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The dimensions of relationship value between suppliers and customers based on complex products and systems

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The dimensions of relationship value are different from different industry. There are no studies in Complex Products and Systems (CoPS) yet. It is more important to study relationship value for buyers and sellers in CoPS. This paper investigates the dimensions of the relationship value between suppliers and customers in the context of CoPS. Theoretically, the relationship value based on CoPS includes three aspects: product, service and cost. Each aspect could be further divided into three dimensions. From the data collected from market research, it is found that the effect of each dimension on relationship value is consistent with the theory predicts. Product quality, technology support, business support and uncertainty are the most important factors.

Key words: Complex products and systems, relationship value, dimensions.

INTRODUCTION

Relationship value is becoming more and more important in marketing studies. It is found that the cost of attracting a new customer is five times that of keeping an old customer. Thus, it is important for firms to maintain a good relationship with key customers and suppliers, which helps to improve product quality and reduce costs (Hadeler and Evans, 1994; Tuten and Urban, 2001). Facing multiple upstream suppliers and downstream customers, firms need to choose the optimal cooperating partner, and balance the cost and benefit of establishing a new relationship.

Most of the academic research investigated the relationship value between supplier and customer based on different background, such as different industry, subject, business environment, etc. However, the relationship value under Complex Products and Systems (CoPS) has long been neglected. Wuyts et al. (2004) claimed that to a large extent CoPS manufacturers need to take the buyer-integrator-subcontractor triad into account; therefore, it is very important to study CoPS from the perspective of relationship value. CoPS is a product or service system, which involves in intensive knowledge input, multiple disciplines and different organizations. It is found that compared with common products, the inter-dependence between supplier and customer is higher in context of CoPS. There is even the demand for cross boundary interest management. The feature of CoPS calls for establishing and maintaining a good internal relationship, among which the relationship between supplier and customer is particularly important. The requirement for knowledge and innovation in context of CoPS is also reflected in the dimensions of relationship value.

This paper studies the dimensions of the relationship value between suppliers and customers in the context of CoPS. It aims to propose the theoretical model of relationship value in context of CoPS, and empirically

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tests the theory based on firm data from in-depth interview. It will shed some light on how to improve the efficiency, reduce production and transaction costs in context of CoPS.

LITERATURE REVIEW

Relationship value and Complex Products and Systems

With the sophistication of labor division and technology, more and more manufacturers choose to reduce the number of suppliers and only keep those key suppliers. They now try to establish and maintain a closer relationship with key suppliers (Jap, 1999; Hewett et al., 2002; Stephan et al., 2009). The tradeoff between the quantity and quality of suppliers signifies the importance of relationship value. On the one hand, a well-maintained relationship value helps reduce the transaction cost. On the other hand, it is useful in quality control and customization of raw materials and components.

Theoretically, there is no consensus on the definition of relationship value. Wilson (1995) pointed out that, any relationship could create value of both sides. Relationship value could enhance the competitive advantage of each other by their cooperation.

The value creation is the process of mutual trust and benefit. In a transaction process, when the relationship between supplier and customer was closed, customers will not evaluate a single product, rather they will evaluate the overall relationship. Therefore, suppliers should not only consider the cost and benefit of the product transaction, but also evaluate the relationship value in the long-term. Thus the relationship value was reflected in the ratio of relationship benefits and sacrifice (Ravald and Grönroos, 1996). Hogan (2001) believed that relationship value was the net benefit that customer felt from the life cycle of the relationship. Walter and Mueller et al. (2002) regarded relationship value as the interaction between customer and supplier. It is customer’s perception of various benefits and costs, instead of only the product value.

