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## **Customer involvement in the process innovation: Antecedents, mediation and performance**

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### **Abstract**

The paper examines the importance of customer involvement for new process development in the Taiwanese manufacturing firms. The antecedents of customer involvement including competitor orientation, social network and internal coordination are investigated. Furthermore, the mediating effect of customer involvement between the antecedents and new process innovation performance is studied. The questionnaires are sent to 2,000 firms that are stratification sampled from a population of 33,844 Taiwanese firms with more than 10 employees. A dataset of 170 valid questionnaires is collected with an overall response rate of 9.7%. The results indicate that three antecedents are positively associated with customer involvement. Customer involvement significantly mediates the relationship between antecedents and new process performance. The paper concludes that the appropriate utilization of customer involvement is crucial to improve the new process innovation performance in manufacturing firms. Some managerial implications for creating appropriate organizational context and mechanisms of customer involvement are suggested.

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**Keywords: customer involvement, process innovation, antecedents, manufacturing firms**

## **1. Introduction**

Enterprises develop innovative products and processes to meet or anticipate the evolving needs and cost reduction in their target markets. Customer involvement

plays a key role in developing new services and products of the process innovation. Recently there have many corporate and academic interests to investigate the issue of customer involvement (Alajoutsijärvi et al., 2012; Cheung and To, 2011; Feng et al., 2010), which is seen as strategic resources for reaching high quality levels, fast and reliable delivery, sufficient flexibility and satisfactory services/ products. Besides, corporates interest in customer involvement also increased dramatically on account of gaining and retaining sustainable competitive advantage in the new service/ product development (Feng et al., 2010). A significant proportion of technological innovations in advanced countries are actually developed by the description of customer involvement in innovations (Franke and Shah, 2003; Morrison et al., 2000; Urban and von Hippel, 1988). In a dynamic, competitive environment a firm adjusts to the changing preferences of consumers or loses out to competitors who do add value through innovation (Svendsen et al., 2011). In many developed countries the distinction between the manufacturing and the service sector has faded, with the distinction between goods production and service activities becoming increasingly blurred. Service and product innovations in customer involvement attract new customers, improve customer loyalty, open new markets and build profitability of a firm's existing product portfolio (Feng et al., 2010).

One research stream about customer involvement in innovation development mainly focused on: 1) customers' characteristics are related to innovation (Franke and Shah, 2003; Franke and von Hippel, 2003; Lakhani and Wolf, 2005; Morrison et al., 2004; Nuvolari, 2004; von Hippel, 2005); 2) resources are contributory to innovation from customers (Arora and Gambardella, 1994; Franke and Shah, 2003; Ogawa, 1998; von Hippel and von Krogh, 2003); 3) environment influences innovation from customers (Benkler, 2002; Henkel and von Hippel, 2005; Jeppesen and Molin, 2003). This well-established stream provides many insights in the area of user innovation.

Recently the other research stream of customer involvement in innovation development comes from service marketing management. It addressed the issue of customer involvement in new product/service development (Alam, 2002; Edvardsson et al., 2000; Edvardsson et al., 2006; Matthing et al., 2004). In other words, these studies emphasized how customers can be involved in innovation development to feedback their opinions. These two streams consistently support that customers can provide helpful information for developing innovations and leads to some benefits.

The mechanisms of maintaining customer involvement functions and further fostering innovation performance in academies are still less developed. Therefore, some researches have been devoted to focusing customers' perspective and their impacts on performance (Alajoutsijärvi et al., 2012; Cheung and To, 2011; Martínez and Martínez, 2010). However, research focusing on customer involvements' antecedents in the process innovation has received little attention (Lager, 2010). Reviewing previous research related to customer involvement in innovation, most studies have discussed topics like the relationship with service marketing (Varki and Wong, 2003), online technology for customers using (van Beuningen et al., 2009), and co-production to influence outcomes with customers (Edvardsson et al., 2012). Previous research has not been able to specify how external partners and internal employees respond to this customer involvement in the process innovation, and few have addressed how to further impacts the performance in the process innovation. Moreover, previous studies on the determinants of customer involvement tend to use end-users perspective of analysis such as the buyers, consumers (Edvardsson et al., 2012; Henkel and von Hippel, 2005; Rapp et al., 2012).

