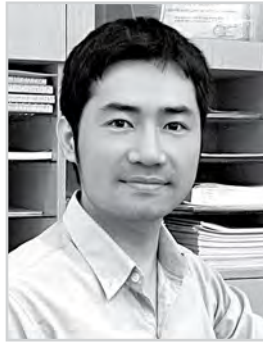


**Phan Chi Anh**

PhD (Business Administration),
Center for Business Administration Studies,
VNU University of Economics and Business
Room No. 307, E4 Building,
144 Xuan Thuy road, Cau Giay District,
Hanoi, Vietnam
anhpc@vnu.edu.vn
ORCID ID:
<http://orcid.org/0000-0002-0153-1845>

**Nham Phong Tuan**

PhD (Business Administration),
Associate Professor,
School of Business Administration,
VNU University of Economics and Business
Room No. 307, E4 Building,
144 Xuan Thuy road, Cau Giay District,
Hanoi, Vietnam
tuannp@vnu.edu.vn
ORCID ID:
<http://orcid.org/0000-0002-0973-3943>

**Hoang Trong Hoa**

Researcher, Center for Business
Administration Studies,
VNU University of Economics and Business
Room No. 307, E4 Building, 144
Xuan Thuy road, Cau Giay District,
Hanoi, Vietnam
hoantronghoa1988@gmail.com
ORCID ID:
<http://orcid.org/0000-0001-6115-8686>

Relationship between manufacturing strategy and firm performance: the empirical study of Vietnamese manufacturing plants

Abstract

The process of formulation and implementation of the firm's strategy is closely linked to its performance. This article presents the results of an empirical research regarding the relationship between manufacturing strategy and performance of manufacturing plants in Vietnam. Data was collected from 25 plants as part of the High Performance Manufacturing (HPM) project and analysed by using statistical tools. The manufacturing companies are operating in three industries: transportation, electronics and machinery equipment. The respondents were mainly directors, vice directors, plant managers, upstream and downstream supply chain managers. The present research is aimed to test two hypotheses constructed. Hypothesis 1: Manufacturing strategy practices at the managerial level have a significant impact on firm performance. Hypothesis 2: Manufacturing strategy practices at the supervisory level have a significant impact on firm performance.

Notable results were found regarding the relationship between manufacturing strategy and firm performance among Vietnamese plants. The results of analysis of variance (ANOVA) and regression analysis indicate the importance of management in formulating and implementing the manufacturing strategy with regard to firm performance, whereas supervision is less significant in terms of its influence on firm performance.

Keywords: Strategy; Firm Performance; Vietnamese Plants; Manufacturer; Vietnam; High Performance Manufacturing (HPM) Project; ANOVA

JEL Classification: M10

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Анх Ф. Ч.

кандидат економічних наук, центр бізнес-адміністрування,
В'єтнамський національний університет економіки та бізнесу, Ханой, В'єтнам

Туан Н. Ф.

кандидат економічних наук, доцент, школа бізнес-адміністрування,
В'єтнамський національний університет економіки та бізнесу, Ханой, В'єтнам

Хоа Х. Т.

дослідник, центр бізнес-адміністрування,
В'єтнамський національний університет економіки та бізнесу, Ханой, В'єтнам

Взаємозв'язок між виробничою стратегією та господарською ефективністю: емпіричне дослідження в'єтнамських підприємств

Анотація. Процес розробки та реалізації стратегії підприємства тісно пов'язаний із його продуктивністю. У статті представлено результати емпіричного дослідження, що стосуються взаємозв'язку між виробничою стратегією та ефективністю діяльності в'єтнамських підприємств. В основу дослідження було покладено дані двадцяти п'яти підприємств-учасників проекту з підвищення ефективності діяльності, аналіз яких був проведений із використанням статистичних методів. Варті ваги результати дослідження мають відношення передусім до взаємозв'язку між виробничою стратегією та ефективністю господарської діяльності в'єтнамських підприємств. Результати проведеного дисперсійного та регресійного аналізу показують те, наскільки важливу роль відіграє управління в розробці й реалізації стратегії виробництва, тоді як роль, що відіграє контроль, вбачається менш значущою з огляду на його вплив на діяльність компаній.

