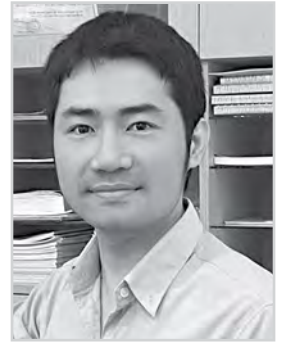


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Determinants of innovation: an empirical analysis for Vietnamese manufacturing firms

Abstract: Innovation, including products, processes, marketing and organisational innovation within a firm, is considered as one of essential components for survival and growth of firms. These innovation activities create values and competitive advantages for successful organisations; therefore, understanding the organisation's overall innovation is the first and foremost to understand the role of innovation on firm performance. The objective of this research is to estimate seven determinants of innovation activities. The questionnaire survey was administered to 118 firms in supporting industries located in Hanoi, Vietnam. The result has demonstrated that there are positive relationships between: 1) communication channels; 2) decentralised structure; 3) organisational resources; 4) belief that innovation is important; 5) willingness to take risks; 6) willingness to exchange ideas; 7) environment and innovation activities. Finally, recommendations have been provided to help academics to understand more about determinants of innovation and firms in supporting industries to improve innovation activities within organizations.

Keywords: Innovation Activities; Innovation Determinants; Manufacturing Firm; Supporting Industry; Vietnam

JEL Classification: M10

Acknowledgements. *The author would like to acknowledge financial support for the study from a research grant (2014-2016) with a code QG.14.42 by Vietnam National University, Hanoi.*

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Детермінанти інноваційної діяльності: емпіричний аналіз для в'єтнамських фірм-виробників

Анотація. Інновації, у тому числі й продукти, процеси, маркетингові та організаційні інновації, розглядаються як один з основних компонентів, що сприяють виживанню та зростанню фірми. Метою даного дослідження є оцінка семи детермінант інноваційної діяльності на підставі проведеного опитування 118 підприємств допоміжної промисловості, що розташовані в м. Ханой. Результат дослідження показав, що існує позитивний взаємозв'язок між: 1) каналами зв'язку; 2) децентралізованою структурою; 3) організаційними ресурсами; 4) переконаністю в тому, що інновації важливі; 5) готовністю йти на ризик; 6) готовністю обмінюватися ідеями; 7) існуючим середовищем та інноваційною діяльністю. Також були наведені рекомендації щодо поліпшення інноваційної діяльності в рамках організацій.

Ключові слова: інноваційна діяльність; детермінанти інноваційної діяльності; фірма-виробник; допоміжна промисловість; В'єтнам.

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Детерминанты инновационной деятельности: эмпирический анализ для вьетнамских фирм-производителей

Аннотация. Инновации, в том числе и продукты, процессы, маркетинговые и организационные инновации, рассматриваются как один из основных компонентов, способствующих выживанию и росту фирм. Целью данного исследования является оценка семи детерминант инновационной деятельности на основании проведенного опроса 118 предприятий вспомогательной промышленности, расположенных в г. Ханой. Результат исследования показал, что существует положительная взаимосвязь между: 1) каналами связи; 2) децентрализованной структурой; 3) организационными ресурсами; 4) убежденностью в том, что инновации важны; 5) готовностью идти на риск; 6) готовностью обмениваться идеями; 7) существующей средой и инновационной деятельностью. Также были предоставлены рекомендации по улучшению инновационной деятельности в рамках организаций.

Ключевые слова: инновационная деятельность; детерминанты инновационной деятельности; фирма-производитель; вспомогательная промышленность; Вьетнам.

1. Introduction. Vietnam's economic growth has been quite high since the Doi Moi policy (renovation) in 1986, but a slowdown of the growth in recent years has been due to the decline of labour productivity growth. In addition, Vietnam has been facing serious challenges such as climate change, environmental protection, resource conservation, etc. In order to solve these problems in long the term; Vietnam needs to set focus on the rational problems, especially innovations.

