

Strengthening Economic Innovation in Vietnam: A SWOT Analysis of Research and Development Role and Impact

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Abstract

This research aims at analyzing Research and Development (R&D) for economic innovation in Vietnam, the opportunities and challenges for enhancing the partnership between public and private sector institutions and universities. In this work, adopting an analytical and descriptive approach, historical analysis, document, and comparative analysis, we assessed the existing framework for R&D in Vietnam and its contribution to the country's economic growth. The results highlighted the fact, where Vietnam has succeeded in constructing the public R & D network, especially through governmental funding to institutes but the interaction between the public and private sectors has still a long way ahead. Cross-sectional studies between South Korea and Taiwan illustrated that public-private partnerships and university collaboration important for advancement of the innovation capacity and economic growth. The study also looks into the issues of obsolescence of equipment and technology, low private sector participation and problems of technology transfers in the global market. Thus, it is recommended that Vietnam should complement its R&D environment by benchmarking to such models, identifying specific sectoral linkage, and increasing R&D investment in the relevant sectors. In this way, Vietnam can improve the role and efficiency of R&D with an aim to enhance productivity, and thus enhance the competitiveness and sustainable economic growth.

Introduction

In today's era of globalization, the role of science and technology has become central in fostering breakthrough developments across all sectors, including industrial production, internal trade, foreign trade and international environment. This can be seen most especially in the Vietnamese case since science and technology have been central in the process of achieving economic development. The integration and globalization process has also brought in many opportunities for developing countries to upgrade their technological capacity by participating in international partnerships as well as acquisition of technologies. Among them research and development (R and D) is one of the most important enablers that enable research, creativity, and enhancement of productivity in economies. With the trend of global integration as well as international technology transfer in the past several years, the relationship between R&D and economic innovation of Vietnam has strengthened (Nguyen, 2021). Vietnam's experience with

international technology transfer activities has contributed positively to the country's domestic R & D results within industries (Nguyen et al., 2021). The swap with the technologies of the developed countries has facilitated the acquiring and adapting of the sophisticated technologies in Vietnamese enterprises that has brought several fold changes in the productivity and innovative levels in enterprises.

Nevertheless, the degree of production of new knowledge in developing countries that results from R&R activities of industrialized countries depends very much on their own R&R works (Anand, et al., 2021; Aldieri et al., 2021). Some authors opine that despite the fact that countries in Vietnam circumstances can largely benefit from innovation of the associated partners, the extent of the effect is contingent on the ability of the country to apply such technologies through its own research activities. This implies that an improvement on the association between international technology transfer and domestic R and D efforts is vital to maintain innovation-led economic development in the country Aden (2023).

The last significant source of R&D resources in Vietnam can also be said to come from the government (Tuan & Dung, 2020). In the last ten years, the government has been actively investing in the creation of public research institutes that today make approximately one-third of both the public funding of R&D and individuals engaged in research. Currently, Vietnam has 652 researched organizations functioning in the country as of 2020. Nevertheless, in contrast to Taiwan and South Korea, where public research institute is closely related with firms and universities since the early 1970 s, Vietnamese research institutes have been connected comparatively weakly with the private sector and academic establishments (Yun, 2022). This limited coordination between public research and private sector has thus not promoted translations of scientific research into actionable economic innovations.

What stands out most in Vietnam's R&D profile is the concentration on engineering and technology fields, in particular, they take the largest share of R&D spending (Baark, 2020). This is revealed by the analysis of Vietnamese international scientific publications which reveal the country has accumulated considerable strength in areas like Mathematics & statistics, Agriculture, fisheries and forestry, Biology and so on. Vietnam's focus on these sectors has placed the country in the global science and technologies innovation networks. In addition, whereas the total research activities are distributed at about 69% with emphasis on the applied research, shows a great prospect in using R&D as a tool to enhance the technology and labour productivity in the country across the several industries. In this regard, the authors of this paper intend to discuss various directions that may contribute to enhance the interaction of Vietnam regarding R&D and economic innovation.

