

Do Sustainability Innovation and Firm Competitiveness Help Improve Firm Performance? Evidence From the SME Sector in Vietnam

Thanh Tiep Le^a, Muhammad Ikram^{b*}

^a Ho Chi Minh City University of Economics and Finance, Ho Chi Minh City, Vietnam

^b School of Business Administration, Al Akhawayn University in Ifrane, Avenue Hassan II, P.O. Box 104, 53000 Ifrane, Morocco

Abstract

This study unfolds the nexus between sustainability innovation, firm performance of small- and medium-sized enterprises (SMEs) by exploring the mediating role of firm competitiveness in the context of an emerging market. This study adopts a systematic literature review approach which results in arguing that this relationship is not explored in-depth in current literature. This is especially more critical for emerging economies as current literature shows a lack of empirical research in this research topic. A well-structured questionnaire was administrated for data collection. A total of 435 valid responses from top executives, managers, and experts were received and used for data analysis. Structural equation modeling (SEM) was used to investigate the relationships between constructs and latent variables. Our findings reveal that there is a significant and positive relationship among sustainability innovation and firm competitiveness. Firm competitiveness has a positive and significant relationship with financial, environmental, and operational performance. Moreover, sustainability innovation had an indirect positive and significant effect on financial performance. The statistical results indicate that the indirect effects are all significant (sig.<0.05) and the order of these indirect effects is consistent with those of direct effects of firm competitiveness on firm performance dimensions. Stakeholder theory is applied to check how firm competitiveness helps improve the performance of SMEs. To the best of our knowledge this study is the first that explores the mediating role of firm competitiveness between sustainability innovation and SMEs' performance. Based on the context of the influence of the COVID-19 pandemic, this study presents implications for entrepreneurs and top management with respect to strategic perspectives to drive their businesses in a sustainable direction.

Keywords: Sustainability Innovation; Firm Competitiveness; Firm Performance; SMEs; Emerging Markets; Vietnam

1. Introduction

Sustainability innovation is a broad concept of innovations toward sustainability (Hermundsdottir *et al.*, 2021), which reduces firm's adverse impacts on the ecosystem and society while ensuring economic growth of the firm. Indeed, the growth of the economy and population is proportional to increased consumption of resources and increased emissions that

* Corresponding author (Muhammad Ikram; i.muhammad@aui.ma)

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2 cause burden on the environment (UN, 2019). Due to negative social and environmental
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4 consequences and adverse effects of this trend, the pressures of stakeholders on firms to respond
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6 to these challenges and deal with issues related to climate vulnerability, social and ecological
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8 degradation have increased (El-Kassar *et al.*, 2019; Cai *et al.*, 2018).
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12 Businesses are increasingly facing challenges from external pressures to be more sustainable,
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14 while dealing with high competition due to globalization and advancement in technology
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16 development (Ikram *et al.*, 2021). From the positive perspective, such pressures consequently
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18 generate internal motivation for firms to implement sustainability innovation for improving
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20 performance in a sustainable way (Boons *et al.*, 2013). From the revisionist view, sustainability
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22 innovation can lead to improved firm performance in the sense of enhanced competitive
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24 advantages that drive firm performance in a sustainable direction.
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29 Previous studies have examined sustainability innovation related to firm competitiveness and
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31 firm performance (Boons *et al.*, 2013). However, most of these studies focused on a single
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33 relationship either between sustainability innovation and firm competitiveness, firm
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35 competitiveness and firm performance, or sustainability innovation and financial performance,
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37 these relationships are rarely integrated in a single research model (Gürlek and Tuna, 2018). In
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39 addition, there is heterogeneity in the findings in the current literature. Such heterogeneity may
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41 be explained by contextual-factor- and methodology-related aspects (Hermundsdottir *et al.*,
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43 2021). Furthermore, most studies concerning the impact of sustainability innovation on firm
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45 performance use cross-sectional data while it requires time to analyze the impact of sustainability
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47 innovation (Ikram *et al.*, 2019). Therefore, longitudinal studies are critically necessary and
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49 almost unique to be able to observe the real effects of sustainability innovation on firm
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51 performance (Tiep *et al.*, 2021; Doluca *et al.*, 2018; Kassinis *et al.*, 2016; Ikram *et al.*, 2021).
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53 Such studies are necessary because this approach uses continuous or repetitive measures to track
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55 a particular subject over a long period of time. Therefore, even in the same context, repeated
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research is needed at certain stages to assess the real impact of sustainability innovation on organizational performance. Furthermore, Ikram et al. (2019), Kusi-Sarpong et al. (2019) conducted studies to investigate to focused on different parameters to see how different conditions affect the effectiveness of sustainability innovations.

The above discussions and arguments demonstrate that there is a gap in the literature to develop the investigated framework based on sustainability innovation, firm performance, and mediating effect of firm competitiveness of small and medium enterprises (SMEs). In this context, firm competitiveness was assumed to mediate the relationship between sustainability innovation and firm performance. Recent literature shows that SMEs in Vietnam have in common that they demonstrate quite well innovation, but these innovations are still limited in size, scope and orientation. In particular, innovations are mainly about savings and making small changes to existing products in order to be able to access lower market segments (OECD, 2021). This may be due to the limited resources of SMEs in Vietnam and insufficient government support for innovation at the company level (OECD, 2021). Consequently, this affects the competitiveness of SMEs in the context of international integration and pressure from various stakeholders on sustainable development. Therefore, the choice of firm competitiveness as a mediator between sustainability innovation and firm performance is very appropriate in the context of this research.

In addition, this study focuses on manufacturing SMEs in Vietnam for the following motivations. Recent literature shows that research on the domain of firm innovation and firm performance for SMEs in Vietnam are approached from different perspective (Canh et al., 2019; Mai et al., 2019; Tran et al., 2016; Tuan, 2012). However, current studies mainly focus on process innovation, product innovation, and open innovation on conventional firm performance, while sustainability innovation on sustainable firm performance with the mediating role of firm competitiveness has not been explored in the current literature. Besides, although Vietnam's

economy is known as an emerging economy with rapid growth over the past decades, its development of innovation system is still in its early stages (OECD, 2021). Moreover, Vietnam's economy is an export-oriented economy and most SMEs participate in the export value chain (OECD, 2021), besides, SMEs account for a high proportion (about 98%, according to Chuc et al., 2017) and manufacturing SMEs play a critical role in driving national economy and employment (Canh et al., 2019).

In the context of international integration, firm competitiveness towards globalization is considered prerequisites not only for firm survival and development but also for sustained national economy and competitiveness. Therefore, sustainability innovation should be the most suitable predictor of firm competitiveness in the new era. Further, by considering the national involvement, Vietnam is in the early stages of implementing the Paris Agreement on climate change, therefore, in order to achieve the committed goal, it requires coordination at all levels. In which, the contribution of SMEs is expected to be significant in realizing the Paris Agreement commitments on climate change and in developing the national economy in a sustainable way. Therefore, a holistic study addressing these related concerns should be of high priority (Hussain et al., 2018; Lopes Santos et al., 2019). Thus, this study addresses the above issues by answering the following research questions:

(1) *What is the role of sustainability innovation in boosting firm competitiveness and firm performance for SMEs in emerging economy?*

(2) *How firm competitiveness mediates the relationship between sustainability innovation and operational performance, environmental performance and financial performance?*

This study contributes to the current literature and provides implications in various ways. First, it provides an extension to the current literature on sustainability innovations and firm performance by integrating firm competitiveness as a mediator between this relationship. Second, this study offers insights into the mechanism of how innovations are associated with improving performance dimensions and how firm competitiveness mediates this relationship. Third, to the best of our knowledge, this study is first among its kind that develops the integrated framework of sustainability innovations, firm competitiveness, and firm performance dimensions

in a single research model, whereby firm competitiveness plays a mediating role. Fourth, this study provides theoretical and managerial implications that are of significance to business practitioners, managers, and policymakers to address the aforementioned issues. Finally, this study suggests avenues for future research on sustainability innovation to further enrich the literature.

The rest of this paper is organized as follows. Section 2 presents a literature review, the theoretical framework, hypothesis development and model development. Section 3 outlines the research design and methods. Section 4 presents the results of this study. Section 5 discusses the findings and stating the theoretical and practical implications. Section 6 concludes the study and figures out limitations for future scope of studies.

2. Literature Review

2.1. Theoretical underpinning

This study uses stakeholder theory as the underpinning theory for this study. According to Freeman (1984), stakeholders are those can be affected by the business outcomes and can affect the results of its operations in various ways. Stakeholders are inclusive of different groups such as employees, customers, partners, communities, shareholders (Freeman et al., 2020). In this context, sustainability innovation pertains the efforts of enterprises towards the interests of stakeholders on the basis of balancing economic, social and environmental benefits. In turn, this will generate a positive response from stakeholders to the business. As a result, this will enhance the various aspects of firm competitiveness leading to improved operational, environmental and financial performance metrics of the business.

