

Evaluation of Innovation Activities: An Empirical Investigation of Industrial Enterprises in Thai Nguyen Province

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Abstract: *Innovation is crucial for any business to survive and thrive. In particular, the spread of the COVID-19 epidemic has put tremendous pressure on the innovation activities of enterprises. Using survey data from 266 industrial enterprises in Thai Nguyen province, the paper has assessed the current status of innovation activities in Thai Nguyen provinces - Vietnam through four aspects: Product innovation, process innovation, organizational innovation, and Marketing innovation. The analysis results show that innovation activities are only at an average level and need many efforts from both enterprises and local authorities. The study also suggested a number of solutions to promote innovation, including (i) strengthening human resource development, (2) enhancing scientific research to promote innovation, (3) improving international cooperation, and applying modern instruments in production and innovation.*

Keywords - *Product Innovation, Process Innovation, Organizational Innovation, Marketing Innovation, Thai Nguyen Province*

I. INTRODUCTION

Innovation is the creation and application of achievements, technical and management solutions to improve the efficiency of socio-economic development, productivity, quality and added-value of products. Innovation is the result of a market economy and comes from competition. Being innovative is very important for startups because it is the only way to stand out from the competition. It is widely accepted that innovation is related to the business's longevity. When a company is no longer worried about innovation, it risks failure in the market. Customers primarily benefit from their perception of the value of what they are presented and commented on. The customer buys or uses a product that offers certain benefits, even though the best features are superior to competitors, but there will be alternatives at a lower price.

Innovation creates an advantage over competitors and helps companies mature and thus maintain a leadership position in the market. Many companies get through the hard road of conquering a new market through their product. However, they later found it extremely difficult to keep up with the opponent. A startup needs to stay up-to-date and consider the following steps to realize innovative ideas that are highly practical. Innovation allows a company to operate due to the need for greater efficiency and productivity. The businesses focusing on finding an entirely new solution or improving existing ones make it easier to tackle new problems and challenges.

Over 190 years of construction and development, Thai Nguyen has always maintained its position as the center of the Northern mountainous regions of Vietnam. Along with the traditional historical and cultural values, Thai Nguyen is proud to be the place to create the foundation and build the revolutionary movement and make an essential contribution to the development of Vietnam. The achievements cultivated over 190 years have been affirming the imprints of this land and creating the strength that makes steady and breakthrough strides in the process of renewal and integration with the country. It can be said that innovation is one of the most important strategies of Thai Nguyen province's leadership to comprehensively develop socio-economic, especially for the construction industry - one of the key industries of the Thai Nguyen province, accounting for 58% of the whole economic structure in 2019 (GSO, 2019) [12]. This study was conducted to assess the current status of innovation activities in industrial enterprises in Thai Nguyen province, thereby proposing solutions to promote innovation activities in the whole province.

II. LITERATURE REVIEW

1. Definition of Innovation

According to Schumpeter (1934), innovation can be defined as an introduction of a new product or a new quality of the product. Process innovation is an introduction of a new production method [15]. Drucker (1998) argues that innovation is a specific tool and means that businesses use to exploit change as an opportunity to create another business or service and help businesses respond well with changes in the external environment or take actions to change the environment (Dananpour et al., 2006) [13] [5]. The ultimate goal of any business is to create customers, and there are only two functions in a business that can do this, namely marketing and innovation (Drucker, 1998) [13].

Innovation is an activity in which an enterprise uses technological or market knowledge to create products, services, processes, or management systems that meet the needs and requirements of the market, thereby helping enterprises improve the efficiency of production and business activities. The source of innovation is “new knowledge” and “new ideas”. According to Plessis (2007), innovation is the creation of new knowledge and ideas to drive better business results, improve processes, restructure internal organizations, and create product-market orientation.

The driving force for enterprises to engage in innovation is: The pressure to exist in the production of new technology; the opportunities and benefits that new technologies bring (e.g., exogenous technology compared to endogenous technology; mining technology compared to exploration technology), and opportunities, economic benefits (e.g., profit, market share, market power). The origin of the new knowledge is due to investment in research and development in search of a new idea. The goal of a business when it comes to innovation is to earn a high return on R&D investment or to earn money from leasing new ideas or inventions [8].