In the empirical research, the measure of relationship value is the central problem. The existing literature constructs models of relationship value from various perspectives. Hogan (2001) divided relationship value into two parts; one was the net future benefits which consist of capital accumulation, quality improvement and technology upgrading. The other was the relationship cost, such as time and cash. Ulaga and Eggert (2005) regarded relationship value as customer’s perception of product, service, knowledge property, opportunity and cost. Gwinner et al. (1998) found that relationship benefits were constituted by social benefit, confidence benefit and special treatment benefit. The difference between Internet transaction and traditional transaction is that it lacks face-to-face interaction, thus under Internet environment, relationship benefit contains only confidence and special treatment benefits (Yen and Gwinner, 2003).

Relationship value is more important for CoPS manufacturers. CoPS is a product or infrastructure with large R&D investment, complex structure and high technological level. They are usually highly integrated (Hobday, 1998). CoPS evolves from large technical system, including aerospace products, high-speed train, intelligent building and large-scale computer. CoPS is customized and produced in small quantity without scale effect, because it is technology intensive with strict maintenance requirements. The innovation for CoPS is persistent, because its life cycle of investment and product is long. The function and design may be subject to change even if it has been put into production.

Therefore, compared with standard products under mass manufacturing, CoPS involves a large number of suppliers and customization, which makes relationship value more prominent. CoPS manufacturers also try to reduce the number of suppliers and coordinate with main suppliers based on objective, task, information and resources. Moreover, CoPS manufacturers may choose to cooperate with suppliers to diversify risk and shorten new product development cycle and reduce costs.

The cooperation between CoPS manufacturers and suppliers consists of two parts. First, the physical cooperation is to assemble and integrate various components from the suppliers together. Second, the technological cooperation has two aspects, one is the function and the effect of each component in the system, the other is the interaction between components and systems, and its effect on the uncertainty of the system.

Relationship value and CoPS are related to each other in two aspects. First, both involved factors such as product, technology, process, market and knowledge. Second, they share similar analytical framework, including benefit, cost and risk aversion. We call the two aspects as direct relation and indirect relation, respectively, as shown in Figure 1.

This paper focuses on the relationship value in the perspective of CoPS. Relationship value is more important for CoPS than other products, since it could fully enhance the possibility of success for the CoPS development and effectively reduce risk.

Dimension of relationship value

The central question for the study of relationship value is how to construct its dimensions. Existing literature analyzed the dimensions of relationship value based on different industry background, which could be classified into three categories. First, relationship value was viewed as a one-dimensional concept, which is customer’s overall evaluation of cost and benefit. Second, narrowly speaking, relationship value was referred to as either

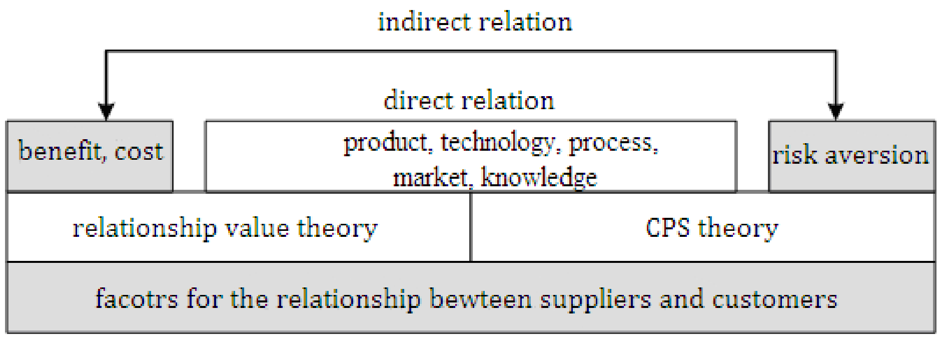

Figure 1. Relationship value and complex products and systems.

Table 1. Exploratory factor analysis.

Indicator	Product	Service	Cost
Quality 1	0.672		
Quality 2	0.713		
Customization 1	0.701		
Customization 2	0.652		
Solution1	0.609		
Solution2	0.695		
R&D1		0.671	
R&D2		0.810	
T-Support1		0.718	
T-Support2		0.759	
B-Support1		0.697	
B-Support2		0.851	
D-Cost1			0.683
D-Cost2			0.733
C-Cost1			0.832
C-Cost2			0.817
Uncertainty1			0.652
Uncertainty2			0.691
Variance extracted（%）	24.91	26.89	21.82

relationship benefit or relationship cost. Third, broadly speaking, relationship value was regarded as both relationship benefit and relationship cost. In the second and third categories, relationship value was further distinguished into more detailed concepts, such as economic benefit, strategic benefit, etc.