In the context of Covid-19 emergency, uncertainty becomes increasingly complex as the devastation of Covid-19 on humanity, on socio-economic life, on the environment is still not sufficiently predictable. In this complex context, the value of cohesion between entities in society towards sustainable values for stakeholders becomes more important than ever.

Therefore, stakeholder theory is particularly suitable as underlying theory for this research to explain why and how sustainability innovation affects a firm's competitiveness leading to various performance metrics of the enterprise.

In addition, this study outlines the grounded theories included sustainability vision theory, integrated innovation theory, and resources-based innovation theory. In which, sustainability vision theory explains why organizations must innovate in a sustainable manner and how sustainability innovation enhances firm performance (Kantabutra, 2020). According to this theory, sustainability innovation is imperative if businesses want to survive and thrive. In other words, sustainability innovation is not optional for performance sustainability. Additionally, integrated innovation theory pertains to the innovation process towards integrating elements of resources, ideas, methods, systems, structures, etc., in order to improve the outcomes of innovation according to the mechanism of organic duplication (Wang *et al.*, 2016). In the context of SMEs in emerging economies with limited resources, this integration is necessary for businesses to be able to realize sustainability innovation on the basis of resource optimization. More importantly, this practice is quite familiar compared to their current practice. Besides, resources-based innovation theory explains how and where innovation should start to utilize a firm's primary resources for competitive advantages (Barney *et al.*, 2005), as a critical source of firm competitiveness (Zefeng *et al.*, 2018; Hojnik *et al.*, 2016a). As a result, this will result in enhancing firm's core competencies and lead to sustainable competitive advantages.

2.2. Sustainability Innovation

The concept of sustainability innovation is diverse in the current literature (Hermundsdottir *et al.*, 2021). In previous studies such as Clark *et al.* (2007), it is broadly defined in that "sustainability innovation is a process" that incorporates the environmental, societal, and economic values into the company system from the stage of concept development, "research and development", and "commercialization" (Kibler *et al.* 2018). "This process applies

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2 to products, services, and technologies, as well as to new business and organizational models” (p.
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4 99). According to Arcese et al. (2015), sustainability innovation is perceived as changing for
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6 better that enhances corporate sustainability performance.
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10 In addition, sustainability innovations were approached from two contradicting views,
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12 that is, traditionalist and revisionist (Hermundsdottir *et al.*, 2021), which caused heterogeneity in
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14 the current literature. The traditionalist view argues that sustainability innovations do not lead to
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16 generated benefits for firms but the environment only. Then, sustainability innovations require
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18 high initial investment, long payback, and lead to increased cost, increased price, and reduced
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20 firm competitiveness (Kuzma et al., 2020; Rauter et al., 2019). On the contrary, the revisionist
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22 view denies this notion and suggests that sustainability innovations lead to increased
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24 competitiveness in many ways that improve firm performance dimensions (Gürlek *et al.*, 2018;
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26 Hojnik *et al.*, 2017; García- Sánchez *et al.*, 2019; Ikram *et al.*, 2020).
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32 Stakeholder theory posits sustainability innovation at the company level is seen as
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34 company efforts towards the interests of stakeholders of sustainable values. Stakeholders are
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36 identified as being associated with the company’s operations and either affect the firm’s success
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38 or are affected by its results (Freeman, 1984). In this sense, the values that sustainability
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40 innovation targets for stakeholders collectively are economic, social, and environmental benefits.
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42 In another approach from the sustainability vision theory, innovation is a must for the future of
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44 the business and for stakeholders (Kantabutra, 2020). From a wider perspective, a firm needs a
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46 vision that inspires its members and stakeholders for “revolutionary thinking” to “achieve
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48 innovation in products and services.” Indeed, a company only achieves innovation when it
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50 integrates sustainability into its strategies to “align the triple bottom line for future generations”
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52 (Kantabutra, 2020; Ikram *et al.*, 2019).
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59 Theoretically, the concept of innovation is increasingly expanded with the complexity of
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61 the socioeconomic environment. Consequently, innovation is no longer simply understood as a
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technical specificity, but integrates innovations in products, quality, strategy, management, process, and technology toward sustainability, referred to as the “integrated innovation theory” (Wang *et al.*, 2016). In addition, according to Adams *et al.* (2015), sustainability innovation requires consistency in corporate philosophy, values statement, products, processes, executions, ect, as long as its outcomes lead to the simultaneous creation of economic, environmental and social values.

2.3. Nexus of Sustainability Innovation and Firm Competitiveness

The relationship between sustainability innovation and firm competitiveness has been of interest to many scholars, but their findings are inconsistent and have yet to come to a consensus (Cai *et al.*, 2018; Hussain *et al.*, 2018; Rezende *et al.*, 2019). The connection between sustainability innovation and firm competitiveness is conceptually divided into two opposite views (Cai *et al.*, 2018; Hussain *et al.*, 2018). From the traditionalist point of view, the sustainability innovations approach is considered only enhance the cost of firm (Shin *et al.*, 2018; Brooks, 1996) which leads to add up in the total cost for firms, increase prices, and help to reduced competitiveness (Blowfield *et al.*, 2008). The revisionist view asserts that “sustainability innovations is a tool that can create win-win situations value addition process for the ecosystem and society while simultaneously gives the competitive advantage to firms” (Porter *et al.*, 1995).

Kusi-Sarpong *et al.* (2019), and Suat *et al.* (2019) found that sustainability innovation has a positive and significant relationship with firm competitiveness. In addition, Cherrafi *et al.* (2018) determined that sustainability is a driving force which is linked with higher profitability, increase business efficiency, and competitiveness. Therefore, global trends suggest that businesses and nations are most concerned to adopt sustainability practices (Ikram *et al.*, 2020). Drivers for adoption of sustainability innovation have been identified as those that could be majorly categorized as external pressures and internal motivation (Díaz-García *et al.*, 2015).

This study principally approaches sustainability innovation from the revisionist view, which asserts that sustainability innovations positively and significantly affect firm competitiveness. This notion indicates that sustainability innovation helps enhance firm's competitiveness in the sense of reduced operational cost (Díaz-García *et al.*, 2015), enhanced customer satisfaction, increased brand equity and corporate reputation, and increased efficiency in using materials and energy, which helps save costs and protect the environment (Clark *et al.*, 2007; Ikram *et al.*, 2019). In addition, innovation was also approached from the resources-based perspective in which innovation should begin with identifying specific firm resources that are primary sources of competitive advantages. As a result, it enhances the firm's core competencies, which leads to sustainable competitive advantages (Cho *et al.*, 2020; Barney *et al.*, 2005).

2.4. Firm Competitiveness and Firm Performance

Firm competitiveness is critically important because the firm itself, not its home country, directly competes in international markets (Porter, 1998). Hove *et al.* (2014) conceptually defined firm competitiveness as “the ability of a firm to outweigh their rivals because of certain competitive advantages that accrue to them in the form of minimized costs and maximized business opportunities” (p. 167). Therefore, a firm's competitiveness is formulated from a variety of competitive advantage criteria such as “lower prices, rapid product innovation, higher quality, higher dependability, and shorter delivery time” (Hove-Sibanda *et al.*, 2017; Kotler *et al.*, 2011) that contribute to enhanced overall firm performance. A firm that offers premium quality products has high potential to increase return on sales and investment. In addition, a firm that has the ability to sustainably innovate, rapidly develop products, and quickly launch products in the market can achieve the first mover advantage and thus enjoy higher market and sales volume (Madzimore, 2020).

Theoretically, firm competitiveness was commonly approached from the competency perspectives, which emphasize the major roles of internal resources such as capacities to

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2 innovate, business strategy, intangible assets, and tangible assets for firm competitive success
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4 (Bartlett *et al.*, 1989). Competitive success refers to enhanced customer satisfaction against
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6 competitors that lead to enhanced operational efficiency and financial effectiveness (Hammer *et*
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8 *al.*, 1993).
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11 Firm performance is defined as the extent to which a firm achieves its defined goals.
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13 Over the past few decades, firms have dominantly focused on economic goals to generate
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15 “financial return for shareholders” (Upward *et al.*, 2016). This approach consequently
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17 contributed to environmental problems “where excessive use of limited resources has caused
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19 pollution, climate change, global warming, and ozone layer depletion” (Parida *et al.*, 2019).
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21 However, businesses are increasingly emphasizing their sense of sustainability, so they put
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23 sustainability at the forefront as the core of their survival and development (Nußholz, 2017;
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25 Lewandowski, 2016).
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32 In addition, according to stakeholder theory (Freeman, 1984), the primary goal of the
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34 business is not only to achieve economic values but also social and environmental benefits as a
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36 way of balancing the interests of various stakeholders. Therefore, how the business is governed
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38 to achieve this goal is the primary concern of stakeholders. This is measured through the
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40 performance of the business according to distinguishing operational, environmental and financial
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42 metrics. Therefore, firm performance is expected to be sustainable to meet stakeholders’
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44 expectations with respect to the three bottom line values that include economic, social, and
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46 environmental criteria (Le Thanh *et al.*, 2021). Therefore, it is necessary to extend the measures
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48 of firm performance by the resulting objects to clarify the extent to which firms benefit from
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50 competitive advantage. From this perspective, the current study measures firm performance that
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52 is composed of three main measures included operational, environmental, and financial
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54 performance (Xue *et al.*, 2019) as crucial indicators for sustainable development (Parida *et al.*,
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2019) that derived from the outcomes of sustainability innovation (Cillo et al., 2019). Previous studies related to sustainability innovation are summarized in table 1.