There is one research questions addressed in this study. First, what are the antecedents could increase performance from customer involvement in the process innovation? The intermediate role of customer involvement has not yet been justified

in accordance with the works of innovation from external partners and internal employees perspectives in manufacturing firms. In order to bridge the research gaps, this study aims to empirically investigate the relationship between antecedents of customer involvement and innovation performance mediating by customer involvement. Six sections of this paper follow. In the next section, Section 2 reviews the relevant literatures of customer involvement, competitor orientation, external social network, internal coordination, mediation effects of customer involvement and constructs the framework of this study. Section 3 constructs the questionnaire development, sample and respondents, data collections and response rates of this study. Section 4 describes the research results and verifies the results introduced in Sections 2 and 3. Section 5 offers discussion from the results of Section 4, and provides conclusions and suggests possible directions for future research in Section 6.

## **2. Theoretical Model**

### **2.1 Customer Involvement**

There are few studies describing customer involvement at specific stages of the new service development process and then conceptually or empirically linking that involvement to specific innovation outcomes. The original research on customer involvement in the various stages of new service services and products was conducted by Alam (2002), who investigated several aspects of user involvement in each of ten sequential stages of the new service process. Alam (2002) did not explicitly link customer involvement at specific stages to any of those outcomes, but the study does report how frequently and intensely the service firms involved customers in each of the process innovation stages. From the point of view of manager respondents, user involvement was most important at the idea generation, service/process system design, and service testing/pilot run stages.

Alam (2002) provided valuable insights on how customers are involved in the process innovation, and some basis for hypothesizing how customer involvement in specific stages influences innovation outcomes. Magnusson et al. (2003) focused on the idea generation stage and conduct an experiment that demonstrates customers' new service ideas can be as good or better than ideas produced by professional service designers. The experiment showed that customers can generate innovation ideas as potentially beneficial to a firm as those of in-house professional developers, and the potential profitability of those ideas improves when customers are given the right amount of training and consultation as to what is or isn't technically feasible.

Customer-driven innovation refers to the process of collecting a particular type of information about the user: it deals with insights both at an observable and a more latent level that are quite difficult to grasp (Matthing et al., 2004). Magnusson et al. (2003) found that customer involvement has resulted in ideas for new innovative and useful services, and that customer involvement is heavily dependent on how involvement is managed. To facilitate proactive learning about the customer, several findings stress customer involvement in the development process and observations of customers in real action (Matthing et al., 2004). Kristensson et al.(2008) further proposed a conceptual framework concerning the key strategies required for the successful involvement of customers in the co-creation of new technology-based services. Furthermore, user involvement not only provides useful information about users' needs but also increases the understanding of users' values (Kujala, 2008).

Overall, the literature points to beneficial results from customer involvement in the idea generation and market testing stages of innovation development. These studies emphasized how customers can be involved in innovation development to feedback their opinions. In this study, customer involvement perspective is regarded as the co-creation of process innovations.

## **2.2 Competitor Orientation**

Customer involvement focus might play a key part in the strategy to create superior customer value, but an effective strategy requires more than simply customer-centered methods (Svendsen et al., 2011). A complete reliance on customer orientation often can lead to incompleteness in business strategy, which leaves an organization prone to a reactive posture, as opposed to a proactive disposition, in coping with competitors' strategies (Day and Wensley 1988; Han et al., 1998). However, an unbalanced focus on competitors is not desirable because exclusive attention on the competition can lead to the neglect of the exigencies of customers (Deshpandé et al., 1993; Kristensson et al., 2008). Therefore, Day and Wensley (1988) propose that a balanced mix of customer and competitor orientation is a requisite for maintaining a competitive advantage in the marketplace, which is consistent with Narver and Slater's (1990) equal weighting of market orientation's core components.

Competitor orientation essentially centers on the following questions: (1) Who are the competitors? (2) What technologies do they offer? (3) Do they represent an attractive alternative from the perspective of the target customers (Slater and Narver 1994)? On the whole, competitor orientation entails gathering intelligence on these three questions. The core methodology typically consists of measuring a company directly against its target competitors (Day and Wensley 1988; Kristensson, Matthing, and Johansson, 2008). Competitor oriented firms seek to identify their own strengths and weaknesses through the integration with customers. Such an approach often creates helpful insights into their relative standing in the marketplace. Because of competitor oriented involves a company discovering, understanding, and satisfying the expressed needs of customers, and also involves discovering, understanding, and satisfying the latent needs of customers (Narver et al., 2004; Kristensson et al., 2008). Nevertheless, a business should practice forms of competition orientation if it is to