Wilson (1995), Gwinner et al. (1998), Biggemann and Buttle (2005), Sweeney and Webb (2001), Möller and Törrönen (2003) insisted that relationship value was equal to relationship benefits, thus they shared the same dimensions, as shown in Table 1. On the contrary, Dwyer et al. (1987) regarded relationship value as relationship cost, which consisted of direct cost, indirect cost and mental cost. Most literatures gave more comprehensive interpretation. Anderson (1995), Anderson and Narus (1995;1999), Grönroos (1997), Lapierre (2000), Ulaga and Eggert (2003;2005; 2006), Walter and Muller et al. (2003), Lefaix-Durand et al (2009) interpreted relationship value as both relationship benefit and cost. However, they are different in items of each dimension. Figure 2 summarizes the viewpoint of those literatures.

MEASURE MODEL

Based on ground theory and the features of CoPS, we will explore the influencing factors and dimensions of relationship value in context of CoPS. Ground theory was proposed by Glaser and Strauss (1967), which bridged theory

	Simple dimension	Two dimensions
Empirical basis	Sweeney and Webb(2001)[2,A]	Lapierre(2000)[B] Ulaga and Eggert(2003)[B] Walter and Muller et al.(2003)[B] Ulaga and Eggert(2005)[B] Ulaga and Eggert(2006)[B] Lefaix-Durand and Kozak et al.(2009)[B]
No empirical basis	Wilson and Jantrania (1994)[1,A] Biggemann and Buttle(2005)[1,A] Möller and Törrönen(2003)[1,A] Dwyer and Schurr et al.(1987)[1,B]	

1: benefit dimension, 2: cost dimension
From the perspective of A: supplier and customer, B: customer

Figure 2. Summary of the dimensions of relationship value.

and evidence by extracting information from systematic data analysis. This section first proposes the dimensions of relationship value in context of CoPS, then the next section empirically tests the theory and corrects the hypothesis, from which we obtain our conclusion.

In context of CoPS, the cooperation between supplier and customer consists of two levels, the physical level and the knowledge level. The physical cooperation mainly refers to the production of components and products. The knowledge level is the technical support and related services. This is consistent with Ulaga (2003) and Ulaga and Eggert (2006). This paper adjusts the dimensions and structural model of relationship value by taking the characteristics of COPS into consideration.

We propose the model of dimensions for relationship value in context of CoPS, as shown in Figure 3. Relationship value contains three dimensions, product (physical level), service (knowledge level) and cost (risk).

The product dimension could be further divided into three aspects. Product quality is concerned with the function of the product and whether it could meet customer's demand. This is the most basic requirement for production. Customization is the specific characteristic of CoPS. Different from products of mass production, the compo- nents of CoPS should be designed and produced according to its specific requirements. Solution provides the complete implementation plan for CoPS, which organizes various components into a well-functioning product system.

The service dimension further includes R&D capability, technical support and business support. R&D capability refers to whether the supplier could develop and produce the component required by the CoPS manufacturer. It evaluates the innovation of the supplier. Technical support means whether the supplier could provide sufficient technical guidance to the CoPS manufacturer. It measures the technical capacity of the supplier. Business support is the related service that supplier provides to the CoPS manufacturer. R&D capacity and technical support put more emphasis on supplier's technology, while business support emphasizes the supplier's service after sales.

The cost dimension contains direct cost, coordination cost and uncertainty. Direct cost is related to component procurement, inventory management and logistic costs. Coordination cost is incurred because CoPS manufacturing involves a large number of suppliers, which needs to maintain the relationships (Songailiene et al., 2011). The components of CoPS are usually highly customized. They may generate business secrets and privacy, which are also costly to protect. Uncertainty refers to that CoPS that have higher risk and are more likely to fail, because they are technically more difficult and have more strict requirements.