Since the Doi Moi reform in 1986, there has been an increasing number of both Vietnamese and FDI enterprises which have invested in Vietnam. They have played an important role in securing economic growth and employment creation. One of the most important ways through which businesses can contribute to productivity and economic growth is their ability to innovate. There is a comprehensive view that innovations are always essential for the survival of particular businesses and organisations in general. In fact, innovations still occur in Vietnamese enterprises when there are external assistance programs for them and their own efforts to promote in-

novation. However, to survive and grow in the fiercely competitive environment they still need to make more efforts in terms of innovation. Among these efforts, researches find it essential to establish knowledge of innovations in a systematic way, which guides the decisions of managers and governments practically and professionally.

In recent years, in the world there has been a great deal of research on determinants of innovation for companies, but such research activity is very rare in Vietnam, especially the one which regards testing the determinants of innovation. Therefore, this study will focus on analysing determinants of innovation activities of firms in supporting industries of mechanics, electronics, motorbike and automobile building in Hanoi City. These firms are on a list of companies with 150 firms (known as The Excellent Vietnamese Companies in Northern and Central Vietnam) established by JETRO (the Japan External Trade Organization) in Vietnam and VCCI (the Vietnam Chamber of Commerce and Industry). This study uses primary data from a questionnaire survey. The questionnaire involves

four parts including general information, determinant of innovation activities and innovative performance. These indicators are measured by the 5-point Likert scale ranging from: 1= strongly disagree; 2= disagree; 3= neutral; 4= agree; 5= strongly agree.

The questionnaire survey was administered to directors, CEO of those firms during April and May, 2014. It was followed by telephone calls to remind participation and return of the questionnaires. Prior to the launch of the official questionnaires, a pilot test of the questionnaire was administered to five firms and experts in the field of this research. Some modifications were made in several question constructs related to the layout of the questionnaire and some theoretical ambiguities. Out of the 150 questionnaires sent out, 131 were returned. Among the 131, 118 were valid, accounting for 78.7% of the true response rate. This study uses analytical methodologies of reliability, factor analysis and regression.

2. Brief Literature Review. Literature shows that firms need innovation to survive and succeed [10; 2; 3; 9] and gain sustainable competitive advantage [19; 1]. Despite the numerous studies on the topic of innovation and a large number of definitions of innovation in the literature, there is still a lack of consensus as to a single definition. Similar to Wan et al., (2005) [23], by taking the broadest view of innovation, this study considers innovation as a process that involves generation, adoption, implementation and incorporation of new ideas, practices or artefacts within the organization [22].

Innovation research is complicated when researchers further break innovations down to different types/categories. Daft (1978) [5] classified innovation into a technical and an administrative innovation. The technical aspect refers to products, services and production processes that are at the core of an organisation's technical ability. As for the administrative innovation, it refers to innovations that are generated from the managing and alteration of an organisation's structural and administrative procedures. Besides, Dewar & Dutton (1986) [8] considered innovation as the radical and incremental innovation. The radical innovation brings about a non-routine but clear change to the very core on how activities are carried out while the incremental innovation is usually part of routine changes that do not deviate much from present organizational activities [23]. OECD (2005) [14; 15] classified innovation into four different types which are used in this study: a product innovation, a process innovation, a marketing innovation and an organizational innovation. A product innovation is the introduction of a good or service that is new or significantly improved regarding its characteristics or intended uses; a process innovation is the implementation of a new or significantly improved production or delivery method, a marketing innovation is the implementation of a new marketing method, an organizational innovation is the implementation of a new organisational method.

Based on literature and Wan et al. (2005) [23], this paper identifies seven following determinants of firm innovation activities. However, unlike the previous studies, the dependent variables of this study are innovation activities, not innovation performance. In the viewpoint of innovation process, innovation activities lead to innovation performance. In other words, innovation activities are effects that can create innovation results. Therefore, this study considers determinants of innovation activities, rather than innovation as performance. Innovation activities are classified into four types in this paper: product, process, marketing and organizational innovation activities so that we have four specific dependent variables.

Communication channels

In Nonaka & Takeuchi (1995) [13] claimed that internal communication is one of the important factors to amplify and develop new knowledge. Ross (1974) [17] also suggested that interaction was able to facilitate creation. Thus, it is proposed that:

H1. Frequent internal communication is positively related to firms' greater innovation activities.

H1a. Frequent internal communication is positively related to firms' greater product innovation activities.