Hypotheses were developed based on the careful literature review and discussions in section 2 and on the aforementioned theories. Accordingly, this study formulates the following hypotheses:

Hypothesis 1 (H1). Sustainability innovation has a positive relationship with firm competitiveness.

Hypothesis 2a (H_{2a}). Firm competitiveness has a positive relationship with financial performance.

Hypothesis 2b (H_{2b}). Firm competitiveness has a positive relationship with operational performance.

Hypothesis 2c (H_{2c}). Firm competitiveness has a positive relationship with environmental performance.

Hypothesis 3a (H_{3a}). Sustainability innovation has a positive relationship with financial performance, via the mediating role of firm competitiveness.

Hypothesis 3b (H_{3b}). Sustainability innovation has a positive relationship with operational performance, via the mediating role of firm competitiveness.

Hypothesis 3c (H_{3c}). Sustainability innovation has a positive relationship with environmental performance, via the mediating role of firm competitiveness.

Table 1: Related Studies on Sustainability Innovation

Author	Context	Methodology	Findings / Contributions	Limitation
Hermundsdottir et al. (2021)	Review of previous studies on the relationship between sustainability innovation and firm competitiveness	Literature review	Most studies found that sustainability innovation is positively associated with firm competitiveness.	Databases Wide range of sustainability innovation term
Madzimure (2020)	South Africa Logistics firms	PLS SEM	Firm competitiveness is positively and significantly related to firm performance.	Research context Business sector
Guangpei et al. (2019)	China Listed enterprises	Hierarchical regression analysis	Green technological innovation positively and significantly impacts firm competitiveness.	Research data Research methodology
Zanotti et al. (2018)	European	Structural equation	Competitiveness has	Research context

		Brewing industry	modeling (SEM)	a positive relationship with financial performance, but not operational performance.	Business sector
	Bacinello <i>et al.</i> (2019)	Brazil	SEM	“Sustainability innovation maturity positively influence business performance.”	Research context Research data
	Qiu <i>et al.</i> (2019)	China Manufacturing industry		Sustainability innovation has a positive and significant relationship with firm competitiveness.	Research context Business sector Research method
	Suat <i>et al.</i> (2019)	Malaysia Manufacturing firms	Smart PLS	Sustainability innovation and firm competitiveness are positively and significantly associated.	Research context Sample size

Based on the above literature review, discussion, literature gap, and need, the authors believe that it is necessary to conduct new research on sustainability innovations, firm competitiveness, and firm performance in an integrated model as shown in Figure 1 below.

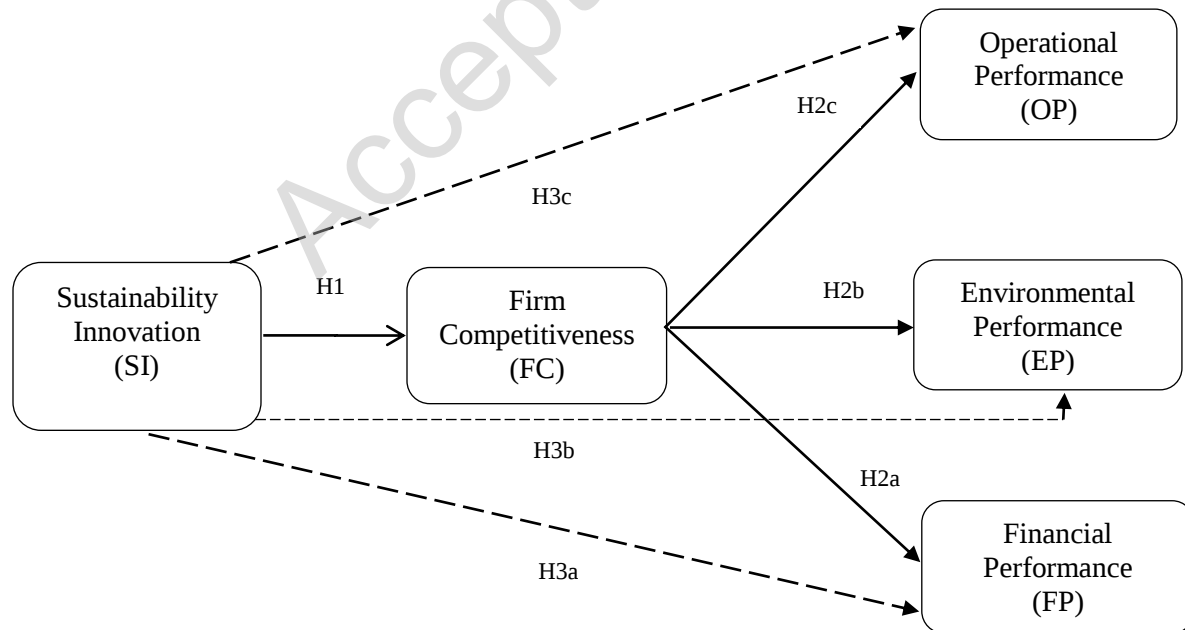


Figure 1. Conceptual Model

3. Research design and methods

This study explores the nexus between sustainability innovation, firm competitiveness, and firm performance in an integrated conceptual model whereby firm competitiveness is assumed to mediate between sustainability innovation and firm performance. This study focuses on manufacturing SMEs operating in Vietnam for ten years or more. Such firms were selected because this is a major driver of the Vietnamese economy, an emerging economy that still faces many challenges related to sustainable competitiveness, at the firm-, industry-, and nation-levels. Importantly, in the context that global integration is accelerating faster than ever, and Vietnam is in the early stages of implementing the Paris Agreement, reducing, and preventing pollutants emitted from the manufacturing process is of paramount importance to survival and growth (Yang *et al.*, 2019).

The definition of SMEs follows that by the IFC (2009), under which firms registering fewer than 250 employees are identified as SMEs. The selected companies are in the South of Vietnam. In terms of characteristics, SMEs are perceived to have different characteristics from large enterprises. In the context of this research, in developing a research model, the authors have considered the typical characteristics of SMEs in Vietnam such as the advantages of innovation ability (small scale, simple management apparatus, flexible, willing to learn, market-oriented (especially the young entrepreneur generation), those can be favorable in the innovation process, simultaneously, willing to innovate (OECD, 2021).

Authors with the perception that innovation is a complex subject, moreover, this study focuses on sustainability innovation, so it's even more complicated. From this perception, we were cautious in selecting the sample for this study. Accordingly, the authors have chosen enterprises that are applying basic standards such as ISO 9001 (quality management), 14001 (environmental management) and 26000 (social responsibility) because the authors believes that for enterprises that are applying these standards, they will be able to fully understand the relevant

concepts in this study and able to accurately answer the survey questions. Furthermore, the survey questionnaire has been validated by professionals and pilot testing by those who have similar background with the target population. Moreover, the target respondents are those at the leadership level of the business, thus, the authors believe that they are fully capable of properly understanding the concepts and meanings of the survey questions to be able to answer accurately. The conceptual model includes Sustainability Innovation (SI) as an independent variable, Firm Competitiveness (FC) as a mediating variable, and Firm Performance dimensions are separately categorized in three sectors that include Operational Performance (OP), Environmental Performance (EP), and Financial Performance (FP). The description of construct variables is outlined in table 2.

Table 2: Description of construct

Variables	Items	Description	References
SI (Sustainability Innovation)	SI1	Technological improvement	Hermundsdottir <i>et al.</i> (2021); Cho <i>et al.</i> (2020)
	SI2	Continuous process improvement	
	SI3	Reduced consumption of energy, water, other natural resources	
	SI4	Recycling and reuse	
	SI5	Environmental management by adoption of proper standard system	
	SI6	Reduce waste	
	SI7	Use environment friendly materials	
FC (Firm Competitiveness)	FC1	First mover advantage	Hermundsdottir <i>et al.</i> (2021)
	FC2	New market opportunities	
	FC3	Premium quality	
	FC4	Improved efficiency	
	FC5	Improved corporate reputation	
	FC6	Improved profitability	
OP (Operational Performance)	OP1	Outstanding product lines	Xue <i>et al.</i> (2019)
	OP2	Improved capacity utilization	
	OP3	Outstanding customer satisfaction	
	OP4	Shorter time to response to the market need	
EP (Environmental Performance)	EP1	“Reduced emissions”	Xue <i>et al.</i> (2019)
	EP2	“Reduced environmental accident”	
	EP3	“Reduced pollutants emitted”	
FP (Financial Performance)	FP1	Increased return on sales	Xue <i>et al.</i> (2019)
	FP2	Increased profitability over years	
	FP3	Increased dividend to shareholders over years	