Product

Value should not only be measured by activities (Porter, 1998), but also be measured by product (Mohan, 1991). Product value could be viewed as the source of competitive advantage of the key suppliers. Suppliers could reduce customer's price sensitivity by excellent product customization and solutions (Yamamoto and Lambert, 1994).

Product quality is the most basic element in relationship value (Čatera, 2010). Suppliers could maintain good relationship with manufacturers only if they could provide reliable components with good quality (Homburg and Rudolph, 2001). But quality is only a necessary condition, which could not guarantee success by itself in the market competition.

Customization is a major requirement of the CoPS

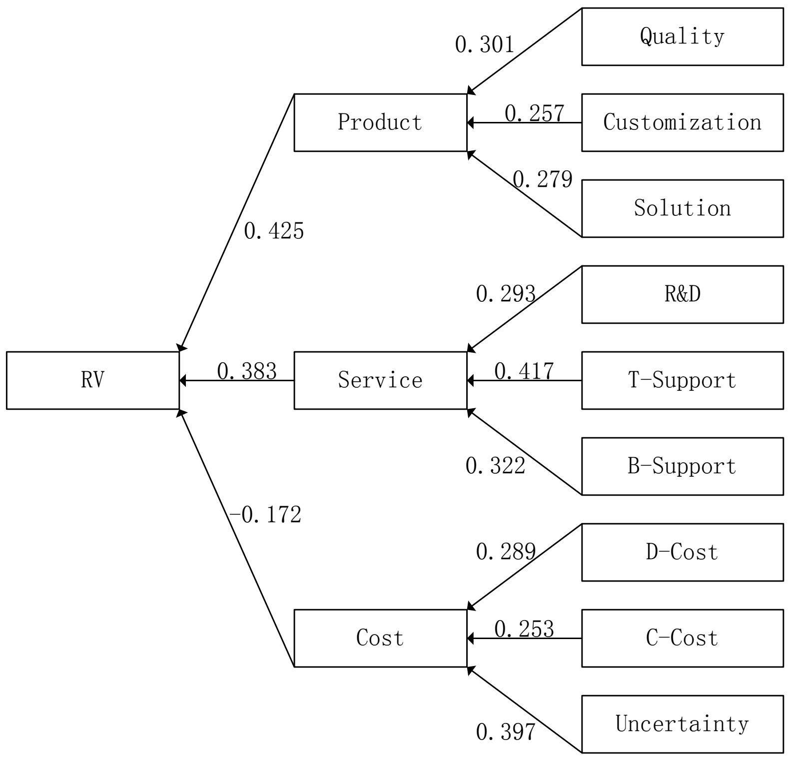

Figure 3. Dimensions of relationship value for CoPS.

manufacturer to the supplier since many components of CoPS are highly customized. It could effectively enhance the satisfaction of the manufacturer to its relationship with the supplier (Moreau et al, 2011). Selnes (1993) investigated that customization could make customers more committed since the switching cost was higher. Ostrom and Iacobucci (1995) pointed that customization leads to better match between customer and product, which brings more enjoyment to the customer. Srinivasan et al. (2002) empirically showed that customization significantly affects relationship value.

Solution is the comprehensive plan that suppliers provide to the manufacturer based on its requirements, which aims to solve manufacturer's difficulties in the CoPS production (Kapletia and Probert, 2010). Product quality, customization and solution are three different dimensions. Product quality emphasizes supplier's basic capability on production and quality control. Customization puts emphasis on the flexibility and adaptability of the suppliers. And solution evaluates the comprehensive value of the suppliers.