Ключові слова: стратегія; ефективність; результативність діяльності підприємства; в'єтнамські підприємства; виробник; В'єтнам; проект підвищення ефективності діяльності підприємств.

Анх Ф. Ч.

кандидат экономических наук, центр бизнес-администрирования,
Вьетнамский национальный университет экономики и бизнеса, Ханой, Вьетнам

Туан Н. Ф.

кандидат экономических наук, доцент, школа бизнес-администрирования,
Вьетнамский национальный университет экономики и бизнеса, Ханой, Вьетнам

Хоа Х. Т.

исследователь, центр бизнес-администрирования,
Вьетнамский национальный университет экономики и бизнеса, Ханой, Вьетнам

Взаимосвязь между производственной стратегией и эффективностью хозяйственной деятельности: эмпирическое исследование вьетнамских предприятий

Аннотация. Процесс разработки и реализации стратегии предприятия тесно связан с его продуктивностью. В статье представлены результаты эмпирического исследования, касающиеся взаимосвязи между производственной стратегией и эффективностью деятельности вьетнамских предприятий. В основу исследования были положены данные двадцати пяти предприятий-участников проекта по повышению эффективности деятельности, анализ которых был проведен с использованием статистических методов. Заслуживающие внимания результаты исследования были получены в отношении взаимосвязи между производственной стратегией и эффективностью деятельности вьетнамских предприятий. Результаты проведенного дисперсионного и регрессионного анализа показывают то, насколько важную роль играет управление в разработке и реализации стратегии производства, в то время как роль, которую играет контроль, видится менее значимой с точки зрения его влияния на деятельность компаний.

Ключевые слова: стратегия; эффективность деятельности предприятия; вьетнамские предприятия; производитель; Вьетнам; проект повышения эффективности деятельности предприятий.

1. Introduction

Vietnam has made remarkable progress on industrialisation, and the manufacturing sector is taking an increasingly important role. During the 2000s, together with the rapid export growth, the share of Vietnam's manufacturing in the country's total GDP rose from 15% to 25% [11]. In 2015, the growth rate of industrial manufacturing reached 10.6%, counting for 1.6% within the total 6.7% of the country's GDP growth rate. At the end of 2016, the growth rate was 11.2%, and the manufacturing sector continued to be the strongest driver within the Vietnamese economy [7]. The manufacturing sector is expected to maintain consistent growth mainly for two reasons. Firstly, foreign direct investment continue coming to Vietnam - the first-two-month period of 2016 witnessed USD 2.8 billion invested from overseas. Secondly, domestic demand remains strong as a result of the high GDP growth rate and consumption [21].

However, a recent study by Nikkei (2016) suggests that the volume growth and the order quantity were slowing down during the first months of 2016, when Vietnam's Purchasing Managers Index (PMI) dropped from 51.3 to 50.3 [12]. Despite a slight recovery of the manufacturing sector, its state is yet not up to expectations, according to Nikkei. The first quarter of the year 2017 saw a major improvement of Vietnam's PMI as it reached 54.6 in March - the highest indicator from May 2015. This is largely thanks to a significant increase in foreign orders, which is forecasted to maintain its rise until the end of the year [13]. This implies tremendous opportunities for the Vietnamese manufacturing sector which is currently under great pressure to be more competitive [3].

A study by P. Athukorala (2009) indicates that regardless of Vietnam's efforts, its position among the global manufacturing network is still humble [1]. According to the Vietnam National Productivity Institute (2014), the country's labour productivity remains low with limited growth compared to other developing countries such as Mongolia, India, Laos and Cambodia [20]. In 2012, Vietnam's equaled only 7% of labour productivity in Singapore, 9% of labour productivity in Japan, 14% of labour productivity in Korea and 35% of labour productivity in Thailand.