The sample size was initially set at 490 randomly selected samples. This study applies the principle of “10-times rule” to calculate the number of samples needed for the study (Hair,

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2 Ringle, & Sarstedt, 2011). However, as a precaution against non-response bias, this study
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4 determined the initial sample to be 490. The study period is from December 2020 to February
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6 2021. The respondents are senior leaders and management board of firms that are knowledgeable
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8 and have extensive experience in operating their business as well as their insights into economic,
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10 environmental, and social issues. This study uses primary data collected from the questionnaire,
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12 which was composed of three sections (Supplementary Information). The first section is
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14 respondent information. The second section is open-ended questions to determine respondents'
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16 perspectives of sustainability innovation and SMEs' competitiveness in the new context of
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18 Vietnam. The third part is close-ended questions on a five-point Likert scale where 1 represents
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20 "strongly disagree" and 5 represents "strongly agree." To validate the questionnaire, 15 experts
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22 were asked to check its content to ensure it is readable, understandable, and suitable for the
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24 research context. Additionally, to ensure the consistency of the questionnaire, 45 companies with
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26 similar characteristics to those of the target companies were selected for pilot testing. Finally, all
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28 suggestions and comments noted earlier were considered for the final assessment.
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36 In order to achieve a high response rate, the authors have made efforts in the following
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38 processes: (a) Sampling process: the authors selected samples from a most suitable source
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40 (LinkedIn) that allows the authors perform a preliminary evaluation during sampling process. (b)
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42 Questionnaire delivery process: when the author sent the questionnaire to the respondents, the
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44 author attached an open letter clearly stating the purpose of this study and the potential value that
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46 respondents might gain in turn from this study, what it helps for their business. This motivates
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48 them to enthusiastically participate in the survey. (c) Tracking process: the authors installed a
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50 reminder mode to actively follow up with respondents according to the progress to achieve the
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52 highest possible response rate.
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58 The questionnaire was sent to the respondents via email and Google Drive, depending on
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60 which was more convenient for the respondent. We received 475 questionnaires (96.94%
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response rate) and these were then scanned and incomplete responses removed. Finally, 435 completed questionnaires remained (88.77% response rate).

Within, the study we applied Structural Equation Modelling (SEM) to analyse the causal relationships between latent and construct variables. The association analyzed in SEM depicts the hypotheses formulated in this study. Conventionally, these associations can't be statistically tested for directionality (Wang and Rhemtulla, 2021). The application of SEM is mostly used for research that is developed to confirm the linkages between the latent and construct variables. Due to this fact, the SEM has been widely used to analyse the intensifying effects of variables in a hypothesis. SEM provides numerous benefits, but the visual display of model is one of the appealing attributes. Moreover, the visual display of SEM is easy to interpret even if the statistics behind the data are quite complex. The qualified data were analyzed using Smart PLS (Partial Least Squares) and SPSS 26.

4. Results

4.1 Descriptive Statistics

The results of descriptive statistical analysis indicate that the survey sample is relatively balanced in terms of gender. Specifically, 51.72% of respondents were male and 48.28% were female. Regarding the age of respondents, the 46-50 year age group accounts for the highest proportion (49.83%), followed by over 50 (28.04%), and finally from 41 to 45 years (22.53%). Regarding education, results indicate that the group of respondents with a master's degree accounts for the majority (54.02%), followed by that with a bachelor's degree (27.13%), and finally a post-master's degree (18.85%). Regarding years of working for their company, a service period of 7 to 10 years accounts for the highest ratio (57.01%), followed by more than 10 years (29.89%), and the remaining group from 3 to 6 years (13.10%). Lastly, with regard to firm size, this study focuses on SMEs, and the criteria for determining SMEs is number of employees (IFC, 2009). However, the survey samples were further classified into subgroups into subgroups to

ensure they were representative. The proportions for the group from 101 to 150 employees and from 151 to 200 employees are quite similar at 40.92% and 38.39% respectively. The remaining group (50 to 100 employees) accounts for 20.69%. Overall, the sample characteristics are highly representative of the targeted population of this study, and therefore suitable for the purpose of the study. The descriptive statistics of the samples are summarized in table 3.

Among the samples collected, there are 145 SMEs operate in the food production sector, 126 SMEs operate in the agricultural production sector, and 48 SMEs operate in beverage and health care products industries of our interest in terms of their innovation efforts.

Table 3. Descriptive Statistics of Sample

Index	n = 435	Intensity (%)
Gender		
Male	225	51.72
Female	210	48.28
Age		
41–45 years	98	22.53
46–50 years	215	49.43
Over 50	122	28.04
Education		
Bachelor	118	27.13
Master	235	54.02
Above	82	18.85
Years of working for the company		
3–6 years	57	13.10
7–10 years	248	57.01
Over 10 years	130	29.89
Size of company		
50–100 employees	90	20.69
101–150 employees	178	40.92
151–200 employees	167	38.39

4.2 Construct, Reliability, and validity of measure

To check the validity of measurement model, covariance-based criteria such as composite reliability and average variance is performed. The reliability statistics indicate that all observed variables have corrected item-total correlation greater than 0.3. In addition, Cronbach's Alpha coefficients of the scales of SI, FC, OP, EP and FP are greater than 0.7 as presented in table 7; the scales thus ensure reliability (Hair *et al.*, 2016). Therefore, the proposed scale is preserved.

Kaiser-Meyer-Olkin (KMO) and Bartlett's tests were employed for factor analysis and the results are presented in table 4 below. The KMO result is 0.932 (>0.5); thus, factor analysis is appropriate. Sig. (Bartlett's Test) is 0.000 (<0.05); thus, the observed variables are mostly correlated (Kaiser *et al.*, 1974; Bartlett, 1954).

Table 4: KMO and BARTLETT'S results

Test	Results
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.932
Bartlett's Test of Sphericity Approx. Chi-Square	5864.961
df.	253
Sig.	0.000

The statistics indicate that all the outer loadings of all variables are greater than 0.7, as presented in table 7. Therefore, all observed variables are significant in the proposed model (Hulland, 1999). The statistics indicate that all composite reliability (CR) of scales is greater than 0.7 and average variance extracted (AVE) is greater than 0.5 (Hair *et al.*, 2010; Fornell and Larcker, 1981), as presented in table 7; therefore, all the scales ensure convergence or convergent validity is supported.

Discriminant validity was evaluated by assessing the square root of AVE (Fornell and Larcker, 1981) and heterotrait-monotrait ratio (HTMT) (Henseler *et al.*, 2015). According to table 5, all the square roots of AVE (the first value of each column) are greater than the correlations between the latent variables (the correlation coefficient is below the first value of the column); therefore, discriminant validity is supported. As reported in table 6, all HTMT values are smaller than 0.85; hence, discriminant validity is confirmed.

Table 5: FORNELL-LARCKER criterion

	EP	FC	FP	OP	SI
EP	0.877				
FC	0.551	0.811			
FP	0.405	0.571	0.874		
OP	0.328	0.557	0.333	0.853	

SI	0.358	0.552	0.370	0.288	0.800
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Table 6: HETEROTRAIT-MONOTRAIT RATIO (HTMT)

	EP	FC	FP	OP	SI
EP					
FC	0.632				
FP	0.478	0.656			
OP	0.379	0.626	0.384		
SI	0.404	0.608	0.418	0.322	

Table 7: Construct, Reliability, and Validity Results

Items	Variables	Outer Loading	Average Variance Explained	Composite Reliability	Cronbach's Alpha
Environmental Performance	EP1	0.868	0.909	0.768	0.849
	EP2	0.885			
	EP3	0.868			
Firm Competitiveness	FC1	0.834	0.920	0.657	0.893
	FC2	0.795			
	FC3	0.817			
	FC4	0.806			
Financial Performance	FC5	0.805	0.907	0.764	0.845
	FC6	0.807			
	FP1	0.868			
	FP2	0.885			
Operational Performance	FP3	0.868	0.914	0.728	0.875
	OP1	0.840			
	OP2	0.855			
	OP3	0.863			
	OP4	0.854			
Sustainability Innovation	SI1	0.795	0.926	0.640	0.903
	SI2	0.735			
	SI3	0.779			
	SI4	0.836			
	SI5	0.831			
	SI6	0.817			
	SI7	0.804			

4.3 Path Model Estimation

The application of structural equation modeling technique (SEM) is used to analyze the relationship between sustainability innovation, firm competitiveness, and firm performance through robustness of estimation method is presented in Figure 2 in SMEs of Vietnam. In this study, SEM was used as it is recommended as the most suitable tool for complex model evaluation (Hair et al., 2017). According to Becker et al. (2012), the model is considered

complex when it concurrent consists of direct effects, mediation and moderation as it's involved in this study. The structural model was evaluated by assessing R^2 value, the results of R^2 and R^2 adjusted are greater than 0.1, which confirms the proposed model is good (Falk and Miller, 1992). The R^2 and R^2 adjusted values of construct variables are presented in table 8.