Service

Suppliers not only provide tangible products to the manufacturer, they also offer additional intangible services, which are probably more important (Levitt, 1981; Hutt and Speh, 1992). Service plays an important role in differentiating suppliers (Anderson and Narus, 1995). It helps suppliers to gain more advantage in market competition (Ganesan, 1994; Grönroos, 2011). In a long-term co-operation relationship, manufacturers would try to obtain suppliers support on resources and technologies (Kalwani and Narayandas, 1995), which are necessary for manufacturers' competitive advantage (Jap, 1999; Hogan and Armstrong, 2001).

Service includes many aspects other than after-sales service and logistics, such as meeting customer's information requirement, providing technological support, etc. In this research we further divide the service dimension into technology support, R&D and business support. Technology support means whether the supplier could provide sufficient support and help on technology to the manufacturer. It evaluates supplier's technological capability, including product assembling, adjustment and product warranty.

R&D assesses suppliers' technology capability in designing components that could meet CoPS manufacturer's demand. Walter and Muller et al. (2003) suggested that innovation was a major aspect that evaluates a supplier's potential value. Specifically, outsourcing is a common phenomenon in modern industries. It is important for suppliers to provide timely support for product design, production and testing.

Supplier's ability on new product development is a prominent feature for the relationship value of CoPS (Wernerfeh, 1984). Business support is suppliers' capability in providing related knowledge and service to the manufacturer. Technology support and R&D emphasize technology, while business support emphasizes service. Fast market reaction is strategically important in supply chain management (Stalk and Hout, 1990). Customers hope to get information at right time, therefore, suppliers should be prompt and quick to meet their right to know. In developing new products, manufacturers need suppliers' intense participation, including giving comments and feedback, and producing prototype. Business support helps communication between manufacturers and suppliers, which is important in maintaining relationship value (Ballantynea, 2011).

Cost

Relationship value could not only enhance firm's efficiency, but also reduce various costs (Cannon and Homburg, 2001; Corsaro and Ivan, 2010). In the cost dimension of relationship value, we distinguish it into direct cost, coordination cost and uncertainty. Direct cost refers to the costs from component procurement, inventtory management and logistics. Relationship value could effectively reduce direct cost (Hutchinsona et al., 2011). For example, manufacturer could require suppliers to produce according to its demand, which avoids inventory cost. The relationship value is difficult to maintain if the direct cost between manufacturers and suppliers is high.

Different from common products, CoPS involves many shareholders, which incurs high coordination cost. Manufacturers need huge time and energy to maintain and coordinate their relationships with many suppliers. The components of CoPS are highly customized, which involves the protection of business secrets. Coordination cost is a relationship-specific investment. Sunk cost increases with a firm's investment to its relationship with a partner. Such investment cannot be transferred to other partners. Thus relationship value increases with co-ordination cost.

CoPS is technically more difficult and involves more cooperators, so they face higher risk and are more likely to fail. Such uncertainty would contribute to costs significantly. Since product is the major linkage between suppliers and customers, customers would bear more risk when they buy CoPS. Thus uncertainty is a main dimension in the relationship value of CoPS. It has adverse effect on the relationship between suppliers and manufacturers.

QUANTITATIVE RESEARCH

Questionnaire design

We collect the data by questionnaire from CoPS manufacturers. The survey questionnaire was designed based on the literature of relationship value and CoPS. We propose the measures and items for each dimension. The measurements of relationship value, product value, service value and costs are based on Ulaga and Eggert (2006), Eggert and Ulaga (2002), Lapierre (2000) and Grönroos (1997), respectively. We revise the measurements according to our industry background. The final questionnaire contains 20 items, as shown in the appendix.

The first part of the questionnaire introduces the purpose of the interview and invites managers to complete the questionnaire based on their practice. The second part is the basic information, including industry background, scale, start year, registration type and the position of the respondent. The third part consists of 21 questions of interest, which measure the relationship value, product value, service value and cost.

Pre-survey

According to the paradigm of scale development process (Churchill, 1979), we conducted a pre-survey. We collected 91 questionnaires, and modified a few entries through exploratory factor analysis. The appendix shows the final 7 Likert scale table with 1 indicating strongly disagree, and 7 indicating strongly agree.

