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Investment in Research and Development
in an Asian Emerging Economy:
An Overview and Policy Implications

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Abstract

The Fourth Industrial Revolution is taking place strongly and affecting the production systems of countries worldwide. Investment in research and development (R&D) is seen as a pivotal strategy to promote economic growth and improve the competitiveness of the economies. This paper aims to analyse the investment in R&D in Vietnam, an emerging country that has successfully maintained robust economic growth in recent years. The study result shows that R&D investment in this economy has been still quite limited compared to the other countries in Asia. The low value of R&D investment would lead to a low level of technology in domestic production systems. Therefore, this evidence concludes that there is a great challenge in promoting high economic growth in the coming period. Finally, the paper provides some policy implications to promote investment in research and development in Vietnam in the coming period.

Keywords: R&D, innovation, technology development, knowledge-based economy.

JEL Classification: O14, O25, O40.

1. Introduction

In the context of science and technology being regarded as the cornerstone of a country's success (Nair et al., 2020; Anand et al., 2021). One of the keys to the success of science and technology development is research and development (R&D) (Inekwe, 2015; Zafar et al., 2019; Tung, Hoang, 2023). Therefore, the level of

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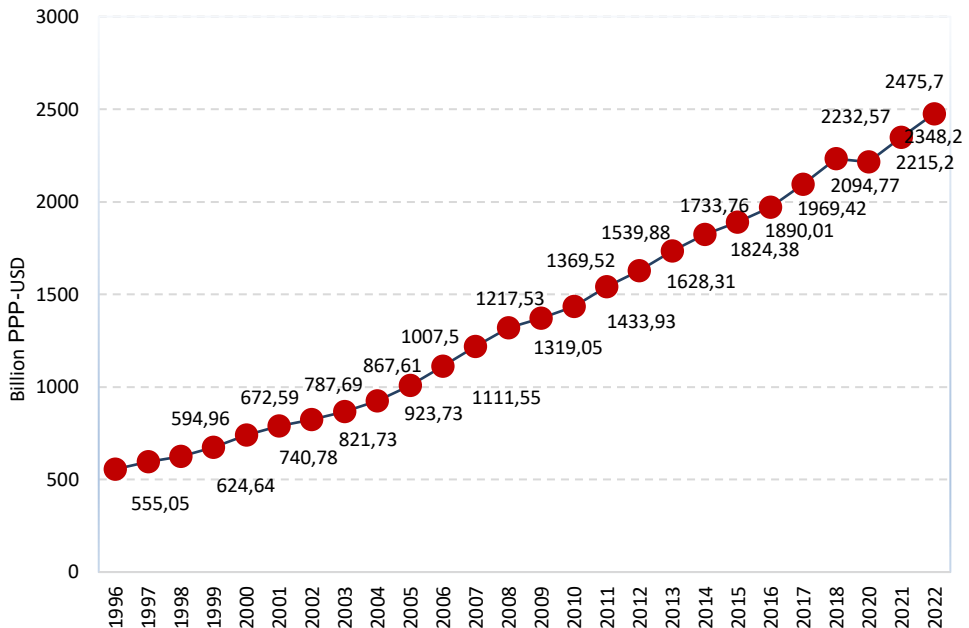
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development is directly proportional to the amount of resources invested by countries in R&D. It is believed that significant investment in R&D over an extended period of time is the primary factor behind the achievements of a large number of multinational firms located all over the world (Tung, Binh, 2022). R&D at research units in the economy is responsible for the development of new products, new types of services, new technologies, and even new production methods (Vithessonthi, Racela, 2016).

According to the statistics provided by R&D World, governments throughout the world spent a total of 2,475.6 trillion USD on R&D in 2022 (R&D World, 2022). This is a 5.43 % increase compared to 2021. However, the level of investment in R&D varies greatly from country to country. In particular, a total of 1,939.7 billion USD, or 78.3 % of the total, was invested by the top 10 countries, namely the USA (679.4 billion USD), China (551.1 billion USD), Japan (182.2 billion USD), Germany (143.1 billion USD), South Korea (106.1 billion USD), France (68.5 billion USD), India (65.2 billion USD), UK (54.9 billion USD), Russia (52.2 billion USD) and Brazil (37 billion USD) (R&D World, 2022). As a result, developed countries are ahead of the curve when it comes to spending on R&D, and they will keep that momentum going into the foreseeable future.

