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Effects of Partner Characteristic, Partnership Quality, and Partnership Closeness on Cooperative Performance: A Study of Supply Chains in High-tech Industry

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ABSTRACT

Owing to the rapid development of information technology, change of supply chain structures, trend of globalization, and intense competition

in the business environment, almost all enterprises have been confronted with unprecedented challenges in recent years. As a coping strategy, many of them have gradually viewed suppliers as "cooperative partners". They drop the conventional strategy of cooperating with numerous suppliers and build close partnerships with only a small number of selected suppliers. This paper aims to explore partnerships between manufacturers and suppliers in Taiwan's high-tech industry. Through a review of literature, four constructs, including partner characteristic, partnership quality, partnership closeness, and cooperative performance are extracted to be the basis of the research framework, hypotheses, and questionnaire. The questionnaire is administered to staff of the purchasing and quality control departments in some high-tech companies in Taiwan. The proposed hypotheses are later empirically validated using confirmatory factor analysis (CFA) and structural equation modeling (SEM). This paper expects to provide substantial suggestions to enterprises in the high-tech industry and help them develop mutually beneficial partnerships.

Keywords: *partner characteristic, partnership quality, partnership closeness, cooperative performance*

INTRODUCTION

In Taiwan's current business environment, the information technology industry is an industry with the highest business performance and has been considered as the main economic support for local manufacturers. In the present, it is holding certain advantages for future development. However, it has been confronted with numerous challenges in the operation of global logistic management and an increased demand for

research and development (R&D) capacity. In addition to advancement in R&D and processing techniques, entering the global market and cooperating with partners has been more and more emphasized. From the general perspective of supply chains, increase of efficiency in supply chain management, which covers supply chain planning, purchasing, production, delivery, and maintenance, as well as decrease of supply chain management cost are the keys to surviving corporate competitions. Supply chain management is no longer an instrument that facilitates transactions. It has been viewed by many international enterprises as the core of all competitive strategies.

In the past, enterprises tended to cooperate with multiple suppliers to minimize costs and avoid risk concentration. With the change of the environment and industries, many enterprises in nowadays have gradually viewed suppliers as "partners" for the sake of long-term cooperation. They drop the conventional method of cooperating with multiple suppliers and seek closer partnerships with only a small number of them. Therefore, in the current business environment where competitions are intense, how to achieve integration of supply chains is strongly emphasized.

For corporate management, partnership has become particularly important. Before establishing a partnership, enterprises will first evaluate the characteristic and fit of this new partner. The partnership quality influences the closeness of their cooperation (partnership), and such closeness of cooperation (partnership) has potential impact on their cooperative performance. Through an overview of previous studies, we have found that most of them are focused on front-end customer relationship management to help enterprises create customer value and solicit orders. An integrated model has seldom been adopted to explore partnerships between manufacturers and suppliers in back-end supply chain integration.

This paper is then designed to explore the relationship among partner characteristic, partnership quality, partnership closeness, and cooperative performance and construct a research model based on these four constructs. The research focus is placed on high-tech companies (dedicated to R&D or manufacturing of IC, computer peripherals, communications, optoelectronics, and biological technologies) in Taiwan Hsinchu Science Park. A questionnaire survey is conducted on staff of purchasing and quality control departments in these companies. Through this survey, we expect to empirically explore the cooperative relationships between manufacturers and suppliers and provide some substantial implications for the current high-tech industry in Taiwan.

LITERATURE REVIEW

Technology advances at all times. The trends of shortening product life cycles and forming global economic systems have made it difficult for traditional corporate entities to quickly adapt to the ever-changing environment. Those used to fighting alone can hardly survive in the present. Thus, many enterprises have realized the importance of partnership. Instead of cooperating with multiple suppliers, they now try to form close partnerships with only a small number of suppliers to access important resources and seek organizational growth. The following is a review of literature associated with the four constructs adopted in this research, namely partner characteristic, partnership quality, partnership closeness, and cooperative performance.

