A Study of Competitive and Cooperative Strategies on Taiwan Amplifier and Speaker Manufacturers

Chunwei Lu, Chenghsien Sung, George Y. Wang, Weichin Li

***Abstract*—**Economic globalization had forced and was still forcing firms to develop new global manufacturing and distribution concepts. Through the development of economic globalization, every government and firms in the world was proceeding to reform and redevelop in order to deal in globalization to get competitiveness. From designing products, searching customers, getting orders, inbound, operations, outbound to after services, the value chain of firms had become globalization. This study found the competitiveness of the Taiwan amplifier and speaker manufacturers, and questionnaires were issued to the object companies. The purpose of this study was to find out how competitive and cooperative strategy of the industry and what kind of cooperative strategy was properly for the industry. Based on M. E. Porter's competitiveness theories and value chain, a specialist questionnaire was utilized to establish a complete evaluation framework for the firms. Furthermore, cooperative strategy was a crucial issue for firms to develop their manufacturing or marketing service. Firms were able to apply their core value with strategic alliances as main tools to lower costs. They had to respond by introducing lean production and flexible organizations with a high innovation capability. Strategic alliance in the reorganization of relations to the other actors, notably, customer and suppliers were important. Therefore, interdependent relations in this industry were emphasized. The study found that most of the firms emphasized on self-development and products' differentiated, and they would cooperate customers rather than with the other manufacturers in the same industry. Moreover, the study indicated that "quality manpower and resources of the industry", "supports from suppliers", and "cooperate with customers" were the three main factors on the competitiveness of the industry. The implication of this research was to enhance on procurement ability, equipment application, and apply human resources should be used for the industry to review and enhance its competitiveness in the future.

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I. Introduction

SPEAKERS and amplifier were two of the most important parts for audio products, and audio industry was identified under consumer electronics. The audio industry of Taiwan established the factories in Mainland China, Vietnam or Eastern Europe. The research and development of technology of Taiwan had lagged behind Europe, America and Japan. Some of the Taiwan audio firms had their own brands; however, the brands were not famous and most of the main businesses were doing ODM/OEM for international companies, like Sony, Pioneer, Polk, Axiom, and REL.

In regard to technological development, globalization of the economy and competitive pressures, firms had to face more and more competitors. One of the most important purposes of firms to develop was serving customers; therefore, the regional horizontal divisions were occurred and drove the industry to develop. Moreover, in order to overcome more and more challenges as firms attempt to go global, they had to learn how to learn from the constant flow of new demands, opportunities and challenges.

Audio products were subject to safety laws which required electrical appliances must cover safety tests in accordance with standards like UL, CE, CCC, BSMI, PSE, and other standards; thus, while a customer approved one design, it was hard for the customer to change the same product to the other manufacturers, especially while the customer paid the safety fee. The main materials for an amplifier were transformer, panel, heat-sink and ICs. The prices up rose since 2004. For firms, it was a big challenge between suppliers and customers.

While people discussed about business, a profound impact on various business activities and value chain activities must be concerned. It included "supplier relationships", including production and supply chain management [1, 2], R&D, comparing product data management [3] and design, commercial activities, referring to ordering, billing and enterprise resource planning [4], and finally marketing and sales, including customer relationship management [5]. This paper researched how Taiwan amplifier and speaker

manufacturers competed with the globalization, and how they worked with their customers, suppliers, and the other manufacturers in the same industry in order to get the competitiveness. The purport of this study was to deal with the competitiveness of the industry and the strategies alliances among press organizations under this circumstance.

II. Literature Review

A. Competitive Strategy

Over the last decade, a new global business environment had evolved. The vast majority of businesses now had some forms of global presence through competitive, cooperation and joint ventures. The international development of financial markets, of technology and of some manufacturing and service bring firms a new set of limitations upon the freedom of action of nations.

Competitive strategy was the search for a favorable competitive position in an industry, the fundamental arena in which competition occurs. It aimed to establish a profitable and sustainable position against the forces that determine industry competition. Technology alliance was defined as technological collaboration in some researches and reflects the nature that two or more partners contribute different resources and technological know-how to jointly agreed aims of such a cooperation activity.