H1b. Frequent internal communication is positively related to firms' greater process innovation activities.

H1c. Frequent internal communication is positively related to firms' greater marketing innovation activities.

H1d. Frequent internal communication is positively related to firms' greater organisational innovation activities.

Decentralised structure

Moss Kanter (1983) [12] proposed that an organization which has fewer layers of hierarchy but performs greater interactions and frequently empowers to lower-level employees facilitates development and creation. Similarly, according to Subramanian & Nilakanta (1996) [20], decentralized and informal organizational structures were described as an effect generating new ideas. Thus, it is hypothesised that:

H2. Greater decentralisation of decision making authority is positively related to firms' greater innovation activities.

H2a. Greater decentralisation of decision making authority is positively related to firms' greater product innovation activities.

H2b. Greater decentralisation of decision making authority is positively related to firms' greater process innovation activities.

H2c. Greater decentralisation of decision making authority is positively related to firms' greater marketing innovation activities.

H2d. Greater decentralisation of decision making authority is positively related to firms' greater organisational innovation activities.

Organisational resources

Delbecq & Mills (1985) [7] compared innovation success and failure; they found out that firms' innovation fails because of the lack of organisational resources while special funds for innovations provide support to ensure the innovation success. On the other hand, organisational slack allows firms to purchase innovations, absorb failure, bear the costs of instituting innovations and explore new ideas in advance of an actual need, therefore, it has a positive influence on innovations [16]. Thus, it is proposed that:

H3. A greater amount of organisational resources set aside for innovation is positively related to firms' greater innovation activities.

H3a. A greater amount of organisational resources set aside for innovation is positively related to firms' greater product innovation activities.

H3b. A greater amount of organizational resources set aside for innovation is positively related to firms' greater process innovation activities.

H3c. A greater amount of organisational resources set aside for innovation is positively related to firms' greater marketing innovation activities.

H3d. A greater amount of organisational resources set aside for innovation is positively related to firms' greater organisational innovation activities.

Believing in importance of innovation

Businesses which are expected to develop innovations need to motivate employees to generate new ideas. The method should be the company's culture that supports and gives rewards for useful ideas. Employees should realise that innovations bring a lot of value for both them personally and the company, while the company should create conditions for innovation activities through the group norms or ideological organisations. Realisation of new ideas, providing psychological and resource support, is very important. In a set of seven innovation-related norms in Russell's (1986) [18] study of SMEs, some typical norms are: 1) the absolute number of innovations successfully implemented in the organizations; 2) the frequency and importance of innovation as an element of organisational strategy. Thus, it is proposed that:

H4. A greater belief that innovation is important for firms' success is positively related to firms' greater innovation activities.

H4a. A greater belief that innovation is important for firms' success is positively related to firms' greater product innovation activities.

H4b. A greater belief that innovation is important for firms' success is positively related to firms' greater process innovation activities.

H4c. A greater belief that innovation is important for firms' success is positively related to firms' greater marketing innovation activities.

H4d. A greater belief that innovation is important for firms' success is positively related to firms' greater organisational innovation activities.

Willingness to take risks

Changes always mean uncertainty and changes in innovation can result in risk-taking for a company. Enterprises can face risks when they do innovation projects, and they may suffer the failure. However, risk-taking behaviours should be encouraged [21] since innovative performances cannot be achieved without risk. He also believed that possible failures should be tolerated if the employees act in the interests of the customer. Thus, it is hypothesised that:

H5. A greater willingness to take risks is positively related to firms' greater innovation activities.

H5a. A greater willingness to take risks is positively related to firms' greater product innovation activities.

H5b. A greater willingness to take risks is positively related to firms' greater process innovation activities.

H5c. A greater willingness to take risks is positively related to firms' greater marketing innovation activities.

H5d. A greater willingness to take risks is positively related to firms' greater organisational innovation activities.

Willingness to exchange ideas

A new idea will become practical if there exist expression and exchange of information, and if knowledge is shared among the members of an organization [18]. Thus, the hypothesis is that:

H6. A greater willingness to exchange ideas is positively related to firms' greater innovation activities.

H6a. A greater willingness to exchange ideas is positively related to firms' greater product innovation activities.

H6b. A greater willingness to exchange ideas is positively related to firms' greater process innovation activities.