Partner Characteristic

In the formation of a strategic alliance, partner characteristic is one of the important factors that enterprises consider (Pelton et al., 2001). However, the strategy of forming partnerships is not an elixir and may entail certain risks. A bad partnership may result in a waste

of resources and opportunity costs. Studies have shown that failure of a strategic alliance is partly attributed to a wrong decision made in the choice of partners (Hitt et al., 2000). Besides, lack of strategic and operational fitness between partners may also lead to conflicts, which cause obstruction in information sharing, distortion of truth (Bennet and John, 2001), and even termination of a partnership in the worst case (Serapio and Cascio, 1996). Only careful application of partnership can help enterprises create values. Thus, selecting a right partner is a strategic decision that all enterprises should carefully make when forming a new partnership. The overall fitness between the two parties has significant influence on the performance of the formed alliance. This reveals that partner characteristic is positively correlated with the success of a strategic alliance (Saxton, 1997).

Partnership Quality

According to Crosby et al. (1990), relationship quality is an overall assessment of the strength of a relationship and the extent to which it meets the needs and expectations of the two parties based on a history of successful or unsuccessful encounters or events. Williamson (1979) mentioned that relationship quality can maintain a long-term relationship between buyers and suppliers. It allows buyers to reduce transaction costs and uncertainty over future profits by making long-term commitments to suppliers. Morgan and Hunt (1994) proposed that success of a long-term partnership is built on mutual trust and commitment. More trust means more assurance, while commitment means that a certain amount of resources will be persistently invested, and both parties are willing to maintain the cooperation. For enterprises, building trust and commitment in advance can reduce opportunistic behaviors of their partners and the risk of being used (Hill and Johns, 1995). It can be discovered that a higher level of trust and commitment between partners can reduce uncertainties in future

cooperation, enhance fit of partners, and raise both parties' intention to cooperate.

Partnership Closeness

Kanter (1988) argued that intensive cooperation between two partners may gradually turn a pure trading relationship into a close partnership. Spekman et al. (1998) indicated that in traditional supply chain management, most manufacturers tend to choose their suppliers on the basis of price. They share only minimal cost information and engage in pure market trading and short-term contracts. In today's supply chain management, many traditional concepts have been revolutionized. Share information with partners to jointly enhance their capabilities is now considered a must. By doing so, a win-win situation can be ultimately created, with the profits of both sides be maximized. In a study of the automobile industry, Perez and Sanchez (2001) proposed that the relationship between suppliers and customers in this industry is unique from those in other industries. For some suppliers, their relationship with customers is more like a strategic partnership. For others, it is more like a market exchange. The difference between the two models lies in transfer of information and technology, long-term trust and commitment, and supplier's involvement in product development.

Cooperative Performance

In this paper, cooperative performance is a measure of cooperative relationship between manufacturers and suppliers. Previous studies on strategic alliance performance are employed as a basis of this measure. There are generally two approaches to evaluating the performance of a strategic alliance, and these two approaches are respectively based on subjective performance and objective performance. Both approaches are commonly adopted in the academic arena. The approach based on objective performance measures the performance of an alliance by

sales growth and market share (Aulake et al., 1996). The approach based on subject performance takes into account satisfaction of members in the alliance, expected return, degree of harmony and mutual trust, perceived managing capability of the alliance, sustainability of the alliance (Beamish, 1984; Yan and Gray, 1994). Chakravarthy (1986) mentioned that performance of an alliance cannot be measured simply by profitability of a company, satisfaction of interested parties and quality of transformations should also be considered. Each alliance may have a different goal, and the effect or value of an alliance can hardly be quantified. As a result, these objective indexes are not completely suitable for evaluation of alliance performance (Anderson, 1990). According to Chiang (1998), performance cannot be measured by only financial outcomes, and changes of behaviors of partners that take place during cooperation should be included in the evaluation. As harmony and efficiency are stressed in partnerships, operational procedures between partners may be constantly modified, thus causing variation of borders between organizations.

Through a review of the above literature, the research framework is developed to explore the relationships among partner characteristic, partnership quality, partnership closeness, and cooperative performance in Taiwan's high-tech industry. It is expected that the research results can be contributive to the development of the current high-tech industry.

