

Effects of Market Orientation, Internal Cooperation Practice and Process Formality on Product Innovation Performance and Business Performance

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Abstract

Objectives: This study was carried out to verify market orientation, internal cooperation practice, and process formality on product innovation performance and business performance in Product Innovation. **Methods/Statistical analysis:** A survey was conducted and analyzed on manufacturing companies which had gone through New Product Development stage. Factor analysis was done by using package SPSS21 and the effects between variables were analyzed with a structural equation model using package Amos 21. **Findings:** First, Market Orientation was found to have a positive effect on Product Innovation Performance. Second, Internal Cooperation Practice was found to have a positive effect on Product Innovation Performance. Third, Process Formality was found to have a positive effect on the perceived Product Innovation Performance. Fourth, Product Innovation Performance was found to have a positive effect on Business Performance. **Improvements/Applications:** This study suggests a need to increase institutional support for enhancing Market Orientation as well as Internal Cooperation Practice and Process Formality. It also has significance in presenting effective and efficient directions for Product Innovation.

Keywords: Business Performance, Internal Cooperation Practice, Market Orientation, Process Formality, Product Innovation Performance

1. Introduction

As customer demands continue to become varied recently, it's been emphasized that it is necessary to understand what customers are really expecting in a very positive way and develop new products to meet their needs. It is gradually becoming impossible to improve customer satisfaction only by increasing the number of product functions and improving product performance based on enterprise's own ideas and intentions. In order to make product innovation successful, it is important to understand who the real customer is and what the customer really wants and reflect this into product development¹. In² pointed out that 46% of the resources invested into the development were consumed into the products that had failed². It was

reported that the introduction of new products had a risk of average failure rate of 40% with consumer products and industrial products combined². In order to improve product innovation outcome and business performance in such development environment, the market orientation responding to customer needs immediately is becoming more important. It is also necessary to continue to reinforce process formality³ which means that the process related regulations and rules for researcher to comply with in the new product development related product planning stage, which is an important factor for product innovation performance, in order to make development procedure efficient and maintain the development quality. In this process, it is also expected that efficient and smooth interdepartmental cooperation will serve as a major

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factor. Accordingly, this study aims to make an empirical analysis of B2B manufacturers which are enjoying their businesses with industrial materials which had gone through research and development stage, identify the effect of market orientation, internal cooperation practice, and process formality, among various factors related to product innovation activity of these industrial B2B manufacturers, on product innovation performance and business performance, and provide suggestions for research and development activities.

1.1 Market Orientation

In⁴ defined market orientation from the behavioral perspective that consisted of market information acquisition, transmission to the entire department, and reaction to market information⁴, and⁵ defined it as having such constituents as customer orientation, competitor orientation, and functional departmental coordination from the organizational cultural perspective⁵. In⁶ defined market orientation by classifying it into two aspects: market response orientation which means a response to the current customer needs and market orientation which means market creation to try to change market structure toward future customer needs⁶. Furthermore⁷ have continued to publish their research reporting that such market orientation improves corporate performance, announcing that marketing performance including market orientation is one of important factors for product innovation performance since the late 1990s⁸.

1.2 Internal Cooperation

In⁹ maintained that efficient communications and information exchange in the research and development and marketing sector have a positive effect on research and development and corporate performance⁹ and¹⁰ stated that communications and information exchange between functional departments which can draw cooperation between them are necessary for an efficient progression because priority is different on various factors to be considered in new product development due to difference in characteristics between departments¹⁰. In¹¹ reported that if the integration of marketing function and research and development function meets a high level of new product development resources, new product effect increases¹¹. Furthermore¹² announced that marketing and R&D cooperation improves development capability

and has a positive (+) effect on product innovation performance¹².

1.2 Process Formality

In³ defined that process formality is what provides process regulations and rules for a researcher to comply with in the product planning stage related to new product development and enables development progression process to be efficient and gone through without omission to maintain development quality³. In¹³ made an empirical analysis and found that strategically planned process formality has an effect on corporate performance¹³ and¹⁴ claimed that performing product innovation process faithfully has a positive (+) effect on product innovation performance and in particular, Korean enterprises' development process has more effect on performance than Japanese and American ones¹⁴.

