

COMPARISON BETWEEN LOCAL AND MULTINATIONAL SUPPLY CHAIN

— THE CASE OF THAILAND —

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Abstract

Automotive and electronics industries has been the most valuable industry in Thailand due to the extremely high volume of production and exports since 2008, and also been the top two largest industries. Since an innovation and supply chain collaboration play major roles on the firm performance, therefore, the main factors considered for use in this research are the type of firm in the supply chain which are local and foreign companies, and the relationship with innovation and supply chain collaboration between customer-firm-supplier. The firm innovations are in four forms which are product, process, marketing, and organizational innovation. The supply chain collaboration considered in this research consists of information sharing (IS), decision synchronization (DS), incentive alignment (IA), and sharing process (SP).

This study was conducted in questionnaires survey, where a total of 2,050 surveys were distributed to automotive and electronics companies, and 174 responses which were 8.49% response rate.

Keywords: Supply Chain Collaboration, Supply Chain, Innovation, Automotive Industry, Electronics Industry

1. INTRODUCTION

The automotive and electronics industries have been growing gradually since a decade. There are the top two largest industries in Thailand, where in the automotive industry accounts for 12 percent of Thailand' GDP and electronics industry accounts for about 30 percent of total exports. Currently, more than 50 percent of production in the automotive industry is for exports. Thailand is considered the export base for foreign assemblers for the ASEAN region (TAIA, 2012) and for the Hard Disk Drive (HDD) products in the electronics industry. Today, Thailand is ranked as the world's number one HDD and components manufacturing base.

Innovation has been playing a significant role in an organization in terms of improving performance, products, processes, and methodologies. Furthermore, innovation

can lead to improving customer demands, higher satisfaction, and faster turnaround times. For these reasons, we want to illustrate what type of firm and size of firm that have the highest level of innovation.

Innovation is the act of initiating new ideas or the act of changing current processes. It can be referred to as taking a new idea and implementing it for improvements to a company. Innovation is about more than just developing new products, it is also about reinventing business processes, building entirely new markets that meet untapped customer needs, and executing on the right ideas (McGregor, 2006). Innovation can occur in many different forms such as creating new products or improvement on existing products (product innovation), where some parts of the process are improved (process innovation) or introducing new technology to businesses (technology innovation). Researchers divide the categories of innovation into different types. Firstly, technical and administrative innovation: (Daft, 1978) proposed that innovation could be classified as technical and administrative innovation. The technical aspect refers to products, services and production processes that are at the core of an organization's technical ability (Daft, 1978; Damanpour and Evan, 1990; Knight, 1967). As for administrative innovation, it refers to innovations that are generated from the managing and alteration of an organization's structural and administrative procedures (Daft, 1978; Damanpour and Evan, 1990; Knight, 1967). These two forms of innovation vary in importance depending on the innovation needs of an organization, whether it is technical or administrative and whether the organizational structure is mechanistic or organic (Daft, 1982). Secondly, product and process innovation: Product innovation deals with the production of new products and services to create new markets/customers or satisfy current markets or customers. Process innovation is reflected in the improvements or introduction of new production processes for products or services (Knight, 1967). However, the most two popular types among innovation specialists are radical innovation and incremental innovation. Radical innovations provide something that is completely new to the market while the incremental innovation utilizes existing products, processes, technology or methods by improving on what currently existed.

2. LITERATURE REVIEW

2.1 Supply Chain Collaboration

Traditional supply chain is a series of weak connections of activities and decisions, both internal and external to the firm. Its lack of connections can tear down the value of the supply chain. Thus, collaboration is recognized as a significant process that maintains the value and creates opportunity, which can drive efficient supply chain management. Collaboration is comprised of information sharing, joint relationship efforts, and dedicated investments; collaboration is found to be essential for supply chain performance and customer satisfaction. (Nyaga et al., 2010).

Supply Chain Collaboration is defined as a partnership process where two or more autonomous firms work closely to plan and execute supply chain operations toward common goals and mutual benefits. Supply chain collaboration consists of information sharing (Manthou et al., 2004), goal congruence (Angeles and Nath, 2001), decision synchronization (Stank et al., 2001), resource sharing (Sheu et al., 2006), and incentive alignment (Simatupang and Sridharan, 2005) among independent supply chain partners.