Innovation is a research trend that has existed for a long time in the world, with many authors studying innovation in different fields (Quintane et al., 2011) [10]. However, there are two distinct schools of innovation; one that views innovation as a process, the other that sees innovation as an outcome.

In general, most of the studies choose to classify innovation according to the Manual (2005) approach, which is divided into four categories: (1) Product innovation; (2) Process innovation; (3) Organizational innovation; (4) Marketing innovation [14].

2. Product innovation

Product innovation is the introduction of a new product or an improvement of an existing product (Chang et al., 2011) [3]. The goal is to increase economic, technical, or social product characteristics (Polder et al., 2010) [9]. Similarly, Phùng and Lê (2013) believe that product innovation is the change and adjustment of product functions compared to existing products in the market [7]. For successful product innovation, businesses need to use new technology, knowledge, or a combination of new technology and knowledge in production (Gunday et al., 2011) [6].

Today, customers' needs change constantly; hence product innovation also needs to change to match the needs. On the other hand, competition in the market is increasingly fierce, technological changes are rapid, leading to short product life cycles (Gunday et al., 2011) [6]. Product innovation is, therefore, a challenging activity. We can easily measure the benefits of product innovation, but the innovation also involves a lot of risks; the cost is expensive; the success rate is low. Many projects are terminated during the first phase of the new product development cycle (Cormican and O'Sullivan, 2004) [4]. In addition, the government's policies often change; protection activities are unstable; these are significant barriers for enterprises to innovate products (Phùng and Lê, 2013) [7].

3. Process innovation

According to Manual (2005, p.49), process innovation is the implementation of a new or significantly improved method of production or distribution [14]. This includes significant technical, equipment or software changes. In particular, the use of new methods in the production or delivery of products or services; using new methods in organizing logistics, importing materials or distributing products; introducing new add-on activities. Process innovation is an activity from product design to distribution and commercialization related to the technological process (Phùng and Lê, 2013; Trần, 2018) [7] [11].

Process innovation is a change in activities such as planning, designing, analyzing the way or method of production, and arranging production activities. Process innovation can be one or all stages in enterprises' production and business processes (Amara et al., 2009) [2].

Innovating production and business processes will help businesses save production costs, improve product quality, thereby increasing efficiency and productivity, enhancing the competitiveness of enterprises (Abdallah and Phan, 2007; Trần, 2018) [1] [11]. For process innovation to be successful, enterprises need to design a control system to assess deviations and failures of the stages of process innovation (Tidd and Bessant, 2011) [16].

4. Organizational innovation

According to the Manual (2005, p.51), organizational innovation includes the implementation of a new organizational method in an enterprise's business practices, organizational restructuring or external relations [14]. Amara et al. (2009) argue that organizational innovation is the process of implementing many new forms and methods of management, which are different from other businesses [2]. Trần (2018) believes that organizational innovation needs to be based on the actual conditions of enterprises and the business environment [11]. Organizational innovation needs to ensure the science and art of human resource management. The goals of organizational innovation are to reduce administrative and transaction costs, increase employee satisfaction, promote access to knowledge and external resources, thereby improving enterprises' labor productivity and operating efficiency.

People are the main factor in carrying out innovation. Phùng and Lê (2013) emphasize that organizational innovation is the change of organizational structure, thinking and vision of leaders or innovation culture in enterprises [7]. In the current fiercely competitive environment, businesses need to build a flexible and organic organizational structure; reduce the bureaucracy in the organization; strengthen teamwork and innovative thinking.

5. Marketing Innovation

According to the Manual (2005, p.49), marketing innovation is the implementation of a new marketing method that involves a significant change in the design of a product or its packaging, the place where the product is sold, and the promotion of the product or the price of the product [14].

Marketing innovation plays a crucial role for businesses; it directly affects the consumption output of businesses. It also shows the relationship between businesses and customers. Enterprises will use new marketing methods, marketing tools, sales promotion methods in order to increase sales volume, customer orientation, and corporate branding. Marketing innovation needs to pay attention to the global distribution system and apply social media in product promotion activities (Nguyễn, 2020); Trần, 2018) [17] [11].