B. Value Chain

Firms needed to develop a unique set of skills that other organization do not have. This kind of abilities were supposed to be incorporated into the business's activities, but attaining them requires a detailed analysis of these very activities, which Porter grouped under another fundamental notion in his thought-the value chain. Porter introduced a generic value chain in 1985. Value chain focused on cost management efforts and allowed alignment of process with customers. It provided for efficient process which improved the timeliness of operations. Value chain focused on cost management efforts and allows for an alignment of process with customers. It provided for an efficient process that improved the timeliness of operations. Value chain model was as follows[6]:

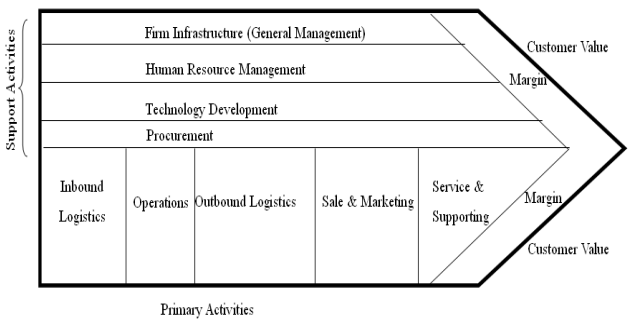

Fig. 1 Porter's value chain model

The primary activities of value chain were inbound logistic, operations, outbound logistics, sales and marketing, service and supporting; and the support activities were general management, human resource management, technology development and procurement. The goal of these activities was to offer customers a level of value that exceeds the cost of the activities, thereby resulting in a profit margin. Multiple infrastructures increased costs at all levels, with respect to operations, maintenance/support, security and services [7]. Because technology was employed to some degree in every value creating activity, changes in technology could impact competitive advantage by incrementally changing the activities themselves or by making possible new configurations of the value chain. Technology and value chain of this industry was explained as follows:

1) Inbound logistics: it included material handling and storage, transportation, communications, educations, testing and information systems, and the receiving and warehousing of raw materials were required. The prices of international raw materials effected upon this industry. Firms had to follow different customers' needs to create different level products.
2) Operations: the processes of transforming inputs into finished products and services. Technology development was not only a support activity but also one of the most important primary activities for the industry. Not only R&D was important but also integrated testing equipment was needed. Sometimes, customers designed and the firms did the jog as ODM/OEM.
3) Outbound logistics: the manufacturers worked for the international companies as ODM/OEM factories; most of the firms did not need to focus on warehousing of finished goods, inbound logistics was much more important than outbound logistics.
4) Marketing and sales: the identification of customers' needs and the generation of sales. Most of firms did not contact with their final customers, they sold products to international companies to assemble or to overseas distributors.
5) Service: It included after services. In this industry, most of the firms did not touch finial consumers or distributors. They customized products to specific customers.

Moreover, John H. Dunning & Feng Zhang [8] extended M.E. Porter's Resource-Based theory and identified competitiveness as the resources, capabilities and markets (RCM) which made up the physical environment in which firms and other organization create economic well-being; and second, the institutions which provided the incentive structures to make up the human environment, and which set the rules of the game for, and

determine the cognition and motivation of, firms and other wealth creating entities, that produce wealth; these were the components of competitiveness [9].

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 gave 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.

C. Typology of Alliance

Technology alliance was defined as technological collaboration in some researches and reflects the nature that two or more partners contribute differential resources and technological know-how to jointly agree aimed of such a cooperation activity.

In business relationships, bounded rationality forces companies to work in the grey area where relations and trust replace the fine calculation of costs, short term profits and returns. Therefore, cooperation was a substitute for the assurance of solid quantitative evidence. The primary driver of cooperative strategy was the emergence of intense global competition. By relating cooperation and conflict, Yoshino and Ragan maintained Typology of Alliance [10] and it was showed in Table 1.