This has a significant importance for not only increasing the efficiency in a number of conventional sectors, but also for the country's capability to penetrate into new economy areas like environment friendly technology, digitalization, smart production or manufacturing and many others (Paramati et al., 2022; Borowski, 2021). By examining the characteristics of R&D in Vietnam it would be possible to develop appropriate strategies to increase cooperation between the public research institutes, business and industry and universities. Furthermore, when these linkages are enhanced, Vietnam's growth would be able to harness the knowledge outcomes of R & D leading to commercial success hence economic competitiveness across the globe. To address these challenges, this paper is structured into several key sections: the sections of the paper include introduction, a review of the literature, research findings and conclusions. The analysis of prior literature reveals the following primary observations: First, research studies have established that R & D spillovers from the industrialized countries to the developing world has a positive impact on the TFP of the latter. Belderbos et al. (2021), observed that to the extent the developing countries can capture the foreign R&D, depends on

their capacity to invest on R&D themselves. Likewise, Zhou et al. (2020) in their study stated that absorptive capacity that is ability of a country to identify, acquisition and exploit knowledge in the external environment is also equally significant. Such macro factors include the level of economic development and also more recent research also brings to light the macro factors that impact on the role of the R& D in the promotion of economic innovation. For instance, in the study conducted by Yasmeen et al. (2022) it can be deduced that domestic R & D and FDI play an important role in enhancing domestic productivity and value added domestically. In addition, Kou et al. (2020) capture the relevance of money supply and loan from bank in influencing market factor and its effects on R & D studies.

Therefore, the objectives of this paper are to make a contribution to the Vietnam study on how to strengthen the correlation between R & D and economy innovation. This paper aims at presenting practical suggestions on how to increase the collaboration between research institutions, companies and universities by using the findings of prior studies and latest trends of R&D expenditure and innovation (Castañer & Oliveira, 2020). These connections are essential for the R&D activities already undertaken in Vietnam to provide concrete economic effects in the country's strategic developmental themes. The table given in the paper also recaps the major findings of the prior researches that have examined the link between R&D, innovation, and economic development (Baark, 2020; Pham, 2020). Every column in the table contains detailed information of the year of publication, the content of contribution, and the results of important researches in each period, thus, present a general view on how R&D has been researched and how and what kinds of insights these analyses bring into connection with the role of R&D in economic innovation.

Method

The research work that was undertaken to investigate the link between R&D and economic innovation in Vietnam adopted a qualitative research approach since a number of research methods were used in the study in order to give a holistic view of the research topic. Using the qualitative approach helped to expand and obtain more, contextual information about the conditions affecting R&D activities in Vietnam as well as to fill the gaps in the existing literature. Qualitative comparative analysis, comparative inductive reasoning, historico-dialectical method, historical method and analysis of documents were used in an integrated manner to provide more important approaches to the revealed research problem. This research included a major document analysis, which involved a synoptic and critical narrative synthesis and critical synthesis of the literature; government reports; policy documents and institutional framework on R & D, economic innovation of Vietnam. This method was useful in obtaining from the primary as well as secondary sources information about the status and plans of the given country as for R & D, currently existing and functioning governmental programs and policies in the country, as well as collaboration between the sectors of the economy involved in the process of innovation.

The document analysis was used to understand the current policies towards R & D in Vietnam, past developments and trends, as well as, discover the contribution of universities, research institutions and industries. In this paper the following issues have been analyzed to reveal areas of policy successes and continuing policy challenges the application of R&D have been identified. The document analysis also helped to identify how well Vietnam aligns (or not) with the international trends of R&D and technology management. This analysis of the current literature helped in the identification of system deficiencies which include separation of public and private R&D, reliance on history and slow transition to contemporary innovation. Apart from the benchmarking of the internal structure of R&D in Vietnam, we had a benchmarking study with a comparison to South Korea and Taiwan as successful cases. These have been

selected for their vibrant PPP systems, key drivers for development of their economies esp. through R&D innovation.

The comparative analysis was to discover which approaches and patterns of cooperation in R&T worked well, and thus were potentially transferable to Vietnam. This paper analyzed how South Korea and Taiwan built partnership between PRIs, universities, and private firms for enhancing the technology and innovation. In comparison with Vietnam, these successful countries were assessed on the structural dissimilarities and similarities in terms of governance, funding, industrial policies and education system. It was also possible to compare and distill basic parameters that defined success of R&D partnerships in these nations and how such concept could possibly fit the Vietnamese context. After data collection in the form of document and comparative analysis, inductive reasoning was used to draw conclusions out of the results and make conclusions regarding the probability of enhancing the existing R&D and innovation connection in Vietnam. Inductive reasoning which is a common approach of drawing general conclusions from specific observations proved especially appropriate in formulating theories of how the R & D environment in Vietnam could be improved.