Figure 1. Global investment on R&D, 1996-2022



Source: Statista (2022).

Many developing nations with rapid economic expansion and thriving commercial sectors have been classified as "emerging economies" over the years. Emerging economies are expected to play a significant role in driving global economic growth during the next decade. However, there are increasing challenges for these countries in maintaining high economic growth over the long run, which is necessary if they are to avoid falling into the middle-income trap. In order to assist developing countries in rapidly increasing their competitiveness, expanding the size of their economies, and reaching the per capita income level of the group of developed countries in the coming period, the development of science and technology as well as the promotion of R&D activities is considered to be the right direction.

The objective of this study is to investigate the current state of R&D investment in Vietnam, which is an emerging economy in Asia. On the basis of these findings, some policy implications are offered to encourage the continuation of this work in the near future. When it comes to fostering long-term, sustainable economic growth in the coming years, developing countries can benefit from the lessons that can be drawn from the experience of Vietnam.

2. Overview of the Impact of R&D on Development

In general, R&D is defined as "comprises creative and systematic work undertaken in order to increase the stock of knowledge, including knowledge of humankind, culture, and society, and to devise new applications of available knowledge" (OECD, 2015). Owing to its wide coverage in many fields of science and technology, R&D includes three main areas, namely (i) Basis research, (ii) Applied research, and (iii) Experimental development research. In particular, basis research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundations of phenomena and observable facts, without any particular application or use in view. Applied research is the original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific, practical aim or objective. Experimental development is systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes (OECD, 2015).

At the national level, R&D plays a significant part in promoting economic growth, which helps to increase national competitiveness and, as a result, helps to promote sustainable growth, according to the findings of various studies that were conducted (Tung, Hoang, 2023). Cooperation between countries in the field of R&D helps to tighten those countries' ties in the production technology arena, which in turn leads to the development of international production value chains (Inekwe, 2015). When viewed through the lens of the national production function, R&D contributes to economic growth by boosting both the total factor productivity as well as the marginal productivity of capital and labor. In the context of the ongoing fourth wave of the industrial revolution, the nations that invest the most in R&D are also the nations with the most prosperous economies (Nair et al., 2020). Investment

in R&D contributes not only to the enhancement of the national production model but also to the promotion of the green growth model, both of which are geared toward the elimination of emissions and the amelioration of environmental contamination. When viewed through the lens of agricultural production, the achievements of R&D help to improve crop productivity while simultaneously decreasing the negative effects of climate change (Zafar et al., 2019).

In terms of the micro perspective, studies conducted on the subject of R&D have revealed this field's favorable outcomes on the performance of corporations (Tung, Binh, 2022). In particular, R&D plays a key role in the process of bringing products of exceptional quality, distinctive, and appealing services to market. R&D is important to the process of developing new technologies, since it helps to improve technical autonomy and the capacity to assimilate new technologies (Vithessonthi, Racela, 2016). R&D also helps enhance the ability to adapt and update imported technologies, which in turn leads to an improvement in the export ability of businesses, the avoidance of the import of obsolete technologies, and the saving of resources for the procurement of technology. Businesses have the ability to develop new types of products, new services, or new features and new functionalities to improve already existing products and services through R&D as well as newly invented technologies. In addition, R&D efforts assist in the reduction of production and operating costs. This is accomplished by the development, fabrication, and improvement of new materials that have lower pricing, as well as by making the production process quicker, more productive, and less dependent on the consumption of energy. R&D not only serves to enhance the performance indicators of businesses, but it also helps to increase their market value, which is especially beneficial for businesses that are listed on a stock exchange. The driver for an increase in the capitalisation of corporations is the favourable impact that R&D has on the performance and growth of businesses.

In spite of this, investing in R&D involves not only triumphs but also failures. The reason for this is that both nations (at the macro level) and businesses (at the micro level) need to expend a significant amount of resources in order to support and advance R&D efforts. In the event that R&D projects are unsuccessful, businesses will be compelled to account for production costs, which will lead to an increase in the cost space. When expenses go up, prices go up; but, if that cost increase is not accompanied by an increase in the quality of the product or service being offered, there is a risk of losing the company's competitive position in the market. In other words, failure of R&D projects can negatively affect the competitive position of businesses.

