Competitive Advantage of Collaboration between Taiwan and Japan Transformer Industries

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Abstract: From the view of geography, Taiwan was proximity to Japan than most other countries and also historical and cultural factors were two of the points to contact Taiwan and Japan. This paper was an empirical study, described and explored the case of competitive advantages of the Taiwanese and the Japanese transformer industries as catalogued by the consumer electronics division and made a comparison in order to discover the collaborative possibilities between Taiwan and Japan transformer industry.

Taiwan transformer industry had competitive advantages on factory management and internationalization, and Japan transformer industry had competitive advantages on technology innovation and high quality control. As the result, firms could collaborate with the other manufacturers in the same industry, and it could enhance the competitive advantages for the industries.

Key-Words: Competitive Advantage, Collaboration, Transformer, Industry, Taiwan, Japan

1 Introduction
Asia-Pacific represented the largest and the fastest growing transformers market in the world, with sales projected to exceed US$ 16.4 billion by 2010[2]. Many developed countries, like America, Japan, and Germany, energy conservation had been a serious issue. Meanwhile, transformer was not only a simple device that transfers electrical energy from one circuit to another through inductively coupled conductors but also played a role in energy efficiency and environmental conservation.

Michael E. Porter’s diamond model [8] was a classical theory of national advantage. He used a diamond shaped diagram as the basis of a framework to illustrate the determinants of national advantage. The effect of one point depended on the others. Factor disadvantages would not lead firms to innovate unless there was sufficient rivalry. Moreover, Porter introduced a generic value chain in 1985. Value chain focused on cost management efforts and allows alignment of process with customers. It provided for efficient process which improved the timeliness of operations.

Moreover, for Porter, any hint of alliances or collaboration was viewed as a potential source of erosion to long term competitive advantage. His position was understandable in the event that the resultant collaboration creates nothing new and unique; but not all collaborations were like this.

From literature review, we did not find studies discussing about competitive advantages of transformer industry. And based on M.E. Porter’s diamond model and value chain, through in-depth interviews with CEOs of Taiwan and Japan transformer industries, we wanted to extract the main factors which would affect the competitive advantage of the industries. Then, a new model was existed as a basic model to be estimated by
questionnaires in order to explore collaborated possibilities between Taiwan and Japan transformer industries.

2 Literature Review

Over the last decade, various academics began to consider the possibilities of collective and collaborative strategies. Astley (1983) [1] considered the growing complexity of the business environment states. He said that firms must consider a new level of planning collective strategy. The collective approach helped enhance the awareness of organizational nuances that were so important in controlling the environment.

Moreover, by visiting a viable and profitable alternative for developing communities via cooperative enterprises whose prime mandate was to cultivate and strengthen social conditions and work opportunities capable of responding to human needs and developing human potential (Omar, Miloud and David, 2005) [5].

2.1 Diamond Model [8]

Followed by Porter’s diamond model, Taiwan and Japan transformer industries had the same conditions as follows:

1. Factor Conditions: A country created its own important factors such as skilled resource and technological base. Moreover, the amount and cost of capital resources that were available in the banking and finance sectors, and the type, quality, and user cost of nation; infrastructures, should also be considered. Technology improvement, good internal management, and high quality of labor force were important factors in transformer industry. Produce high quality products and products accepted by global nations require various safe testing could bring competitiveness.

2. Firms’ Strategy, Structure, and Rivalry: Local conditions affected firm strategy; and local rivalry forced firms to move beyond basic advantages that the home country may enjoy, such as low factor costs. Transformer industry was highly competitive; firms focused on cost down in order to survive. Thus, making contracts with customers/suppliers were crucial factors affected the development of firms.

3. Demand Conditions: The nature of demand for products or services at home and the degree of sophistication of buyers, such as the compositions of demand in the home market. Customers’ orders are small quantities with various designs.