1.4 New Product Development Performance

In¹⁵ asserted that research on product innovation performance is strongly characterized by a purpose-oriented study focusing on product innovation performance aspects because the purpose for product innovation performance depends on environmental factors that an enterprise faces¹⁵. In¹⁶ too knew product's entry time, new product's quality level, new product's market share, and percentage of new product that had successfully entered the market as the items that could measure new product development performance¹⁶. Also¹⁷ selected development period from concept setting to market launch, efficient use of development resources, product performance, and cost of production, production yield, and level of corresponding to consumer demands as the items that could measure new product development performance¹⁷.

1.5 Business Performance

With respect to the business performance related to new product development activity, by¹⁸ maintained that product innovation capability is the most important factor to make enterprises successful and product innovation activity is very important for obtaining competitive advantage and achieving sustained growth¹⁸. In¹⁹ set profitability of general products, satisfied target rate of return, satisfied target sales goal, achieved sales growth

rate, and satisfied target market share as the items that could measure business performance¹⁹.

2. Proposed Work

2.1 Research Structural Model

This study proposes the research structural model like in Figure 1 in order to identify the effect of market orientation, internal cooperation practice, and process formality on product innovation performance and corporate performance in product innovation based on the previous studies.

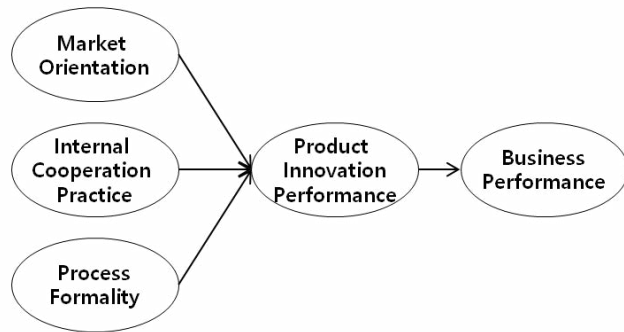


Figure 1. Research model.

2.1 Hypothesis

2.2.1 Relationship between Market Orientation

Relationship between market orientation, internal cooperation practice, and process formality and product innovation performance²⁰ stated that enterprises with higher market orientation, defined as business activity to correspond to the customer needs in the present and the future are superior to those with lower market orientation in terms of performance²¹ and²² revealed that cooperation between two functions - marketing and R&D - has a significant correlation with the development performance including product benefit, quality, etc²². In relation to process formality, there was a proposal made by²³ that defining development order and contents clearly in advance in product innovation process and performing development according to the defined order has an effect on product innovation performance²³. Based on the

previous studies as presented above, this study sets the following hypotheses in order to identify the effect of market orientation, internal cooperation practice, and process formality on product innovation performance.

H1: Market orientation will have a positive effect on product innovation performance.

H2: Internal cooperation practice will have a positive effect on product innovation performance.

H3: Process formality will have a positive effect on product innovation performance.

2.2.2 Relationship between Product Innovation Performance and Business Performance

Griffin (1997) reported that with the rapid changes in market environment, product life cycle was reduced and technology became obsolete earlier, which led to increased level of competition and thus the effect of success or failure of new product on corporate performance has increased²⁴. In²⁵ maintained that in such environment, the level of product differentiation becomes lower and thus it is easy to rely on price competition rather than differentiation competition between companies, in other words, labouringly developed product becomes an ordinary one and corporate profitability becomes lower, and at this time, if an enterprise develops a new product with no competitor, its corporate performances becomes good again²⁵. Also, ²² identified that product innovation performance has a positive (+) effect on financial performance and customer satisfaction²². This study sets the following hypotheses in order to identify the effect of product innovation performance on business performance based on the above previous studies.

H4: Product innovation performance will have a positive effect on business performance.

2.3 Research Methodology

2.3.1 Parent Population and Sampling

In order to identify the effect of market orientation, internal cooperation practice, and process formality, among various factors related to product innovation activity, on product innovation performance and corporate performance in B2B manufacturers which are enjoying their business with industrial materials, this study selected B2B manufacturers which were enjoying

their business with industrial materials that had gone through research and development as objects of this study, conducted a survey for about two (2) months from Mar. 2015 through email and visiting, collected 184 copies of questionnaire, and utilized 166 copies of questionnaire excluding the questionnaire that had missing values, etc into our final analysis.