Data collection

The formal investigation was conducted during May and July in 2011. We employed students in Beijing University of Aeronautics and Astronautics (BUAA) to survey the related enterprises. We contacted 452 enterprises, and finally obtained 311 cases with valid information. The questionnaire recovery rate is 68.81%.

Sample characteristics

The interviewed enterprises are distributed in the industries of electronics, electricity, industrial control and aeronautics, which are quite representative. Age of respondents is between 31and 58, the average age is 39.5. Work experience is between 6 and 31, the average work experience is 11.6. Influence of purchase decisions of respondents is measured by 7 Likert scale table, and the average is 5.91.

Nonresponsive bias

We assessed nonresponsive bias following Mentzer et al.'s (2001) recommended guidelines. We contacted a random sample of 35 non-respondents over the telephone and asked them to answer our four questions that captured overall value perceptions in a supplier relationship (RV1–RV3 in the Appendix). In addition, we asked non-respondents to provide background information on themselves and their company. The t-tests of group means revealed no significant difference between non-respondents and our sample. Thus, non-response bias was not considered a problem in the present study.

Exploratory factor analysis

In order to test the reliability and validity of our scale table, we conducted an exploratory factor analysis. We used the principal component analysis method and the maximum variance rotary to extract common factors, and took the factor interception standard eigenvalue greater than 1. The result of exploratory factor analysis showed that KMO was 0.859, Bartlett sphericity test significantly (P =.00), sample date was suitable for factor analysis. The cumulative variance was 73.62%, and the joint degree was between 0.609 and 0.851, construct validity passed testing. Factor loading of all items is shown in Table 1.

Confirmatory factor analysis

LISREL and PLS are two main methods in the estimation of structural equations. LISREL is based on covariance analysis, which approximates the sample covariance and the model covariance to estimate the coefficients. However, it needs restrictive assumptions on sample size and distribution. PLS (partial least squares) only needs a small sample and less restrictive assumption on sample distribution. It is suitable to estimate complex models with latent variables (Chin, 1998; Henseler et al., 2009). Thus we choose PLS method for our data analysis.

We employ the SmartPLS2.0 software to conduct the PLS analysis. PLS is an iterative estimation technique, which consists of a series of least square methods. It treats the latent variable as a linear combination of the corresponding observed variables. Given the initial weights, it iteratively computes the scores of latent variables until they converge.

Thus, we could obtain the parameters of the structural model. PLS is essentially a structural equation modeling technique based on variance. It could estimate both measurement model and construct model. Applying the bootstrap re-sampling technique, we test the significance of major parameters of the model. Bootstrap re-sampling technique is a common testing method, which repeatedly and randomly selects a sub-sample in the whole sample. It replicates the same estimation strategy on each sub-sample, and constructs the t statistic to test the model parameters based on these estimates. In this research, we set the number of each sub-sample as 311, which is the same number with the whole sample, and repeat for500 times. Table 2 presents the statistics from the PLS estimate.

Model testing

The measurement model consists of latent variable and observed variable. We mainly test the reliability and validity of the latent and observed variables in the model.

Reliability

Reliability indicates to what extent the measures are reliable. It tests the robustness and consistency of the data when we measure the same factor using different methods. It also tests the reliability and internal consistency of the set of observed variables for a latent variable.

Cronbach's α is a commonly used indicator for reliability and consistency. Composite Reliability (CR) is used to measure internal consistency. The measure is reliable when α is larger than 0.7. Larger CR values imply that there is high internal consistency among the observed variables.

As shown in Table 2, all α values are larger than 0.7, which implies that the measures in our design are quite reliable. The smallest value of CR is 0.910, which is still larger than the threshold value 0.7. It indicates that the measures are internally consistent.

Validity

Validity refers to what extent the items in the questionnaire could correctly measure the latent variable of interest. It aims to make sure the collected data could reflect the problems we concern about, and could help justify the rationality of the theoretical model. Validity analysis includes convergent validity and discriminate validity.

