | 0.3546  | 1.00 | 1.00 | 1.00 | 0.0079 | 0.000 | 1.00 | 0.98 |
| Responsiveness                   | 3            | 0.8510           | 0.87                  | 0.69                       | 0.71-0.89           | 0.090       | 0.7613  | 1.00 | 1.00 | 1.00 | 0.0097 | 0.000 | 1.00 | 1.00 |

0.6, as shown in Table IV. All *t*-values were higher than 1.96, at a 0.05 significance level. The overall fit was good:  $\chi^2/df = 0.647$ , *p*-value = 0.9627, GFI = 0.98, CFI = 1.00, NNFI = 1.00 and SRMR = 0.0223. In conclusion, a firm's supply performance construct comprised the proposed sub-constructs and items in accordance with their supportive theories.

Moreover, all measurement models were tested for convergent, discriminant, and nomological validity, as shown in Table III. Five of the six models had an average variance extracted value that exceeded 0.50, suggesting acceptable convergent validity (Shook *et al.*, 2004). Discriminant validity was assessed by examining correlations between pairs of latent variables (Anderson and Gerbing, 1988). All correlation coefficients were well below 0.8, confirming that the sub-constructs were distinct. Therefore, discriminant validity could be assumed. In addition to the GFI, CFI and NNFI which had been measured and confirmed, AGFI, IFI and RMSEA tests were added to assess nomological validity (Steiger, 1990). They confirmed that the measurement models were nomologically valid. Based on the overall results, these measurement models were found fit and valid.

### 5. Findings and discussion

The overall fit of the structural model was assessed with the same set of multiple fit indexes as those of the measurement models, with the following results:  $\chi^2/df$  ratio = 0.82, *p*-value = 0.9, GFI = 0.96, CFI = 1.00, NFI = 0.986, NNFI = 1.00 and SRMR = 0.039. For path analysis, all *t*-values were well above the critical value at 1.96, with significance at 0.05. Employee involvement had a relationship with partnership management, as illustrated by the standardized estimate of 0.61 and *t*-value 5.96. Thus *H1*, which hypothesized that employee involvement has a direct positive impact on partnership management, was supported. Internal employee involvement in TQM led to improvement in external partner management in SCM. Additionally, employee involvement had a significant direct effect on firm's supply performance with standardized estimate 0.64, *t*-value 8.23. Then, *H2* was supported. Employee involvement also had a significant indirect effect on a firm's supply performance through partnership management. The standardized estimate of the indirect effect was 0.19 with *t*-value 3.98. Therefore *H3* was supported. This is because, although SCM emphasizes external partnership with customers and suppliers, real SCM implementation must start from internal collaboration among departments and employees. Coordination within an organization is a prerequisite of SCM (Lambert and Cooper, 2000; Croxton *et al.*, 2001; Skjoett-Larsen *et al.*, 2003). Therefore TQM, which focuses on employee involvement and management, is a foundation for partnership in SCM. In turn, both contribute to a firm's supply performance improvement. The results support the finding of Halldorsson *et al.* (2008) that intra-organizational integration is a prerequisite for inter-organizational integration. Gowen and Tallon (2003) found that

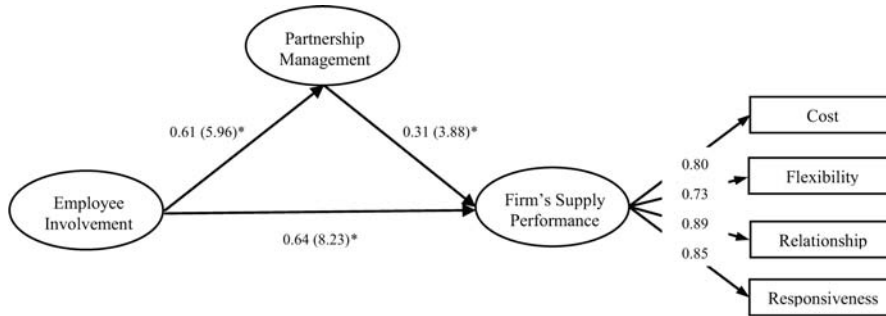
| Firm's supply performance sub-construct | Standardized estimate | <i>t</i> -value |
|---|-----------------------|-----------------|
| Cost                                    | 0.805                 | 11.15           |
| Flexibility                             | 0.690                 | 7.65            |
| Relationship                            | 0.960                 | 10.91           |
| Responsiveness                          | 1.000                 | 12.07           |

**Table IV.**  
Second-order  
confirmatory factor  
analysis

management and employee involvement can improve supplier partnership. Harland (1996) suggested that soft behavioral features such as the attitudes, involvements, expectations and perceptions among supply chain partners are critical for the success of the partnership. Vanichchinchai and Igel (2011) studied the relationship between TQM and SCM in the automotive industry in Thailand and found that TQM can directly facilitate the implementation of SCM and can directly enhance the firm's supply performance. Moreover, TQM can indirectly improve firm's supply performance through SCM. However, there are some negative effects of disruptions caused by TQM especially when employees were not involved and did not clearly understand SCM requirements. Thus, they recommended that training in quality awareness, communication, involvement, goal alignment or adopting industry-specific quality management systems such as ISO/TS 16949 are recommended prior to SCM implementation. Lin *et al.* (2005) surveyed the impact of supply chain quality management in Taiwan and Hong Kong and found that quality management practices were significantly correlated with the supplier participation and selection strategy in SCM, and that this influenced business performance. Wellins and Rioux (2000) also advised that effective human resource management and involvement should be applied in SCM. Importantly, it should be observed that among a firm's supply performance sub-constructs, relationship had a strong standardized coefficient to its second-order construct both in path analysis and second-order CFA. This was in keeping with the emphasis of this research on relationship-based SCM.