attract and retain customers. The challenge for businesses thus lies in identifying and satisfying the latent needs of customers. Competition orientation requires a company to possess the ability to formulate number of intelligent questions and/or carry out careful observations of customer behavior which will later enable it to tailor a product or service containing value for the customer. The customer will play a largely passive role, merely answering questions or allowing observations. Proactive competition orientation entails the customer taking part as a collaboration partner, jointly co-creating value with the company. While customers are collaborating with the company over a period of time, opportunities are likely to occur whereby they can share their experiences. The implication is that, because of competitor-centered methods is to keep pace with or stay ahead of the rest of the field, a competitor oriented culture should facilitate customer involvement and innovations (Kristensson et al., 2008). The preceding discussion suggested the following hypotheses.

**Hypothesis 1 : The competitor orientation of a firm is positively correlated to customer involvement.**

### **2.3 External Social Network**

In the process innovation, the process innovation is carried out in a project in which all the customers are present. Social tools could further accelerate customer involvement in innovation development (Helfat, 2006; Hoyer et al., 2010; Kohler et al., 2009) because of the features of external social network. The concept of external social networks is useful for identifying, accessing and involving customer involvement in innovation development (Pitta and Fowler, 2005; Sigala, 2012). Empirical studies also reveal that customer participate in some online communities to contribute knowledge about existing products, to exchange experiences in the use of certain products or communicate needs and preferences regarding products (Belz and

Baumbach, 2010; Fuller et al., 2007).

In addition, customer involvement in external social network is important, since they receive great credibility by their peers, and their views have a significant influence in creating, shaping and disseminating innovation ideas through social networks. Besides, the increasing popularity of external social networks confirms that customers' interactions and dialogues enable customers to share and understand the context of using services, which in turn triggers emotions and cognition that help customers to generate and further enhance ideas for new services. Thus, the variety of customers and the sharing of their diverse roles have a positive influence on enabling participants of online social networks to generate new ideas (Sigala, 2012). The preceding discussion suggested the following hypotheses.

**Hypothesis 2 : The external social network of a firm is positively correlated to customer involvement.**

#### **2.4 Internal Coordination**

The concept of internal coordination involves coordinating and leveraging all available resources across departmental boundaries to create superior customer value (Narver and Slater, 1990). Internal coordination has become important in the sales and performance context as changing customer demands has led to all departments becoming more involved in the customer relationship (Flint and Mentzer, 2000). The greater the integration among departments, the better the firm is able to adapt to current customer needs. Internal coordination allows for faster communication between departments as well as fewer chances that communication between departments will be misinterpreted (Inglis, 2008). When employees across departments work towards a common goal, problem-solving capabilities and reaction times are increased (Rapp et al., 2012).

In addition, working in physical proximity of internal employees allows for the development of informal networks and interactions (Gajendran and Harrison, 2007). By increasing the spatial distance from colleagues, outside salespeople might create an environment where they are inadvertently ostracized from their colleagues (Rapp et al., 2012). The lower the frequency of face-to-face interactions between colleagues, the less rich will be the communication between telecommuters and other organization members. Because of evolving technologies, many customers also expect immediate responses from their sales representative. This type of constant and immediate response might also prohibit the salesperson from developing relationships with his/her organizational colleagues. Based on the spatial distance, technological demands, and constant customer demands, it is suggested that:

**Hypothesis 3 : The internal coordination of a firm is positively correlated to customer involvement.**

## **2. 5 Mediation Effects of Customer Involvement**

Moreover, prior exploratory research suggests that firms invite customers in the early and late stages of the process innovation to get the service and produce idea right in the initial development phase and to evaluate the complete product and service delivery offer before the full rollout (Alam 2002). Magnusson et al. (2003) demonstrated that customer-generated new ideas have higher user value than those generated solely by internal product development staff, and that customer involvement in idea generation improves service marketability by helping the firm better anticipate and respond to expressed and latent customer needs. Bowers (1989) also argued that customer involvement in the design stage is to better understand how to satisfy customer needs and the development stage to help the firm create the most effective promotional message. Edvarsson and Olsson (1996) found that customer

involvement in concept and process development leads to value-added service offers with “customer-friendly” service processes. Clearly, customer contributions to development of content and delivery mechanisms for a new service help differentiate the product, offer simple enough to be readily understood by the target market, and contribute to product innovativeness and product and service delivery quality (Edvardsson et al., 2012). Thus:

**Hypothesis 4 : The customer involvement is positively correlated to the process innovation performance.**

This study argued that customer involvement mediates the relationship between the three antecedents (competitor orientation, external social network and internal coordination) and subsequent innovation performance. That is, the three antecedents influence innovation performance through customer involvement. Prior research argued that the mediating effect of contextual customer involvement occurs because the features of the antecedents themselves can create and amplify internal tensions if they do not contribute to the simultaneous capabilities for customer decisions (Cheung and To, 2011). In the current study, different level of co-production with customers who involved in the process innovation could provide more a clearly profile in the performance (Cheung and To, 2011). Furthermore, Peled and Dvir (2012) also argued that external competition and system complexity of coordination in the project will encourages customer involvement to create more benefits to the performance. Therefore, this study argued that the features of competitor orientation, external social network and internal coordination comprises customer involvement. The preceding discussion suggested the following hypotheses.

**Hypothesis 5 : Customer involvement mediates the relationship between antecedents- captured by the interaction of competitor orientation, external social network and internal coordination—and performance.**

This study depicted the research framework and the corresponding hypotheses in Figure 1.

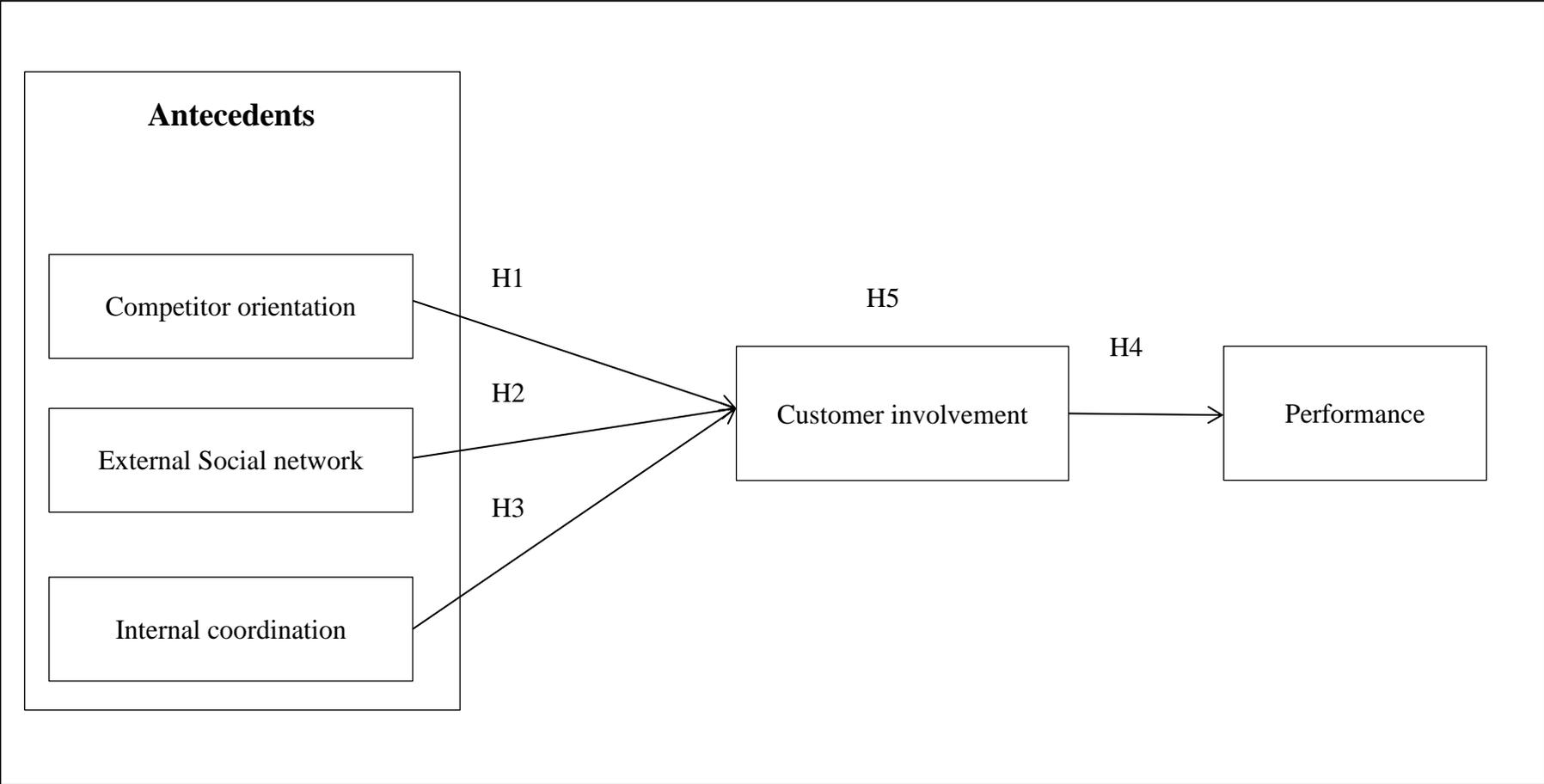


Figure 1 Antecedents, Customer Involvement, and Performance in the Process Innovation

### **3. Methods**

#### **3.1 Questionnaire development**

The questionnaire was mainly modified from Kim and Kim (2010) measure, which was designed based on the 3rd edition of the Oslo Manual (OECD/Eurostat, 2005). In addition, the concept of customer involvement in new service development proposed by Alam (2002) was also applied to the questionnaire. The first part of the questionnaire consists of seven firm attributes including industry, ownership, employment, R&D intensity, export ration, innovativeness and performance. The second part concerns the following constructs: competitor orientation (3 items), external social network (7 items) and internal coordination (7 items). The third part concentrates customer involvement consisting of five items. Finally, there are four items to measure performance.