Despite its strengthening position within the Vietnamese economy, the manufacturing sector is still suffering from limited competitive performance. The primary question to ask is how to improve its performance when a great deal of domestic manufacturing technology is outdated and largely dependent on foreign know-how and resources, besides the fact that labour skills stay low. According to B. Flynn et al. (1997), factors impacting firm performance can be diverse, covering supply chain management, quality management, lean manufacturing, human resource management, manufacturing strategy and so on [6]. Strategy is generally

considered a strong predictor of performance (Anwar et al., 2016) [9]; and in particular, manufacturing strategy - coined by W. Skinner (1969) [18] - is said to be an important intrinsic factor impacting the firm's competitiveness. In a similar statement, P. Swamidass and W. Newell (1987) indicate that manufacturing strategy is a critical part of a firm's comprehensive strategy, aimed at improving competitive performance by leveraging manufacturing strengths [19]. Yet, a recent research by U. Dmbrowski et al. (2016) indicates the currently poor attention being paid to manufacturing by a good many of manufacturers [5].

On the other hand, it should be noted that firms' practices can be vastly different, especially when it comes to those operating in different nations with dissimilar geographic, economic, political, cultural and other traits. Thus, the impact of manufacturing strategy on firm performance across countries may differ depending on such environmental attributes. This has been also indicated in a recent study by Yuliansyah et al. (2016) about the relationship between strategy and performance of firms in the service sector [22]. For that reason, the topic of manufacturing strategy, which is being under-studied in Vietnam despite its important role, has aroused great interest. Accordingly, this study aims to cover the gap by analysing the process of formation and implementation of in a number of Vietnamese plants, and identify possible relations between manufacturing strategy and firm performance. The results of the study will provide a broader understanding of how to advance Vietnam's manufacturing sector in the post-2015 period.

2. Brief Literature Review

«A manufacturing strategy is defined by a pattern of decisions, both structural and infrastructural, which determine the capability of a manufacturing system and specify how it will operate, in order to meet a set of manufacturing objectives which are consistent with the overall business objectives.»

Platts et al. (1998)

This view emphasises that manufacturing objectives - or strategic priorities in Hallgren's (2007) descriptions - are crucial to a firm's comprehensive strategy. These priorities are: low cost, high quality, on-time delivery and flexible production. Based on the chosen structural and infrastructural priorities, a firm can construct more concrete steps to realise its manufacturing strategy and improve its competitive performance. Numerous studies have proven a tight relationship between manufacturing strategy and good operating performance. For instance, a firm with better-constructed manufacturing strategy is more likely to achieve better performance. Similarly, companies with better performance are also more likely to spend effort on optimising their manufacturing strategy [16]. The process of formulating

and implementing manufacturing strategy requires a number of key factors which M. Beer and R. Eisenstat (2000) [2] summarised into the Table 1.

According to M. Beer and R. Eisenstat (2000), the above six factors restrict the effectiveness of formulating and implementing manufacturing strategy by impacting three aspects:

- Firstly, the three factors, which are: senior management team, management style and effective strategies and priorities, will determine the quality of direction, i.e. how strategy is championed.
- Secondly, even if strategy direction is of high quality, the poor top-down communication will limit the quality of learning, accordingly, hindering the strategy realisation effort.
- Thirdly, the final factors for successful strategising are at the concrete implementation level, where coordination across function and leadership skills are most critical.

In short, coherent and effective conduct on all the three aspects - direction, learning and implementation - is the basis of a successful strategising process. The framework by M. Beer and R. Eisenstat (2000) has brought valuable insights to the authors to construct a relevant framework to present a correlation between manufacturing strategy and firm performance in this research.

When a firm formulates and implements its manufacturing strategy, a number of key actors are involved. They are normally at the managerial level, namely managing directors, managers and heads of departments or functions, etc., or at the supervisory level, such as supervisors, shift leads, production coordinators, technical managers, etc. While management teams are responsible for formulating a strategy and organising it at a higher level, supervisors are directly involved in the process of its implementation in terms of concrete activities [10].