Table 1 Typology of Alliance

		Extent of Organized Interaction	
		Low	High
Conflict Potential	High	Pre-competitive Alliances	Competitive Alliances
	Low	Pro-competitive Alliances	Non-competitive Alliances

By relating two concepts, four types of alliances were created. A pre-competitive alliance typically bring together firms from different, unrelated industries while pro-competitive alliances were formed by firms at different industries in the vertical value chain to further the competitiveness of the chain. Non-competitive alliances were typically intra-industry alliances among non-competing firms. About pre-competitive, as an example, an amplifier manufacturer did strategy for expanding their market with customers was seemed to be a kind of pre-competitive alliance. Their extent of organized interaction was low; however, their potential conflict was high.

D. Defining Competitive and Cooperative Strategies

From the 1950s to the 1970s, we witnessed a dramatic growth of the multinational companies which, by meaning of the multi-divisional form (M-form) of organization [4], internalized as many activities as possible [11]. The purpose of strategic alliance was to be source of competitive advantage [9, 12]. Companies responded by starting to externalized activities, strategic alliances being one of the most popular meant of responses [13, 14]. In 1993, Buckley and Chapman agreed that a property strategic alliance must be defined for a given time [15].

Firms have taken new initiatives in managing their environmental impacts [16]. They seek new ways to reduce their costs, increase their efficiency, lower their liabilities, and enhance their competitiveness while reducing pollution, conserving resources, and eliminating waste. This view, to some extent, negates some of the benefits promoted as accruing from the use of technology to integrate the supply chain [17, 18].

Competitive strategy was the search for a favorable competitive position in an industry, the fundamental arena in which competition occurs. It aims to establish a profitable and sustainable position against the forces that determine industry competition [19]-[21]. This research listed the previous definitions for competitiveness as below.

Table 2 Previous Definitions for Competitiveness

Scholar	Content
Colin Leys [11]	The International development of financial markets, of technology and of some manufacturing and services bring firms a new set of limitations on the freedom of action of nations. To survive, nations and firms must increasingly "manage" national politics in such a way as to adapt them to the pressures of trans-national market forces.
Dennis A. Rondinelli [5]	A competent state needs to provide for open, efficient, and competitive markets. Increasing firms' competitiveness (including social) through the implementation of sound economic policies was also crucial for good and effective governance.
John H. Dunning & Feng Zhang [8]	The resources, capabilities and markets (RCM) which make up the physical environment in which firms and other organization create economic well-being; and second, the institutions which provide the incentive structures to make up the human environment, and which set the rules of the game for, and determine the cognition and motivation of, firms and other wealth creating entities, that produce wealth; these are the components of competitiveness.
Michael E. Porter [22]	Competitiveness depends on the productivity with which a nation uses its human, capital, and nature resources. A nation competes to offer the most productive environment for business and thereby creates competitiveness. The public and private sectors play different

but interrelated roles in creating a productive economy.

According to Chandler [23], from 1950s to 1970s, we witnessed a dramatic growth of the multinational companies which, by means of the multi-divisional form (M-form) of organization, internalized as many activities as possible. This, on the other side, led to bureaucracy and inflexibility and form the late 1970s onwards, the companies responded by starting to externalize activities, cooperative strategies being one of the most popular means of response [24]. This popularity has made it necessary to redefine the role of not only governments to encompass alliances but also industries to re-think as a competitive mode of organization rather than as collusion [25].

A property cooperative strategy must be defined for a given time [24]. Assumed the partners had near complete information and thus were able to prepare a detailed plan for the strategies, in contrast as a long-term arrangement would make it difficult to foresee the end; therefore, it should also be stressed that the partners of a cooperative strategy need "not" had common goals which meant that they may have different goals. The goals were known and that it was agreed that the different goals could be fulfilled within one and the same strategies [25]. A core for cooperative strategy was that the firms possessed resources attractive to others and that the partners had access to the resources and capabilities of each other [26]. In other words, firms cooperated to compete. They did not collaborate to circumvent competition [27].