HYPOTHESES

The theoretic foundation of this paper is the above-mentioned literature. The research by Wu et al. (2008) is extended in this study to explore the relationships among the four constructs of partnership between manufacturers and suppliers, namely partner characteristic,

partnership quality, partnership closeness, and cooperative performance. Hypotheses proposed in this paper are as follows:

H1:"Partner characteristic" has positive influence on "partnership quality".

A partnership is aimed at building long-term cooperation. In the consideration of partners, enterprises will evaluate whether their partners and they can reach a certain consensus in terms of strategic goal, interval value, and commercial activity, so as to increase tolerance in cooperation, flexibility in operation, and minimize obstacles in cooperation. Therefore, partner characteristic is influential to partnership quality (Madhok, 1995; Angeles and Nath, 2001; Bennet and John, 2001).

H2: "Partner characteristic" has positive influence on "partnership closeness".

From the traditional point of view, manufacturers and suppliers are in an antagonist and competitive relationship. In nowadays, such relationship has evolved into partnership that requires close interactions and profound mutual understanding for the purpose of building long-term cooperation. However, if the two parties of a partnership have compatible goals, it means that they have reached a certain consensus in terms of strategic goal, internal value, and commercial activity. They will be motivated to form a closer relationship. Compatible goals not only make it easier for them to communicate and negotiate with each other but also reduce opportunistic behaviors of any party and increase information sharing; all of which can help maintain long-term cooperation (Niederkofler, 1991; Anand and Khanna, 2000).

In terms of cultural compatibility, compatible organizational cultures help enterprises build a solid partnership (Klepper, 1995). A higher similarity between two cultures has positive effect on mutual learning and knowledge transfer (Simonin, 1999; Kale et al., 2000) and will increase partners' intention to engage in more exclusive investment and establish connections in operational activities. Regarding supplementary resources and capabilities, we all know that enterprises usually seek resources absent in themselves by forming partnerships. For particular techniques, knowledge, and strategies, they form close relationships with particular partners (Coulson, 2000; Inkpen, 2001). In the present, they need close interactions with and in-depth mutual understanding of their partners to form long-term cooperation and jointly create values.

H3: "Partner characteristic" has positive influence on "cooperative performance".

Brouther et al. (1995) argued that conflicting goals in an alliance may lead to unsatisfactory alliance performance or confine its development, thus giving opportunities to competitors to lead in the competition. It can be inferred that partner characteristic has a significant influence on cooperative performance. Shamdasani and Sheth (1995) mentioned that the better that the two parties can match in terms of capabilities, and the more goals that they can jointly achieve in technology development, product development, increase of market share, and increase of competitive status, the more successful that their cooperative relationship can be. Besides, a partnership built on long-term cooperation requires consensuses between two parties over strategic goal, interval value, and commercial activity. It can not only increase tolerance in cooperation, flexibility in operation, but also minimize resistance in cooperation (Madhok, 1995; Angeles and Nath, 2001; Bennet and John, 2001).

H4: "Partnership quality" has positive influence on "partnership closeness".

A good cooperative relationship is built upon trust and commitment of the both parties of a partnership. Mutual trust is an important factor affecting the success of long-term cooperation (Frank and Richard, 2000). Commitment indicates the importance of a partnership and is an important variable that can be used to measure future relationship (Wilson, 1995). Besides, trust is a key factor affecting partner satisfaction and success of an alliance (Inkpen and Currall, 1997), and mutual trust of partners is likely to foster a close relationship (Frank and Richard,2000; Daniel, 2001).

H5: "Partnership quality" has positive influence on "cooperative performance".