In this study, the process of inductive reasoning was conducted from the patterns found in the gathered data stems from the consideration of the Vietnam's R & D scattered and the lack of leveraging the private sector's opportunities. This approach enabled us to organise our analysis of the consequences of the gaps we pinpointed and make conclusions about the actions necessary to strengthen the country's innovation potential. Besides, it is necessary to underline that it has been state the new hypotheses as a result of this process which can become the empiric base for the next investigations. Thus, to analyse the main tendencies of Vietnam's R&D system, we employed the historical approach, which traced the milestones of the Country policies and procs, innovation policies and practices. Recognizing the true sources of the government's investment in the public research institutions enabled us to put today's issues in the proper perspective. This method allowed to track changes in the development of R&D infrastructure in Vietnam throughout the years with focus on the time period after Đổi Mới of the 1980s.

The historical analysis was complemented by a method called dialectical materialism based on Marxist theories which analyses the opposition and the material premises of history. This approach was used to look into the interactive systems between the varying parties of Vietnam's R&D system including the government, private businesses, global entities and public research institutions. Here, Yugometry employed dialectical materialism to determine how these relationships are not mutually exclusive and how they have conflicting interests that hinders the formulation of integrated R&D strategy. For instance, the relation between public universities that offered academic research and private organizations that are in the commercial world was examined to explain why the partnership between these two categories is still limited. This method also allowed in the identification of the impact of international technology transfers, examining how the overseas investment and cooperation either promoted or hindered the domestic R & D advancement.

Result and Discussion

National economic growth and competitiveness require countries to develop better technological capabilities which accompany rising global levels of business competition. The R&D infrastructure in Vietnam has substantially improved through investments from both state organizations and universities which led to infrastructure development. The R&D development faces ongoing hurdles because public institutions are not working optimally with private firms and technology lags behind modern standards and knowledge transfer faces impediments. The research analyzes Vietnam's innovation environment to compare successful models across

South Korea and Taiwan. The purpose of this evaluation is to observe both Vietnam's existing achievements and remaining deficiencies in R&D-based innovation promotion approaches. This section evaluates the study's findings through analyzing both Pakistan's strengths as well as weaknesses to discover options that will enhance its R&D-driven economic development path.

Overview of Domestic R&D Situation

This paper reveals the multiple forms of external forces that are involved in the R&D context of Vietnam and which have both positive and negative impacts on economic growth and innovation. Justification for public subsidization of R&D costs is made through the recognition of positive externalities, benefits which affect non-particular commercial entities. These are improved production capacity, knowledge exchange and technology transfer, which all enhance the competitiveness of a nation. However, these externalities are not always beneficial as we are about to see in the next sections. Goldin et al. (2021) there is also internal constraints to the R&D process, for instance in the concept of the 'fishing out hypothesis, where the idea pool constantly reduces over time, and in the stepping on toes effect, whereby, different companies end up investing in the same research areas. Further, there is the idea of creative destruction, where new technologies, and can push out older technologies, making industries unstable and possibly arresting development (Vermeulen & Psenner, 2023).

However, the findings mentioned above put forward some challenges to Vietnam's R & D sector. However, the Vietnam R & D sector demonstrates the signs to possess a great potential (Klingler & Wade, 2020). The greater part of Vietnam's R&D equipment is concentrated in public research institutions that are beginning to be seen as sources of innovation, including in priority sectors such as agriculture and forestry, Mathematics, and basic medicine, non-communicable diseases. These sectors define areas of competitiveness that show Vietnam research having acquired specific competencies that are better than world averages in some fields. Still, these strengths remain untapped owing to lack of synergy between research organizations, universities, and the private's sector (Hoa et al., 2020).