Based on the literature review, the authors would like to propose a framework to analyse the correlation between the formulation and implementation of strategy and the performance of Vietnamese manufacturing plants, as shown in Figure 1. The study will independently examine the impacts of the relevant strategy practices between at the managerial and supervisory levels on firm performance.

Strategy practices at the managerial level are evaluated via the four above aspects which cover the strategising process from formulating a strategy to organising and integrating functions for its implementation. Generally, these strategic activities are handled by management teams within an organisation. Two aspects are to be considered in terms of practices at the supervisory level. They are directly related to the role of supervisors, who take charge of concrete activities such as direct supervision, motivation and coordination to implement strategies at a higher level. Firm performance is normally evaluated basing on a comprehensive set of criteria covering product quality, production costs and delivery in comparison to direct competitors.

Given the above framework, this research aims to test the following two hypotheses constructed based on what have been understood from theories and practices of firm operation.

Hypothesis 1: Manufacturing strategy practices at the managerial level have a significant impact on firm performance.

Hypothesis 2: Manufacturing strategy practices at the supervisory level have a significant impact on firm performance

3. Research Methodology

To test these hypotheses, the authors employed the questionnaires and response data of the High Performance Manufacturing (HPM) project. The project was started in 1988 by R. Shroeder and B. Flynn, proceeding through multiple rounds aimed at analysing the impacts that manufacturing management, production, quality, supply chain, strategy,

Tab. 1: The six «Killers» of manufacturing strategy

Aspects impacted	Factors impacting
Quality of Direction	Ineffective Senior Management Team
	Unclear Strategies and Conflicting Priorities
	Top-Down or Laissez-Faire Senior Management Style
Quality of Learning	Poor Vertical Communication
Quality of Implementation	Poor Coordination across Functions, Businesses or Borders
	Inadequate Down-the-Line Leadership Skills and Development

Source: M. Beer and R. Eisenstat (2000) [2]

human resources, etc. have on manufacturing firms' competitiveness. Until now, there have been four data collection rounds in which the target group expanded from 45 plants in the USA in Round One up to more than 500 plants from 18 countries in Round Four. More than 200 scholars and 500 manufacturing enterprises from countries such as Japan, USA, Germany, Italy, Austria, Finland, Sweden, Brazil, South Korea, China and Singapore have been taking part in this project. Further details can be obtained via the publication by Shroeder and Flynn (2002) [17].

In Vietnam, the HPM project was started in 2014 by a group of Vietnamese researchers from the VNU University of Economics and Business, Foreign Trade University and Hanoi University of Science and Technology. At the beginning of the project, manufacturers registered their participation and received the survey for their responses. The obtained results were then analysed and presented to all the key stakeholders. In further details regarding the data collection method of the HPM project in Vietnam, cross-sectional data was collected from 25 companies, both local and FDI, during the period from 2014 to 2015. The manufacturing companies are operating in three industries in Vietnam, which are transportation, electronics/electrical and machinery equipment.