#### **3.2 Sample and respondents**

The total population of manufacturing firms registered in the Department of Commerce at Ministry of Economic Affairs of Taiwan was 91,185 in 2010. The target population in this study is the manufacturing firms with more than 10 full-time employees. Thus the number of firms in the target population is 33,844, where the rate of firms with employees below 50 is 79.4%. Obviously, there mainly exist small and medium enterprises in Taiwan. The questionnaire was administered to 2,000 firms, which were randomly sampled with the strata of industry and firm size. According to firm size (number of employees), the distribution of the samples is shown in Table 1.

Table 1 The distribution of the samples

<b>Firm size (employees)</b>	<b>Population</b>	<b>Rate (%)</b>	<b>Number of samples</b>
Above 101	2861	8.47	172
51-100	4106	12.13	242
41-50	2167	6.40	128
31-40	3325	9.82	196
21-30	6625	19.57	390
11-20	14760	43.61	872
Sum	33844	100.00	2000

### 3.3 Data collection and response rates

According to the contact information provided by the Department of Commerce at Ministry of Economic Affairs of Taiwan, one PhD student and five MBA students mailed the questionnaire to the 2,000 sampled firms between March and April, 2011. Initially only 86 firms returned the questionnaire and 243 firms were not reachable due to the reasons of bankruptcy, dissolution, liquidation etc. Then the PhD student and five MBA students were introduced to the concepts of innovation and user innovation. Hereafter, they made phone calls to the 1671 non-response firms, excluding 243 unreachable firms, and requested a response to the questionnaire between May and June, 2011. Once the request was accepted, the students then asked whether the firm developed or modified any production equipment, technologies, software, or production system. A total of 1,345 firms responded that they did not produce any innovation, 210 firms were reluctant to answer any question and return the questionnaire, and 116 firms returned the questionnaire after making the phone calls. Finally we obtained a total of 202 questionnaires and the response rate is 11.5%. Through screening the questionnaires, there were 170 questionnaires to be effective and hence the effective response rate is reduced to 9.7%.

Among them are 108 firms (63.5% of samples), who produced innovations over the past three years 2008-2010. These firms can be viewed as user innovations (Kim

and Kim, 2010). However, during the process of recollecting the questionnaire by telephone, 1,345 firms responded that they did not produce any innovation. In addition, 62 firms also responded they had not any innovation over the past three years by returning the questionnaire. Therefore, the user innovation rate of Taiwanese manufacturing firms is lower than 19.9%, calculated by  $(2000-243-1345-62)/(2000-243)$ . As a result, the 108 firms, which created or modified at least an innovation for internal use over the past three years 2008-2010, were the samples for analysis.