Both microeconomic and macroeconomic competitiveness must be concerned. In regard to literature reviews, competitive and cooperative strategies were defined that in order to service customers, firms had to apply their core values (including resources, technology, internal management, and innovation) to cooperate with their partners. The partners could be their customers, suppliers, the other manufacturers in the same industry or even the other industries. As an example, an amplifier manufacturer cooperated with transportation companies in order to get competitive freight charges to quote a competitive price for their customers. Meanwhile, firms had to know how and who to compete and cooperate in order to improve their competitiveness.

III. Method

According to the statistics from MIC IT IS in 2004 [28], the ratio of Taiwan international vertical integration of electronics manufacturers was around 0.26, higher than the other industry. Firms imported components to assemble then exported to the other countries. It meant Taiwan electronics industry was in the chain of international vertical integration. Moreover, IT IS showed the ratio of audio industry exporting in 2008 was higher than 2006 and 2007.

Enterprise scales were distinguished into three parts in this study: large-medium enterprises, small-medium enterprises and small enterprises. According to the Executive Yuan of R.O.C., the definition of large-medium enterprise was that in the manufacturing, a paid-in capital of over NT$ 80 million or over 200 regular employees; and small-medium enterprise was identified to be a paid-in capital of less than NT$ 80 million or less and the number of regular employees must be less than 200; small enterprises was with the number of regular employees less than 20. We combined the data from Ministry of Economic Affairs, R.O.C and Bureau of Foreign Trade and there were total 145 amplifier and speaker manufacturers who also had import and export trading Taiwan. The totals of 145 questionnaires were mailed and 81 effective returns were received in Jan. 2008. The effective return ratio was 55.86% [29]-[31].

A. Model Construction

According to Porter's value chain, both primary activities and support activities were important for firms and value chain was seemed to be an estimation method for firms to evaluate their internal management. However, it was not limited in internal management; it must be seemed to be a kind of interaction between internal and external. In inbound logistics, firms had to search proper suppliers; in outbound logistics, firms had to find proper transportation companies; in sales and marketing, firms had to know where their target market was and how their competitors did, and in service and supporting activities, firms had to service their customers. The purpose of all the activities were service their customers to gain add-value for firms.

Combing value chain and typology alliance, this study distinguished three sections of competitive and cooperative strategies for the industry to examine who to cooperate was a proper way for the industry and how they compete with the other manufacturers in the same industry-vertical integration, horizontal division and competitive scenario of the same industry. Vertical integration was a kind of pro-competitive alliance; it focuses on the relations between suppliers and customers. Horizontal division was pre-competitive alliance, and competitive scenario of the same industry was a kind of non-competitive versus competitive relationship. The evaluation framework of this research was in Figure 2.

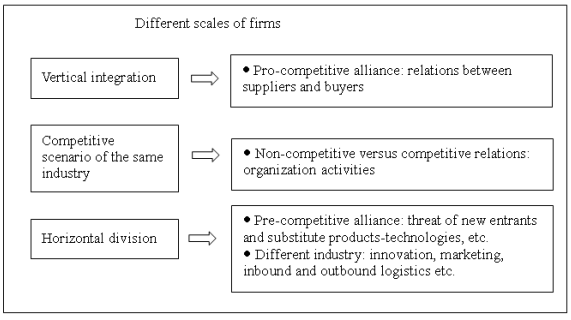

Fig.2 Evaluation framework

Vertical integration meant a style of management control. It was relations between upstream and downstream which meant that suppliers and buyers made a compact of control to each other; the potential competitive was not obvious. The advantageous position for firms were different, firms must develop their strengths on the value chain to get add-value. It included support activities, primary activities, price sensitivity from suppliers and buyers, R&D and switching costs.

Horizontal division was in the sense that partners cooperate in some missions. The conflict was high but organization activities might be low. For example, an amplifier manufacturer was pre-competitive new technology development with the other manufacturer who advantaged to digital sound R&D. The two firms expected to reap profit by flexible cooperate strategies.