4. Related and Supporting Industries: When local supporting industries are competitive, firms enjoy more cost effective and innovative inputs. Transportation in both Japan and Taiwan were highly developed; it brought products to overseas quickly and effectively.

5. Government’s Role: Encourage companies to raise their performances and stimulate early demand for advance products. Transformer firms expected governments provided supportive and progressive stance on patents and tax incentives. Figure 1 was Michael E. Porter’s diamond model.

Fig.1 Michael E. Porter’s Diamond Model [8]

2.2 Value Chain [6,7]

Firms needed to develop a unique set of skills that other organization did not have. This kind of abilities were supposed to be incorporated into the business’s activities but attaining them required a detailed analysis of these very activities, which M.E. Porter grouped under another fundamental notion in his thought-the value chain. Porter introduced a generic value chain in 1985 [6,7]. Value chain focused on cost management efforts and allows alignment of process with customers. It provides for efficient process which improves the timeliness of operations.

In value chain, there were “primary activities” and “support activities”. As Porter conducted, firms might need to be creative in order to develop a novel value chain configuration that increases product differentiation. Moreover, because technology was employed to some degree in every value creating activity, changes in technology can impact
competitive advantage by incrementally changing the activities themselves or by making possible new configurations of the value chain. Figure 2 was Porter’s value chain.

![Fig.2 Michael E. Porter’s Value Chain [6,7]](image)

The business unit was the appropriate level for construction of a value chain, not the divisional level or corporate level. Products passed through all activities of the chain in order, and at each activity the product gains some value. The chain of activities gives the products more added value than the sum of added values of all activities. It was important that not to mix the concept of the value chain with the costs occurring throughout the activities.

Hosein and Thomas (2004) [3] ted out that much of the competitive advantage due to the globalization of the supply chain and value chain functions and “lean manufacturing” slowing disappeared as global companies converge to a similar management models. Today, companies were competing more and more on their ability to innovate effectively and efficiently. To compete, companies had to integrate globally dispersed technological and market know-how to innovate products, services and process for the global market.

The advantage of using lower cost labor in India, Vietnam or China evaporated as rivals that access the same labor pools and locate their operations in the same areas. So, the lasting competitive advantage will come from the ability to innovate fast and successfully. The precondition for global innovativeness was access to technology know-how.

3 Interview Result

About the competitive advantages of the transformer industry in Japan, the CEOs’ considerations were sorted as follows:

1. Internal organizations:
   The communications between employees and firms were concerned. The employees’ loyalty to the firms was higher than Taiwan. And also the reliabilities between employees and firms were higher. The ratio of employees leave firms was low; and many employees worked for more than 10 years. On operation, they had enough experiences and know-how; the working speed and working process were effective. On research and development, the engineers had special skill on transformers’ design and materials applications.

2. Technology innovation:
   The Japanese firms learnt from times of mistakes and failures, and the experiences were unique. They could produce unique products with high qualities and innovation. For example, some firms spent around one year on temperature control, and from experiences, they took the data to fuse manufacturers to develop a new type of fuse. This was a kind of technology collaboration.

3. Collaboration and reliability:
   Firms believed their suppliers and the reliability had been developed for many years; therefore, firms would not approval the other suppliers’ sample easily. Firms had to communicate with upstream and downstream in order to make a suitable design for customers’ circuits and space, etc. Moreover, transformer was a kind of electronic components which with many safety certificates; therefore, while a customer approved one design, it was hard for the customer to change the same product to the other transformer manufacturers, especially while the customer paid the safety fee. Some firms cooperated with the other manufacturers in this industry in order to get economy scales and learn technologies from each other. The kind of technology cooperation might help firms get new ideas on innovation.

4. Culture: (working attitude of employees)
   The Japanese firms developed business culture on the world of “WA” which meant firms respected for peace, balance, esteem, and feelings on business activities. Moreover, customer services, technologies and qualities were three DNA of the Japanese transformer manufacturers. The three DNA were unique which global competitors could copy but could not learn or understanding the really meaning as well.