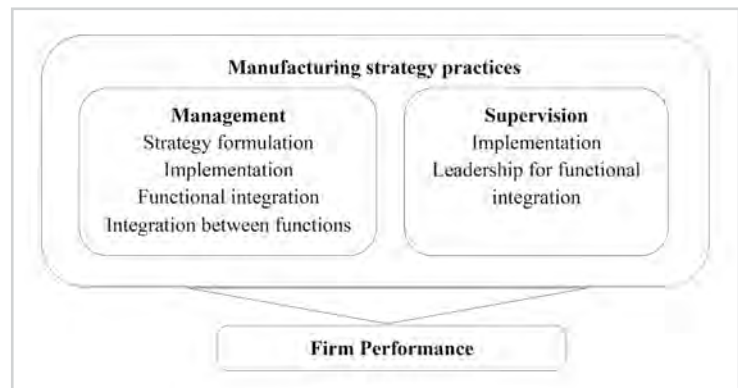


Fig. 1: Analytical framework

Source: Compiled by the authors based on literature review

The multiple respondents who are mainly directors, vice directors, plant managers, upstream and downstream supply chain managers were targeted to avoid a regular bias. The measuring constructs were adopted from the HPM project. An English version questionnaire was established. The questionnaire, then, was translated into Vietnamese and checked back and forth three times by researchers, experts and company managers to make sure that the questionnaire was correctly translated and understandable. The final Vietnamese questionnaire version was sent to manufacturers by direct handling and email. The questions were measured according to the 1 to 5 Likert scale.

In this paper, the survey questionnaire regarding manufacturing strategy and firm performance was filled by plant managers and supervisors, and consists of the following scales.

Strategy formulation:

Targeting Plant Management level with 4 questions. Evaluates the process of constructing manufacturing strategy of the plant. The four questions examine whether the plant has

its mission, vision and strategy clearly stated and documented, which are regularly reviewed and revised by the management.

Implementation - management level:

Targeting Plant Management level with 7 questions. Evaluates the process of realising manufacturing strategy of the plant by management team, via their level of engagement in leading, training and supervising closely the plant's activities toward achieving its strategic objectives.

Functional integration:

Targeting Plant Management level with 9 questions. Evaluates the integration of the organisation between different functions. The questions examines how mismatching activities are resolved between the functions, and how the functions are connected to fulfill the common goals.

Integration between functions:

Targeting Plant Management level with 4 questions. Evaluates how the functions within the plant collaborate with each other from their independent perspectives. For example, marketing, finance, product development or human resources departments need to understand the overall situation of the whole plant.

Implementation - supervision level:

Targeting Plant Supervision level with 7 questions. Evaluates the process of realising manufacturing strategy of the plant at the supervisory level. The questions examine the level of understanding and engagement that supervisors have for manufacturing strategy. This scale plays an important role as it evaluates the «Quality of learning» posed by M. Beer and R. Eisenstat (2000), which is a critical link in bringing manufacturing strategy to reality.

Leadership for functional integration:

Targeting Plant Supervision level with 4 questions. Evaluates the comprehensiveness and coherence of strategy implementation. This scale targets the supervisors to examine their awareness about their role as the coordinators that directly enforce strategic actions under management's leadership.

Competitive performance:

Targeting Plant Management level with 27 questions. Measures the competitiveness of the company. This scale consists of questions regarding the detailed operation results of the companies such as unit average manufacturing cost, capability to design, product quality, on-time delivery, production flexibility and so on. These factors are all related to the criteria for choices of manufacturing strategy proposed by M. Hallgren (2007) and A. De Meyer et al. (1989) [8; 4]. The respondents are the plant managers, who then benchmark their results by 27 criteria with competitors' performance according to the 1 to 5 Likert scale (1 - significantly poorer, 3 - similar, 5 - significantly better).

4. Results

Among the 25 participating firms, the majority is electronics/electrical firms (40% of the total number of respondents). Transportation and machinery firms accounted for smaller shares with 32% and 24%, respectively.

Before testing the hypotheses, data reliability was examined using Cronbach's Alpha. The results indicate high reliability and consistency for all the employed scales, since all Cronbach's Alpha values are higher than the threshold value 0.6 - as in other similar studies (see Table 2).

Prior to the regression analysis, the correlation values of the variables are tested with results presented in Table 3. The result of analysis of variance show that the four component variables of the new variable «Manufacturing strategy at managerial level» (MS-M) are all independent in terms of statistical values from the other new variable «Manufacturing strategy at supervisory level» (MS-S), as well as its two-component variables. Likewise, the two-component variables of MS-S are also independent from the new variable MS-M and its four-component variables. With the Pearson value of 0.002 and Sig. 2 - tailed value of 0.99, MS-M and MS-S are arguably independent from each other. Further observations reveal that MS-S and its related variables have very low correlation with Competitive Performance; while MS-M and its related variables have rather low correlation with Competitive Performance.