Some of the barriers that have been attributed to the slow commercialization of research outputs in the past have been the absence or weak links between academia, research institutes and the business society. This divergence can be seen more when considering the case of Vietnam in relation to Taiwan and South Korea where R&D institutions developed industry linkages that motivated industrial upgrading from the 1970s. Vietnam has improved its performances in scientific research, especially in applied research, but results in the implementation of the research findings in industrial and economic development are still limited indicating that the advancement in the R&D is somewhat constrained.

Several papers provided insights into the interactions between R&D, Innovation and economic outcomes in the recent past. While Singh & Aggarwal (2022) pointed out a lack of consensus regarding the the definition of R&D and innovation and stressed that they should be conceived as two distinct index though related. From their assessment, the R&D creates the innovation that in turn enhances export performance among the firms and sub-firms irrespective of their size. In the context of this study, the researcher presents the "learning to export" hypothesis suggesting that investment in R & D has a positive impact in enhancing the firms and especially the SMEs capability to innovate and export. However, it also reveals that there is a direct causal relationship between export activities and innovation and R & D in large firms only. Infarction, firm size appears to be an important qualitative factor that determines the direction of innovations and growth.

This therefore underlines the need for policies that interventions should be directed towards firms that are both involved in R&D and innovation. Through support of these activities, Vietnam is in a position to build up the export capacity, especially in areas of strength for the country. However, even with these linkages, several challenges continue to plague the country's innovation system including outdated technologies, low productivity among those involved and poor collaboration between key players. In addition, there is concern on the current IP protection system which as noted by Burrell et al. (2023), hinders knowledge dissemination. Especially in the light of such emerging global issues as climate change, the IP regime consistently tends to focus on the private capture of R&D returns, thereby limiting the public multiplier effects of innovation. Amidst growing climate change risks to economic and environmental prosperity, there is a growing imbalance between IP rights that encourage R & D and access to the knowledge gained by society to address emerging crisis. This debate is most pertinent to Vietnam, a nation sensitive to the effects of climate change, and where nurturing open innovation might reap great dividends in the future.

SWOT Analysis of Vietnam's R&D Environment

Table 1. SWOT analysis and Values

| Strengths | Weaknesses |
|--|---|
| <ul style="list-style-type: none"> - The deep level of R&D will affect commercial activities (and of enterprises) - R&D in math, agri, forestry, base medicine. - Deep levels of R&D influence commercial activities, especially within enterprises. - R&D expertise in fields such as mathematics, agriculture, forestry, and basic medicine. - Strong involvement of universities and research institutions in the R&D ecosystem. - High potential for growth in sectors that align with Vietnam's natural resource-based economy, such as agriculture, forestry, and fisheries. - R&D drives commercial activities and enterprise performance. - Expertise in key areas such as mathematics, agriculture, forestry, and basic medicine. - Active participation of universities and research institutions in the R&D ecosystem. - Growth potential in sectors like agriculture, forestry, and fisheries due to alignment with natural resources. | <ul style="list-style-type: none"> - Using many old technologies Many sectors, particularly manufacturing and industrial, rely on outdated technologies, reducing competitiveness and innovation potential. - Limited collaboration between universities, research institutes, and private companies, hindering the commercialization of research. - Lack of modern technological infrastructure, affecting the ability to scale R&D outcomes into market applications. - Many sectors, particularly manufacturing and industrial, rely on old technologies, reducing competitiveness and innovation potential. - Limited collaboration hampers commercialization of research. - Outdated infrastructure affects the scaling of R&D outcomes. - Invest in upgrading technology and infrastructure. - Develop policies to enhance collaboration between research entities and industry. - Promote technology transfer and modernization initiatives. |
| Opportunities | Threats |
| <ul style="list-style-type: none"> - positive economic growth (average 5.2% last 3 years) - linkage with universities and research institutes | <ul style="list-style-type: none"> - low productivity, still lack of high qualified laborers - high, intensive capital foreign firms |