Morgan and Hunt (1994) mentioned that every trust behavior is a commitment to building a partnership. If any party in a cooperative relationship lacks trust behaviors, the other parties will immediately realize that there will not be return on their commitment. This phenomenon will culminate in termination of relationship, a continuous vicious cycle, deteriorating performance, and dissatisfaction (Gundlach et al., 1995). It has been pointed out that trust has significant influence on market performance and efficiency (Aulakh et al., 1996). Trust also affects efficiency. Partners having mutual trust can reduce cost of supervision and are capable of effectively integrating the tacit knowledge and supplementary capabilities of both parties. Therefore, integrating capabilities of partners is characterized by its effects on reducing costs and amplifying values (Madhok, 1995; Dyer and Singh, 1998). As to commitment, Parkhe (1993) pointed out that commitment to investment with no return has an absolute association

with performance. In a partnership, whether one can provide resources and techniques necessary to the other and whether both can develop mutual trust and commitment all have significant impact on cooperative performance (Lewis, 1990).

H6: "Partnership closeness" has positive influence on "cooperative performance".

According to Ellram and Edis (1996), building partnerships with front-end retailers helps manufacturers increase their market share, trading opportunities, and competitiveness in the market, while building close relationships with back-end suppliers helps them reduce production preparation time, enhance product quality, reduce cost of raw materials, and jointly solve problems with suppliers. If enterprises are allowed to persistently obtain adequate and instant information from their partners, they can optimize internal operations and also adjust themselves according to external market situations (Aulakh et al., 1996). Bensaou (1999) empirically discovered that developing close partnerships can facilitate the increase of supply chain management performance.

Gold et al. (2001) mentioned that acquisition of sharing tacit knowledge helps increase the closeness of a cooperative relationship. Thus, frequent information exchanges between partners can help members of a partnership accurately respond to the others' needs, obtain better cooperative performance, and also lead them to improve their operational models (Hitt et al., 2001).

The above hypotheses can be organized into a framework as shown in Figure 1.

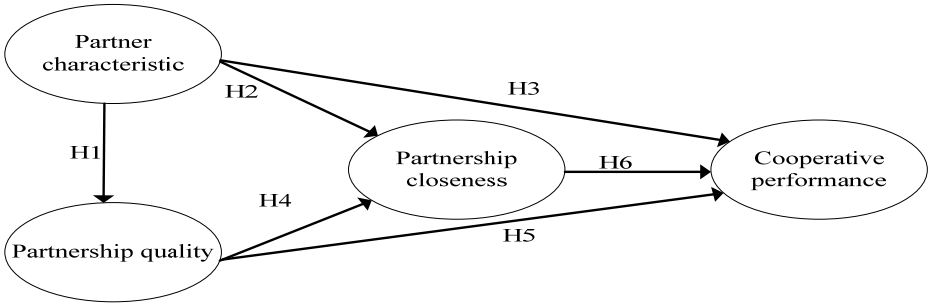

Figure 1 Research Framework.

DATA ANALYSIS AND RESULTS

In this study, the subjects were executives and general staff of purchasing and quality control departments in Taiwan's high-tech companies. With professional experience and insights about the cooperation between their companies and their suppliers, these employees could provide accurate, reliable, and comprehensive data for our research. A questionnaire designed using Likert's five-point scale was developed and administered to managers of purchasing and quality control departments in selected companies and some experts in related areas for a pre-test first. After the pre-test, the draft was modified to produce a formal questionnaire. The formal questionnaire was distributed over a period of five months. A total of 1218 copies were issued, with 255 copies returned. Of these returned copies, 224 were valid. The valid response rate was 18.39%.

Basic Analysis of the Sample

As shown in Table 1, those working in the communication companies made up the largest proportion (29.3%). In terms of history of establishment, an even distribution was obtained. The majority of the surveyed companies had a history of more than 15 years (about

38.8%). In the aspect of capital, the highest ratio was contributed by those having a capital of more than NT$5 billion (26.3%). This affirms that the high-tech industry is really a locomotive of all industries.

