Study on the Effect of Manufacturing Technology Factor on the Sustainable Development of Industrial SMEs in Ha Noi

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Abstract

In recent years, many researchers have always been special interest to sustainable development of enterprises, including small and medium enterprises (SMEs). However, the choice of research direction on sustainable development of industrial SMEs has not many published results related to this issue. Especially with the scope of a province in a country. The study selected research scope in Hanoi, Vietnam. Applying qualitative and quantitative methods to evaluate the influence and the degree of influence of manufacturing technology factor on the Sustainable Development of Industrial SMEs in Ha Noi. The research results show that, manufacturing technology factor is the greatest impact on the sustainable development of industrial SMEs in Ha Noi behind other factors: Financial resources; Human resources; Corporate social responsibility policies and local support policies. That is also the findings in this study, the manufacturing technology is the most important factor, it has a greater influence than the internal resources of industrial SMEs including financial and human resources. Since then, the research has indicated some important policies to promote the sustainable development of industrial SMEs in Hanoi. It emphasizes policy that, state management agencies need to improve the efficiency of mechanisms and policies to support the development of science and technology for industrial SMEs.

Keywords: Sustainable, Development, Industrial, SMEs, Manufacturing Technology.

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1. Introduction

In the trend of deeper and deeper international integration, the issue of sustainable development of enterprises has always been paid special attention in recent years. Implementing sustainable development is the responsibility of all the society, including the contribution of the business community. However, to be able to further promote the development of businesses towards sustainability, that is essential to evaluate the role of manufacturing technology in businesses. Ha Noi is one of two largest cities in Viet Nam. The total number of enterprises in Ha Noi by the end is over 150,000 enterprises in 2019. In which SMEs account for approximately 98% of the total enterprises number, the number of industrial enterprises accounts for about 20% of the total SMEs number. In order to promote industrial SMEs in Ha Noi to maintain and develop more towards sustainable development. The study of the effects of manufacturing technology factor on the sustainable development of industrial SMEs in Ha Noi is necessary before the current situation of SMEs in Hanoi. Through the research results, the author proposes a number of solutions and recommendations to the government management. Which is agencies to maintain and promote the sustainable development of the industrial SMEs sector on a wider scale and more quality.

2. Literature Review

Atkinson et al. (1999) stated that, there are 6 target systems for sustainable development, divided into 3 groups: human system; support system; and natural system. These three groups of systems correspond to the three capital sources commonly used in analyzing the entire system, namely: human capital; structural capital; natural capital. Understanding sustainable development also plays an important part in the theory of sustainable development, including an analysis of the relationship between society and environment; Sustainable development and government administration; tools and systems for sustainable development; outline of a sustainable society (Blewitt, 2008). In addition, there are some other documents showing that, in the theoretically, sustainable development has been studied by many researchers in the world. There are two perspectives, which are also two levels of sustainable development: weak sustainability and strong sustainability, the weak sustainable development model recognizes that unlimited economic expansion is unexpected and impossible (Daly, 1989). This model does not care about the relative differences between capital types and assumes, there is a perfect replacement of capital, and non-renewable resources can and will be replaced by other forms of energy and Manufacturing materials, such as from recycling. This approach will allow some environmental degradation to take place as long as the overall balance of natural capital and Manufacturing is maintained through economic and social benefits (Baker et al, 1997). Strong sustainable development model emphasizes the prolongation, improvement and maintenance of present and future capital, this model stems from the perception that the replacement of productive capital for natural capital is uncertain, since the existence of natural

capital has irreplaceable contributions to welfare (Bridger and Luloff, 1999; Ekins, 2003).

In Vietnam, in recent years, there have been a number of case studies on sustainable development, basic studies have relatively theoretical views with foreign authors. Criteria for assessing whether an economy is considered to be a high-quality growth country only when it is ensured that two factors are high growth rates should be maintained in the long term and that growth must contribute directly to improving the quality of life (Nguyen Huu So, 2009). The Vietnam Chamber of Commerce and Industry (VCCI) launched a program to assess and rank sustainable businesses in Vietnam in 2017 based on a set of Sustainable Business Index. There are 151 specific criteria divided into 3 groups of fields: Economics; Environment; Society, labor and human rights. Up to now in 2019, the sustainable development indicator set has been revised, leaving only 98 specific criteria. In addition, there are some other case studies such as: Phan Van Dan, 2012; Hoang Hong Hanh, 2017; Vu Thuy Anh, 2009; Vo Thi Phuong Nhung, 2018.