## **4. Results**

### **4.1 Demographics of the respondents**

Among a total of 202 responses, only 170 questionnaires are effective. Through the analysis of descriptive statistics, the characteristics of these 170 firms are summarized in Table 2. Electrical machine and metal industry has the highest rate (27.6%) for the samples. Most of the samples belong to independent ownership type (73.5%). The firms with employees below 100 nearly occupy 60%. The rate of the firms with over 5% R&D intensity, total R&D expenditure over total sales, is 27%. The rate of the firms with export ratio below 30% is nearly 60%. The rate of the firms with over 30% innovativeness, total sales of innovation output in the last five years over total sales in this year, is 25.3. Among these 170 firms, 108 firms developed one innovation project at least. In addition, descriptive statistics (means, standard deviations, and correlations) for all the constructs were presented in Table 3. Competition orientation, external social network, and internal coordination were significantly and positively correlated with the customer involvement. Furthermore, performance had a strong, positive

correlation with competition orientation, external social network, internal coordination and customer involvement, showing that those four constructs can indeed achieve performance. More importantly, the finding indicated evidence that the antecedents of competition orientation, external social network, and their internal coordination are positively related to customer involvement; customer involvement is positively related to performance. The subsequent analysis in the sub-section verified the complexity of this relationship as mediated by customer involvement.

#### **4.2 Tests of Hypotheses**

This study tested the hypotheses using ordinary least square (OLS) regression. Hypothesis 1 predicted that competitor orientation will be positively related to customer involvement. As depicted in Table 4, the coefficient for competitor orientation in model 2 is positive and statistically significant ( $\beta = .202, p < .05$ ), thus supporting Hypothesis 1. Moreover, Hypothesis 2 predicted that external social network would be positively correlated to customer involvement. As shown in model 2, the prediction also is supported ( $\beta = .216, p < .1$ ). Hypothesis 3 predicted that internal coordination would be positively correlated to customer involvement. As depicted in Table 4, the coefficient for internal coordination in model 2 was positive and statistically significant ( $\beta = .228, p < .05$ ), thus supporting Hypothesis 3.

Table 2 Characteristics of the samples (N=170)

Attributes	Classification	Frequency	Percentage
Industry	Electronics and Information Technology	27	15.9
	Electrical machine and Metal	47	27.6
	Chemistry and Consumer	40	23.5
	Biotechnology and Medicine	7	4.1
	Others	49	28.8
	Ownership	Independent	125
Domestic		35	20.6
Foreign		10	5.9
Employment	Below 50	73	42.9
	51-100	25	14.7
	101-300	22	12.9
	301-500 人	12	7.1
	Above 501	38	22.4
R&D intensity	Below 1%	37	21.8
	2%-3%	47	27.6
	4%-5%	40	23.5
	6%-10%	23	13.5
	Above 11%	23	13.5
Export ratio	Below 10%	74	43.5
	11%-30%	26	15.3
	31%-50%	15	8.8
	51%-70%	10	5.9
	Above 71%	45	26.5
Innovativeness	Below 10%	72	42.4
	10%-20%	32	18.8
	20%-30%	23	13.5
	30%-40%	9	5.3
	Above 40%	34	20.0
Firm Performance	Mean=3.58, SD=0.908	Min=1	Max=5
Innovation generation	No	62	36.5
	Yes	108	63.5

Table 3 Means, Standard Deviations, and Correlations

Variables	Mean	S.D.	1	2	3	4
1. Competitor orientation	10.82	2.70				
2. External social network	16.31	7.84	.197*			
3. Internal coordination	13.06	7.29	.160	.693**		
4. Customer involvement	10.54	9.07	.301**	.446**	.441**	
5. Performance	12.18	4.57	.283**	.427**	.454**	.846**

N=108 ; \* p < .05; \*\* p < .01; \*\*\* p ≤ .001

Furthermore, Hypothesis 4 predicted that customer involvement will be positively related to performance. Observing Table 4, the coefficient for customer involvement in model 3 was positive and statistically significant ( $\beta = .860$ ,  $p < .001$ ), thus supporting Hypothesis 4. Hypothesis 5 predicted that customer involvement will mediate the relationship between customer involvement antecedents and performance. A mediator variable represents an intervening variable or, stated differently, a mechanism through which an independent variable is able to influence a dependent variable (Baron and Kenny, 1986). Analyzing mediation involved three steps (Baron and Kenny, 1986; MacKinnon and Dwyer, 1993). The first step was to establish that the independent variable (customer involvement antecedents) influences the mediator (customer involvement). This step was supported in model 2 above and demonstrated from hypothesis 1 to hypothesis 3. The second step was to establish that the mediator (customer involvement) influences the dependent variable (performance). This step was supported in model 3 and demonstrated from hypothesis 4. Last, one must identify that the mediating variable (customer involvement) influences the dependent variable, with the independent variable (customer involvement antecedents) controlled. If, in this final step, the effect of the antecedents on performance is no longer significant when the mediator is in the model, full mediation is indicated (Aldwin,