Finally, the regression analysis was conducted between «Competitive Performance» and two independent variables MS-M and MS-S. The results are shown in Table 4.

Based on the results presented above, a number of remarks could be proposed. Firstly, The Adjusted R Square of 0.65 means 65% of the Competitive Performance variable can be predicted by the variables MS-M and MS-S.

Secondly, the variable MS-M has significant linear regressive relationship with Competitive Performance, with Beta at 0.83 and the p value at 0.00. The other independent variable, MS-S, with Beta at approximately 0 and the p value at 1, cannot be justifiably concluded to have linear regressive relationship with the dependent variable.

The results of analysis of variance and regression analysis suggest that Hypothesis 1 can be accepted and Hypothesis 2 should be rejected.

Tab. 2: Measurement Test and Descriptive statistics

Scales	Cronbach's Alpha	Min	Max	Mean	Std. Dev.
Strategy formulation	0.81	3.0	5.0	4.49	0.56
Implementation - management level	0.66	3.2	5.0	4.27	0.47
Functional integration	0.79	3.3	5.0	4.20	0.54
Integration between functions	0.68	2.9	4.8	4.15	0.48
Implementation - supervision level	0.70	3.0	5.0	3.87	0.59
Leadership for functional integration	0.80	2.7	5.0	4.03	0.69
Competitive performance	0.98	2.6	5.0	4.14	0.76

Source: Authors' own calculations

Tab. 3: Results of correlation analysis between the variables

	Str. For.	Imp. - Mng.	Func. Int.	Inte. btw func.	Imp. - Sup.	Lead. Func. Int.	MS-M	MS-S	Comp. Perf.
Strategy formulation	1	.585**	.617**	.375	.201	.217	.812**	.255	.615**
Implementation - management level	.585**	1	.659**	.426*	.078	.096	.820**	.123	.639**
Functional integration	.617**	.659**	1	.524**	-.327	-.187	.874**	-.229	.724**
Integration between functions	.375	.426*	.524**	1	-.069	-.201	.713**	-.188	.675**
Implementation - supervision level	.201	.078	-.327	-.069	1	.901**	-.032	.971**	.003
Leadership for functional integration	.217	.096	-.187	-.201	.901**	1	-.009	.979**	-.016
MS-M	.812**	.820**	.874**	.713**	-.032	-.009	1	.002	.823**
MS-S	.255	.123	-.229	-.188	.971**	.979**	.002	1	.000
Competitive performance	.615**	.639**	.724**	.675**	.003	-.016	.823**	.000	1

Source: Authors' own calculations

Tab. 4: Results of regression analysis between manufacturing variables (MS-M and MS-S) and performance variable (Competitive Performance)

Adjusted R Square	ANOVA		Regression Analysis			Collinearity Stats.	
	F	Sig.	Independent Variables	Beta	Sig.	Tolerance	VIF
0.65	20.75	0.00	MS-M	0.83	0.00	1.00	1.00
			MS-S	0.01	0.94	1.00	1.00

Source: Authors' own calculations

These results indicate that management plays an important role in formulating and implementing manufacturing strategy with regard to firm performance. Meanwhile, the role of supervision in the manufacturing strategy process seems less significant in terms of its influence firm performance. This is possibly because supervisors at Vietnamese plants are particularly less involved in this process where management takes charge more comprehensively.

5. Conclusions

The purpose of this research is to investigate the relationship between manufacturing strategy and firm performance on the sample of Vietnamese manufacturing firms. The authors focused on the process of formulating and implementing manufacturing strategy at the managerial and supervisory levels in relation to firm performance, which was competitive performance in particular.

Based on the data collected from 25 Vietnamese plants participating in the HPM project, the authors used regression analysis to reach the conclusion that the manufacturing strategy process at the managerial level has a significant impact on competitive performance of manufacturing firms. Vietnamese plants need to be clearly aware of this relationship in order to achieve better performance in both the strategy process and competitiveness.

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