The advantages to be gained from successful collaboration will vary according to the type of business or company. The benefits can include: increased profit through sharing expertise across business units or companies, cost reduction through sharing best practices, improvements in decision-making through sharing insights and knowledge, innovation

through sharing ideas, and improvements in the ability to pursue goals that involves distributed units or companies (Hansen and Nohria, 2004). Supply chain collaboration helps firms to reduce the costs of opportunism and monitoring that are inherent in market transactions through process integration and mutual trust; thus, increasing the probability that partners behave in the best interest of the partnership (Croom, 2001).

2.2 Innovation

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Innovation is the act of initiating new ideas or the act of changing current processes. It can be referred to as taking a new idea and implementing it for improvements to a company. Innovation is about more than just developing new products, it is also about reinventing business processes, building entirely new markets that meet untapped customer needs, and executing on the right ideas (McGregor, 2006). Innovation can occur in many different forms such as creating new products or improvement on existing products (product innovation), where some parts of the process are improved (process innovation) or introducing new technology to businesses (technology innovation). Researchers divide the categories of innovation into different types. Firstly, technical and administrative innovation: (Daft, 1978) proposed that innovation could be classified as technical and administrative innovation. The technical aspect refers to products, services and production processes that are at the core of an organization's technical ability (Daft, 1978; Damanpour and Evan, 1990; Knight, 1967). As for administrative innovation, it refers to innovations that are generated from the managing and alteration of an organization's structural and administrative procedures (Daft, 1978; Damanpour and Evan, 1990; Knight, 1967). These two forms of innovation vary in importance depending on the innovation needs of an organization, whether it is technical or administrative and whether the organizational structure is mechanistic or organic (Daft, 1982). Secondly, product and process innovation: Product innovation deals with the production of new products and services to create new markets/customers or satisfy current markets or customers. Process innovation is reflected in the improvements or introduction of new production processes for products or services (Knight, 1967). However, the most two popular types among innovation specialists are radical innovation and incremental innovation. Radical innovations provide something that is completely new to the market while the incremental innovation utilizes existing products, processes, technology or methods by improving on what currently existed.

3. METHODOLOGY

The methodology of this study is conducting survey through questionnaires. The questionnaire was sent to 558 automotive companies from the list of Thai Automotive Companies from Thailand Automotive Institute and members of Thai Automotive Industry Association (TAIA) and 1492 electronics companies from the list of Thai Electronics Companies from The Electrical and Electronics Institute (EEI) during January to February via mail. We designed two copies of questionnaires for each industry. The questionnaires were divided into four sections. The first section was asking about some general information and firm's characteristics such as type of firm, tier of firm, type of business, fixed assets, number of employees, and main products. The second section was asking about innovation in the firm and factors that trigger the innovation in the firm. The third section was asking about firm

partners' information, collaboration activities and collaboration factors between firm and its partners. The last section was asking about ISO international standards and firm's performance such as profit, product quantity and etc.

This study had set up the assumption to believe that there is a relationship between the type of firm in supply chain and level of innovation and collaboration in both dimensions which are customer and supplier. Independent variables are divided into 3 main groups which are pure local supply chain (TH) and multinational supply chain (EX), Exporter and Non-Exporter, and Importer and Non-Importer. There are 12 dependent variables from 3 main groups which are innovation (Product Innovation, Process Innovation, Marketing Innovation, and Organizational Innovation), collaboration (Information Sharing, Decision Synchronization, Incentive Alignment, and Sharing Process) with customer and supplier as shown in Figure 1.