IV. Hypotheses

SPSS 12.00 software was used to analyze. Descriptive statistics and factor analysis results were enclosed in estimation results [32]. A very readable and informative history of the development of factory analysis was provided in the beginning of Harry Harmon's classic text. Factor analysis includes exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA approach was presented as a method for discovering how many factors could be used to explain in the relationships among a given set of observed measures, and which variables load considerably on which factor [42)]-usually be used in pre-investigation. CFA was not concerned with discovering or disclosing factors as EFA, but instead with quantifying, testing, and confirming an a priori proposed (preconceived) or hypothetical structure of the relationships among a set of considered measures. This study used CFA to find what factors took how much percentage on competitiveness of the industry. Many scholars consider that factor analysis was one of the large-sample statistical procedures that the sample drops below an N of 100 was poor (over 200 was fair) [33]. According to Tabachnick & Fidell, the correlations among the variables were high but the correlations among the factors are not high, 50-100 samples are acceptable [34]. Kaiser-Myer-Olkin (KMO) was between 0-1, measures of sampling adequacy and Bartlett's Test of Sphericity. The KMO index can tell researchers how effectively the variables can be grouped into a smaller number of underlying factors. According to Kaiser, KMO value over 0.90 was marvelous (perfect to do factor analysis), over 0.8 was meritorious (meritorious), over 0.7 was middling, over 0.6 was mediocre, 0ver 0.5 was miserable, and below 0.5 was unacceptable [35, 36].

According to the framework of this research, the hypotheses were as follows:

H1: Firms would like to vertical integration rather than horizontal division.
H2: Different enterprise scales had different inclination toward to cooperate with customers or suppliers.
H3: Cooperating with customers was a significant factor on the competitiveness of the industry.

V. Results

A. Average Scores

Cronbach's α was a measure of how well each individual item in a scale correlates with the sum of the remaining items. Cuieford pointed out that Cronbach's α coefficient of 0.7 referred to high intensity of reliability, and the one between 0.7 and 0.35 referred to acceptable standard. Once Cronbach's α coefficient was lower than 0.35, it meant rejected validity. The Cronbach's α of the vertical integration (relations with customers and suppliers) was 0.90; of the horizontal (new entrants and substitutes) was 0.68; of perceived cooperation with the other manufacturers in the same industry was 0.75. Likert scale was used in this research, and the top ten ranking important factors that affect the activities of the industry on value chain were sorted in Table 3.

Table 3 Ranking of Factors to Affect the Activities of the Industry on Value Chain

Ranking	Section	Average scores
1	Quality demand by customers	4.12
2	Procurement ability of the firms	3.96
3	Equipment application of the firms	3.94
4	Human resources of the firms	3.82
5	Technology of supportive suppliers	3.79
6	Financial situation of the firms	3.74
7	After service demand by customers	3.74
8	Cost down demand by customers	3.73
9	R&D capitals of the firms	3.73
10	Design demand by customers	3.70

From Table 3, we knew quality was a crucial factor in this industry. Customers concerned about quality and price. Thus, the ability on purchasing (drove cost down on material costs) was an important factor in this industry. Meanwhile, both the ability of firms and customers' needs were respected.

About international expansion, there were 44.60% firms answered that they had located plants outside of Taiwan, and 18.20% firms answered that they had set up branch

companies, offices or business units outside of Taiwan. Base on Yoshino and Ragan's typology of alliance, this research

Table 4 Average Scores on Typology Alliance in the Industry

Enterprise scales	Pre-competitive Alliances	Competitive Alliances	Pro-competitive Alliances	Noncompetitive Alliances
Large-medium	3.04	2.99	4.06	3.88
Small-medium	2.50	2.30	3.97	3.23
Small	2.92	2.56	3.63	2.88
Total	2.82	2.62	3.89	3.33

The manufacturers would like to make pro-competitive alliances which meant that firms would like to cooperate with the other industries where with lower potential conflict and lower extent of organized interaction. Most of the firms emphasized on self-development; therefore, they would like to cooperate with customers or suppliers rather than to cooperate with the other manufacturers in the same industry because this industry was high competitive. Moreover, the average score on non-competitive alliances was 3.33, it meant that firms would like to cooperate with the other manufacturers in the same industry but they were not competitors on market and their products might be differentiated. For example, firms who produced Class A/B type (analog) of amplifiers would like to cooperate with the other firms who make Class D type (digital) amplifiers while they wanted to upgrade their products. Their extent of organized interaction was high.