Convergence validity means the correlation between items which measure the same dimension. It measures the magnitude and significance of the factor loading coefficient. When the factor loading coefficient is larger than 0.7, most of the variance of the dimension could be explained by the corresponding items. Fornell and Larcker (1981) suggest using average variance extracted (AVE) to measure the validity of a model. AVE computes the explanatory power of the items for the dimension variable. Validity increases with AVE. Conventionally, we take 0.5 as the threshold value for AVE. Table 3 shows the results. The factor loading coefficient for all items are significant and larger than 0.7. It implies that these items are valid in explaining the dimension variables.

Discriminate validity measures to what extent the items are differentiated with each other. According to Bagozzi and Yi (1988), the model could pass the discriminate validity test if the AVE square root of all latent variables

Table 2. Parameter estimates of PLS.

Variable		Factor loading	t	α	CR	AVE
Product	Quality1	0.876	63.137	0.913	0.930	0.877
	Quality2	0.895	47.289			
	Customization1	0.922	120.121	0.892	0.927	0.792
	Customization 2	0.937	110.271			
	Solution1	0.910	48.952	0.921	0.915	0.731
	Solution2	0.902	58.981			
Service	R&D1	0.857	69.378	0.877	0.943	0.781
	R&D2	0.877	43.545			
	T-support1	0.912	78.943	0.827	0.910	0.891
	T-support2	0.915	45.463			
	B-support1	0.899	95.325	0.911	0.955	0.873
	B-support2	0.912	120.322			
Cost	D-cost1	0.889	74.783	0.901	0.932	0.719
	D- cost2	0.873	32.456			
	C-cost1	0.927	73.639	0.812	0.953	0.826
	C-cost2	0.912	28.462			
	Uncertainty1	0.932	44.922	0.836	0.950	0.735
	Uncertainty2	0.941	50.083			
Relationship value	RV1	0.952	65.385	0.925	0.959	0.798
	RV2	0.937	69.779			

Table 3. The correlation coefficient and the AVE square root.

	Product	Service	Cost	RV
Product	0.882			
Service	0.783	0.891		
Cost	0.725	0.822	0.912	
RV	0.713	0.793	0.802	0.901

Table 4. Determination coefficient R^2.

Variable	R^2
Product	0.785
Service	0.776
Cost	0.712
Relationship value	0.759

are larger than the correlation coefficient of the latent variables, and the AVE square root is larger than 0.5. The results in Table 3 indicate that the model has high discriminate validity.

Model evaluation

Structural model aims to explore the causal relationship of latent variables. The key evaluation criterion is the determination coefficient R2, which reflects the explanatory power of exogenous variables on the endogenous variable of the model. It also indicates the predictive power of the model. The structural model fits the data well if R2 is larger than 0.67 (Chin, 1998). Table 4 shows that the R2 of all the endogenous variables are larger than 0.67, so the structural model is reliable.

Model analysis

We use SmartPLS2.0 software to test the model. The results are shown in Table 5. The standardized path coefficient is the basic test for the model. It reveals the correlation between variables. T value indicates whether the relationship is statistically significant. As shown in Table 5, the path coefficients of all the latent variables

Table 5. The standardized path coefficient.

Relationship	Standardized path coefficient	t
Product to relationship value	0.425	4.273***
Product quality to product value	0.301	6.252***
Customization to product value	0.257	3.217**
Solution to product value	0.279	2.643**
Service to relationship value	0.383	2.179*
R&D to service value	0.293	4.532***
Technical support to service value	0.417	4.902***
Business support to service value	0.322	5.093***
Cost to relationship value	0.172	3.182**
Direct cost to cost	0.289	3.019**
Coordination cost to cost	0.253	2.476*
Uncertainty to cost	0.397	2.398*

have the same sign with the model prediction, and the estimates are statistically significant.