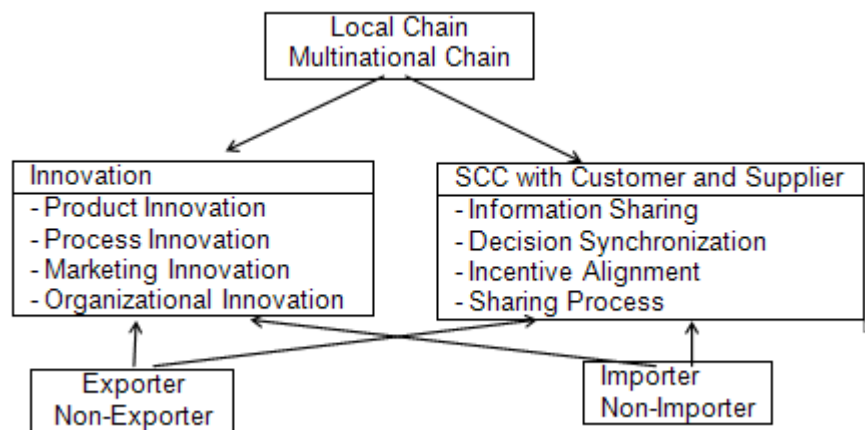


Figure 1: Conceptual Model

4. DATA COLLECTION

A total of 2,050 copies of questionnaires was sent to the automotive and electronics companies. The number of response is 174 which represent 8.49% in the response rate. The automotive and electronics industry accounts for 46.60% and 53.40% of total response rate respectively as shown in Table 1. From the total of 174 companies, Multinational is 51 represent 29.30%, Joint-ventures is 42 represent 24.10%, and Domestic is 81 represent 46.60% as shown in Table 1. Most firms tend to choose their customer and supplier which have the same type of firm as the firm itself, for instance, multinational company tend to have their customer and supplier which are multinational company as shown in Table 2, 3 and 4.

Table 1: Firm's characteristics

Firm's Characteristics		f	%
Type of Industry	Automotive	81	46.55%
	Electronics	93	53.45%
Type of Firm	MNC	51	29.31%
	JV	42	24.14%
	Domestic	81	46.55%
Tier of Firm	Assembler	14	8.05%
	Tier 1	14	8.05%
	Tier 2&3	146	83.91%
Fixed Assets	Less than 50M	28	16.09%
	50M - 200M	65	37.36%
	More than 200M	81	46.55%
No. of Employees	Less than 50	19	10.92%
	50 - 200	45	25.86%
	200 - 500	62	35.63%
	500 - 1,000	23	13.22%
	1,000 - 2,000	12	6.90%
	More than 2,000	13	7.47%

Table 2: Multinational firm / Customer * Supplier

Firm	Customer		Supplier			Total
			MNC	JV	Domestic	
MNC	MNC	Count	34	3	7	44
		% of Total	66.70%	5.90%	13.70%	86.30%
	JV	Count	2	2	0	4
		% of Total	3.90%	3.90%	0.00%	7.80%
	Domestic	Count	1	0	2	3
		% of Total	2.00%	0.00%	3.90%	5.90%
Total	Count		37	5	9	51
	% of Total		72.50%	9.80%	17.60%	100.00%

Table 3: Joint-Ventures firm / Customer * Supplier

Firm	Customer		Supplier			Total
			MNC	JV	Domestic	
JV	MNC	Count	2	3	0	5
		% of Total	4.80%	7.10%	0.00%	11.90%
	JV	Count	1	30	2	33
		% of Total	2.40%	71.40%	4.80%	78.60%
	Domestic	Count	0	1	3	4
		% of Total	0.00%	2.40%	7.10%	9.50%
Total	Count		2	34	6	42
	% of Total		7.10%	81.00%	11.90%	100.00%

Table 4: Domestic firm / Customer * Supplier

Firm	Customer		Supplier			Total
			MNC	JV	Domestic	
Domestic	MNC	Count	5	2	6	13
		% of Total	6.20%	2.50%	7.40%	16.00%
	JV	Count	0	1	7	8
		% of Total	0.00%	1.20%	8.60%	9.90%
	Domestic	Count	5	3	52	60
		% of Total	6.20%	3.70%	64.20%	74.10%
Total	Count		10	6	65	81
	% of Total		12.30%	7.40%	80.20%	100.00%

As you can see in Table 5, in the chain that is not pure Thai-owned companies tend to get more ISO international standards than the pure Thai-owned chain. For ISO 9000/9001 and 14000/14001, only 63.5% and 26.9% of total companies that are pure Thai-owned chain get the standards compared to the chain that is not pure Thai-owned which is 82% and 67.2% of total respectively.