| | |
|--|--|
| <ul style="list-style-type: none"> - taking advantage of young scientific researchers <p>Vietnam's positive economic growth over the last three years, with an average GDP increase of 5.2%, presents an opportunity to expand R&D investments.</p> <ul style="list-style-type: none"> - Opportunities for strengthening linkages between universities, research institutes, and industries for collaborative research and innovation. - Vietnam has a young and growing pool of scientifically trained researchers who could contribute to driving future R&D innovation. - Potential to leverage international collaborations to modernize outdated technologies and promote technology transfer from advanced countries. - Vietnam's economic growth supports expansion of R&D investments. - Strengthening linkages can enhance collaborative research and innovation. - Young researchers present an opportunity for future R&D advancements. - International collaborations could modernize technologies and drive innovation. | <ul style="list-style-type: none"> - Vietnam still suffers from low labor productivity, especially in high-tech and R&D-driven sectors, limiting its ability to fully exploit R&D outputs. - There is still a lack of highly qualified laborers, particularly in R&D-intensive sectors. - Foreign firms dominate capital-intensive industries, posing a threat to domestic enterprises that struggle to compete without sufficient R&D support. - Climate change and environmental concerns could threaten economic stability if not addressed through focused R&D on sustainable technologies. - Implement workforce development and training programs to boost productivity. - Support domestic enterprises through R&D incentives and subsidies. - Prioritize R&D in sustainable technologies and climate adaptation strategies. |
|--|--|

To further explore Vietnam's R&D environment, a qualitative SWOT analysis provides insight into the country's current strengths, weaknesses, opportunities, and threats.

Vietnamese R&D environment is supported by highly recognized field specific areas like; Mathematics, Agriculture & Basic medical science. It is in these areas that the country's industrial and economic growth depends and thus provides a solid ground for technology. It also has the strength that many universities and research institutions are deeply involved in these areas to show that Vietnam has been striving to strengthen its capability of science. Besides, using the R&D in specific activities such as agriculture and fishery are also suitable to the natural resource-based economy of Vietnam, these sectors can be positive to playing the role of spearheading the sustainable development. As we pointed out earlier, the country still has several systemic weaknesses that prevent it from realizing its R & D capabilities. This is in the area of manufacturing and industrial sectors whereby organizations are still using some of the old technologies.

This technological gap becomes an obstacle to the firms to maximize on the opportunities brought about by R&D. In addition, the poor linkages between universities and research institutes on the one hand and the private sector on the other reduces the commercialisation of research findings. If Vietnam fails to develop such partnerships, the nation could fail in its bid to bring the academies and sciences' innovations to the market. Despite these challenges they are opportunities that can be considered for growth as highlighted below. The economic development of Vietnam over the past years has been generally upward having an average annual GDP growth rate of 5%. According to Jarn, Ruusun, and Solesaar 2% over the last three years. On the one hand, there is the positive economic trend which means that further economic

growth will be conducive for new R&D driven innovation; on the other, there is the positive demographic development, the increasing number of young and scientifically highly educated researchers. Enhancing the collaboration between university, government and the industry will be important for building this capital and for enhancing a vigorous R & D system.

Vietnam has the following challenges which are external and internal and they hamper the country's progress. High unemployment rate and low labor productivity rates have remained rampant even in hi-tech industries. Also, there is tendency of globalization that has seen the South Africa dominated by the firms from other countries especially in capital manufacturer industries this may become a big obstacle to local firms in their attempts to carry out intensive investigations without increased research in innovation. the development of R&D in Vietnam provides both potential and limitation in the scope. Though, the country has achieved significant improvement in some definitive areas of scientific research in particular it lacks behind in some areas of R&D technology, scarcity of collaborative research and inadequate legislation that hinders the sharing of ideas through Intellectual Property Rights. However, more selective measures towards encouraging risky R&D investments especially among SMEs and enhancing the quality of PPPs might create new possibilities of innovation and economic development. The call for a more open and shared approach of innovation and Research & Development that is especially obvious in the face of global problems such as climate change, has put pressure on traditional conceptions of IP and innovation.

Based on the findings outlined above, several policy recommendations emerge to address the gaps in Vietnam's R&D ecosystem and enhance its contribution to economic innovation: Perhaps one of the most important of these is the need to actively work towards creating improved links between Vietnamese universities, public research institutes and the business world. Such partnerships would assist in narrowing down the gap that exists between scientific discovery and marketing of the findings. This can be attained by the formulation of policies that encourage the firms to affiliate with university institutions, provision of grants for cooperative research projects or creation of innovation zones where private companies and research institutions can embark on innovative projects. However, considering that the advancement in R&D has a major effect on improving export performance, especially for SMEs, it is suggested that strategic policies that encourage SMEs to invest in R&D and innovation through provision of incentives should be formulated. These could be in the form of tax credits, grants or low interest charged on funds that are meant for the financing of R&D. Thus, extending further support and offering equipment to support the SMEs' research portfolios offered increased innovation potential and competitiveness on the international stage.