Marketing innovation aims to satisfy customer needs better, find and open new markets for businesses, product positioning, or business positioning in the market. It aims to increase revenue and market share for the company (Trần, 2018) [11].

III. METHODOLOGY

To assess the innovation activities of industrial enterprises in Thai Nguyen province, the author uses the Slovin formula to calculate the necessary sample. Accordingly, the author did a survey with 266 industrial enterprises following four aspects of innovation, including product innovation, process innovation, organizational innovation, and Marketing innovation.

The Likert 5-scale is used to collect respondents' assessments as shown in the following table:

Table 1. Likert 5-scale

Point	Range	Interpretation
5	4.20 - 5.0	Excellent
4	3.40 - 4.19	Good
3	2.60 - 3.39	Average
2	1.80 - 2.59	Poor
1	1.0 - 1.79	Weak

After doing a pilot survey and revising it, the questionnaire is delivered to all respondents in numerous ways. The collected data is analyzed by SPSS after removing invalid votes and biased assessment.

IV. FINDINGS AND DISCUSSIONS

1. Product innovation

The current status of product innovation activities is shown in the table below:

Table 2: Product innovation of industrial enterprises in Thai Nguyen province

Code	Variable	Mean	Standard deviation	Assessment
PI1	Developing new product lines and brands	2.51	0.03	Poor
PI2	Innovation in product design, packaging, and wrapping	3.19	0.03	Average
PI3	Innovation in product quality	3.32	0.02	Average
PI4	Innovating features, characteristics, technical specifications	3.26	0.03	Average
PI5	Change the materials to make up the product	2.95	0.02	Average

The above data table shows that the product innovation results at industrial enterprises in Thai Nguyen province are not effective. The content of product innovation is mainly average and poor. In which, the issues of developing new product lines and brands has a weak level of achievement, with an average grade of 2.51. The reason is that developing new product lines and brands requires enterprises to spend a lot of time, money, and human resources.

In the content of product innovation, innovation in product quality is currently the most interested among industrial enterprises in Thai Nguyen province with an average value of 3.32, but the performance results are only average. Enterprises have realized the importance of product quality innovation in order to increase their product competitiveness in the market, but the level of product quality innovation in enterprises has not really been achieved. There are many breakthroughs.

2. Process innovation

The current status of production process innovation is shown in the table below:

Table 3: Process innovation of industrial enterprises in Thai Nguyen province

Code	Variable	Mean	Standard deviation	Assessment
QI1	Innovating production methods	2.86	0.04	Average
QI2	Enterprises apply new technology to production	2.27	0.04	Poor
QI3	Innovation in planning, analysis and design of production methods	3.01	0.04	Average
QI4	Enterprises applying information technology to production	3.06	0.04	Average
QI5	Innovation in the organization of production activities	3.18	0.04	Average

Among the issue of process innovation, "Innovation in the organization of production activities" is evaluated as the best performance, with an average of 3.18. The content "Enterprises applying information technology to production" is an average of 3.06; "Innovation in planning, analysis and design of production methods" is an average of 3.01. The poor evaluated innovation content is "Enterprises apply new technology to production" with an average value of 2.27, corresponding to a poor significance level.

To find out more about the current status of innovation in the production process, the author interviewed Mr. NQT, the head of the production department of Glonics Vietnam, and he has explained that

Glonics is a company specializing in the production of electronic components. Therefore, the innovation of the production process is often concerned by the company. However, in the last two years, due to the impact of the Covid epidemic, the company's production and business activities faced many difficulties due to social distancing. This dramatically affects revenue and R&D activities, as well as innovation results. Currently, the company operates in moderation, cautiously, and has almost no innovation in production processes. In fact, this happens to not only Glonics, but also other industrial companies in Thai Nguyen province.