3. Current Status of R&D Activities in Vietnam

Vietnam is now considered to be a member of the group of emerging economies after having achieved achievement in economic development (Barker, Üngör, 2019). This economy has received huge benefits from the successful implementation of the Doi Moi policy for more than four decades (World Bank, 2023). In addition, Vietnam has been successful in attracting a significant amount of foreign direct

investment (FDI), and it remains high on the list of potential destinations in Asia for international investment. Vietnam's domestic market has significant purchasing power and is a dynamic business environment for all types of businesses given the country's large and growing population and the influx of tourists (World Bank, 2023). In 2022, Vietnam's GDP grew by 8%, placing it among the top economies in the world (GSO, 2023). The Gross Domestic Product (GDP) of Vietnam is estimated at around 420 billion USD, with a GDP per capita of 4,200 USD. Vietnam is forecast to continue to grow rapidly in the next decades and be among the 20 largest economies by 2045.

Table 1. The main statistical indicators of the Vietnamese economy, 2022

No	The national indicator	Unit	Statistical number
1	Area	1000 km ²	331.2
2	Population	Million people	99.3
3	Labour force	Million people	51.7
4	GDP per capita	USD	4110
5	Average FDI per capita	USD	279
6	Economic growth	%	8.02
7	Inflation	CPI, %	3.15
8	Unemployment	%	2.32
9	International trade (Exports + Imports)	Billion USD	730.21

Source: The General Statistics Office (GSO, 2023).

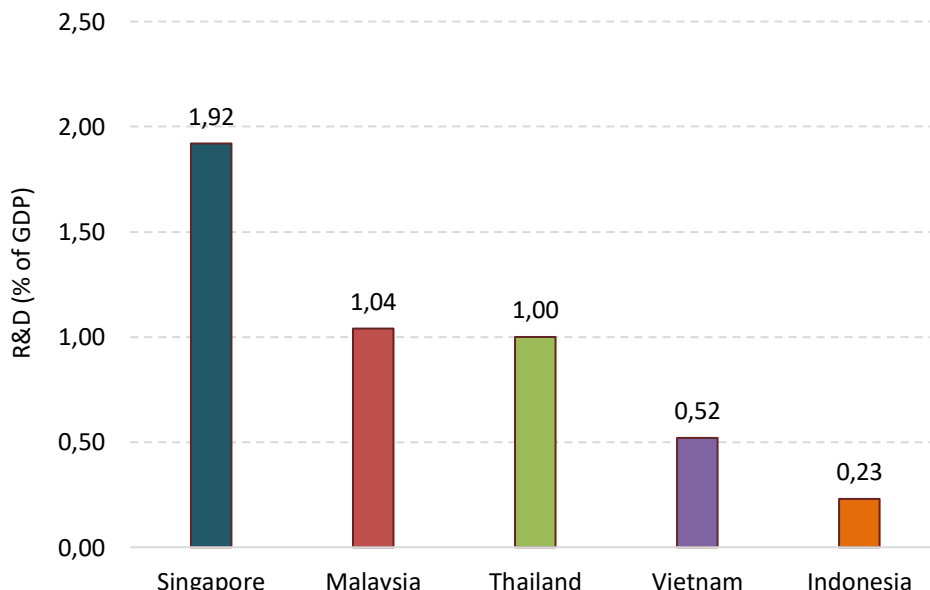
The policy for the development of the business community is always focused and, by the end of 2022, Vietnam had developed a business community consisting of 714,000 firms operating in a wide variety of areas. However, the majority of these businesses are located in large cities such as Ho Chi Minh City (31.9 %) and Hanoi (20 %). As of right now, the business community is responsible for the creation of jobs for 14.5 million people, many of whom are seeing their earnings increase (GSO, 2019). The World Bank's report from 2107 comes to the conclusion that the quality of human resources, qualified workforce, and innovative activity in the form of coming up with new ideas are going to be extremely important factors in determining whether or not the economy will be able to stand and flourish successfully in the coming era (World Bank, 2017).

Countries such as Vietnam absolutely require a paradigm shift in their approach to economic growth in order to break free of the challenges posed by the "middle-income trap." The model for economic growth needs to be founded in science and technology, with a strong emphasis placed on both fundamental and applied research. As a result, the government of Vietnam has persistently placed science and technology at the center of its long-term development strategy, and the business community in Vietnam has taken significant steps to expedite this approach. However, in general, the potential of the Vietnamese business community is still

rather low, resulting in relatively low levels of investment in R&D. According to a report that was published by the World Bank in 2017, the ability of the business community in Vietnam when it comes to science, technology, and innovation is still fairly low, and the innovation system in the production units is still fragmented and small. In general, R&D spending in Vietnam's manufacturing sectors has not received the attention it deserves (World Bank, 2017). This circumstance has demonstrated that a large number of businesses have a tendency to become mired in production procedures that require an excessive number of people or an ongoing requirement for extra cash.