Table 5 was the average scores of the percept of the Taiwanese amplifier and speaker manufacturers to cooperate with their suppliers.

Table 5 the Percept of the Firms to Cooperate with their Suppliers

Enterprise scales	Case number	Percentage	Average scores
Large-medium	22	27.15%	2.93
Small-medium	37	45.70%	2.78
Small	22	27.15%	2.87
Total	81	100.00%	2.86

From Table 5, the percept of the firms to cooperate with their suppliers was not high. And the percept of the firms to cooperate with their customers was sorted in Table 6 as below.

Table 6 the Percept of the Firms to Cooperate with their Customers

Enterprise scales	Case number	Percentage	Average scores
Large-medium	22	27.15%	3.60
Small-medium	37	45.70%	3.53
Small	22	27.15%	3.58
Total	81	100.00%	3.57

sorted the average scores in Table 4.

Comparing with the average score in Table 5 and 6, firms trended to cooperate with their customers rather than suppliers.

About the percept of the firms to cooperate with the other manufacturers in the same industry, the average scores were showed in Table 7.

Table 7 the Percept of the Firms to Cooperate with the other Manufacturers in the Same Industry

Enterprise scales	Case number	Percentage	Average scores
Large-medium	22	27.15%	3.00
Small-medium	37	45.70%	2.56
Small	22	27.15%	3.03
Total	81	100.00%	2.86

Comparing with Table 5 and 7, the total average scores on cooperating with suppliers and the other manufacturers in the same industry were the same-2.86. Moreover, this study found that small enterprises in the industry respected on customers introduced by their suppliers or the other customers (average score 3.3) more than the large-medium and small-medium enterprises. In regard to Table 5 and 6, firms would like cooperate with customers rather than with the other manufacturers in the same industry was identified; therefore, H1 was partially significant. Furthermore, from the average scores, the percept of large-medium firms cooperating with customers and suppliers was higher than the other firms; however, by T-test, it was not significant (T-value 0.887 to cooperate with customers and 0.295 to cooperate with suppliers). H2 was not significant.

B. Factory Analysis

In order to examine H3: Cooperating with customers was a significant factor on the competitiveness of the industry-partially significant.

The Kaiser-Meyer-Olkin (KOM) value was between 0~1. In this case, KOM value was 0.795 and Bartlett's Test of Sphericity was approx. Chi Square 831.197 (sig. 000*). There were total 19 variables to examine the inclination of the firms toward to cooperate with customers, suppliers or the other manufacturers in the same industry, by varimax method, the factor analysis results of the Taiwanese amplifier and speaker industry was in Appendix I.

In analysis of the reliability, the coefficients of Cronbach's α were 0.692, 0.678 and 0.695. The five factors were all measured consistently. The measure of sampling adequacies (MSA) of the three factors were 0.884, 0.880 and 1.089; all of them are over 0.6 mean that they were extracted properly [44]. And the three factors of the competitiveness of the manufacturers were identified, and they were indicating good subscale reliability. Meanwhile, the present three-factor model was deemed the best solution because of its conceptual clarity and ease of interpretability. They were named as follows:

Factor 1: quality manpower and resources of the industry
Factor 2: supports from suppliers
Factor 3: cooperate with customers

Factor 1 took the percentage of variance 22.926 which meant that factor 1 was the most important factor of the competitiveness of the industry. Firms in order to get competitiveness were to focus on the resources of the industry and develop their manpower. H3 was verified.

C. LMEX Basic Metal Exchange

Figure 1 showed LMEX basic metal exchange index from 2005 to 2010 (information from London Metal Exchange-the World Center for Non-Ferrous Metal Trading) [37].