Currently, the technology of industrial SMEs in Ha Noi is still quite backward, in order to be able to compete in the market, it is necessary to have a policy of technological innovation in the direction of mainly taking advantage of its predecessors, acquire modern technologies in the world to accordance with the conditions of each locality (Bouazz, 2015). New technology will be help to improve Manufacturing efficiency, create more product volume and are the cause of profitability for SMEs (Drucker, 1985). Technological resources in industrial SMEs will be help to improve Manufacturing efficiency, reduce Manufacturing costs, expand market share in both domestic and foreign market (Morse et al,2007).

3. Methodology

3.1 Variables and Measures

3.1.1 Data collection methods

Our study was conducted through a survey of 225 industrial SMEs operating in Hanoi using the stratification method by field of activity. The size of enterprises and the number of employees are the basis for identifying the enterprises in the sample that are suitable for the study subjects of industrial small and medium enterprises.The questionnaire is designed for business managers (directors or business owners). During the survey, we emphasize that there is no right or wrong answer but only the judgments of the company based on practical activities to avoid the risk of bias according to the wishes of the respondents. The collected data includes information for both independent and dependent variables. The total number of responses to the questionnaires that can be used for analysis is 182 observations

3.1.2   Data processing method

After collecting and processing the data, the authors analyze the reliability of Cronbach's Alpha scale and EFA factor analysis through using the SPSS 23.0 software to measure the investigated variables to ensure no errors, determine the answers from the investigators is accurate and true to reality. In particular, through these coefficients to test statistics on the degree of rigor that the questions in the scale correlate with each other and check the unidirectional of the scales. When assessing Cronbach's Alpha coefficients that have a variable correlation coefficient (Item -Total Correlation) less than 0.3, they will be disqualified and the criteria for choosing a scale are Cronbach's Alpha coefficients of the component greater than 0, 8. After obtaining the official scale and identifying the main factors that influence of Manufacturing technology on sustainable development of industrial SMEs in Ha Noi , the authors conduct multiple correlation analysis and multiple linear regression analysis to measure the extent of the Manufacturing technology factor affecting on sustainable development of industrial SMEs Ha Noi.

3.1.3   Research model

In this research model, the dependent variable is the sustainable development of industrial SMEs in Ha Noi, the independent variables are: Manufacturing technology; Enterprise resources; Corporate social responsibility policies and local support policies. The control variables are type of business and business lines. (Figure 1).
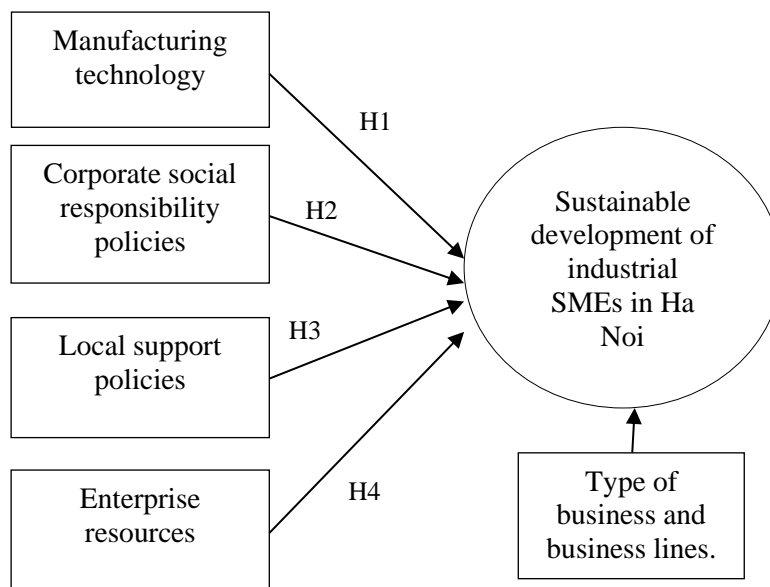

Figure 1: The research model of the effects of Manufacturing technology factor on the sustainable development of industrial SMEs in Ha Noi

- Hypotheses:

Hypothesis H1: Manufacturing technology have the same direction influence on the sustainable development of industrial SMEs in Hanoi.

Hypothesis H2: Corporate social responsibility policies have the same direction influence on the sustainable development of industrial SMEs in Hanoi.