2.3.2 Operational Definition and Measurement of Variables

Referring to the items presented by²⁶ and the items presented by²⁷ as the measuring instruments on market orientation, this study constituted the measuring items of market orientation with regular market research, periodic effect evaluation of market environment changes, in-house information sharing and conference system and institutional mechanism for quick response, and periodic inspection of customer needs. Internal cooperation practice was defined as “cooperation and sharing activity for achieving mutual common goals between functional departments related to new product development” and drew measuring items in reference to the previous studies²⁸. Process formality was constituted with the measuring items³ developed by²⁹ and the measuring items included formality of rules and procedures, observance with formalized rules and procedures, and phased formal progress of rules and procedures. New product development performance and corporate performance were constituted with three items (profit, sales, and market share and technical capability, customer satisfaction, and development content satisfaction, respectively) by using the measuring items²⁹.

The survey was composed of a total of 18 questions. To the variable related survey items, one (1) point meant ‘It isn’t so at all’ and five (5) points indicated ‘It is so too much’ on a five (5)-point scale. The results can be summarized in Table 1.

Table 1. Composition of survey

Measurement variables	No of questions	Preceding studies
1.Market Orientation	5	(26, 27)
2.Internal cooperation practice	4	(28)
3.Process Formality	3	(3)
4.PI Performance & Business Performance	6	(29)
Total	18	-

2.4 Empirical Analysis

2.4.1 Data Collection

The general characteristics of sample are shown in Table 2. The position in the company is evenly distributed from ordinary employees to the management level and in the number of employees; over 500 individuals occupied 60.8%. In case of responsible duty, research and design sector occupied 59%, which was the highest percentage, followed by marketing at 18.1%.

Table 2. The Characteristics of samples

Categories		Frequencies	%
Company staff level	Associate	21	12.7
	Assistant Manager	36	21.7
	Manager	20	12.0
	Deputy General Manager	24	14.5
	General Manager	45	27.1
	More than Director	20	12.0
	Total	166	100
No. of Employees	Less than 50	23	13.9
	50~100	9	5.4
	101~300	12	7.2
	301~500	21	12.7
	501~1000	42	25.3
	More than 1000	59	35.5
	Total	166	100
Business Sector	Research	43	25.9
	Product development	55	33.1
	Marketing	30	18.1
	Sales	15	9.0
	Production	1	0.6
	Management	16	9.6
	Support etc.	6	3.6
	Total	166	100

2.4.2 Validity and Reliability Analysis

Prior to research hypothesis testing, this study performed validity and reliability analysis. In the first place, in order to determine validity, this study conducted exploratory factor analysis. To extract factors, it adopted principal component analysis and used orthogonal rotation method as factor loading simplification process. This study set Eigen value 1.0 or higher and factor loading 0.50 or higher as the basis. There was no factor removed in the factorial analysis process and the accounted total variance appeared at 70.08%. Five (5) variables were extracted similarly to the theoretical structure of the previous studies and named as

market orientation, internal cooperation practice, process formality, new product development performance, and business performance and then reliability analysis of each variable was conducted. As it was identified that there were no factors to inhibit the confidence level, all items were used for analysis, and as Cronbach's α for each variable was distributed at .779~.870 as shown in Table 3, it was determined to be at a reliable level (Cronbach's $\alpha > 0.7$)

Table 3. Exploratory Factor Analysis and Reliability Test

MV	MO	PF	IP	BP	PP	Ca
MO1	.836					.813
MO2	.801					
MO3	.708					
MO4	.665					
MO5	.648					
PF2		.868				.870
PF3		.858				
PF1		.836				
IP2			.864			.860
IP1			.821			
IP3			.814			
BP2				.797		.788
BP1				.784		
BP3				.775		
PP2					.788	.779
PP1					.779	
PP3					.767	
OV	2.881	2.478	2.350	2.127	2.073	
V%	22.19	22.53	21.37	35.44	34.66	
AV%	22.19	48.71	70.08	35.44	70.00	