Table 8: Evaluation result of structural model

Variables	R^2	R^2 Adjusted
EP	0.304	0.302
FC	0.305	0.304
FP	0.326	0.325
OP	0.310	0.308

Moreover, Standardized root mean squared residual approximation (SRMR) confirms the fitness of model. Statistical results indicate that SRMR value is 0.053 (<0.08), therefore, the estimated model is suitable and has good fit (Hu and Bentler, 1999). Further, multicollinearity was evaluated by assessing variance inflation factors (VIF) values. The maximum acceptance threshold is 10. Accordingly, multicollinearity does not exist if VIF values are smaller than 5 (Hair *et al.*, 2011). All VIF values are satisfied; therefore, there is no multicollinearity problem persist among variables of the research model in the study.

4.3.1 Bootstrapping of measurement model

To validate the results of the PLS algorithm, we used the bootstrapping procedure by running the 5000 bootstrap-ping samples, for the model with replacement. Table 9 shows the importance of items in each construct. The statistical results indicate that the direct effects are all significant ($\text{sig.} < 0.05$) and the order of standardized regression coefficients (original sample) shows that firm competitiveness as mediating factor between sustainability innovation and firm performance, has a strongest impact on FP, then OP, then EP. This process ensures that the measurement model is reliable enough and all the items are loaded well on their respective scales.

Table 9: Bootstrapping result of the measurement model

Effects	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	CI-2.5%	CI-97.5%	P-Values
FC -> EP	0.551	0.549	0.038	14.424	0.468	0.615	0.000
FC -> FP	0.571	0.569	0.040	14.310	0.485	0.643	0.000
FC -> OP	0.557	0.556	0.038	14.840	0.473	0.626	0.000
SI -> FC	0.552	0.553	0.041	13.498	0.470	0.633	0.000

4.3.2 Bootstrapping of the path model

As shown in table 10 the t values between the SI, FC and EP are 8.631 at p -value of 0.000, this indicates the significant relationship. Similarly, the t value for relationship between SI, FC and FP is 8.458 at p value 0.000 and the t value for relationship between SI, FC and OP is 8.894 at p value 0.000. In addition, result shows that all relationships are significant at 97.5% confidence interval. Therefore, it concludes that the indirect effects are all significant ($\text{sig.} < 0.05$) and the order of these indirect effects is consistent with those of direct effects of FC on firm performance dimensions.

Table 10: Path coefficients bootstrapping results

Effects	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	CI-2.5%	CI-97.5%	P-Values
SI -> FC -> EP	0.305	0.304	0.035	8.631	0.235	0.369	0.000
SI -> FC -> FP	0.316	0.315	0.037	8.458	0.245	0.393	0.000
SI -> FC -> OP	0.308	0.308	0.035	8.894	0.241	0.374	0.000

The level of impact was evaluated by assessing the effect size through f -square values. According to Cohen (1988), the lowest comparison threshold is 0.02, meaning that there will be no effect if the corresponding f -square value is less than 0.02. On the contrary, the larger the f -square value, the stronger the influence. Specifically, there are four specific thresholds to determine the level of impact (f -square < 0.02 : no effect, f -square ≥ 0.02 : small effects, f -square ≥ 0.15 : medium effects, f -square ≥ 0.35 : large effects). The results show that f -square values are all greater than 0.35 as shown in the table 11 below; therefore, all effects in this model are large. In summary, the above analysis of impact proves that all assumed hypotheses are supported, and

all effects are strong. Figure 2 presents the final SEM model that shows the aforementioned parameters and paths.

Table 11: F-Square values

	EP	FC	FP	OP	SI
EP					
FC	0.437				
FP			0.484		
OP				0.449	
SI		0.439			

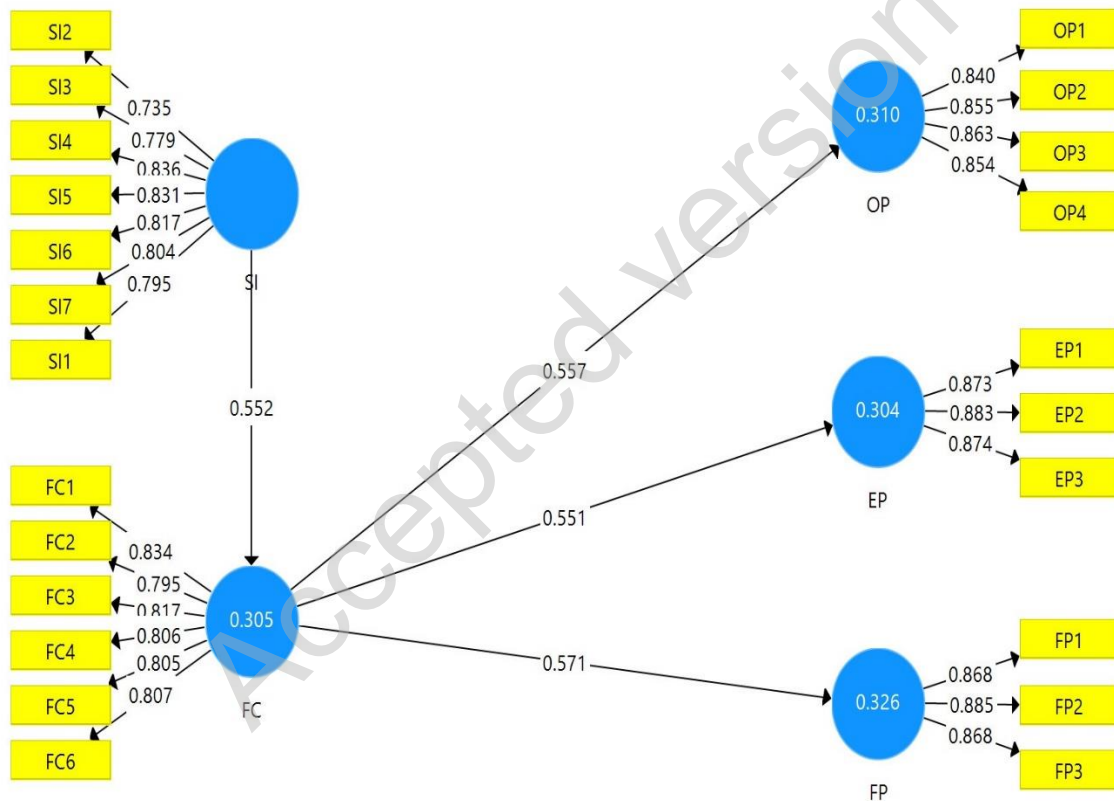


Figure 2. Final SEM model

5. Discussion and Research Implications

5.1 Discussion

The statistical results provide databases to discuss relationships in the model of this study. The path coefficient between SI and FC is positive and p-value is 0.000 (<0.05); therefore, hypothesis 1 (H1) is confirmed ($+0.552; <0.05$). This determines that sustainability innovation positively and significantly affects firm competitiveness. This finding supports previous studies Kiveu et al. (2019), Borsatto and Amui (2019). Sustainability innovation is found to lead to enhanced corporate reputation, improved product quality, enhanced customer satisfaction, increased values for stakeholders, and expanded business opportunities, which help improve firm competitiveness.

The path coefficient between FC and FP is positive and p-value is 0.000 (<0.05); therefore, hypothesis 2a (H2a) is supported ($+0.571; <0.05$). This proves that firm competitiveness has a positive and significant relationship with financial performance. This finding supports Madzimore's (2020) recent research implying that by taking advantage of being the first mover, businesses can access higher markets and higher volume, which contribute to improve firm performance. The path coefficient between FC and OP is positive and p-value is 0.000 (<0.05); thus, hypothesis 2b (H2b) is confirmed ($+0.557; <0.05$). This determines that firm competitiveness positively and significantly affects operational performance. This supports the previous findings of Hove-Sibanda *et al.* (2017) and Kotler *et al.* (2011) implying that by taking advantage of advanced quality management systems, improved efficiency, and first mover advantage helps improve product quality and product line, shorten time to market, shorten time to respond, and enhance customer satisfaction, which drive operational performance (Severo *et al.*, 2017; Boons *et al.*, 2013).