The youths and the scientific calibre of workforce available in Vietnam are strength. However, this talent pool requires enhancement in order to provide for the needed skills in the high-tech industries. To voice support and policy-making by implementing the need for investing in STEM education and vocational training and reskilling programs for the workforce advancement to the technology precincts. Also, the cultivation of university entrepreneurship might help students to commercialise research findings. Vietnam has to urgently resolve the problem of outdated technologies which dominates many fields at the moment. This not only entails funding for the purchase of new technologies; but also financing of technology acquisition and diffusion from developed nations. This means that efforts to improve the technological standing of domestic organizations through R&D activities, and the ability of the country to integrate foreign technology will go a long way in filling this void. The existing set of legislations and protection standards shall be used to reassess Vietnam's current approach to IP to identify gaps that prevent the balance between rewarding research and developments through patents and sharing benefits of innovative works among the broad population.

It could be to extend different IP protections for sectors where they are needed to meet the requirements, especially in the fields that are of crucial importance to address the global issues like climate change. Increasing the number of open-access IP policies in environmentally friendly inventions will enhance diffusion of appropriate innovation that will be helpful in the achievement of sustainable living. Since climate change remains one of the biggest threats to economic sustainability, this is a right time for Vietnam to support innovation sustainable technologies. Government policies towards research and development should be in a bid for green technology that would help in the adaptation and mitigation of climate change. Vietnam should integrate its R&D plan to include sustainable development goals thus easily competing as a leading nation in developing solutions to climate change issues while at the same time improving its economic competitiveness. This paper also identifies the need for Vietnam's R&D to integrate in regional and global research networks. Thus, the Vietnamese researchers could benefit from the practice of developing joint projects with foreign institutions as well as from membership in international research consortiums in terms of newly obtained knowledge, technologies and financing. Strengthening such networks would also serve as important sources of information as well as nodes for capacity development amongst Vietnamese researchers. The prevalence of the threats of climate change hence offers a rationale for contemplation of the current intellectual property protection mechanism where measures are in place to increase private appropriability of returns on R&D investments and reduce dissemination of knowledge products (Leung & Sharma, 2021).

Subsequently, Heij et al. (2020) stated that and, Results indicate that there is a clear difference between R&D and innovation, meaning that these two concepts should not be considered as synonyms, but as two different variables. When controlling for endogeneity, R&D increases exports through an unmediated and a mediated path that is, through innovation in both SME and large firms supporting the "learning to export" hypothesis. However, the impact of export on innovation and on R & D is valid or seen significant only in large firms. This study establishes that exports are enhanced when SME firms are encouraged to adopt innovation through R&D outlay. This requires formulation of more efficient and firm selective measures that can differentiate between exporters that are involved in enhanced R&D and innovation activities. This research work examines the connection between R&D and economic innovation in Vietnam with findings that fill up profound gaps in the literature. While there exists significant literature on the contribution of R&D in the economic growth of both the developed and developing world, particularly the relationship between R&D and growth in the Vietnamese setting remains largely unexplored, despite its rapidly transforming economy and improving technological endowment. The first research question of this study is answered by this finding, which points that inter organization relationship between Vietnamese public research institutes, universities, and private enterprises is rather limited.

This corroborates and goes a long way in supporting the findings of Yoo et al. (2020), Anderson and Pold attract, who found out that innovation policies more often than not, emerge in silos, without cross pollination across sectors. However, this study takes it a notch higher by breaking down the structural challenges in Vietnam's R & D sector, and realizing that there is a mismatch between the government's research agenda and the private sector. While Taiwanese and south Korean transitions established the cross-sector integration of R&D in the 1970s, indicating strong public research base, the current solid structure of public R & D in Vietnam does not have adequate linkages with the private sphere. This is something that is important for policymakers to evaluate, specifically since indicated types of collaborations between the public and private sectors will play a significant role in the application of research towards commercial goals. In doing so, the study shows where such gaps exist and supports arguments about policy changes that encourage cross-sector cooperation, which is a general prescription

for boosting economic innovation. Ending the fragmentation of capital and people encouraging private enterprises to connect with universities and other public research organizations would level this gap, a proposal Negre which earlier research analyzing Vietnam's R&D has not fully addressed.