About the competitive advantages of the transformer industry in Taiwan, the CEOs’ considerations were sorted as follows:

1. Production and factory management:
   The Taiwanese manufacturers learnt from the Japanese and American manufacturing ways. When they went global, they re-developed and reformed the production processes by themselves to suit the domestic employees’ lifestyle and the level of educations. Because transformer manufacturers needed a large number of employees on production lines to make products, factory management was
important. Human assets were the most valuable assets to the company. Moreover, they emphasized production management in order to saves costs for firms. Firms focused on BOM (bill of material) and apply software like ERP systems (enterprise resource planning) to plan, revise and integrate business activities on series of production processes from inbound logistics to customer services.

2. Internal management:

The Taiwanese manufacturers emphasized enterprise self-development. Most of the firms were SMEs and their maneuverability was faster than big firms; they were capable of process engineering or organizational restructuring when necessary. And SMEs could do internal cross-organizational cooperation fast. They were bravely to discover new management ways by their innovation. Firms thought that internal factors were much more than externals, because external factors could not be controlled but internal factors could. Firms attached importance to the learning ability of employees.

3. Collaboration

Firms knew where to buy materials and the ability on searching new suppliers who could provide new materials were high. This brought them advantage on delivery dates. Moreover, firms would require forecast from customers and provide the forecasts to their suppliers; it caused the delivery date could be predicted and satisfied customers’ urgent formal orders.

4. Internationalization:

Firms established factories overseas in order to take advantage of lower labor wage level, near materials or near their customers. Going global brought profits for firms because Taiwan was too small to get nature material resources.

According to the results of interviews, the factors affected competitive advantages of the transformer industry in Taiwan were: 1) production and factory management, 2) internal management, 3) collaboration, 4) government’s attitude, and 5) internationalization. And the factors affected Japan were: 1) technology innovation, 2) internal management, 3) collaboration, 4) government’s attitude, and 5) culture.

Furthermore, both of the Japanese and the Taiwanese transformer industries produce transformers as horizontal division in the world. And both of them have to face the tendencies of 1) energy saving products will be the main products in the world, 2) environmental protection rules, 3) material cost-up and 4) rising wages.

3.1 Model Construction and the Evaluation

Framework

Production and factory management, technology innovation, and culture were combined in core value of the industry. The factors affected the competitive advantage of Taiwan and Japan transformer industries were showed in Fig. 3.

![Fig.3 Evaluation Model of This Study](image)

Factors affected competitive advantages were sorted to be 4 factors: 1) government’s attitude, 2) the level of internationalization, 3) core value of the industry, and 4) internal management.

Strategic options were taken from the view of horizontal and vertical as 1) collaboration with suppliers, 2) collaboration with the other manufacturers in the same industry, 3) collaboration with customers, and 4) collaboration with the other industries (especially marketing business). And two hypotheses were enclosed.

H1: 4 factors (affect competitive advantage) would affect strategic options of firms. (by multiple regression)

H2: Different strategic options between Taiwan and Japan would affect the collaboration. (by interview and multiple regression)

The objects of survey of this research were small and medium enterprises. About the objects in Taiwan, by combining the data from Ministry of Economic Affairs, R.O.C. [9] and Bureau of Foreign Trade [10], total 83 Taiwanese transformer manufacturers were collected, and 62 effective returns were received. About the objects in Japan, by comparing TM Net Transformer [11], member lists of Association of Kinki Transformer Industry and internet web home page of transformer manufacturers, 81 Japanese transformer manufacturers were collected, and 61 effective returns were received.

3.2 Methodology

Multiple regression was used for predictive purposes, such as estimating from a series of entrance tests how successful various job applicants might be. It generated two variations of the prediction equation, one in raw score form and the other in standardized form. The raw score equation was an expansion of the raw score equation for simple linear regression [4].
4 Estimation Result
Through multiple regression, the results were sorted in Table 1 and 2 (all VIF value were small then 10.)