Note: 1) PF: Process Formality, 2) IP: Inter-cooperation Practice, 3) MO: Market Orientation, 4) BP: Business Performance, 5) PP: Product Innovation Performance, 6) Ca: Cronbach's α , 7) OV: Original Value, 8) V%: Variance %, 9) AV% : Accumulation Variance %

2.4.3 Measurement Model Analysis

To test the validity and reliability of goodness of fit and scale of the measurement model adopted in this study, this study performed a measurement model analysis. To determine the goodness of fit of the data, such values as CMIN/DF (<3.0), GFI-CFI-NFI-IFI, TLI (>0.9), AGFI (>0.8), RMR (<0.05), and RMSEA (<0.08) were used. To generate the goodness of fit presented in the final items, this study repeated the process of removing based on the SMC value, which indicates the level that measurement variables account for latent variables. Finally, market

orientation 3, 4, and 5, new product development performance 3, and business performance 3 were removed as shown in Table 4. As a result, it was found that t value over the estimation of the relationship between latent variable and measurement variable far exceeded 1.965, which suggested that as the SMC value showed 0.4 or higher, it could be interpreted that latent variable well accounted for the variance of the applicable measurement variable. Also, CMIN/DF 1.884, GFI .925, AGFI .867, CFI .960, NFI .921, IFI .961, TLI .940, RMR .034, and RMSEA .073, which suggested that the measurement model was an appropriate one.

Table 4. Goodness of fit of measurement model

Measure		FLV	SLFV	SE	T value	p	SMC
MO	1	.881	.753	.140	6.308	***	.567
	2	1.000	.850	-	-	-	.723
IP	1	.728	.721	.070	10.470	***	.520
	2	.927	.855	.072	12.938	***	.731
	3	1.000	.890	-	-	-	.792
PF	1	1.141	.871	.102	11.234	***	.759
	2	1.066	.859	.096	11.134	***	.737
	3	1.000	.768	-	-	-	.590
PP	1	.831	.739	.090	9.266	***	.547
	2	1.000	.837	-	-	-	.701
IP	1	.896	.742	.113	7.960	***	.550
	2	1.000	.823	-	-	-	.677
Goodness of Fit - measurement model		<p><Initial model> Chi-Square=192.467, df=112, p=.000, CMIN/DF=1.718, GFI=.884, AGFI=.842, CFI=.941, NFI=.872, IFI=.942, TLI=.928, RMR=.044, RMSEA=.066</p> <p><Final model> Chi-Square=82.885, df=44, p=.000, CMIN/DF=1.884, GFI=.925, AGFI=.867, CFI=.960, NFI=.921, IFI=.961, TLI=.940, RMR=.034, RMSEA=.073</p>					

Note 1) FLV : Factor Loading Value Note 2) SLFV : Standardized Loading Factor Values Note 3) SE : Standard Error Note 4) SMC : Squared Multiple Correlation

2.4.4 Research Model Analysis

To test the research model, this study identified the goodness of fit of the structural equation model as final measurement model item. The statistical research model is as shown in Figure 2, and the goodness of fit results is like in Table 5.

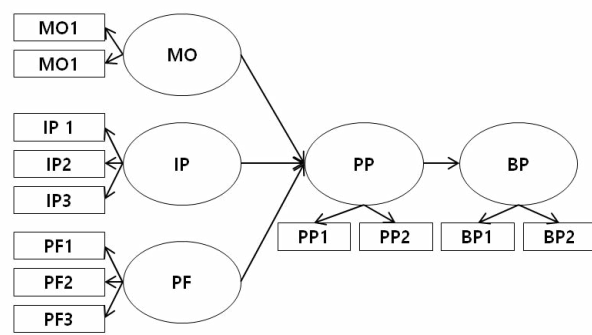


Figure 2. Statistical research model.