5. DATA ANALYSIS

We compared those 3 groups of independent variables with 3 groups of dependent variables separately which are Local Chain VS Multinational Chain, Exporter (Foreign Customer) and Non-Exporter (Local Customer), and Importer (Foreign Supplier) and Non-Importer (Local Supplier) with firm innovation and supplier chain collaboration with customer and supplier.

5.1 Thai Chain VS Foreign Chain

5.1.1 Innovation

There was no statistically significant difference between groups for product innovation as determined by one-way ANOVA ($F(1,172) = 2.474$, $p = .118$). Therefore, we can conclude that, the level of product innovation were no statistically significant differences between the local chain and multinational chain.

An analysis determined by one-way ANOVA ($F(1,172) = 4.163$, $p = .043$) shows that the level of process innovation was statistically significant higher in the multinational chain ($3.370 \pm .7889$) compared to the local chain ($3.087 \pm .9489$).

An analysis determined by one-way ANOVA ($F(1,172) = 4.775$, $p = .030$) shows that the level of marketing innovation was statistically significant higher in the local chain ($3.100 \pm .9259$) compared to the multinational chain ($2.782 \pm .8582$).

An analysis determined by one-way ANOVA ($F(1,172) = 6.741$, $p = .010$) shows that the level of organizational innovation was statistically significant higher in the multinational chain ($3.416 \pm .7574$) compared to the local chain ($3.069 \pm .9151$).

5.1.2 Collaboration with Customer

There was no statistically significant different between groups for information sharing as determined by one-way ANOVA ($F(1,172) = .614$, $p = .434$). Therefore, we can conclude that, the level of information sharing between firm and customer was no statistically significant difference between the local chain and the multinational chain.

There was no statistically significant different between groups for decision synchronization as determined by one-way ANOVA ($F(1,172) = 3.346$, $p = .069$). Therefore, we can conclude that, the level of decision synchronization between firm and customer was no statistically significant difference between the local chain and the multinational chain.

An analysis determined by one-way ANOVA ($F(1,172) = 28.298$, $p = .000$) shows that the level of incentive alignment between firm and customer was statistically significant higher in the chain multinational chain ($2.584 \pm .8242$) compared to the local chain ($1.832 \pm .9205$).

An analysis determined by one-way ANOVA ($F(1,172) = 11.062$, $p = .001$) shows that the level of sharing process between firm and customer was statistically significant higher in the multinational chain ($2.724 \pm .8491$) compared to the local chain ($2.221 \pm .9993$).

5.1.3 Collaboration with Supplier

There was no statistically significant different between groups for information sharing as determined by one-way ANOVA ($F(1,172) = .340$, $p = .560$). Therefore, we can conclude that, the level of information sharing between firm and supplier was no statistically significant difference between the local chain and the multinational chain.

An analysis determined by one-way ANOVA ($F(1,172) = 9.368$, $p = .003$) shows that the level of decision synchronization between firm and supplier was statistically significant higher in the multinational chain (2.873 ± 1.0593) compared to the local chain (2.317 ± 1.1790).

An analysis determined by one-way ANOVA ($F(1,172) = 14.094$, $p = .000$) shows that the level of incentive alignment between firm and supplier was statistically significant higher in the multinational chain ($2.277 \pm .9620$) compared to the local chain ($1.692 \pm .8851$).

An analysis determined by one-way ANOVA ($F(1,172) = 7.123$, $p = .008$) shows that the level of sharing process between firm and supplier was statistically significant higher in the multinational chain ($2.413 \pm .9810$) compared to the local chain ($1.981 \pm .9671$).

5.2 Exporter VS Non-Exporter

5.2.1 Innovation

An analysis determined by one-way ANOVA ($F(1,172) = 5.359$, $p = .022$) shows that the level of product innovation was statistically significant higher in the exporter ($3.316 \pm .6785$) compared to the non-exporter ($3.045 \pm .8562$).