Table 1 Basic Data of the Sample Companies

Item	Categories	Percentage (%)	Item	Categories	Percentage (%)
Industry	Communication	29.3	Number of staffs in the purchasing department	No such department	4.5
	Computer peripheral	24.1		No more than 5 persons	32.1
	Integrated circuits (IC)	14.7		5-10 persons	15.6
	Others (optoelectronics, precision machinery, bio-tech)	31.9		Over 10 persons	47.8
History of establishment	No more than 5 years	23.7	Number of cooperative suppliers	1-2	1.3
	6-10 years	18.3		3-5	10.3
	11-15 years	19.2		5-8	9.8
	More than 15 years	38.8		More than 8	78.6
Capital	No more than NT$500 million	25.9	History of cooperation with suppliers	2-3 years	12.5
	NT$500 million – NT$3 billion	24.6		3-5 years	26.8
	NT$3 – 5 billion	23.2		6-10 years	34.4
	More than NT$5 billion	26.3		More than 10 years	26.3
Number of employees	No more than 100 persons	21.0	Source of supplier information	Report presented by suppliers in the company	38.5
	100-500 persons	23.2		Internet	31.4
	500-1000 persons	6.7		Opto-electronics exhibitions	10.6
	Over 1000 persons	49.1		Others (including electronic journals and semi-conductor exhibitions)	19.5

However, about 1/4 of the companies were established during the past five years with a capital of less than NT$500 million. These

companies were also important and should not be neglected. As to the number of employees, most of the companies had more than 1,000 employees (49.1%) and deployed more than 10 employees in the purchasing department (47.8%). In terms of the number of suppliers, the majority cooperated with more than 8 suppliers (78.6%), indicating that local high-tech companies still tended to cooperate with multiple suppliers to reduce cost or enhance self-competitiveness through comparison of multiple suppliers. Besides, most of the respondents (38.5%) said that they acquired supplier information mainly from reports presented by suppliers in their companies. The valid sample consisted of female and male respondents in equal proportions (see Table 2). Most of them were aged between 26-35 years old and have received a university degree (57.6%). In terms of position in their companies, most of them were in middle-ranking positions (including management personnel, engineers, and basic-level employees) (63.8%). Of those working in purchasing and quality control departments, most had a seniority of no more than five years.

Table 2 Basic Data of the Respondents

Item	Categories	Percentage (%)	Item	Categories	Percentage (%)
Gender	Male	47.3	Position	Manager, vice manager	13.4
	Female	52.7		Section chief, specialist	22.8
Age	Under 25	7.6		Others (management personnel, engineer, basic-level employees)	63.8
	26-35	65.2	Length of employment	No more than 5 years	63.4
	Above 35	27.2		6-10 years	27.7
Education background	MA	20.1		More than 10 years	8.9
	BA	57.6	Seniority in purchasing	No more than 5 years	75.9
	College	17.4		6-10 years	19.6
	Senior high school (vocational high school)	4.9		More than 10 years	4.5

Reliability Analysis

Reliability is a measure of trustworthiness. The level of reliability is reflected upon the consistency and stability of a measurement instrument. Determined mainly by the error of measurement, reliability indicates the level to which a measurement instrument or procedure can be trusted. However, any measurement entails error, and error is dominated by probability. In other words, it is random error. Smaller error leads to higher reliability, while greater error leads to lower reliability. Therefore, reliability can be viewed as the degree to which the test result is affected by probability. In this study, reliability was measured by the equation proposed by Cronbach (1951) as shown in Equation (1).

$$\text{Cronbach's } \alpha = \frac{k}{k-1}\left(1-\frac{\sum s_i^{\,2}}{s^2}\right) \tag{1}$$

where,

K =number of items

S^2 =total variance

Si^2 =variance of item i

According to Tan and Teo (2000), Cronbach's α between 0.5~0.6 is an acceptable level of reliability. For empirical studies, they suggested that Cronbach's α be above 0.7.In this paper, the reliability coefficients of the four constructs were as follows: partner characteristic=0.9159, partnership quality=0.8428, partnership closeness=0.8667 and cooperative performance=0.9184. All the above values were greater than 0.8, indicating the derived results had good internal consistency.

Content Validity

Chang (2001) pointed out that content validity refers to the extent or level to which a measure represents all facets of a concept. It

indicates the representativeness of the test content, sampling adequacy, and whether the content of the questionnaire represents all constructs of the measurement. In this study, the questionnaire was developed on the basis of domestic and foreign literatures and modified through a pre-test on experts and managers of purchasing departments in several high-tech companies. Therefore, the questionnaire used in this study had an acceptable level of content validity.