The level of attention paid to Vietnam's R&D investments by governments throughout the years has resulted in various shifts in that level of investment. In spite of this, as compared to other nations in Southeast Asia, the resources available to Vietnamese businesses for investment spending on science and technology in general, and R&D in particular, are still relatively low. According to R&D World's statistics, Vietnam's R&D spending in 2020 is only equivalent to 0.52 % of GDP. This percentage is quite low when compared to Singapore's 1.92 % of GDP and Malaysia's 1.04 % of GDP. Spending on R&D by businesses in Vietnam ranks just 70th out of 141 nations, according to data compiled by the World Economic Forum (WEF, 2019). This is a very low ranking when compared to Singapore (14th), Malaysia (24th), and Thailand (48th), all of which score far higher. According to the statistics, there is a lack of investment in R&D in Vietnam.

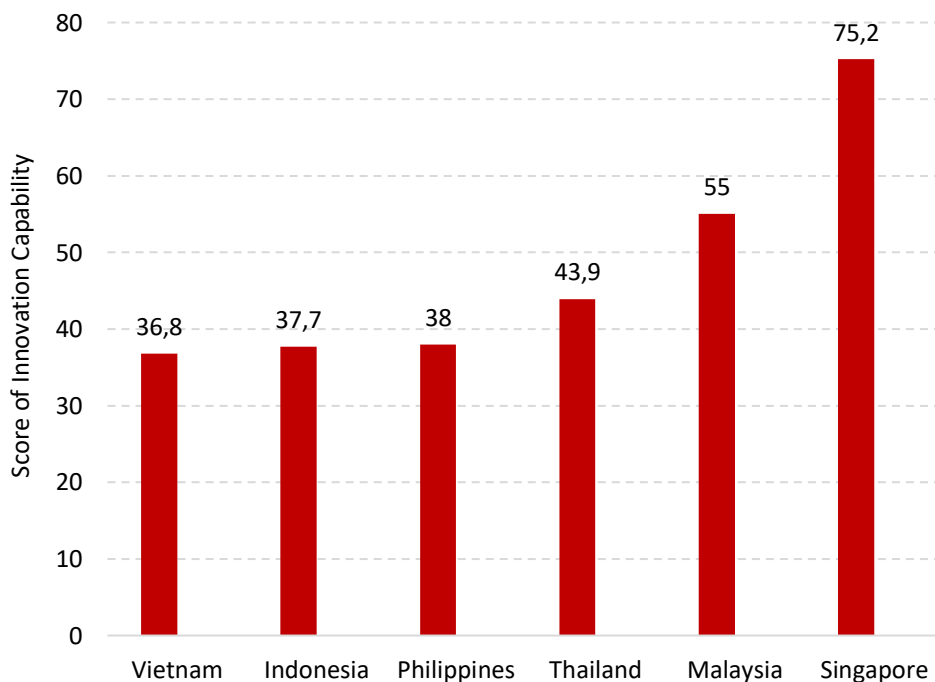
Figure 2. R&D spending as a percentage of GDP in some Southeast Asian countries, 2020



Source: R&D World and World Development Indicators.

The analysis of the innovation situation that was included in the 2019 edition of the Global Competitiveness Report produced by the World Economic Forum (WEF, 2020) found that the innovation capability score of the business community in Vietnam was the 6 lowest among the 6 ASEAN nations. To be more specific, Vietnam has a score of 36.8 (ranking 76th out of 141 nations), Indonesia has a score of 37.7 (ranking 74th), the Philippines has a score of 38.0 (ranking 72th), Thailand has a score of 43.9 (ranking 50th), Malaysia had a score of 55 (ranking 30th), and Singapore had a score of 75.2 (ranking 13th). Aside from that, there has not been much progress made by Vietnam. The Score of Innovation Capability for the economy was 3.3 (73/141 nations) in 2019, but it has since climbed to 36.8 and moved up three places, to 76/141 countries. According to the statistics, the business community in Vietnam is still somewhat "passive" when it comes to the implementation of activities related to innovation. In spite of the fact that Vietnam has had a rate of economic growth that is among the highest in recent history, the Score of Innovation Capability has only made very slight progress.