Table 1 Estimation Results of Taiwan Transformer Industry

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Collaboration with suppliers</th>
<th>Collaboration with the other manufacturers in the same industry</th>
<th>Collaboration with customers</th>
<th>Collaboration with the other industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government's attitude</td>
<td>Not significant</td>
<td>Not significant</td>
<td>Not significant</td>
<td>Not significant</td>
</tr>
<tr>
<td>Level of Internationalization</td>
<td>Not significant</td>
<td>Not significant</td>
<td>Not significant</td>
<td>Not significant</td>
</tr>
<tr>
<td>Core value of the Industry</td>
<td>0.286 (0.002*)</td>
<td>0.198 (0.019*)</td>
<td>0.343 (0.000*)</td>
<td>Not significant</td>
</tr>
<tr>
<td>Internal management</td>
<td>0.197 (0.023*)</td>
<td>2.246 (0.002*)</td>
<td>1.908</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

Equation:
Collaboration with suppliers = 0.286 x highly competitive product quality in the international market
Collaboration with the other manufacturers in the same industry = 0.198 x knowledge sharing in the industry
Collaboration with customers = 0.197 x highly competitive product quality in the international market

Collaboration with suppliers = 0.197 x highly competitive product quality in the international market
Collaboration with the other manufacturers in the same industry = 0.198 x knowledge sharing in the industry
Collaboration with customers = 0.197 x highly competitive product quality in the international market

From Table 1, we knew that in this industry, core value and internal management affected the collaboration with the other manufacturers in the same industry; especially improvement in manpower quality was an investment took high weight of 0.657.

Table 2 Estimation Results of Japan Transformer Industry

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Collaboration with suppliers</th>
<th>Collaboration with the other manufacturers in the same industry</th>
<th>Collaboration with customers</th>
<th>Collaboration with the other industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government's attitude</td>
<td>0.217 (4.3310.002*)</td>
<td>2.071 (0.001*)</td>
<td>Not significant</td>
<td>Not significant</td>
</tr>
<tr>
<td>Level of Internationalization</td>
<td>Not significant</td>
<td>Not significant</td>
<td>Not significant</td>
<td>Not significant</td>
</tr>
<tr>
<td>Core value of the Industry</td>
<td>0.254 (5.0900.001*)</td>
<td>2.125 (0.025*)</td>
<td>Not significant</td>
<td>Not significant</td>
</tr>
</tbody>
</table>

Equation:
Collaboration with suppliers = 0.217 x provision of talent cultivation programs and advantageous trainings
Collaboration with the other industries = 0.254 x knowledge sharing in the industry

Level of Internationalization

From Table 2, we knew that if Japan government provided provision of talent cultivation programs and advantageous trainings, it would affect the collaboration with suppliers more than others. Internal management affected strategic options more than other 3 factors, and cross-organization took the weight of 0.401.

According to Table 1 and 2, H1 and 2 were partially significant. Besides, by interview, both of the Japanese and the Taiwanese transformer industries produced transformers as horizontal division in the world which meant that collaboration in the same industry had become important. Taiwan and Japan transformer industries collaborated was possible; however, form both of them, only the factor of “internal management” was significant.

5 Conclusions
According to interview results, Taiwan transformer industry had competitive advantages on factory management and internationalization, and Japan transformer industry had competitive advantages on technology innovation and high quality control. Through survey, the possibility of collaboration between Taiwan and Japan transformer industries was identified. We suggested that firms should focus on their internal management, by crossing organization collaboration, processing engineering or organizational restructuring when collaborate, it could improve their competitive advantages.
References:


[9] www.moea.gov.tw (Ministry of Economic Affairs, Taiwan)

[10] www.trade.gov.tw (Bureau of Foreign Trade, Taiwan)