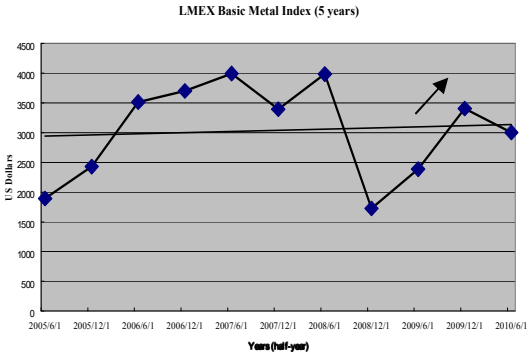

Fig.3 LMEX Basic Metal Index (5 Years)

As an example, in 2008, the average price of steel was US$ 479.59, the highest price was US$ 950.00 and the lowest price was US$ 250.00. The unstable material prices caused firms had to decide to prepare or not to prepare materials (steel price concerned about panel and heat-sink prices) because it would affect the cash flow of firms and purchasing costs. Moreover, rising wages was one of crucial problem for firms. China labor wages had been rising. Between 1978 and 2007, the average real annual wage for staffs and workers grow more than sevenfold from 3,285 to 24,943 yuan. In the period 1998-2007, wage growth accelerated to an astonishing 13.20%. This period of wage explosion has been coincided with China's preparation for and accession into the WTO [38].

In-depth interview with CEOs, amplifier and speaker industry in Taiwan was high technology industry. SWOT analysis was in Appendix II. And firms thought that cooperate with suppliers, customers and the other manufacturers in the same industry could bring firms to be A+. Moreover, if firms were only focus on their business without collaborating with their customers, suppliers or the other manufacturers in the same industry, they might miss information and fallen on strategies. Furthermore, firms thought that they needed to face the tendencies of:

(1) Energy save products would be the main stream in the world, especially on consumer electronic devices.

(2) Environmental protection rules: firms had to do actions on WEEE (Waste Electrical and Electronic Equipment) or RoHS (Restriction of Hazardous Substances Directive), etc.

(3) Material prices up and down: it made firms hardly to control their stock. Firms had to predict if the materials would be price down or price raise or their loss would be huge. Moreover, in order to face the fluctuated material prices, firms had to up-grade their products to high-end, and low-end products set free to China or Vietnam domestic manufacturers. Therefore, sharing technology in the same industry became important lessons for firms.

The firms learnt from the Japanese and American manufacturing ways. When they went global, they were good at applying innovation to re-develop and reform the production processes by themselves to suit the domestic employees' lifestyle and the level of educations. Because firms needed a large number of employees on production lines to make products, factory management was important. Human assets were one of the most valuable assets to the company. Moreover, they emphasized on production management in order to save costs for firms. Firms focused on BOM (bill of material) and applied 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. 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 be controlled by the managers of the firms. Firms attached importance to the learning ability of employees and thought it was important to make innovation.

VI. Conclusion

Firms in this industry would like to cooperate with their customers rather than suppliers or the other manufacturers in the same industry; therefore, H1 was partially verified but H2 was not significant. From in-depth interview, CEOs thought that to up-grade their products and technologies were important and cooperate with the other manufacturers in the same industry might help firms to get innovation on current technology and manufacturing way. The threat of substitute products was not a significant threat of the industry because the tone quality between digital devices and analog were different.

Moreover, the crucial factors of the competitiveness of the industry were also verified by description statistics and factor analysis. This paper demonstrated the three-factors affected the competitiveness of the industry, and they were (1) quality manpower and resources of the industry, (2) supports from suppliers and (3) cooperate with customers. By factor analysis, H3 was verified.

There were three findings of this research:

(1) Most of the firms did the jog as ODM/OEM for international companies. They did not touch final customers directly; therefore, they would like to cooperative with customers in order to know their target market and up-grade their products in order to suit for their final customers' needs.

(2) The industry was high competitive. By factor analysis, they thought that getting supports from their suppliers was important, as an example, they would like to get contract prices to maintain their quotations.

(3) Firms concentrated on up-grade their products' quality to service their customers, cost down from procurement, inbound logistics to after service in order to satisfy customer's needs, and human resources could help them get competitiveness, and the other activities in value chain were also important.

In order to grow and enhance the overall competitiveness of the Taiwanese amplifier and speaker manufacturers, the results of this paper provided views for future references.