1994; Baron and Kenny, 1986). As shown in model 4, model 5 and model 6 of Table 5, the coefficients for customer involvement are positively and significantly correlated to performance, indicating a main effect of customer involvement on performance ( $\beta = .864, p < .001$ ;  $\beta = .584, p < .001$ ;  $\beta = .826, p < .001$ ), thus supporting the full mediation proposed in Hypothesis 5.

In addition, all the above models were not significantly influenced by the following firm attributes: industry, ownership and employee. To further verify our findings and explore more discussions, this study conducted in the next section.

Table 4 Results of Regression Analysis

<b>Variables</b>	<b>Model 1 Customer involvement</b>	<b>Model 2 Customer involvement</b>	<b>Model 3 Performance</b>	<b>Model 4 Performance</b>	<b>Model 5 Performance</b>	<b>Model 6 Performance</b>
Industry	-.166 <sup>+</sup>	-.131	-.004	-.004	-.005	-.004
Ownership	-.093	-.063	-.007	-.009	-.005	-.005
Employee	.243*	.091	.036	.035	.028	.024
Competitor orientation		.202*		.021		
External social network		.216 <sup>+</sup>			.043	
Internal coordination		.228*				.084
Customer involvement			.860***	.864***	.584***	.826***
$\Delta R^2$	-	.218***	.078***	.620***	.544***	.523***
$R^2$	.083	.301	.747	.757	.758	.762
Adjusted $R^2$	.057	.259	.756	.745	.746	.750
ANOVA F	3.152*	7.243***	79.842***	63.388***	63.754***	65.224***

A. For all models, N = 108.

B. <sup>+</sup> p ≤ .10; \* p ≤ .05; \*\* p ≤ .01; \*\*\* p ≤ .001

## 5. Discussions

Customer involvement in innovation development has increasingly dominated practice since innovation development is necessary for firms to survive and growth. It is necessary to focus in customer involvement in the process innovation because of the customers are those that have to pay for and thus accept the innovation. Process innovations are required to have scientific- and human- contributions to development, therefore developing mechanisms to maintain process innovation routines and foster economic functions are gaining more attentions. This study conducted a multilevel approach to understanding customer involvement antecedents in process innovation in manufacturing while also their impacts on performance success. We verified significant influence that customer involvement mediates the relationship between features of the customer involvement antecedents that encourage their performance. The findings raised importantly theoretical and practical issue for discussion.

First, the findings suggested that the antecedents of customer involvement which includes competitor orientation, external social network, and internal coordination as a determinant to nourish customer involvement. Specifically, social concepts of external social network and internal coordination are as antecedents that persuade the customer involvement to simultaneously engage in performance activities. The results of external social network, and internal coordination which impacted in customer involvement were frequently mentioned in the previous research (e.g. Pitta and Fowler, 2005; Rapp et al., 2012; Sigala, 2012 ). This study argued that the social tools which include virtual tools allowed manufacturers to involvement with their customers of their choice. In particular, lots of IT integration appeared to improve the ability of sample manufacturers to request, and their customers to provide useful information on product design. Moreover, due to continued social relationships and

better understanding of a company's performance, customers might have greater ability to provide relevant information to be incorporated into the design of new or existing products (da Silveira, 2011). Besides, the antecedent of competitor orientation was also positively impacted on customer involvement. This finding supports the view that competitor orientation involves a company understanding, and satisfying the expressed needs of customers, and also involves discovering, understanding, and satisfying the latent needs of customers (Kristensson et al., 2008). This finding is also consistent with argument of Svendsen et al. (2011). Svendsen et al. (2011) argued that competitor orientation positively impact customer involvement and suggested competitor orientation was conducive to facilitating both technical and administrative innovations when the level of technological turbulence in the business environment is relatively high. This study suggested that customer involvement antecedents are that provides a clearly defined approach for process innovations to enhance the profile of customer involvement.