3. Organizational innovation

The current status of organizational innovation activities is shown in the table below:

Table 4: Organizational innovation of industrial enterprises in Thai Nguyen province

Code	Variable	Mean	Standard deviation	Assessment
OI1	Innovating organizational forms and methods	3.68	0.04	Good
OI2	Organizational restructuring	3.20	0.03	Average
OI3	Innovating the method of business administration	3.82	0.03	Good
OI4	Innovating the organizational system	3.43	0.03	Good
OI5	Renovating cooperation and association of enterprises	3.06	0.03	Average

According to the above data table, we can see that organizational innovation is being interested and implemented by industrial enterprises in Thai Nguyen province. In which, the innovation contents are assessed to be well implemented, including innovating the method of business administration with an average value of 3.82; Innovating organizational forms and methods with the average point of 3.68; Innovating the organizational system with the average number of 3.43. The remaining contents are evaluated as average performance.

During the complicated spread of the Covid-19 epidemic, organizational innovation has become a decisive factor affecting enterprises' production and business performance. The change of structure, operation activities, flexible shift and crew division help businesses' production and business activities take place continuously, thereby minimizing adverse impacts of disease on the production and business activities.

4. Marketing innovation

The current status of Marketing innovation activities is shown in the table below:

Table 5: Marketing innovation of industrial enterprises in Thai Nguyen province

Code	Variable	Mean	Standard deviation	Assessment
MI1	Innovating Marketing strategy	3.69	0.04	Good
MI2	Innovating channels, policies and distribution methods	3.48	0.04	Good
MI3	Innovation in promotion, communication and advertising activities	3.36	0.04	Average
MI4	Renovating marketing mix	3.02	0.03	Average
MI5	Innovating sales policies and methods	3.57	0.02	Good

Marketing is the process of human activities to promote the satisfaction of their needs and desires through exchanging goods and services. The Covid-19 epidemic requires this activity to be changed and adapted to the social isolation conditions. According to the survey, the contents of the marketing innovation of industrial enterprises in Thai Nguyen province are assessed to be well implemented, including innovation in marketing strategy (3.69 points), renovation of channels, policies and distribution methods (3.48 points), and innovation in sale policies and methods (3.57 points). The epidemic leads to a change in demand and buying behavior of consumers; then, enterprises need to choose alternative effective marketing solutions to deal with social isolation. One of the options that many individuals and businesses choose is online marketing. It can be said that

online marketing forms both help keep the customer's attention, promote a more positive brand image, and sell more effectively.

V. CONCLUSIONS AND POLICY RECOMMENDATIONS

Research results show that innovation activities of industrial enterprises in Thai Nguyen province are only at an average level; there are still many issues that need to be changed, including content, strategy and implementation. In the context of the current COVID-19 epidemic, innovation activities need to be further promoted and applied more strongly. In particular, marketing innovation activities play a crucial role in helping businesses adapt to new conditions and enhance business efficiency. In which, the role of online marketing is significant. To be able to promote innovation of industrial enterprises in Thai Nguyen province, local leaders can apply some of the following solutions.

Firstly, they should strengthen human resource development. It is essential to develop a long-term strategy, forecast key technology industry, and determine training criteria to ensure "quantity" and "quality" employees. They must meet practical needs, in line with the recruitment criteria of the enterprise, unlike the past, which only focused on the supply of human resources and ignored the expectations of the enterprise. In addition, it is necessary to strengthen the policy on employment benefits and remuneration to reduce brain drain after training. At the same time, we should create an environment that encourages innovation at work.

Secondly, we need to strengthen scientific research to promote innovation. First of all, enterprises themselves need to clearly define the role of international links in scientific research, thereby establishing long-term plans and specific solutions, seeking opportunities from international integration, and actively participating in projects in the same field. Currently, the government is constantly creating conditions to connect businesses with prestigious universities, institutes or technology groups to deploy large-scale projects to promote research capacity, integrate experience for Vietnamese enterprises, and gradually receive technology transfer from partners.

Thirdly, enterprises should strengthen international cooperation and apply modern instruments in production and innovation. Enterprises need to regularly coordinate with external experts to update the latest information and knowledge. They also should organize field trips to learn from leading domestic and foreign companies.

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