Structural Equation Modeling (SEM)

Structural equation modeling (SEM) is generally used to analyze a set of mutually dependent equations, especially those involving casual relationships. Combining factor analysis and path analysis, SEM can be used to analyze the causal relationships among variables. It not only makes up the drawback of factor analysis but also solves the constraint of path analysis by including error in the analysis. This method features both universality and practicality. Compared with general path analysis, it is more capable of anatomizing complicated phenomena and constructs. Besides, it can measure unknown coefficients involved in a linear structural model, so it is viewed as an important instrument in the research of behavior science and social science (Bagozzi and Yi, 1988). Wu (2006) pointed out that SEM is a mathematic model that yields objective results. It has been mainly applied to test the hypothesized relationships between observed variables and latent variables as well as the overall model fit. Confirmatory Factor Analysis (CFA) adopted in SEM, compared with the conventional Exploratory Factor Analysis (EFA), is also more meaningful. EFA is dominated by mainly instinct and informal rules, so it will be more appropriate to evaluate intensity of relationships between factors and their variables using CFA.

In SEM, difference between theoretic data and actually observed data should be evaluated from multiple perspectives. The purpose of

evaluating overall model fit is to assess whether the theoretic model can effectively explain the observed data. In other words, it is to assess the gap between theoretic model and actually obtained data.

Bagozzi and Yi (1988) mentioned that a complete SEM should involve measurement in three aspects, including Preliminary Fit Criteria, Overall Model Fit Criteria, and Fit of Internal Structure of Model Criteria. The purposes of these criteria are explained as follows: Preliminary Fit measures the error term of the model. Overall Model Fit tests the fit between the overall model and data, i.e. the external quality of the model. Fit of Internal Structure of Model assesses the significance level of the estimated parameters and reliability of each index and latent variable. In other words, it measures the internal quality of the model.

In LISREL analysis, for sample size of 100-150 samples, Maximum Likelihood Estimation (MLE) is suggested (Ding et al., 1995). Chiou (2003) pointed out that in SEM, the sample size should exceed 200. Unless the covariance matrix coefficients are ideal, analysis with fewer than 200 samples may derive instable results. To sum up, CFA was adopted in this study to test the theoretic model. In the assessment of overall model fit, we used MLE and set the significance level at 0.05 to test the fit of the theoretic model. The fit indexes proposed by Bagozzi and Yi (1988) were employed to evaluate the fit of the proposed model. In this study, a total of 224 valid responses were collected, so the sample size satisfied the above-mentioned requirement. The results of related tests are shown as follows:

Model-Fit Evaluation

In terms of preliminary fit criteria, all factor loadings were between 0.58-0.79, and all error variances were non-negative and reached the significance level. Regarding fit of internal structure of

model, the composite reliability (CR) of the four constructs was computed using Equation (2).

Bagozzi and Yi (1988) suggested that CR be greater than 0.6. In this study, all CR values were between 0.7-0.9, indicating good reliability. The average variance extracted (AVE) of latent variables can be used to explore the average explanatory power of all variables for a particular latent variable. A higher AVE value (AVE>0.5) indicates higher reliability and convergent validity of the latent variable. In this study, all latent variables had a nearly acceptable AVE value. Thus, it could be ensured that these variables had a certain level of reliability and convergent validity.

$$\rho_c = \frac{\left(\sum \lambda\right)^2}{\left[\left(\sum \lambda\right)^2 + \sum(\theta)\right]} \qquad (2)$$

where,

ρ_c = Composite reliability (CR)

λ = Standard factor loadings

Θ = Measurement error variances

Table 3 Items Tested for Overall Model Fit

Item	Ideal results	Results
χ^2 (Chi-square)	Smaller the better	801.48
χ^2/d.f.(normed Chi-square) (.d.f.=586)	<3	1.3667
NFI(Normed fit index)	>0.9	0.97
NNFI(Non-normed fit index)	>0.9	0.99
CFI(Comparative fit index)	>0.9	0.99
GFI(Goodness of fit index)	>0.9	0.84
AGFI(Adjusted goodness of fit index)	>0.9	0.80
RMR(Root mean square residual)	<0.05	0.033
RMSEA(Root mean square error of approximation)	<0.05	0.041

Table 3 shows the results of the overall model fit. As shown in this table, GFI and AGFI values were under the ideal value of 0.9. However, according to Bagozzi and Yi (1988), GFI and AGFI above 0.8 can be considered as acceptable. Thus, all test results were within their acceptable ranges, respectively.