Hypothesis H3: Local support policies have the same direction influence on the sustainable development of industrial SMEs in Hanoi.

Hypothesis H4: Enterprise resources have the same direction influence on the sustainable development of industrial SMEs in Hanoi.

- Measurement Scale

On this scale, respondents were asked about four factors in the research model affecting the sustainable development of industrial small and medium enterprises. These scales are self-assessed and estimated by respondents on a 5 level Likert scale. (1 is completely disagree; to 5 is totally agree). (Table 1).

4. Research results

4.1   Verify the reliability of the scale

The reliability of scales is assessed by Cronbach's Alpha coefficient. Results of calculating Cronbach's Alpha coefficients with each concept indicate that 5 groups of research elements have Cronbach's Alpha coefficient greater than 0.6 (Table 2). All observed variables have varied-total correlations meeting the requirement of > 0.4. Therefore, the manufacturing factor scale and three other factors scale affecting the sustainable development of industrial SMEs in Hanoi - Vietnam are eligible for EFA analysis.

Table 1: Measurement scale for the independent variables and dependent variable

Variables	Code	Items	Resources
Manufacturing Technology	CN1	Attention to invest in machines every year	Le Ngoc Nuong, 2018 and research of authors
	CN2	Manufacturing technology is always a top priority	
	CN3	We usually develop a new product development strategy	
	CN4	Attention to invest for human resources to apply new technologies	
Local support policies	CS1	Has been access to manufacturing premises easy	Le Ngoc Nuong, 2018 and research of authors
	CS2	Was supported to participate in local social activities	
	CS3	Didn't have difficult in local administrative procedures	
	CS4	The SMEs association in Hanoi has been a lot of active support for industrial SMEs	
	CS5	Was informed of change policy on environmental protection	
	CS6	The local was interested of social security for workers	
Corporate social responsibility policies	TN1	Attend vocational training programs for young people in the community	Phan Van Dan, 2018 and research of authors
	TN2	Participate in building clean water and sanitation programs for the community	
	TN3	Participate in training, capacity building, social knowledge for workers	
	TN4	Contribute to social activities in the locality	
	TN5	Focusing and paying attention to issues of environmental pollution treatment	
	TN6	Comply with regulations of law on ensuring food and environmental safety	
Enterprise resources	NL1	Current financial resources are sufficient to expand business activities	Umar Ibrahim, 2008 and Trinh Duc Chieu, 2010
	NL2	Current financial resources are sufficient to sustain the business activities	
	NL3	Human resources in enterprises have good working capacity	
	NL4	The number of employees in the enterprise is becoming more and more qualified annually	
	NL5	After being trained, laborers will work more effectively	
Sustainable development of industrial SMEs in Ha Noi	BV1	Enterprise always have high profits and grow steadily every year	Phan Van Dan, 2018 and research of authors
	BV2	Enterprise can be expand production and business markets	
	BV3	Enterprise were recorded for environmental protection in production	
	BV4	Enterprises have made positive contributions to local environmental protection activities	
	BV5	Enterprise has been always highly appreciated by local agencies for their contribution to local social activities	
	BV6	Enterprises has been always create motivation to work for employees	

4.2   Exploratory Factor Analysis EFA

According the results of the EFA discovery factor analysis, the factors influencing the sustainable development of industrial SMEs in Hanoi-Vietnam for KMO value(Kaiser-Meyer-Olkin) = 0.719> 0.6. Therefore, factor analysis is consistent with the research data obtained. The Bartlett's test value with the hypothesis (H0) is "non-correlated variables" with the value Sig = 0.00 <0.05. The data processing result in the value of Eigenvalues is 1,154> 1, so it can be confirmed that the number of factors extracted is appropriate. Total Variance Explained of factor analysis is 65,135%> 50%. This means that the extracted factors that explain 65,135% of the observed variables are included in the EFA analysis. EFA analysis results shown that, enterprise resources factor group are extracted into 2 separate groups of factors is NL1 and NL2 (Financial resources) and NL3, NL4, NL5 (Human resources).