DISCUSSION AND IMPLICATIONS

We analyze the dimensions of relationship value in the context of CoPS. The existing literature on relationship value was based on various industries, subjects and business environments. Compared with common products, the relationship value between suppliers and customers in context of CoPS is more complex. However, the research in this field is very limited. This paper aims to fill the gap in this area.

We first propose the theoretical model to interpret the relationship value in context of CoPS. Then we empirically test the model based on market survey. We contend that relationship value in context of CoPS consists of product, service and cost, which emphasize the physical, knowledge and risk level, respectively. Each dimension could be further divided into three aspects. The product dimension contains quality, customization and solution. The service dimension consisted of R&D, technical support and business support. The cost dimension comprises direct cost, coordination cost and uncertainty.

We test the model by conducting the PLS analysis based on the data. Cronbach's α coefficient and the Composite Reliability coefficient implies that the items are reliable and internally consistent. Factor loading coefficient and AVE square root indicate that the items for the same dimension are highly correlated and differentiated. It is found that all the latent variables have the expected effect on relationship value, and the effects are statistically significant. Specifically, product quality, technical support, business support, and uncertainty have the largest effect on relationship value. They are the key elements for relationship value in the context of CoPS. In order to establish better relationship with suppliers, CoPS manufacturers should take those four factors into consideration.

LIMITATIONS AND FURTURE RESEARCH DIRECTIONS

We explore dimensions of relationship value in context of CoPS; this paper only focuses on the existing theories of relationship value dimensions and CoPS, not considering other theories that can influence and change the dimensions. For example, if we restructure the dimensions when asset specificity was considered, the result may be different. So, it is an important research direction for the author and other marketing researchers.

In addition, our study focuses on structure model of relationship value dimensions, not correlation of every dimension. Yet, it is very important to study correlation for value creation. Therefore, it is another considerable direction for the author and other marketing researchers.

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APPENDIX. Operational measures.

		M	SD
quality	Compared to the second supplier, the main supplier meets our quality standards better.	4.97	1.63
	Compared to the second supplier, the main supplier's products are more reliable.	4.85	1.58
Customization	Compared to the second supplier, the main supplier performs better in providing the personalized products for	4.92	1.53
	Compared to the second supplier, it is easier to gain the personalized products from the main supplier	5.12	1.47
Solution	Compared to the second supplier, the main supplier knows better how to assist us in new product	5.09	1.59
	Compared to the second supplier, the main supplier knows better how to help us drive innovation in our	5.13	1.45
R&D	Compared to the second supplier, the main supplier knows better how to improve our existing products.	4.85	1.69
	Compared to the second supplier, the main supplier knows better how to help us drive innovation in our	4.79	1.50
Technical Support	Compared to the second supplier, the main supplier helps us more in detecting and solving product failures	4.91	1.43
	Compared to the second supplier, the main supplier performs better in helping us speed up product	4.99	1.56
Business Support	Compared to the second supplier, the main supplier provides us with better business services.	5.08	1.55
	Compared to the second supplier, the main supplier reacts more quickly to our requests.	5.17	1.56
Direct Cost	Compared to the second supplier, the main supplier helps us more in saving production cost	5.27	1.48
	Compared to the second supplier, the main supplier helps us more in saving inventory cost	5.01	1.62
Coordination Cost	Compared to the second supplier, the main supplier performs better in communicating with us.	5.11	1.61
	Compared to the second supplier, the main supplier performs better in saving coordination cost.	4.89	1.57
Uncertainty	Compared to the second supplier, the main supplier performs better in business integrity	4.78	1.54
	Compared to the second supplier, the main supplier helps us more in reducing the risk	4.85	1.48
Relationship Value	RV1: Compared to the second supplier, the main supplier adds more value to the relationship overall.	5.29	1.46
	RV2: Compared to the second supplier, the relationship with the main supplier is more valuable.	5.16	1.58
	RV3: Compared to the second supplier, the main supplier creates more value for us when comparing all costs and	5.22	1.63