Discriminant validity

Discriminant validity is intended to ensure that items of different concepts should not be highly correlated with each other. As pointed out by Hatcher (1994) and Ahire et al. (1996), discriminant validity can be measured by testing if χ^2 difference between paired variables in the nested CFA model is significant. In this study, there were four latent variables, and a total of 6 pairs of variables could be formed. As shown in Table 4, all the $\Delta\chi^2$ values (difference betweenχ^2 in nonrestrictive model and restrictive model) reached the significance level P-value<0.001 (degree of freedom=1 and p-value=0.001, χ^2 =10.827). The nonrestrictive model had better fit and supported discriminant validity. Thus, the variables adopted in this study featured good discriminant validity.

Table 4 Test of Discriminant Validity

Paired variables	Nonrestrictive χ^2	df	Restrictive χ^2	df	$\Delta\chi^2$	Δdf	P-value
A-B	554.17	134	808.18	135	254.01	1	P<0.001
A-C	794.32	188	1034.45	189	240.13	1	P<0.001
A-D	810.74	188	1886.33	189	1075.59	1	P<0.001
B-C	377.4	118	445.86	119	68.46	1	P<0.001
B-D	428.68	118	613.8	119	185.12	1	P<0.001
C-D	668.57	169	1290.97	170	622.4	1	P<0.001

Notes: A=Partner characteristic; B=Partnership quality; C=Partnership closeness; D=Cooperative performance

SEM Analysis

Through LISREL test of the theoretic model, six hypotheses were proposed. The path coefficient and t-value of each hypothesis are shown in Figure 2. As presented in Table 5, four of the six proposed hypotheses were supported (H1, H2, H4, and H5), and two were not supported (H3 and H6).

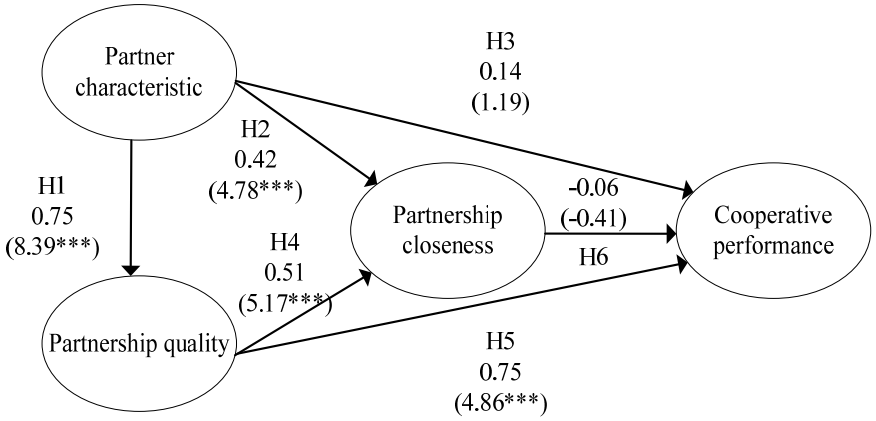

Figure 2 Path Coefficient and Relationship of Variables

Notes: The numerical figure is path coefficient, and the parenthesized value is *t*-value.
denotes t–value>1.96, $p < 0.05$; ** denotes t–value>2.58, $p < 0.01$; *** denotes t–value>3.29, $p < 0.001$.