Table 2: Measurement scale for the independent variables and dependent variable

Factors	Factor Loading					
	1	**2**	**3**	**4**	**5**	**6**
Cronbach's Alpha	0.756	0.728	0.783	0.695	0.789	0.795
CN3	0.801					
CN2	0.765					
CN4	0.734					
CN1	0.703					
CS4		0.785				
CS1		0.762				
CS3		0.735				
CS5		0.682				
CS2		0.651				
CS6		0.632				
TN1			0.835			
TN2			0.798			
TN4			0.776			
TN5			0.761			
TN3			0.752			
TN6			0.732			
NL1				0.736		
NL2				0.654		
NL4					0.831	
NL3					0.801	
NL5					0.775	
BV1						0.836
BV2						0.805
BV4						0.782
BV5						0.772
BV3						0.751

4.3   Regression analysis

The regression analysis result for adjusted R = 0.565 and R^2 value is 0.512, this means that the relationship between the independent variables explains 51,2% of the dependent variable as "The sustainable development of industrial SMEs in Ha Noi". Through ANOVA analysis results, the value of F = 61,562 with statistical significance Sig = 0.000 <0.05, this can confirm the existence of the relationship between the independent and auxiliary variables. Thereby, showing that the research model ensures reliability.

Based on the Beta coefficient in Table 3, it can be seen that the factors in the research model, the manufacturing technology (CN) factor have the largest Beta standardization factor is 0.325. The Human resources factor (NL) has the smallest Beta coefficient is 0.120. Sig.value of all variables < 0.05. Therefore, assumptions H1, H2, H3, H4 proposed in the research model are accepted.

Table 3: Beta coefficient after performing regression

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	**Std. Error**	**Beta**		
(Constant)	-1,435	0,265		-4,263	0,000
CN	0,521	0,045	0,325	6,615	0,000
CS	0,462	0,052	0,138	5,661	0,002
NL	0,118	0,041	0,120	3,252	0,015
TC	0,102	0,025	0,252	3,428	0,003
TN	0,285	0,051	0,215	6,511	0,001

4.4   Test of statistical assumptions

Using Anova's variance analysis to determine the difference type and business lines of the survey enterprises. In this analysis, the coefficient of concern is the Sig coefficient. The H0 hypothesis poses that there is no difference in the sustainable development of industrial SMEs in Ha Noi by type and lines of business. If the Sig coefficient is <0.05, rejecting the H0 hypothesis means that there is a difference in the evaluation results of the subjects on the sustainable development of industrial SMEs in Ha Noi by enterprises characteristics. If Sig <0.05, accept the hypothesis H0.

The test results of all target groups by type and business lines of enterpries all gave Sig values of <0.05. Specifically, testing the difference by type enterprises value Sig = 0.018; Test the difference by business lines of enterprises with value Sig = 0,018. Therefore, reject the H0 hypothesis.

5. Conclusions

The research results show that, the factor of manufacturing technology has the greatest influence on the sustainable development of industrial SMEs in Ha Noi with β=0.325. However, the current situation with industrial SMEs in Hanoi, besides limited resources, the support of the goverment management agencies has not met the needs of enterpries, so the technology innovation activities have not really taken place strongly. Therefore, through the research results, the authors proposes a number of solutions and recommendations to the goverment management agencies to improve the quality of manufacturing technology towards sustainable development of industrial SMEs in Hanoi, specifically the following solutions:

First, Improve the efficiency of mechanisms and policies to support the development of science and technology for industrial small and medium enterprises, must be ensure effective implementation from the time the policy is issued to the person who reviews documents. Cutting unnecessary procedures and papers, enabling enterprises to access capital and supporting technology as quickly as possible.   Researching more specific policies on new technologies like that venture capital funds take risks in the field of new technology, creating favorable conditions for enterprises to have access to capital.

Second, Building a database of new technologies, advanced technology and force of technology experts, creating favorable conditions for industrial SMEs to exploit and use for technological innovation. Support enterprises to apply information technology, building information system for managing enterprise resources and advertising products.

Third, Enterprises need to improve their financial potentials through loans from banks, support capital from the State to research and invest in appropriate technologies for production and business process. Strengthening the expansion of cooperation and relationships with enterprises in the same industry, credit institutions to not only help businesses gain more business information but also help to expand access to capital.

Fourth, Enterprises should be consider applying technological innovation in each period. Enterprises can be break down the investment process according to business cycle or consider improving each stage to reduce the pressure on investment capital.

Finally, Strengthening cooperation and promoting cooperation with foreign-invested enterprises to make it easier to grasp new standards, techniques, access new knowledge and technologies. At the same time, each enterprises need to prepare human resources capable of absorbing the fruits of global technological progress.

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