Figure 3. Innovation capability scores of some ASEAN countries



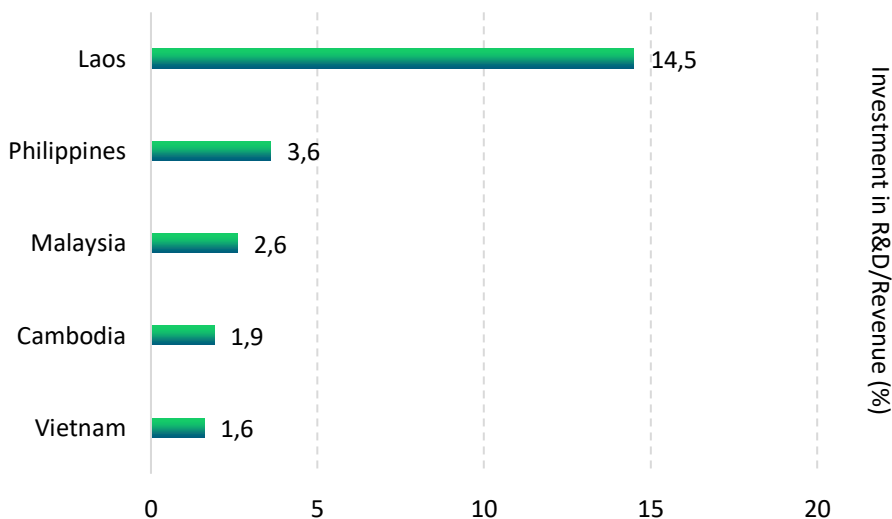
Source: World Economic Forum, 2019.

To promote the development of science and technology and promote R&D activities at enterprises, Decree No. 95/2014/ND-CP was issued with regulations that state-owned enterprises must deduct from 3 % to 10 % of pre-tax profits to set up their science and technology development funds. Non-State businesses are entitled to deduct up to 10 % from pre-tax income to set up a science and technology development fund. According to information obtained from a survey of 7,450 businesses, however, just 6.23 % of businesses (which is comparable to 464 businesses) claimed that they engage in R&D activities (GSO, 2016).

According to information obtained from the World Bank Report titled "Enhancing Enterprise Competitiveness and SME Linkages" which was published in 2017, it is concerning that Vietnamese businesses generally do not spend money on R&D. As a result, the creativity and capacity of Vietnamese businesses to launch new products are currently low when compared to other Southeast Asian countries (World Bank, 2017).

The survey data collected by the World Bank in 2017 in Vietnam shows that just 26 % of medium and large organisations engage in R&D activities; nevertheless, it is "alarming" that only 9 % of small businesses engage in this activity. In light of the fact that the authorities in Vietnam are making efforts to promulgate regulations in order to foster innovation in general of the whole economy, the most expected object, the business community of Vietnam, appears to be relatively inert and has little change. According to research conducted by the World Bank (2017), the proportion of a business's total income that is allocated to R&D investment in Vietnamese businesses is quite low when compared to the average level of businesses operating throughout Southeast Asia. Even more concerning is the fact that Vietnamese businesses consistently lag behind those in Laos or Cambodia.

Figure 4. Ratio of investment in R&D/revenue of enterprises in some Southeast Asian countries, 2017



Source: World Bank, 2017.

The unavoidable consequence of low investment in R&D/revenue ratio is that Vietnamese businesses, despite their attempts to improve managerial capacity and production processes, are "rare" in the introduction of new products to the market with new functions in comparison to existing products. According to Ehie and Olibe (2010), the perception that R&D is the "key" to improvements in the competitiveness of businesses stems from the fact that these improvements can take the form of both new and improved products as well as more sophisticated service offerings. According to the findings of this survey (World Bank, 2017), only approximately 23 % of Vietnamese businesses have reported that they have upgraded an existing product, introduced a new product or service, or introduced both during the past three years. Therefore, the rate at which Vietnamese businesses introduce new products or new services is slower than the rate at which businesses in Cambodia and the Philippines do. In addition, only a tiny fraction of Vietnamese businesses believes that the enhancements they have made to their products or services are innovative in comparison to other businesses that are already operating in the market.