The path coefficient between FC and EP is positive and p-value is 0.000 (<0.05); thus, hypothesis 2c (H2c) is supported ($+0.551; <0.05$). This proves that the relationship between firm competitiveness and environmental performance is positive and significant. The finding implies that by taking advantage of advanced quality management systems and improved efficiency,

1
2 firms can reduce waste, reduce consumption of materials, energy, water, and so on, which reduce
3
4 emissions and pollutant emitted. This will result in conserving and protecting the environment.
5
6

7 The indirect effect coefficient of SI-> FC->FP is positive, and p-value is 0.000 (<0.05);
8
9 therefore, hypothesis 3a (H3a) is confirmed (+0.316;<0.05). This result determines that
10 sustainability innovation indirectly positively and significantly affects financial performance and
11
12 firm competitiveness mediates this relationship. This finding implies that sustainability
13
14 innovation benefits businesses by continuously improving processes for efficiency improvement,
15
16 waste reduction, recycling, and reuse, and improving the quality management system, which
17
18 increases firm competitiveness toward improved financial performance indicators such as
19
20 profitability, return on sales, and return on investment.
21
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26 The indirect effect coefficient of SI->FC->OP is positive, and p-value is 0.000 (<0.05);
27
28 therefore, hypothesis 3a (H3a) is supported (+0.308;<0.05). It indicates that sustainability
29
30 innovation has an indirect relationship with operational performance, and this relationship is
31
32 positive and significant, and firm competitiveness mediates this relationship. The finding implies
33
34 that sustainability innovation benefits businesses by continuous quality improvement, continuous
35
36 process improvement, and use of environment friendly materials, which enhance firm
37
38 competitiveness toward improved operational performance indicators such as improved product
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40 quality and product lines, enhanced customer satisfaction, shortened response time, and
41
42 improved capacity utilization.
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47

48 The indirect effect coefficient of SI->FC->EP is positive, and p-value is 0.000 (<0.05);
49
50 therefore, hypothesis 3a (H3a) is confirmed (+0.305;<0.05). This result indicates that the
51
52 relationship between sustainability innovation and environmental performance is positive and
53
54 significant and is mediated by firm competitiveness. This finding implies that sustainability
55
56 innovation increases firm competitiveness in the sense of improved efficiency, reduced waste,
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58 reduced consumption of materials, energy and water, advanced quality management systems, use
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of more environment friendly material, which result in enhancing environmental performance indicators such as reduced emissions and pollutants, reduced environmental accidents, and improved environmental situation. This contribution is of great significance to business practitioners and managers in planning their strategic sustainability innovation.

5.2 Theoretical Implications

This study provides important contributions to extend the current literature in the domain of firm innovation and firm performance in some ways. First, this study provides a dynamic approach on the firm innovation in the new context. Specifically, firm innovation in the context of international integration should focus on sustainability innovation to improve the competitiveness of SMEs. As a result, this leads to improved firm performance towards sustainability.

Second, this study provides an integrated model of the relationship of sustainability innovation, firm competitiveness, and firm performance dimensions, which was rarely found in the current literature. Moreover, examining the intermediary mechanism of firm competitiveness in the link between sustainability innovation and firm performance dimensions in the context of this research is timely and necessary because different mediators may have different effects on the performance of sustainability innovation (Hermundsdottir *et al.*, 2021).

Third, this study particularly supports stakeholder theory (Freeman, 1984) by asserting that sustainability innovation represents the efforts of enterprises towards the interests of stakeholders on the basis of balancing economic, social and environmental benefits. In turn, this will generate a positive response from stakeholders to the business. As a result, this will enhance the various aspects of firm competitiveness leading to improved operational, environmental and financial performance of the business.

Fourth, its application into the context of SMEs in emerging economy reinforces its theoretical contribution towards a multifaceted approach to the role of innovation in enhancing

1
2 SMEs' competitive advantage towards improving sustainable performance because different
3
4 contexts will influence the outcomes of sustainability innovation (Hermundsdottir *et al.*, 2021).
5
6 The fifth theoretical implication of this study is the provision of the measures of sustainability
7
8 innovation, firm competitiveness, and three distinct firm performance metrics for manufacturing
9
10 SMEs in emerging economy that contribute to diversify the approach to the measures of firm
11
12 sustainability innovation, firm competitiveness and firm performance dimensions in the context
13
14 of international integration and uncertainties.
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17
18

19 **5.3 Practical Implications**

20
21
22 This study has some important practical implications as follows. First, this study provides
23
24 additional evidence about the positive impact of innovation on firm performance. Through
25
26 which, it provides an insightful mechanism of how sustainability innovation enhances firm
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28 competitiveness and how this improves firm performance dimensions. Accordingly, business
29
30 leaders are encouraged to consider a strategic long-term plan for sustainability innovation as this
31
32 is the only way for businesses to survive and develop sustainably, especially in the new
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34 challenging context of emerging economy as Vietnam.
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39 Second, this study provides insight into the important role of sustainability innovation in
40
41 ensuring sustainability for businesses on the basis of balancing the economic, environmental and
42
43 economic values. It suggests that sustainability innovation should be considered from the
44
45 revisionist view that sustainability innovations can create win-win situations for a firm whereby
46
47 such innovation benefits firms by continuously improved processes that help reduce
48
49 consumption of input materials, energy, water, and waste, improved product quality, recycling
50
51 and reuse, avoid using hazardous substances for products, and use environmentally friendly
52
53 packaging and materials. Furthermore, improved managerial process by using evaluation
54
55 methods such as environment management system that drives to improve sustainability
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57 performance, realization of cost savings and increase productivity (Abid et al., 2021). Delivering
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sustainability products to the market is an effective way to exploit new business opportunities associated with new customers who care about the environment and society. This approach can lead to product differentiation, increased customer database, and improved brand awareness and market position (García- Sánchez *et al.*, 2019). These will in turn enhance firm competitiveness through advantages of the first mover position, new market entry capabilities, outstanding quality management systems, outstanding efficiency, enhanced corporate reputation, and improved profitability, which consequently improve firm performance dimensions.

Third, this study suggests to the firm's management that any decision-making on strategies for innovation must be carefully considered based on specific firm's resources, identified as primary resources of competitive advantages, and specific firm context to be doable and achievable. Otherwise, such activities may slow business operations or reduce competitive advantage because it requires time to analyze the real impact of sustainable innovations (Ikram *et al.*, 2019). Indeed, said it can be argued that sustainable innovation is imperative for survival and development. However, based on the current situation of capacity and nature of operation of SMEs in Vietnam, innovating in a new spirit can be a challenge for SMEs. Therefore, firms should break down innovation goals for each stage and optimize internal and external resources, create a connection with external resources to complement each other, and optimize each other's strengths. Importantly, sustainability must be integrated into the company's strategy to realize innovation activities in a sustainable direction.

Fourth, this study suggests government bodies to consider strict environmental regulation, which is considered as external pressure to boost firms to implement sustainability innovations. This may be a great motivator for businesses to undertake sustainability innovation. This may give them greater determination in planning and implementing their strategic long-term planning for such innovation for improving their firm competitiveness and performance as "stricter regulators" are positively associated with firm competitiveness and firm performance

through innovative activities. In the current context in Vietnam, where the development of the national innovation system is still in its infancy, while SMEs majorly implement product and process innovations aimed at improving financial results, it is necessary to introduce institutional regulations, policies, incentives to encourage SMEs to innovate sustainably. This recommendation is specifically aimed at addressing the existing issues of SMEs in terms of limitations in their internal capacity to plan and implement sustainability innovation, and limited access to outside supports. Therefore, practical government support and incentive policies are essential for businesses to have the motivation and linkage to plan and implement sustainability innovation. This brings about sustainable benefits to businesses, the environment, society, and the nation as a whole.

6 Conclusions

The results of this study show that the objectives of this study were successfully achieved. Accordingly, the first research question was responded with the affirmation that sustainability innovation has an important role in promoting firm competitiveness and boosting the sustainable-oriented firm performance indicators. Likewise, the second research question was responded with the determination that firm competitiveness mediates the relationship between sustainability innovation and operational performance, environmental performance and financial performance.

The above findings can also be interpreted as follows. Sustainability innovation has a positive and significant relationship with the multidimensional performance of the business. Further, sustainability innovation positively and significantly affects firm competitiveness ($\beta = 0.552$, $t = 13.498$, $p < 0.05$). Meanwhile, firm competitiveness is proven to mediate the relationship between sustainability innovation and firm performance. Through which, it determines that firm competitiveness has a positive and significant relationship with environmental performance, financial performance, and operational performance, respectfully

supported by $\beta = 0.551$, $t = 14.424$, $p < 0.05$; $\beta = 0.571$, $t = 14.310$, $p < 0.05$; $\beta = 0.557$, $t = 14.840$, $p < 0.05$).

In summary, sustainability innovation has a positive and significant relationship with environmental performance, financial performance, and operational performance through the mediation mechanism of firm competitiveness in the context of SMEs in emerging economy. This conclusion is respectively supported by $\beta = 0.305$, $t = 8.631$, $p < 0.05$; $\beta = 0.316$, $t = 8.458$, $p < 0.05$; $\beta = 0.308$, $t = 8.894$, $p < 0.05$. This study provides interesting finding whereby sustainability innovation has a similar effect on environmental, economic and operational performance of the business. In which, sustainability innovation has a strongest impact on financial performance, followed by operational performance and finally environmental performance. This is seen as a big motivation for SMEs in emerging countries like Vietnam to break through in sustainability innovation because the values it brings to stakeholders are balanced as expected.

Based on the findings, this study discusses the theoretical and practical implications as above. Beyond that, the contributions of this study are particularly important in practical terms because manufacturing business sector is known to have a high probability of adverse effects on the environment due to emissions and pollutants emitted during production processes (Ritchie and Roser, 2020). While SMEs account for the majority of SMEs in Vietnam, this implication may be of interest to agencies of government bodies and departments related to sustainable economic development and environmental resources.