An analysis determined by one-way ANOVA ($F(1,172) = 8.052$, $p = .005$) shows that the level of process innovation was statistically significant higher in the exporter ($3.427 \pm .7412$) compared to the non-exporter ($3.060 \pm .9564$).

There was no statistically significant difference between groups for marketing innovation as determined by one-way ANOVA ($F(1,172) = 1.049$, $p = .307$). Therefore, we can conclude that, the level of marketing innovation were no statistically significant difference between exporter and non-exporter.

An analysis determined by one-way ANOVA ($F(1,172) = 13.587$, $p = .000$) shows that the level of organizational innovation was statistically significant higher in the exporter ($3.488 \pm .6874$) compared to the non-exporter ($3.033 \pm .9365$).

5.2.2 Collaboration with Customer

An analysis determined by one-way ANOVA ($F(1,172) = 3.584$, $p = .060$) shows that the level of information sharing between firm and customer was statistically significant higher in the exporter ($3.127 \pm .8771$) compared to the non-exporter (2.812 ± 1.3193).

An analysis determined by one-way ANOVA ($F(1,172) = 6.372$, $p = .013$) shows that the level of decision synchronization between firm and customer was statistically significant higher in the exporter ($3.280 \pm .8753$) compared to the non-exporter (2.881 ± 1.2095).

An analysis determined by one-way ANOVA ($F(1,172) = 22.370$, $p = .000$) shows that the level of incentive alignment between firm and customer was statistically significant higher in the exporter ($2.605 \pm .8010$) compared to the non-exporter ($1.966 \pm .9632$).

An analysis determined by one-way ANOVA ($F(1,172) = 11.966$, $p = .001$) shows that the level of sharing process between firm and customer was statistically significant higher in the exporter ($2.759 \pm .8603$) compared to the non-exporter ($2.279 \pm .9372$).

5.2.3 Collaboration with Supplier

An analysis determined by one-way ANOVA ($F(1,172) = 4.856$, $p = .029$) shows that the level of information sharing between firm and supplier was statistically significant higher in the exporter ($2.880 \pm .8551$) compared to the non-exporter (2.487 ± 1.5016).

An analysis determined by one-way ANOVA ($F(1,172) = 17.255$, $p = .000$) shows that the level of decision synchronization between firm and supplier was statistically significant higher in the exporter ($2.974 \pm .9027$) compared to the non-exporter (2.280 ± 1.3009).

An analysis determined by one-way ANOVA ($F(1,172) = 15.038$, $p = .000$) shows that the level of incentive alignment between firm and supplier was statistically significant higher in the exporter ($2.320 \pm .8584$) compared to the non-exporter (1.754 ± 1.0521).

An analysis determined by one-way ANOVA ($F(1,172) = 12.894$, $p = .000$) shows that the level of sharing process between firm and supplier was statistically significant higher in the exporter ($2.491 \pm .8863$) compared to the non-exporter (1.953 ± 1.0714).

5.3 Importer VS Non-Importer

5.3.1 Innovation

There was no statistically significant difference between groups for product innovation as determined by one-way ANOVA ($F(1,172) = 2.525$, $p = .114$). Therefore, we can conclude that, the level of product innovation were no statistically significant differences between the importer and the non-importer.

There was no statistically significant difference between groups for process innovation as determined by one-way ANOVA ($F(1,172) = 2.380$, $p = .125$). Therefore, we can conclude that, the level of process innovation were no statistically significant differences between the importer and the non-importer.

There was no statistically significant difference between groups for organizational innovation as determined by one-way ANOVA ($F(1,172) = 2.921$, $p = .089$). Therefore, we can conclude that, the level of organizational innovation were no statistically significant differences between the importer and the non-importer.

An analysis determined by one-way ANOVA ($F(1,172) = 9.600$, $p = .002$) shows that the level of organizational innovation was statistically significant higher in the importer ($3.484 \pm .6701$) compared to the non-importer ($3.106 \pm .9347$).

5.3.2 Collaboration with Customer

There was no statistically significant difference between groups for information sharing as determined by one-way ANOVA ($F(1,172) = 1.236$, $p = .268$). Therefore, we can conclude that, the level of information sharing between firm and customer was no statistically significant difference between importer and non-importer.