H6c. A greater willingness to exchange ideas is positively related to firms' greater marketing innovation activities.

H6d. A greater willingness to exchange ideas is positively related to firms' greater organisational innovation activities.

Environmental changes

Environmental changes define the radicalism required for new products/services in order to stay competitive. Environment is one of the main elements influencing learning new patents, new marketing campaigns, new successful projects from other firms, and even their rivals. Organisations should create conditions to have a general in-depth knowledge of their environment, which constitutes the main source of opportunities and threats [4]. The environment and changes in it are challenges that encourage innovation [4]. Thus, it is proposed that:

H7. A greater environmental change is positively related to firms' greater innovation activities.

H7a. A greater environmental change is positively related to firms' greater product innovation activities.

H7b. A greater environmental change is positively related to firms' greater process innovation activities.

H7c. A greater environmental change is positively related to firms' greater marketing innovation activities.

H7d. A greater environmental change is positively related to firms' greater firm organisational innovation activities.

3. Purpose. This study will focus on the analysis of determinants of firms' innovation activities with regard to in supporting industries such as mechanics, electronics, motorbike and automobile building in Hanoi City.

Results. Through reliability analysis, all items of seven determinants of innovation activities and 4 types of innovation activities are accepted (see Table 1). Therefore, they are further used to conduct the exploratory factor analysis.

In KMO and Bartlett's Test, the KMO value of each scale is 0.696 (between 0.5 and 1) with Sig. of 0.000. Therefore, the validity of data for exploratory factor analysis is confirmed.

Tab. 1: Results of reliability analysis

Variables	Cronbach's Alpha
Decentralized structure	0.811
Organizational resources	0.759
Believing in importance of innovation	0.765
Willingness to exchange ideas	0.862
Communication channels	0.817
Willingness to take risks	0.767
Environmental changes	0.832
Product innovation activities	0.901
Process innovation activities	0.832
Marketing innovation activities	0.926
Organizational innovation activities	0.941

Source: Calculated by the author

The determinants of the innovation activities scale comprise 19 items. After conducting the reliability analysis, there is no item of the scale which is not reliable to be rejected. Therefore, the determinants of the innovation activities scale still have 19 observed items with their internal consistency. The exploratory factor analysis (see Table 2) is conducted with these 19 variables to measure a convergence of variables along with their components, namely «Decentralised Structure» (DECENTRALIZED), «Organisational Resource» (RESOURCE), «Believing in Importance of Innovation» (BELIEVE), «Willingness to Exchange Ideas» (EXCHANGE), «Communication Channels» (COMMUNICATION), «Willingness to Take Risks» (TAKE RISK) and «Environmental Changes» (ENVIRONMENT).

The product innovation scale includes 5 observed variables, extracted to 1 component – PRODUCT; the process innovation scale includes 5 observed variables, extracted to 1 component – PROCESS; their Marketing innovation scale includes 5 observed variables, extracted to 1 component – MARKETING; the organisational innovation scale includes 8 observed variables, extracted to 1 component – ORGANISATION.

Seven determinants of innovation activities were included in the analysis as independent variables. In the first model (Model 1), seven determinants of innovation activities explained 48.5% of the variance in product innovation. In the next three models (Models 2; 3; 4), seven determinants of innovation activities are jointly explained 33.7%, 37.9%, 36.8% of the variance in process innovation, marketing innovation, and organizational innovation, respectively.

The results of the analysis (see Table 3) show that all the independent variables (DECENTRALIZED, RESOURCE, BELIEVE, EXCHANGE, COMMUNICATION, TAKE RISK and ENVIRONMENT) have a significantly positive effect on different types of innovation activities with a statistical significant level of 1, 5 and 10 percent. More specifically, hypothesis 1 states that frequent internal communication is positively related

Tab. 2: Results of rotated component matrix

	Component						
	1	2	3	4	5	6	7
ENVIRONMENT1	.878						
ENVIRONMENT2	.843						
ENVIRONMENT4	.788						
ENVIRONMENT3	.699						
TAKE_RISK2		.821					
TAKE_RISK3		.802					
TAKE_RISK1		.736					
RESOURCES1			.809				
RESOURCES2			.775				
RESOURCES3			.761				
BELIEVE2				.793			
BELIEVE3				.792			
BELIEVE1				.790			
EXCHANGE2					.916		
EXCHANGE1					.884		
DECENTRALIZE2						.918	
DECENTRALIZE1						.842	
COMMUNICATION1							.874
COMMUNICATION2							.867
% of Variance	14.779	11.119	11.061	10.752	9.565	9.142	9.054
Cumulative %	14.779	25.898	36.959	47.711	57.276	66.418	75.472
Extraction Method: Principal Component Analysis.							
Rotation Method: Varimax with Kaiser Normalisation.							