The originality of this study is the provision of insights into the relationship of sustainability innovation, firm competitiveness, and firm performance dimensions in an integrated model for SMEs in an emerging economy. Importantly, the contribution of this study is even more meaningful to SMEs in the current context in Vietnam where global integration is faster than ever, and competition pressure is fiercer than ever. This study provides important

implications that may be of great interest to business practitioners, managers, economists, and policy makers.

This study has some limitations which should be considered in future research. First, data were collected from enterprises in the South of Vietnam. Hence, future research should consider other regions. Second, this study focused on manufacturing firms, thus, other business sectors could be of interest for future research. Third, firm competitiveness was employed as a mediator in the relationship between sustainability innovation and firm performance, therefore, other mediators or moderators could be an interesting choice for future studies. Fourth, this study particularly focused on SMEs with representative characteristics as presented in the table 3. Thus, larger-sized enterprises or different sample characteristics could be an interesting object for future research.

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Do Sustainability Innovation and Firm Competitiveness Help Improve Firm Performance? Evidence From the SME Sector in Vietnam

Thanh Tiep Le^a, Muhammad Ikram^{b*}

^a Ho Chi Minh City University of Economics and Finance, Ho Chi Minh City, Vietnam

^b School of Business Administration, Al Akhawayn University in Ifrane, Avenue Hassan II, P.O. Box 104, 53000 Ifrane, Morocco

Abstract

This study unfolds the nexus between sustainability innovation, firm performance of small- and medium-sized enterprises (SMEs) by exploring the mediating role of firm competitiveness in the context of an emerging market. This study adopts a systematic literature review approach which results in arguing that this relationship is not explored in-depth in current literature. This is especially more critical for emerging economies as current literature shows a lack of empirical research in this research topic. A well-structured questionnaire was administrated for data collection. A total of 435 valid responses from top executives, managers, and experts were received and used for data analysis. Structural equation modeling (SEM) was used to investigate the relationships between constructs and latent variables. Our findings reveal that there is a significant and positive relationship among sustainability innovation and firm competitiveness. Firm competitiveness has a positive and significant relationship with financial, environmental, and operational performance. Moreover, sustainability innovation had an indirect positive and significant effect on financial performance. The statistical results indicate that the indirect effects are all significant ($\text{sig.} < 0.05$) and the order of these indirect effects is consistent with those of direct effects of firm competitiveness on firm performance dimensions. Stakeholder theory is applied to check how firm competitiveness helps improve the performance of SMEs. To the best of our knowledge this study is the first that explores the mediating role of firm competitiveness between sustainability innovation and SMEs' performance. Based on the context of the influence of the COVID-19 pandemic, this study presents implications for entrepreneurs and top management with respect to strategic perspectives to drive their businesses in a sustainable direction.

Keywords: Sustainability Innovation; Firm Competitiveness; Firm Performance; SMEs; Emerging Markets; Vietnam

1. Introduction

Sustainability innovation is a broad concept of innovations toward sustainability (Hermundsdottir *et al.*, 2021), which reduces firm's adverse impacts on the ecosystem and society while ensuring economic growth of the firm. Indeed, the growth of the economy and population is proportional to increased consumption of resources and increased emissions that

* Corresponding author (Muhammad Ikram; i.muhammad@aui.ma)

cause burden on the environment (UN, 2019). Due to negative social and environmental consequences and adverse effects of this trend, the pressures of stakeholders on firms to respond to these challenges and deal with issues related to climate vulnerability, social and ecological degradation have increased (El-Kassar *et al.*, 2019; Cai *et al.*, 2018).

Businesses are increasingly facing challenges from external pressures to be more sustainable, while dealing with high competition due to globalization and advancement in technology development (Ikram *et al.*, 2021). From the positive perspective, such pressures consequently generate internal motivation for firms to implement sustainability innovation for improving performance in a sustainable way (Boons *et al.*, 2013). From the revisionist view, sustainability innovation can lead to improved firm performance in the sense of enhanced competitive advantages that drive firm performance in a sustainable direction.

Previous studies have examined sustainability innovation related to firm competitiveness and firm performance (Boons *et al.*, 2013). However, most of these studies focused on a single relationship either between sustainability innovation and firm competitiveness, firm competitiveness and firm performance, or sustainability innovation and financial performance, these relationships are rarely integrated in a single research model (Gürlek and Tuna, 2018). In addition, there is heterogeneity in the findings in the current literature. Such heterogeneity may be explained by contextual-factor- and methodology-related aspects (Hermundsdottir *et al.*, 2021). Furthermore, most studies concerning the impact of sustainability innovation on firm performance use cross-sectional data while it requires time to analyze the impact of sustainability innovation (Ikram *et al.*, 2019). Therefore, longitudinal studies are critically necessary and almost unique to be able to observe the real effects of sustainability innovation on firm performance (Tiep *et al.*, 2021; Doluca *et al.*, 2018; Kassinis *et al.*, 2016; Ikram *et al.*, 2021). Such studies are necessary because this approach uses continuous or repetitive measures to track a particular subject over a long period of time. Therefore, even in the same context, repeated

research is needed at certain stages to assess the real impact of sustainability innovation on organizational performance. Furthermore, Ikram et al. (2019), Kusi-Sarpong et al. (2019) conducted studies to investigate to focused on different parameters to see how different conditions affect the effectiveness of sustainability innovations.

The above discussions and arguments demonstrate that there is a gap in the literature to develop the investigated framework based on sustainability innovation, firm performance, and mediating effect of firm competitiveness of small and medium enterprises (SMEs). In this context, firm competitiveness was assumed to mediate the relationship between sustainability innovation and firm performance. Recent literature shows that SMEs in Vietnam have in common that they demonstrate quite well innovation, but these innovations are still limited in size, scope and orientation. In particular, innovations are mainly about savings and making small changes to existing products in order to be able to access lower market segments (OECD, 2021). This may be due to the limited resources of SMEs in Vietnam and insufficient government support for innovation at the company level (OECD, 2021). Consequently, this affects the competitiveness of SMEs in the context of international integration and pressure from various stakeholders on sustainable development. Therefore, the choice of firm competitiveness as a mediator between sustainability innovation and firm performance is very appropriate in the context of this research.

In addition, this study focuses on manufacturing SMEs in Vietnam for the following motivations. Recent literature shows that research on the domain of firm innovation and firm performance for SMEs in Vietnam are approached from different perspective (Canh et al., 2019; Mai et al., 2019; Tran et al., 2016; Tuan, 2012). However, current studies mainly focus on process innovation, product innovation, and open innovation on conventional firm performance, while sustainability innovation on sustainable firm performance with the mediating role of firm competitiveness has not been explored in the current literature. Besides, although Vietnam's

economy is known as an emerging economy with rapid growth over the past decades, its development of innovation system is still in its early stages (OECD, 2021). Moreover, Vietnam's economy is an export-oriented economy and most SMEs participate in the export value chain (OECD, 2021), besides, SMEs account for a high proportion (about 98%, according to Chuc et al., 2017) and manufacturing SMEs play a critical role in driving national economy and employment (Canh et al., 2019).

In the context of international integration, firm competitiveness towards globalization is considered prerequisites not only for firm survival and development but also for sustained national economy and competitiveness. Therefore, sustainability innovation should be the most suitable predictor of firm competitiveness in the new era. Further, by considering the national involvement, Vietnam is in the early stages of implementing the Paris Agreement on climate change, therefore, in order to achieve the committed goal, it requires coordination at all levels. In which, the contribution of SMEs is expected to be significant in realizing the Paris Agreement commitments on climate change and in developing the national economy in a sustainable way. Therefore, a holistic study addressing these related concerns should be of high priority (Hussain et al., 2018; Lopes Santos et al., 2019). Thus, this study addresses the above issues by answering the following research questions:

(1) What is the role of sustainability innovation in boosting firm competitiveness and firm performance for SMEs in emerging economy?

(2) How firm competitiveness mediates the relationship between sustainability innovation and operational performance, environmental performance and financial performance?

This study contributes to the current literature and provides implications in various ways. First, it provides an extension to the current literature on sustainability innovations and firm performance by integrating firm competitiveness as a mediator between this relationship. Second, this study offers insights into the mechanism of how innovations are associated with improving performance dimensions and how firm competitiveness mediates this relationship. Third, to the best of our knowledge, this study is first among its kind that develops the integrated framework of sustainability innovations, firm competitiveness, and firm performance dimensions

in a single research model, whereby firm competitiveness plays a mediating role. Fourth, this study provides theoretical and managerial implications that are of significance to business practitioners, managers, and policymakers to address the aforementioned issues. Finally, this study suggests avenues for future research on sustainability innovation to further enrich the literature.

The rest of this paper is organized as follows. Section 2 presents a literature review, the theoretical framework, hypothesis development and model development. Section 3 outlines the research design and methods. Section 4 presents the results of this study. Section 5 discusses the findings and stating the theoretical and practical implications. Section 6 concludes the study and figures out limitations for future scope of studies.