There was no statistically significant difference between groups for decision synchronization as determined by one-way ANOVA ($F(1,172) = .988$, $p = .322$). Therefore, we can conclude that, the level of decision synchronization between firm and customer was no statistically significant difference between importer and non-importer.

An analysis determined by one-way ANOVA ($F(1,172) = 13.794$, $p = .000$) shows that the level of incentive alignment between firm and customer was statistically significant higher in the importer ($2.587 \pm .7819$) compared to the non-importer ($2.085 \pm .9983$).

There was no statistically significant difference between groups for sharing process as determined by one-way ANOVA ($F(1,172) = 3.163$, $p = .077$). Therefore, we can conclude that, the level of sharing process between firm and customer was no statistically significant difference between importer and non-importer.

5.3.3 Collaboration with Supplier

There was no statistically significant difference between groups for information sharing as determined by one-way ANOVA ($F(1,172) = .224$, $p = .622$). Therefore, we can conclude that, the level of information sharing between firm and supplier was no statistically significant difference between importer and non-importer.

There was no statistically significant difference between groups for decision synchronization as determined by one-way ANOVA ($F(1,172) = 2.496$, $p = .116$). Therefore, we can conclude that, the level of decision synchronization between firm and supplier was no statistically significant difference between importer and non-importer.

An analysis determined by one-way ANOVA ($F(1,172) = 4.075$, $p = .045$) shows that the level of incentive alignment between firm and customer was statistically significant higher in the importer ($2.237 \pm .9540$) compared to the non-importer ($1.940 \pm .9808$).

There was no statistically significant difference between groups for sharing process as determined by one-way ANOVA ($F(1,172) = 1.595$, $p = .208$). Therefore, we can conclude

that, the level of sharing process between firm and supplier was no statistically significant difference between importer and non-importer.

Table 5: Comparison between Thai and multinational supply chain

	Whole	Pure Thai chain	Expose to foreign market	Non-Exporter	Exporter	Non-Importer	Importer
Innovation							
Product	3.211	3.073	3.27	3.045	**3.316	3.111	3.295
Process	3.269	3.087	**3.37	3.06	***3.427	3.177	3.375
Marketing	2.877	**3.1	2.782	2.964	2.822	3.003	2.773
Organizational	3.313	3.069	***3.416	3.033	***3.488	3.106	***3.484
SCC with Customer							
IS	3.006	2.908	3.048	2.812	**3.127	2.906	3.088
DS	3.126	2.909	3.219	2.881	**3.28	3.041	3.197
IA	2.359	1.832	***2.584	1.966	***2.605	2.085	***2.587
SP	2.574	2.221	***2.724	2.279	***2.759	2.439	2.686
SCC with Supplier							
IS	2.729	2.65	2.762	2.487	**2.88	2.681	2.768
DS	2.707	2.317	***2.873	2.28	***2.974	2.56	2.829
IA	2.102	1.692	***2.277	1.754	***2.32	1.94	**2.237
SP	2.284	1.981	***2.413	1.953	***2.491	2.179	2.37
ISO 9000/9001							
Yes	77.01%	63.50%	82.00%	65.70%	83.20%	67.10%	84.20%
No	22.99%	36.50%	18.00%	34.30%	16.80%	32.90%	15.80%
ISO 14000/14001							
Yes	55.75%	26.90%	67.20%	31.30%	70.10%	35.40%	71.60%
No	44.25%	73.10%	32.80%	68.70%	29.90%	64.60%	28.40%

**, The mean difference is significant at level $p < 0.05$

***. The mean difference is significant at level $p < 0.01$

6. CONCLUSION

In summary, this research studied on the relationship between the type of supply chain in automotive and electronics industry and level of innovation, and collaboration between firm and partners. The findings of this research show that the multinational chain is most likely to have a significant higher level of innovation, especially organizational innovation, and collaboration in both dimensions which are with customer and supplier, especially incentive alignment, compared to the local chain. However, the interesting point is the type of customer firm is affected to the level of innovation and collaboration more than the type of supplier firm.

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