According to the data, the state of R&D activities in Vietnamese businesses has been rather "quiet" throughout the course of the last few years. Thus, poor spending on R&D activities has shown the core weakness that has lowered the competitiveness of Vietnamese businesses in general and Vietnam's products and services in particular on regional and global markets or even on the home market itself. According to the World Bank (2017), the fact that Vietnam lags behind other nations in the region when it comes to investment in R&D (and even lags behind certain countries that develop more slowly than Vietnam) is very concerning news for the future competitiveness of the Vietnamese business community in general.

Furthermore, endeavours related to R&D that are carried out by businesses may also be encouraged if the business community and the educational system work together. The R&D cooperation between businesses and the university system is a win-win relationship, as businesses are able to deploy R&D activities at a low cost by taking advantage of the resources of the university system. In contrast, the university system obtains research funding from businesses and the opportunity to commercialise research products from businesses. Nevertheless, information obtained from the World Economic Forum's competitiveness rankings (WEF, 2019) reveals that in Vietnam, the level of collaboration between the country's business community and its university system in the area of R&D implementation is not particularly high. In particular, the score for this type of cooperation activity in 2015 (University-industry partnership in R&D) was only 3.3, which resulted in it being placed in 92 out of 141 nations. By the end of 2017, the score of cooperation activities was 3.5, and Vietnam had gone ahead with a ranking of 62 out of 141 countries. As a result, although the collaboration in the application of R&D between the business community and universities is currently at a low level, this activity is gradually improving over the course of time.

According to the statistics, the level of spending on R&D activities in Vietnam, both at the national level and in the business community, is still quite limited in many aspects. These aspects include the ratio of R&D spending to revenue, the size of

R&D expenditures, the number of new outputs of R&D activities, and the degree of cooperation in R&D activities between businesses and the university system. In order to enhance R&D activities in businesses in particular and science and technology activities in Vietnam in general in the time that is to come, it is necessary to find answers to the challenges that currently exist.

4. Conclusion and Policy Implication

Following the implementation of doi moi for more than three decades, Vietnam has achieved remarkable success in a wide variety of economic and social spheres. The broad-based economic growth model is progressively giving way to the depth-based economic growth model in order to ensure that future growth will continue to be both rapid and sustainable. Therefore, R&D in particular and science and technology in general are the keys to the realisation of the comprehensive economic growth model in the period that is to come. Despite this, statistics compiled over the past few years have revealed that the current state of R&D activities inside Vietnamese businesses is still rather poor. The article presents some solutions to promote R&D activities in the business community in the coming time as follows.

First, the authorities should continue to push for the adoption of policies that would assist and encourage businesses in their efforts to integrate scientific and technological endeavours, in general, and R&D operations, in particular, into their production and operational procedures. Take steps to improve domestic and international business communities' ability to collaborate on R&D projects, and act on such improvements.

Second, the competent authorities need to increase their already stringent oversight of the establishment of scientific and technology development funds within businesses in accordance with the relevant legal instruments. To begin the process of generating cash for R&D endeavours within businesses, the fundamental first step is to monitor the allocation of funds for science and technology. Additional punishments for businesses that do not take the required deductions to establish science and technology funds should be considered in order to encourage the incorporation of R&D as a routine activity of the organisation.

Third, to develop effective policies to encourage R&D, it is vital to improve the statistics on R&D activities in businesses and keep these statistics current. Keeping statistics on activities related to R&D in the business community up-to-date is an essential stage in the process of establishing and modifying policies accordingly. In the not too distant future, the authorities will need to build a shared database of information on various applied research topics and emerging technologies for the business community to use in conjunction with one another for scientific and technological endeavours.

Fourthly, when it comes to the advancement of science and technology as well as the promotion of R&D, the authorities need to devise strategies that will enable them to better integrate the university system with the business community. Cooperation with the university system is a crucial step in promoting this activity. This is particularly important in light of the fact that the capacity of Vietnamese

businesses to conduct R&D projects is still quite low. While it is important to encourage financial support for applied research at universities, we must also obey the directives of local businesses.

Fifth, in the near future in Vietnam, it will be essential to take the appropriate steps to redress, bolster, and expand the financial resources that come from the national budget to support activities related to science and technology in general, and R&D in particular. To internationalise scientific and technical endeavours in general, and R&D endeavours in particular, it is important to promote the funding of basic research and applied research, as well as the publication of international research and the granting of international patents.

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