Analyzing Technology Application in Enterprises in Ho Chi Minh City

Nguyen Thi Hoang Anh[1], Tran Thuy Ai Phuong[1], Nguyen Thi Thu Hong[1]
[1]Faculty of Economics, HCMC University of Technology and Education, Ho Chi Minh City, Vietnam, 70000

Abstract— *Technology is an important issue for the success of many businesses. The study investigates the level of technology in information technology (IT) companies in Vietnam. The level was measured by three criteria, including the level of equipment wear, the level of innovation of equipment and technology, and the level of automation. We analyzed 51 IT companies by the qualitative method. The results show that the level of technology in these companies is low: the level of equipment wear is 49.3%; the level of innovation of equipment and technology is 49.4%; the level of automation is 2.9%.*

Keywords— *Level of technology, wear level, level of automation.*

I. INTRODUCTION

Technology is of great importance to the success of many businesses today. However, in Vietnam, especially in small and medium enterprises, the technical equipment and technology are outdated. According to the Vietnamese Ministry of Science and Technology, in 2015, Vietnam had nearly 600 thousand enterprises, with more than 90% small-medium enterprises (SEMs). Most of these enterprises are using technology usage lagged behind the world average by two to three generations[1]. Moreover, according to the Global Competitiveness Report of the World Economic Forum (WEF), Vietnam's technology level is currently ranked 99/144 countries surveyed.

Meanwhile, technology will have a direct impact on productivity and quality. In Ho Chi Minh City, most SMEs are not fully aware of the importance of science - technology in the competition process. The issue of innovating and improving technology to improve productivity and product quality has not received adequate attention. The number of enterprises with access to supportive science and technology policies and information is still minimal. On the other hand, if companies apply science - technology, most of these are outdated lines, machines and equipment that consume much energy and often cause many negative effects [2].

So how is the current situation of technology application in enterprises in Vietnam? Currently, the author has not found any specific studies on this situation. Therefore, in this topic, the author chooses the topic "Analysis of the current state of technology application in Ho Chi Minh City" We choose Ho Chi Minh city because it is the biggest city in Vietnam. The study aims to analyze the current level of technology in enterprises in Ho Chi Minh City.

II. LITERATURE REVIEW

Currently, research on technology is quite extensive around the world.

Some authors studied the relationship between investment in innovation activities, creative outputs (technological innovation and non-technology) and productivity at firms in Uruguay. The main factors that determine technological and non-tech innovation are the level of investment in innovation activities and the size of the company. The results indicate that both technological and non-technological innovation are positively associated with increased productivity in services, but non-tech innovation is more important than technological innovation. The opposite happens in manufacturing, where technological innovation is more about productivity [3]

According to [4], companies that innovate and have formal methods to protect intellectual property are more productive than others, but that does not apply in the field. The study also found that this result is strongest for companies in the service and commercial sectors, but the opposite is true for companies in the manufacturing sector.

Fabian Frick et al. examined the impact of innovation on labour productivity in European food companies and compared it with results for firms operating in high-tech sectors [5]. The food industry is considered a mature industry characterized by a low intensity of research and development (R&D). However, food companies face many challenges and cannot do anything without innovation if they want to stay competitive. Recent studies have applied the study using data from the European Union's Community Innovation Survey (CIS) and applying the endogeneity-robust multi-stage model. The results show that innovation has a strong positive effect on food companies' labour productivity, but the impact is negligible in the high-tech sector. This would suggest that the margins for innovation might be best valued by the sector rather than for the entire manufacturing sector.

According to the Ministry of Science and Technology), there are currently nearly 600,000 enterprises nationwide, with more than 90% being small and medium-sized enterprises. Most are using technologies that lag two to three generations behind the world average. In which, up to 76% of imported machinery and technological lines belonged to a generation in the 60s and 70s of the last century; 75% of the equipment is fully depreciated; 50% of equipment is refurbished; only 20% are in high-tech industries [1]

Most SMEs are not fully aware of the importance of science and technology in the competition process. The issue of innovating and improving technology to improve productivity and product quality has not received adequate attention. The number of SMEs accessing supportive science and technology policies and information is still very limited. On the other hand, if SMEs apply science - technology, most

of these are outdated lines, machines and equipment that consume a lot of energy and often cause many adverse effects [2] [6][7].

From the literature review, we have done this research to analyze the level of technology in Vietnamese companies through three criteria: level of equipment wear, the level of innovation of equipment and technology, and the level of automation.