## 6. Implications and conclusions

While most SCM research has emphasized hard aspects, this study focused on soft issues of people and relationships. It found that internal employee involvement has not only a direct positive impact on external partnership management and firm's supply performance but also an indirect positive impact on a firm's supply performance through external partnership management. It confirmed that effective employee involvement is important in improving partnership in supply chains and in supply performance. Thus, in supply-chain quality-management implementation, obstacles regarding internal employee issues – such as internal resistance, inadequate skills and knowledge, fear of change, lack of participation, lack of a common perspective, and functional silos – should be improved. The viewpoints of employees should be changed from a power negotiation perspective to a collaboration perspective. Employees may resist supply chain partnership initiatives if they do not clearly understand the advantages of the initiatives, or feel that they will be negatively affected. Therefore communication about the rationale for the initiatives, and skills training for new SCM techniques, should be provided. Such programs should be offered to employees within the organizations and extend to cover external business partners as well. SCM managers should neither focus only on hard operational concerns nor on external partnership. They should also emphasize soft internal employee issues. Thus, TQM can be used as a foundation for SCM to achieve their ultimate integration, covering both internal participation and external partnership in the whole supply chain. Although TQM and SCM are large-scale management systems, managers should not consider them as separate entities. Both should be implemented together to achieve excellent performance (Figure 1 and Table V).



**Notes:**  $\chi^2/df$  ratio = 0.82,  $p$ -value = 0.9, GFI = 0.96, CFI = 1.00, NFI = 0.986, NNFI = 1.00 and SRMR = 0.039. \* Significant at 0.05

**Figure 1.** Structural model

| Path     | Total effect |          | Direct effect |         | Indirect effect |         |
|----------|--------------|----------|---------------|---------|-----------------|---------|
| EI → PM  | 0.61         | (5.96)*  | 0.61          | (5.96)* |                 |         |
| PM → FSP | 0.31         | (3.88)*  | 0.31          | (3.88)* |                 |         |
| EI → FSP | 0.83         | (11.01)* | 0.64          | (8.23)* | 0.19            | (3.98)* |

**Note:** \*Significant at 0.05

**Table V.** Direct and indirect effects

### 7. Limitations and suggestions for future research

The distribution of the paper-based questionnaires was a convenience sample, and only 19 percent of the sampled companies provided more than one response. Future research should apply different random sampling methods to allow for more generalization of the results, and other data collection methods should be chosen to increase the multiple respondent rates. Although the measurement instruments, as well as the hypotheses, were comprehensively confirmed as reliable and valid by various statistical techniques, further studies based on the adaptation of these instruments in other industries or developing countries could be conducted to confirm their general validity. The samples in this research comprised only automotive parts suppliers. In future research, the automotive assemblers and downstream business partners could be studied together with the upstream suppliers to investigate the relationship along the whole supply chain. A firm's supply performance also should be extended to cover the performance of the entire supply chain.

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### Appendix

- (1) *Partnership management (PM)* defined as "the extent to which the organizations deal with business partners for relationship development and utilization".
  - PM01 We share knowledge about core business processes with our trade partners.
  - PM02 We share improvement benefits as well as other risks and rewards with our trade partners.

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PM03 We develop a long-term relationship and trust with our trade partners.

PM04\* We rely on a small number of quality trade partners.

PM05 We participate in the sourcing decisions of our suppliers.

PM06 We include our trade partners in our product development projects.

PM07 We have common goals agreed with our trade partners.

EI, PM and  
supply  
performance

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(2) *Employee involvement (EI)* defined as “the extent to which the employees involve in quality management and improvement”.

EI01 We provide training and training resources to employees (workers) and encourage them to attend these training programs.

EI02 We have many active improvement teams.

EI03 We actively evaluate and implement employees’ suggestions related to quality and supply chain management, if they are suitable.

EI04 Our line employees (workers) are responsible for and inspect the quality of their own work (self inspection).

EI05 We have an assistance mechanism (problem solving network) to help line employees solve quality problems.

EI06 Our employees (workers) are actively involved in quality management-related activities.

EI07 We provide awards to individuals and groups for excellent suggestions.

(3) *Firm’s supply performance cost (CT)* defined as “the degree which the organizations can operate with cost effectiveness”.

CT01 We have a good overall inventory management performance (e.g. inventory turnover, obsolete, availability).

CT02 We have a good overall financial performance (e.g. ROA, ROI, ROS).

CT03 We have an effective and efficient production plan.

(4) *Flexibility (FL)* defined as “the degree which the organizations can adapt to changes or customer demand”.

FL01 We have the ability to produce products with various specification (e.g. features, options, sizes, colors, special specification).

FL02 We have the ability to rapidly adjust production capacity in response to changes in customer demand.

(5) *Relationship (RL)* defined as “the degree which the organizations can develop relationship with business partner”.

RL01 Our suppliers have a good overall performance (e.g. quality, cost, delivery).

RL02 We have a good overall relationship with trade partners.



- RL03 We have an accurate demand forecasting.
- RL04 We have an effective and efficient business process (e.g. less clerical, documentary, inspection jobs).
- (6) *Responsiveness (RS)* defined as “the degree which the organizations can respond to customers requirement”.
- RS01 We have a good overall delivery performance (e.g. on-time, fast).
- RS02 We have a good overall quality of products and services.
- RS03 We have the ability to provide our customers real time information about their orders.

Items marked by an asterisk (\*) were removed in the final instrument.

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