The following work is a development of the researches of Coe, (Bournakis & Tsionas, 2022), who depicted that R & D spillovers have favorable impacts on TFP growth in developing countries. However, the previous studies have used these spillover effects in a rather general context while this paper focused the context on Vietnam. The studies indicate that indeed there exists a positive correlation between R&D spillovers and domestic productivity but only if the country links its firms to large R&D activities. This seems to support but also extends previous research works by mentioning that Vietnam has a great R&D capacity but the nation's engagement in domestic R&D is still very low. Further, Edeh et al. (2020) noted that while R &D and innovation are related, R &D Only affects exports through innovation in both sme and big firms. This study, thus, corroborates with Miethy et al., in establishing that there is the potential for significantly increasing Vietnam's export competitiveness through encouraging the SMEs to boost R & D spending. The present research fills a gap in the existing literature by providing evidence that the link between R&D, innovation, and exports is highly pertinent to Vietnam's SMEs, so it contributes value.

The problem of the obsolete machinery and the corporation demand in technology renewal has recurrently been noted in debates about the structure of Vietnam's industrial sector. Past research has pointed out that use of older technologies has limited Vietnam's economic growth. This study therefore gives credence to such assertions while presenting some of the policy recommendations as; enhancing technology transfer from developing countries and improving the country's absorptive capability of foreign technologies. In this regard, through stressing the significance of technological infrastructure enhancement as a concrete way of raising a country's technological status and stimulating innovation for economic growth, this study fills a significant research gap, which requires more specific directions on how to enhance the technological development in Vietnam for the purpose of economic innovation. Unlike prior research that has raised awareness about the need to leverage on advanced technologies, this paper takes the discussion a notch higher by presenting implementable strategies that can be applied to address the issues highlighted including enhanced international cooperation in encouraging R&D and match capital to human capital.

The paper also aims at filling the gap that exists for investigation associating the IP regime and the dissemination of green technologies. Whereas saw risks in IP protections constraining the sharing of knowledge, this study positions those risks into the framework of Vietnam's sustainability agenda. The study's implications are that existing IP frameworks in Vietnam may limit diffusion of green innovations that Vietnam needs to tackle its climate conditions. This is in tandem with the demand by scholars across the globe for liberal IP regimes that prioritize public good especially in such fields as environmentalism. Therefore, by stressing the importance of pursuing the improvements of the IP systems, which would enable a better balance between private appropriability and the public interest in the emerging economies, this study provides a relevant input to the differentiated IP protection approach. It could help disseminate climate technologies which as we have seen above are yet to be widely discussed within the context of Vietnam and need to be enhanced as per this research study.

This research differs from earlier studies mainly concerned with an aggregate evaluation of Vietnam's capability to develop R&D. in that it offers a more detailed analysis of particular policy measures capable of strengthening R&D Innovation relationship. Thus, proposals like the need to provide targeted support to SMEs or to invest in green technologies are all new

ideas which are yet to be fully explored when it comes to Voet's vision of Vietnam's economized future. To this end, the study enhances the SWOT analysis of Vietnam by combining the strengths and weakness of its R & D system providing policymakers with a better alternative for solving these challenges. Furthermore, this study offers policy implications for the creation of regional and international research networks through which Vietnam will improve its connection to the rest of the world's R&D environments. This recommendation is premised on argument of transitioning towards sustainable business models but in adapting it to the Vietnamese economy structure.

Conclusion

This paper has discussed the link between R&D and economic innovation in Vietnam while revealing major challenges in cooperation between government agencies and universities and businesses. From the document analysis of Vietnam R & D foregrounds and comparative studies historical evaluation it is seen that though has been qualitative progress still there are barriers like dated technologies lack of private –public partnership lack of international connection. Like in most developing nations, Vietnam is keen on copying appropriate models of innovation systems from advanced countries such as the Republic of Korea and Taiwan to promote its technology development and industrial growth, increase sectors' cooperation, improve mechanisms for R & D financing and implementing appropriate comparative innovations policies.

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