III. METHODOLOGY

The study use quanlitative method with the techniques such as data synthesis, comparison, and statistical description. To analyze the level of technology, we use three criteria, including the level of equipment wear, the level of innovation of equipment and technology, and the level of automation.

The authors send a questionnaire to 100 enterprises in the information technology field.

The data were calculated and transferred to grade to measure the level of technology (see Table I).

TABLE I. Criterias of level of technology

Contents	Grade
The equipment wear level (Criteria 1)	
The level of wear and tear is below 15%	6
The degree of wear and tear from 15% to below 30%	5
The degree of wear and tear from 30% to less than 45%	4
The degree of wear and tear from 45% to below 60%	3
The degree of wear and tear from 60% to less than 75%	2
The degree of wear and tear below 75%	1
The level of innovation of equipment and technology (Criteria 2)	
Technology equipment innovation coefficient is 25% or more	5
Technology equipment innovation coefficient is from 20% to less than 25%	4
Technology equipment innovation coefficient is from 15% to less than 20%	3
Technology equipment innovation coefficient is from 10% to less than 15%	2
Technology equipment innovation coefficient is below 10%	1
The level of automation (Criteria 3)	
The coefficient of automation is from 75% to below 90%	4
The coefficient of automation is from 60% to less than 75%	3
The coefficient of automation is from 45% to less than 60%	2
The coefficient of automation is from 30% to below 45%	1
The automation coefficient is below 30%	0

An average of three criteria calculated the level of technology. The formula of calculation of criteria were presented below:

LEVEL= (GRADE$_j$* NUMBER$_J$)/ TOTAL NUMBER

GRADE$_j$: it is grade of the factor J.

NUMBER$_j$: It is the number of companies that gain GRADE$_j$.

TOTAL NUMBER: It is the total quantity of companies.

IV. RESULTS

While 100 companies were interviewed, only 60 questionnaires were responded to us. After deleting the missing value, we have 51 answers to analyze.

Firstly, we describe the statistic the type of companies. The results show that data includes one government company, 20 FDI companies, and 30 private companies.
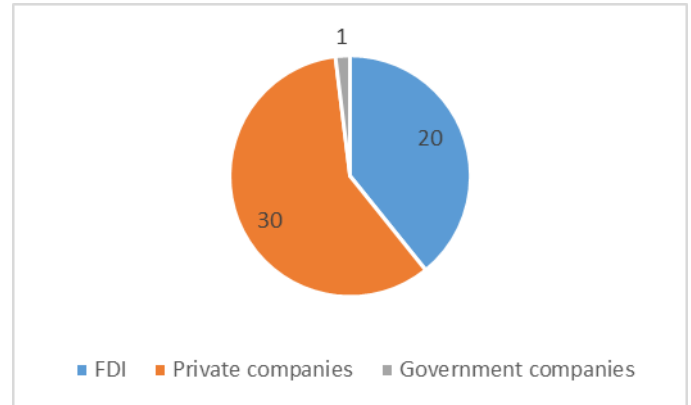

Fig. 1. Type of companies

We use FREQUENCY in excel to find the number of companies in each factor of each criterion. The results show in Table II, Table III, and Table IV.

TABLE III. The number of companies in criteria 1

The equipment wear level (Criteria 1)	Quantity
The level of wear and tear is below 15%	4
The degree of wear and tear from 15% to below 30%	7
The degree of wear and tear from 30% to less than 45%	9
The degree of wear and tear from 45% to below 60%	9
The degree of wear and tear from 60% to less than 75%	7
The degree of wear and tear below 75%	15

TABLE IIIII. The number of companies in criteria 2

The level of innovation of equipment and technology (Criteria 2)	
Technology equipment innovation coefficient is 25% or more	15
Technology equipment innovation coefficient is from 20% to less than 25%	3
Technology equipment innovation coefficient is from 15% to less than 20%	2
Technology equipment innovation coefficient is from 10% to less than 15%	2
Technology equipment innovation coefficient is below 10%	29

TABLE IV. The number of companies in criteria 3

The level of automation (Criteria 3)	
The coefficient of automation is from 75% to below 90%	0
The coefficient of automation is from 60% to less than 75%	1
The coefficient of automation is from 45% to less than 60%	0
The coefficient of automation is from 30% to below 45%	3
The automation coefficient is below 30%	47