APPENDIX I

The Factor Analysis Result

Variance	Communalities	Factors Loadings			% of Variance	Cumulative %
		Factor 1	Factor 2	Factor 3		
2	0.699	0.833	0.072	0.002		
1	0.553	0.769	0.082	0.049		
3	0.600	0.733	0.097	0.078		
6	0.514	0.658	0.154	0.241		
10	0.525	0.605	0.138	0.375	22.926	22.926
4	0.414	0.596	0.217	-0.105		
5	0.342	0.557	0.145	0.102		
9	0.468	0.534	0.345	0.254		
8	0.540	0.522	0.395	0.334		
12	0.626	0.036	0.774	-0.159		
11	0.596	0.230	0.733	0.082		
14	0.753	0.225	0.714	0.276		
13	0.614	0.116	0.706	0.155	18.522	41.449
15	0.637	0.091	0.637	0.478		
7	0.580	0.497	0.574	0.057		
17	0.445	0.082	0.364	0.317		
19	0.326	0.192	0.243	0.255		
18	0.547	0.175	0.196	0.929	9.820	51.269
16	0.388	0.256	0.048	0.280		

APPENDIX II

SWOT Analysis for the Taiwanese Amplifier and Speaker Manufacturers

Value Chain Activity	Strength: Opportunity & Threat	Weakness: Opportunity &Threat
Inbound Logistics According to the influence of fluctuant international material price and the upper supplier's price, to purchase different level materials and create different level's products according to customer's needs. Material warehousing was controlled by ERP systems or others.	S.O.: • Materials prices trended to consistency: Bulk produce might get 20% off or more, however, most suppliers did not sale for small quantity. • Clustered upper suppliers: easier to inquiry or purchase materials in one location. • No counterfeit electronic component. • Compare to Europe and USA, materials prices were inexpensive. S.T.: • High quality main parts like ICs, transistors were controlled by the Japanese and American companies (prices and lead time).	W.O.: • Imitate mutually products to make new ones by self-no creating only imitate. Replacement high prices materials to cheaper to make finial products more competitive on market. • Different kinds of customized products but small quantity caused it was hard to reduce materials costs. W.T.: • Customers who trended to lower and cheaper products purchased in China or Vietnam domestic manufacturers directly. Firms who made low-end products must up-grade.
Operations (included R&D activities) Quality manpower and specialized equipment were needed. Divided into standard and customization production.	S.O.: • The technology was high. Not every new entrant without experiences can make amplifiers or speakers as well. • Sufficient technical staff: training from offshore foreign investors. S.T: • Less professional experience to generation • Less education trading for R&D	W.O.: • Lack of self-design ability: imitate the design and functions from developed countries. • Huge costs on R&D • Limited by laws and regulations: UL, ETL, CSA, TUV, etc.
Outbound Logistics Final product warehousing control. Customer forecast and real order control.	S.O.: • Efficient production capability and complete production line (with production know-how) S.T.: • Dispose of production line most in China where have lower labors cost or social insurances.	W.O.: • Needs to invest a huge capital on equipment. W.T.: • While firms go overseas, the transpiration (outbound logistics) and domestic government's policy was considered.
Sales & Marketing Firms did the jog as ODM/OEM for international companies. Rarely contacted with end users by own brand. Firms attracted famous factories or agencies through joining exhibits or by public praise etc.	S.O.: • Cooperation with downstream and customers could save marketing investigation costs. S.T.: • Orders were controlled by buyers. Although orders quantity normally stable but price was a main factor to attract customers. • New technology products, like PDA, i-phone, MP4	W.O.: • Rarely contacted with end users-consumers cause lack for market trend data of consumers demands. • USA, Japan and Europe buyers required to use their own brand (patriotism). Firms can not expand their own brands on the world. W.T.: • Once major orders were drew out, the operation of

	were substitute.	factory would be serious (accurate plans are needed to avoid this situation)
Service & Supporting • Date of delivery • After service	S.O.: •The delivery control was important, because customers had their own produce schedule. • Immediately service (feedback customers' needs) was important. S.T.: • The service contract with customers	W.O: • Date of delivery was influenced by material, production and transportation.

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