Source: Calculated by the author

Tab. 3: Results of regression analysis

Dependent variables: Product Innovation, Process Innovation, Marketing Innovation, Organizational Innovation; corresponding for Model 1-4				
Independent variables:	Model 1	Model 2	Model 3	Model 4
DECENTRALISED	.105	.141*	.106	.142*
RESOURCE	.186**	.241***	.262***	.197***
BELIEVE	.176**	.153**	.167**	.177**
EXCHANGE	.198***	.222***	.209***	.202***
COMMUNICATION	.087	.036	.132*	.118
TAKERISK	.338***	.386***	.265***	.310***
ENVIRONMENT	.218***	.122**	.195***	.165**
R2	.516	.377	.416	.406
Adjusted R2	.485	.337	.379	.368
F	16.729	9.510	11.188	10.742

Note: *p < .10; **p < .05; ***p < .01; Standardized coefficients reported
Source: Calculated by the author

to greater firm innovation activities. This hypothesis is only partially supported with Model 3 (marketing innovation activities) at a statistically significant level of 10 percent. Therefore, H1c is supported. This result indicates that frequent internal communication should result in a greater dispersion of new ideas, and, hence, firms' greater marketing innovation activities.

Hypothesis 2 states that «Greater decentralization of decision making authority is positively related to firms' greater innovation activities». This hypothesis is only partially supported with regard to Model 2 (process innovation activities) at a statistically significant level of 10 percent. Therefore, H2b is supported. This means that centralisation of decision making by authorities prevents innovative solutions [23].

Hypothesis 3, a greater amount of organizational resources set aside for innovation is positively related to firms' greater innovation activities, is fully supported, which is similar to [23]. The implication is that successful innovations tend to benefit from the presence of innovation funds while failures are possibly due to a lack of organisational resources.

Hypothesis 4 states that a greater belief that innovation is important for firms' success is positively related to firms' greater innovation activities. This hypothesis is fully supported.

Hypothesis 5, a greater willingness to take risks is positively related to greater firm innovation, is also fully supported. Hence, a culture that encourages risk-taking and tolerates failure is positively related to innovation. Similarly, hypothesis 6 and hypothesis 7 are fully accepted.

5. Conclusions. This study focuses on the determinants of innovation activities at 118 companies belonging to supporting industries. The result of this study illustrates that all the seven independent variables have a significantly positive effect on different types of innovation activities with different level of significance. From the results, this study makes a contribution for both academics and company's practices.

For academics, this study provided one more empirical evidence of the determinants of innovation activities. More impor-

tantly, by considering innovation as a process from innovation activities to innovation performance, the determinants have been identified as independent variables that affect innovation activities, but not directly as previous studies in the literature review. Besides, there are modifications on both independent and dependent variables that make the model more comprehensively. More specifically, the variable «Environmental Changes» is added on the basis of the external effect. The dependent variables marked as «Innovation Activities» are divided into four types, including product, process, marketing and organisational innovation activities.

For practitioners, this study emphasises that top managers should encourage risk-taking and exchange of ideas among employees within their organisations. Such a change is very sensitive to firms because of the existing cultures. A change in organisational culture can have benefits for organisations thanks to new ideas, new projects. However, willingness to take risk and willingness to exchange ideas may have some weaknesses due to the uncertainty of innovations. Employees may fail, but they must not feel scared to do the next innovation. Top managers should give more chances for employees to try and solve the problem together. Employees can be actively engaged in creativity through more attractive programs, recognition and awards. As a result, employees can make comments, suggest ideas to improve the innovation process because the workers directly produce products and they are the most proficient ones with regard to the manufacturing process.