We use the formula to calculate the average grade of the level of criteria. The results were presented in Figure 2.
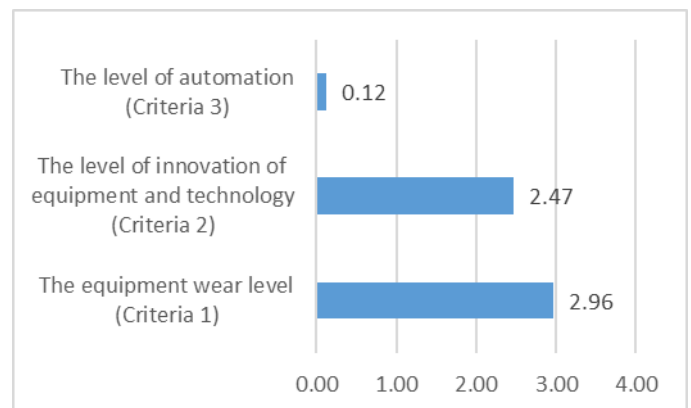

Fig. 2. The average grade of criteria.

The results show that the level of equipment wear is 49.3%; the level of innovation of equipment and technology is 49.4%; the level of automation is 2.9%.
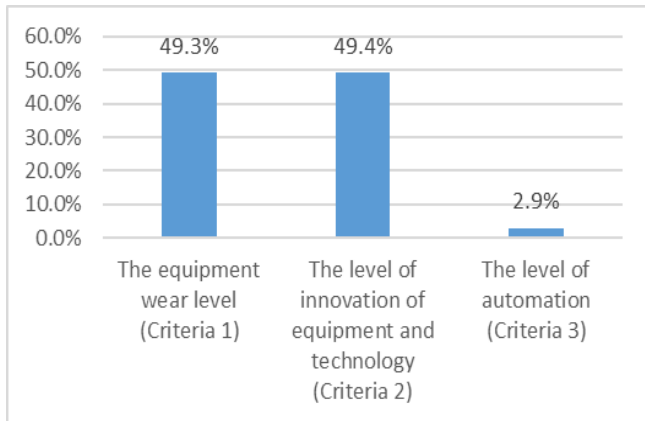

Fig. 3. The level of technology

V. CONCLUSION

The study analyses the level of technology in information technology companies in Vietnam. The level was measured by three criteria, including the level of equipment wear, the level of innovation of equipment and technology, and the level of automation. The results show that the level of technology in these companies is low. Specifically, the level of equipment wear is 49.3%; the level of innovation of equipment and technology is 49.4%; the level of automation is 2.9%. The study has a limitation when calculating the level of technology by three criteria without considering other factors. In the future research, we hope we can add some other dimensions such as skills' employees, quality of technology, etc. to fulfil this issue.

REFERENCES

[1] Q. M. Nhựt, "The effects of science and technology investment on business performance of agricultural enterprises in Ben Tre province," *Can Tho Univ. J. Sci.*, vol. 54(1), p. 187, 2018.
[2] Q. D. H. Vuong, "Challenges that Vietnamese SMEs have been facing," *Sci. Technol. Dev. J.*, vol. 17, no. 2, pp. 42–51, Jun. 2014.
[3] D. Aboal and P. Garda, "Technological and non-technological innovation and productivity in services vis-à-vis manufacturing sectors," *Econ. Innov. New Technol.*, vol. 25, no. 5, pp. 435–454, Jul. 2016.
[4] B. H. Hall and V. Sena, "Appropriability mechanisms, innovation, and productivity: evidence from the UK," *Econ. Innov. New Technol.*, vol. 26, no. 1–2, pp. 42–62, Feb. 2017.
[5] F. Frick, C. Jantke, and J. Sauer, "Innovation and productivity in the food vs. the high-tech manufacturing sector," *Econ. Innov. New Technol.*, vol. 28, no. 7, pp. 674–694, Oct. 2019.
[6] H. Vu Thanh, T. A. Nguyen, and M. T. T. Nguyen, "Supporting Small and Medium Enterpries to Access Technological Innovation State Fund: International Experience and Lessons for Vietnam," *VNU J. Sci. Econ. Bus.*, vol. 34, no. 1, Mar. 2018.
[7] A. N. Nguyen, N. Q. Pham, C. D. Nguyen, and N. D. Nguyen, "Innovation and exports in Vietnam's SME sector," *Eur. J. Dev. Res.*, vol. 20, no. 2, pp. 262–280, Jun. 2008.