This study was designed to explore the relationships among partner characteristic, partnership quality, partnership closeness, and cooperative performance. The results shown in Figure 2 and Table 5 are respectively explained as follows:

A. The influence of "partner characteristic" on "partnership quality", "partnership closeness", and "cooperative performance

Table 5 Test of Relationships between Constructs

Hypotheses		Estimated values	Test results
H1	"Partner characteristic" has positive influence on "partnership quality"	0.75(8.39***)	Supported
H2	"Partner characteristic" has positive influence on "partnership closeness"	0.42(4.78***)	Supported
H3	"Partner characteristic" has positive influence on "cooperative performance"	0.14(1.19)	Unsupported
H4	"Partnership quality" has positive influence on "partnership closeness"	0.51(5.17***)	Supported
H5	"Partnership quality" has positive influence on "cooperative performance"	0.75(4.86***)	Supported
H6	"Partnership closeness" has positive influence on "cooperative performance"	-0.06(-0.41)	Unsupported

H1: "Partner characteristic" has positive influence on "partnership quality"

This hypothesis is "supported". This indicates that manufacturers consider conditions of their partners as influential to their trust on cooperation and also commitment. "Partner characteristic" is an important element that maintains cooperation between two parties.

H2: "Partner characteristic" has positive influence on "partnership closeness"

This hypothesis is "supported". If manufacturers and suppliers have compatible goals, they can form a certain level of consensus over strategic goal, internal value, and commercial activity. Such consensus will increase both parties' intention to form a closer relationship and engage in long-term investment or resource integration.

H3: "Partner characteristic" has positive influence on "cooperative performance"

This hypothesis is "unsupported". The path coefficient indicates that the relationship is positive as hypothesized, but the direct effects are not significant. The empirical results indicate that "partner characteristic" influences "cooperative performance" only through "partnership quality".

B. The influence of "partner quality" on "partnership closeness" and "cooperative performance

H4: "Partnership quality" has positive influence on "partnership closeness"

This hypothesis is "supported". It can be inferred that trust and commitment are important factors affecting information sharing and long-term cooperation between partners. Only when mutual trust and cooperation are in place will both parties be willing to invest more resources on the cooperative relationship and strengthen such partnership.

H5: "Partnership quality" has positive influence on "cooperative performance"

This hypothesis is "supported". With mutual trust, enterprises can effectively integrate tacit knowledge and supplementary capabilities of their partners to further increase cooperative performance and their business performance.

C. The influence of "partnership closeness" on "cooperative performance

H6: "Partnership closeness" has positive influence on "cooperative performance"

This hypothesis is "unsupported". This indicates that there is a negative relationship between the two constructs. However, this finding is inconsistent with conclusions of most of the previous studies. According to Gulati and Singh (1998), having excessively close connections with partners may result in low performance. High interdependence between partners may increase coordination cost. Under the stress of rapid response and conflict, cooperative performance may be reduced.

CONCLUSION

In this study, linear structural modeling was adopted to empirically test the correlations in partnership and interactions between the proposed constructs. The results could be a reference for high-tech companies when establishing partnerships. From the research results, the following conclusions were derived.

In the aspect of cooperative performance, many scholars have proposed that partner characteristic and partnership closeness have direct influence on cooperative performance. However, results showed that cooperative performance is only indirectly influenced by partnership quality and partner characteristic. Hence, enterprises should pay attention to the cooperation process so as to effectively enhance cooperative performance.

In the aspect of partnership closeness, most of the previous studies indicated that close partnership has positive influence on cooperative performance. However, a negative relationship between the two constructs was observed in our study. This is a noteworthy finding for the practical arena. For some industries, it may be appropriate to evaluate partnership closeness by the amount of exclusive investment or intensity of knowledge sharing. For others, good cooperative performance can be achieved even in the absence of a very close partnership. Boyd and Mason (1999) pointed out that a higher

complexity of products means that more product information will be demanded, and a higher demand for product information requires a closer partnership.

On the contrary, if the demand for product information is lower, the demand for a close partnership will also be lower. Therefore, partnership closeness is not necessarily beneficial to cooperative performance. In this study, a negative relationship was observed but not to a significance extent. Steensma and Corley (2000) also mentioned that partnership closeness is affected by uniqueness of technology. Hence, more factors should be considered in the study of the effect of partnership closeness on cooperative performance. The above findings could be a reference for high-tech industry when building partnerships.

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