Secondly, companies should analyse and take advantage of organisational resources as well as learn from the environment. Top managers should pay heed to the power and benefits of decentralisation of decision-making from authorities to lower-level employees [23]. Decentralisation provides for quick action and flexibility, which are crucial in enabling companies to be the first to introduce new innovations (better goods and services) to the market. Kanter (2000) [11] recommended that organisations should raise an innovation fund for the potential ideas to find the money and materials to innovation process smoothly, for example, investing in R&D. Employees and managers should learn from the environment, even from the competitors so as to update the trends and develop business strategies. Firms should pay attention to the relationships with foreign enterprises and domestic companies in the industry.

Like all other researches, this study faces limitations. The research scope is small and includes 150 companies in Hanoi, therefore the analysis results are not highly generated.

Finally, future studies should broaden the topic by investigating impacts of innovation activities on innovative performance of firms. There may be a comprehensive study of a larger scale including industries or regions so that results can be strongly generalised.

References

- Bartel, C. A., & Garud, R. (2009). The role of narratives in sustaining organizational innovation. *Organization Science*, 20(1), 107-117.
- Bell, G. (2005). Clusters, networks, and firm innovativeness. *Strategic Management Journal*, 26(3), 287-295.
- Cho, H., & Pucik, V. (2005). Relationship between innovativeness, quality, growth, profitability, and market value. *Strategic Management Journal*, 26(6), 555-575.
- Clarke, L. (1994). *The essence of change*. London: Prentice hall.
- Daft, R. L. (1978). A dual-core model of organizational innovation. *Academy of Management Journal*, 21(2), 193-210.
- De Coster, J. (1998). *Overview of factor analysis*. Retrieved from <http://www.stat-help.com>
- Delbecq, A. L., & Mills, P. K. (1985). Managerial practices that enhance innovation. *Organizational dynamics*, 14(1), 24-34.
- Dewar, R. D., & Dutton, J. E. (1986). The adoption of radical and incremental innovations: an empirical analysis. *Management science*, 32(11), 1422-1433.
- Gopalakrishnan, S., & Damanpour, F. (1997). A review of innovation research in economics, sociology and technology management. *Omega*, 25(1), 15-28.
- Jimenez, J. D., & Sanz-Valle, R. (2001). Innovation, organizational learning and performance. *Journal of Business Research*, 64(4), 408-417.
- Kanter, R. M. (2000). When a thousand flowers bloom: Structural, collective, and social conditions for innovation in organizations. *Entrepreneurship: the social view*, 167-210.
- Moss Kanter, R. (1983). *The change masters*. New York: Simon & Schuster Moss.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. Oxford university press.
- OECD (2005). *Oslo Manual: Proposed guidelines for collecting and interpreting technological innovation data*. 2nd ed. Paris: OECD Publishing.
- OECD & Eurostat (2005). *Oslo manual: Guidelines for collecting and interpreting innovation data*. 3rd ed. Paris: OECD Publishing.
- Rosner, M. M. (1968). Economic determinants of organizational innovation. *Administrative Science Quarterly*, 614-625.
- Ross, P. F. (1974). Innovation adoption by organizations. *Personnel Psychology*, 27(1), 21-47.
- Russell, R. (1986). *The effect of environmental context and formal and informal organizational influence mechanisms on the process of innovation*. PhD Dissertation. Graduate School of Business, University of Pittsburgh.
- Standing, C., & Kiniti, S. (2011). How can organizations use wikis for Innovation?. *Technovation*, 31(7), 287-295.
- Subramanian, A., & Nilakanta, S. (1996). Organizational innovativeness: exploring the relationship between organizational determinants of innovation, types of innovations, and measures of organizational performance. *Omega*, 24(6), 631-647.
- Tushman, M. L. (1997). Winning through innovation. *Strategy & Leadership*, 25(4), 14-19.
- Van de Ven, A. H., Angle, H. L., & Poole, M. S. (2000). *Research on the management of innovation: The Minnesota studies*. New York, NY: Oxford University Press.
- Wan, D., Ong, C. H., & Lee, F. (2005). Determinants of firm innovation in Singapore. *Technovation*, 25(3), 261-268.

Received 6.11.2015