Second, customer involvement positively influences innovation performance in manufacturing. Successful process innovation in manufacturing was able to aligned and be efficient in responding to customer involvement, while simultaneously being adaptive to commercial performance. The same concept has been discussed through the user innovation studies which contribute to the extension of the existing model of innovation to a more dynamic setting (Raasch et al., 2010). In this study, process innovation in manufacturing may create a context of customer involvement integrating external and internal information to make their resource as to further create their performance in innovations. More importantly, our results indicated that achieving customer involvement in process innovation does stimulate significant performance. This view supported that developing customer involvement context such as concurrent function in social- and environment- strategy is critical to create

co-workers synergies and performance in innovations (Edvardsson and Enquist, 2008; Sigala, 2012). Alternatively, this study argued that customer involvement creates a co-workers strategy in process innovation to complement new service/ produce development and further benefits performance for manufacturing.

Third, even though customer involvement antecedents are important to enhance customer involvement and the subsequent performance in innovation, customer involvement is critical for process innovation to leverage the impacts of customer involvement antecedents on performance. This finding was in line with da Silveira (2011). da Silveira contended that customer involvement is found to mediate the relationship between context and firm performance. Moreover, there are numerous objective measurements available to evaluate performance in process innovation though. Edvardsson et al. (2006) argued that customer involvement yields long-term payouts rather than the short-term maximization of profits. Svendsen et al. (2011) also argued that customer involvement studies should consider multiple performance dimensions. Consider the process innovations are scattered in different disciplinary fields so that difficult to be regulated under the same performance criteria. This study argued that the multi-dimensional indicators may thus provide a supplementary estimation of customer involvement's contributions to the manufacturing's overall performance.

## **6. Conclusion**

This study examines the antecedents, mediation and performance of customer involvement in the process innovations of the Taiwanese manufacturing firms. First, most of the theoretical literature referred to above is rather optimistic or proclaiming: customer involvement based innovation is the right thing for manufacturing firms to do, they should just start doing it. The customer involvement in the process

innovation, from idea to realized innovation, is often presented as smooth if the firm just follows the right model (Cooper, 2011).

There are three findings in the paper. First, three of antecedents, competitor orientation, external social network and internal coordination were related positively with customer involvement. Second, customer involvement can improve the process innovation performance in manufacturing firms. Finally, customer involvement mediates the relationship between antecedents (competitor orientation, external social network, and internal coordination) and performance. The implications for management and policymakers are: government policymakers may focus on enterprises which have higher potential to engage in customer involvement to the process innovation. However, policymakers should be cautious in valuing performance of process innovation by the perspectives of contingent context (e.g., external social network, internal coordination, and competitor orientation). For enterprise top managers, an enterprise is capable of improving performance by customer involvement in the process innovation. For technology views, enterprise may create social tools and novel approaches which provide more interaction between customers and enterprise which can increase the integration in customer involvement. Besides, competitor orientation is conducive to facilitating both technical and administrative innovations from customer involvement when the level of technological turbulence in the business environment is relatively high.

The results of this study reveal interesting relationships between antecedents of customer involvement, customer involvement and performance in the process innovation which contribute to both theory and practice. This study contributes to external involvement and internal coordination studies through a comprehensive empirical study. While most of previous studies related to external involvement explore the roles of customer involvement using theory building or case study

methods, this study supplements the extant theory (Chang et al., 2006; Feng et al., 2010; Lundkvist and Yakhlef, 2004). The findings of the research provide insights into relationships for particular types of involvement which includes external partners and internal employees. From this perspective, this study empirically contributes to the types of external social network and internal coordination are needed for increasing the participation of customer involvement. Besides, managers who plan to adopt customer involvement should consider the type of competitor orientation they are seeking. Second, this study extends and enriches the context of customer involvement by incorporating customer integration. As all customer involvement occurs through the concept of social network provision, it is important for enterprise in their attempt to achieve sustainable performance through the interaction with customers (Sigala, 2012). Even this study verified the contextual customer involvement in process innovation to be influenced by features of competitor orientation, external social network and internal coordination; we would not be too prescriptive to expect the effects to be significant across the industry in country context. Specifically, the effect of contextual ambidexterity may be distinct by national-characteristics differences between industries. There is, however, little evidence on this point, and it would be useful for future research to verify whether there are industrial characteristic or boundary conditions around the concept of customer involvement in process innovation.

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