Table 5. Goodness of fit of research model

	Reference Value	Measured Value
Chi-Square	-	85.404
df	-	47
P	>.05	.001
CMIN/DF	<3.0	1.817
GFI	>.90	.925
AGFI	>.80	.875
CFI	>.90	.961
NFI	>.90	.918
IFI	>.90	.962
TLI	>.90	.945
RMR	<.05	.037
RMSEA	<.08	.070

2.5 Hypothesis Testing Result

As the research model was found to be appropriate, path coefficient was examined for specific hypothesis testing. The results appeared as shown in Table 6. It was revealed that the higher the market orientation, the higher the product innovation effect (standardized coefficient $\beta=.325$, $P=.000$) and the higher the internal cooperation practice, the higher the product innovation performance (standardized coefficient $\beta=.222$, $P=.003$). It also appeared that the higher the process formality, the higher the product innovation performance (standardized coefficient $\beta=.233$, $P=.004$). Furthermore, it appeared that the higher the product innovation performance, the higher the business performance (standardized coefficient $\beta=.799$, $P=.000$).

Table 6. The structural path coefficients of research model

Structure Path	β	t	p
MO \rightarrow NP	.325	4.037	***
IP \rightarrow NP	.222	2.976	**
PF \rightarrow NP	.233	2.855	**
PP \rightarrow BP	.799	7.969	***

** $p<.01$, *** $p<.001$

The results of hypothesis testing on the effects of market orientation, internal cooperation practice, and process formality on product innovation performance and business performance are shown in Table 7.

Table 7. The Results of hypothesis testing

Hypothesis	Hypothesis To Be Tested	Result
H1	Market Orientation will have a positive impact upon the Product innovation Performance	Accept
H2	Inter-cooperation will have a positive impact upon the Product innovation Performance	Accept
H3	Process conformity will have a positive impact upon the Product innovation Performance	Accept
H4	Product innovation Performance will have a positive impact upon the Business Performance	Accept

On one hand, this study additionally analyzed if PI has a mediating effect on between exogenous variables (MO, IP, and PF) and endogenous variable (BP) by using Bootstrapping method. As a result, it was found that the mediating effect (indirect effect) of PI between MO and IP and BP was a complete mediation and thus appeared significant as shown in Table 8.

Table 8. The Mediation analysis results by bootstrapping method: Additional analysis

Structure Path	Indirect Effects	p
MO \rightarrow NP \rightarrow BP	.300	**
IP \rightarrow NP \rightarrow BP	.231	*

$p<.05$, ** $p<.01$, *** $p<.001$

3 Conclusion

3.1 Research Findings and Implications

This study was conducted to identify the effects of market orientation, internal cooperation practice, and process formality on product innovation performance and business performance in product innovation process in industrial B2B manufacturers with years of experience in research and development. Based on the previous studies, this study identified the concept and dimension of each factor, tested the validity and reliability of measurement items, and utilized it into final analysis. The results from hypothesis testing in this study by using structural equation model analysis are as follows: First, it was appeared that market orientation (investigating into the market at all times, sharing the investigated contents to internal departments, and quick response) had a positive effect on product innovation performance (secured technology, contents of development and customer satisfaction). Second, it was appeared that internal cooperation practice (sharing information at all times, mutual cooperation, and operation of integrated team if necessary) had a positive effect on product innovation performance. Third, it was appeared that process formality (defining development process before development, observing development process, and evaluation after development) had a positive effect on product innovation performance. Fourth, product innovation performance (secured technology, contents of development, and customer satisfaction) had a positive effect on business performance (market sales, secured profits, and enhanced market share). Also, it was appeared that such product innovation performance completely mediated market orientation, internal cooperation practice, and business performance. Such research findings suggest that there is a need to reinforce market orientation, internal cooperation practice, and process formality in order for industrial B2B manufacturers to improve product innovation performance and business performance and particularly in market orientation and internal cooperation practice, product innovation performance should be achieved by priority and if so, it may lead to business performance. So this study is expected to be used as a reference in practical aspects.

3.2 Limitations and Future Directions

This study has the following limitations, but aims to

present some directivity for future study. First, it would be desirable to conduct path-coefficient comparative analysis that is used to obtain more data based on the findings from this study and identify the degree of effect between factors. Second, in relation to the new product development, it is considered that it would be desirable to reflect more various factors to fit the characteristics of research objects because there are other various factors other than the factors proposed in this study.

4. Acknowledgments

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