2. Literature Review

2.1. Theoretical underpinning

This study uses stakeholder theory as the underpinning theory for this study. According to Freeman (1984), stakeholders are those can be affected by the business outcomes and can affect the results of its operations in various ways. Stakeholders are inclusive of different groups such as employees, customers, partners, communities, shareholders (Freeman et al., 2020). In this context, sustainability innovation pertains the efforts of enterprises towards the interests of stakeholders on the basis of balancing economic, social and environmental benefits. In turn, this will generate a positive response from stakeholders to the business. As a result, this will enhance the various aspects of firm competitiveness leading to improved operational, environmental and financial performance metrics of the business.

In the context of Covid-19 emergency, uncertainty becomes increasingly complex as the devastation of Covid-19 on humanity, on socio-economic life, on the environment is still not sufficiently predictable. In this complex context, the value of cohesion between entities in society towards sustainable values for stakeholders becomes more important than ever.

Therefore, stakeholder theory is particularly suitable as underlying theory for this research to explain why and how sustainability innovation affects a firm's competitiveness leading to various performance metrics of the enterprise.

In addition, this study outlines the grounded theories included sustainability vision theory, integrated innovation theory, and resources-based innovation theory. In which, sustainability vision theory explains why organizations must innovate in a sustainable manner and how sustainability innovation enhances firm performance (Kantabutra, 2020). According to this theory, sustainability innovation is imperative if businesses want to survive and thrive. In other words, sustainability innovation is not optional for performance sustainability. Additionally, integrated innovation theory pertains to the innovation process towards integrating elements of resources, ideas, methods, systems, structures, etc., in order to improve the outcomes of innovation according to the mechanism of organic duplication (Wang *et al.*, 2016). In the context of SMEs in emerging economies with limited resources, this integration is necessary for businesses to be able to realize sustainability innovation on the basis of resource optimization. More importantly, this practice is quite familiar compared to their current practice. Besides, resources-based innovation theory explains how and where innovation should start to utilize a firm's primary resources for competitive advantages (Barney *et al.*, 2005), as a critical source of firm competitiveness (Zefeng *et al.*, 2018; Hojnik *et al.*, 2016a). As a result, this will result in enhancing firm's core competencies and lead to sustainable competitive advantages.

2.2. Sustainability Innovation

The concept of sustainability innovation is diverse in the current literature (Hermundsdottir *et al.*, 2021). In previous studies such as Clark *et al.* (2007), it is broadly defined in that "sustainability innovation is a process" that incorporates the environmental, societal, and economic values into the company system from the stage of concept development, "research and development", and "commercialization" (Kibler *et al.* 2018). "This process applies

to products, services, and technologies, as well as to new business and organizational models” (p. 99). According to Arcese et al. (2015), sustainability innovation is perceived as changing for better that enhances corporate sustainability performance.

In addition, sustainability innovations were approached from two contradicting views, that is, traditionalist and revisionist (Hermundsdottir *et al.*, 2021), which caused heterogeneity in the current literature. The traditionalist view argues that sustainability innovations do not lead to generated benefits for firms but the environment only. Then, sustainability innovations require high initial investment, long payback, and lead to increased cost, increased price, and reduced firm competitiveness (Kuzma et al., 2020; Rauter et al., 2019). On the contrary, the revisionist view denies this notion and suggests that sustainability innovations lead to increased competitiveness in many ways that improve firm performance dimensions (Gürlek *et al.*, 2018; Hojnik *et al.*, 2017; García- Sánchez *et al.*, 2019; Ikram *et al.*, 2020).

Stakeholder theory posits sustainability innovation at the company level is seen as company efforts towards the interests of stakeholders of sustainable values. Stakeholders are identified as being associated with the company’s operations and either affect the firm’s success or are affected by its results (Freeman, 1984). In this sense, the values that sustainability innovation targets for stakeholders collectively are economic, social, and environmental benefits. In another approach from the sustainability vision theory, innovation is a must for the future of the business and for stakeholders (Kantabutra, 2020). From a wider perspective, a firm needs a vision that inspires its members and stakeholders for “revolutionary thinking” to “achieve innovation in products and services.” Indeed, a company only achieves innovation when it integrates sustainability into its strategies to “align the triple bottom line for future generations” (Kantabutra, 2020; Ikram *et al.*, 2019).

Theoretically, the concept of innovation is increasingly expanded with the complexity of the socioeconomic environment. Consequently, innovation is no longer simply understood as a

technical specificity, but integrates innovations in products, quality, strategy, management, process, and technology toward sustainability, referred to as the “integrated innovation theory” (Wang *et al.*, 2016). In addition, according to Adams *et al.* (2015), sustainability innovation requires consistency in corporate philosophy, values statement, products, processes, executions, etc, as long as its outcomes lead to the simultaneous creation of economic, environmental and social values.

2.3. Nexus of Sustainability Innovation and Firm Competitiveness

The relationship between sustainability innovation and firm competitiveness has been of interest to many scholars, but their findings are inconsistent and have yet to come to a consensus (Cai *et al.*, 2018; Hussain *et al.*, 2018; Rezende *et al.*, 2019). The connection between sustainability innovation and firm competitiveness is conceptually divided into two opposite views (Cai *et al.*, 2018; Hussain *et al.*, 2018). From the traditionalist point of view, the sustainability innovations approach is considered only enhance the cost of firm (Shin *et al.*, 2018; Brooks, 1996) which leads to add up in the total cost for firms, increase prices, and help to reduced competitiveness (Blowfield *et al.*, 2008). The revisionist view asserts that “sustainability innovations is a tool that can create win-win situations value addition process for the ecosystem and society while simultaneously gives the competitive advantage to firms” (Porter *et al.*, 1995).

Kusi-Sarpong *et al.* (2019), and Suat *et al.* (2019) found that sustainability innovation has a positive and significant relationship with firm competitiveness. In addition, Cherrafi *et al.* (2018) determined that sustainability is a driving force which is linked with higher profitability, increase business efficiency, and competitiveness. Therefore, global trends suggest that businesses and nations are most concerned to adopt sustainability practices (Ikram *et al.*, 2020). Drivers for adoption of sustainability innovation have been identified as those that could be majorly categorized as external pressures and internal motivation (Díaz-García *et al.*, 2015).

This study principally approaches sustainability innovation from the revisionist view, which asserts that sustainability innovations positively and significantly affect firm competitiveness. This notion indicates that sustainability innovation helps enhance firm's competitiveness in the sense of reduced operational cost (Díaz-García *et al.*, 2015), enhanced customer satisfaction, increased brand equity and corporate reputation, and increased efficiency in using materials and energy, which helps save costs and protect the environment (Clark *et al.*, 2007; Ikram *et al.*, 2019). In addition, innovation was also approached from the resources-based perspective in which innovation should begin with identifying specific firm resources that are primary sources of competitive advantages. As a result, it enhances the firm's core competencies, which leads to sustainable competitive advantages (Cho *et al.*, 2020; Barney *et al.*, 2005).

2.4. Firm Competitiveness and Firm Performance

Firm competitiveness is critically important because the firm itself, not its home country, directly competes in international markets (Porter, 1998). Hove *et al.* (2014) conceptually defined firm competitiveness as “the ability of a firm to outweigh their rivals because of certain competitive advantages that accrue to them in the form of minimized costs and maximized business opportunities” (p. 167). Therefore, a firm's competitiveness is formulated from a variety of competitive advantage criteria such as “lower prices, rapid product innovation, higher quality, higher dependability, and shorter delivery time” (Hove-Sibanda *et al.*, 2017; Kotler *et al.*, 2011) that contribute to enhanced overall firm performance. A firm that offers premium quality products has high potential to increase return on sales and investment. In addition, a firm that has the ability to sustainably innovate, rapidly develop products, and quickly launch products in the market can achieve the first mover advantage and thus enjoy higher market and sales volume (Madzimure, 2020).

Theoretically, firm competitiveness was commonly approached from the competency perspectives, which emphasize the major roles of internal resources such as capacities to

innovate, business strategy, intangible assets, and tangible assets for firm competitive success (Bartlett *et al.*, 1989). Competitive success refers to enhanced customer satisfaction against competitors that lead to enhanced operational efficiency and financial effectiveness (Hammer *et al.*, 1993).

Firm performance is defined as the extent to which a firm achieves its defined goals. Over the past few decades, firms have dominantly focused on economic goals to generate “financial return for shareholders” (Upward *et al.*, 2016). This approach consequently contributed to environmental problems “where excessive use of limited resources has caused pollution, climate change, global warming, and ozone layer depletion” (Parida *et al.*, 2019). However, businesses are increasingly emphasizing their sense of sustainability, so they put sustainability at the forefront as the core of their survival and development (Nußholz, 2017; Lewandowski, 2016).

In addition, according to stakeholder theory (Freeman, 1984), the primary goal of the business is not only to achieve economic values but also social and environmental benefits as a way of balancing the interests of various stakeholders. Therefore, how the business is governed to achieve this goal is the primary concern of stakeholders. This is measured through the performance of the business according to distinguishing operational, environmental and financial metrics. Therefore, firm performance is expected to be sustainable to meet stakeholders’ expectations with respect to the three bottom line values that include economic, social, and environmental criteria (Le Thanh *et al.*, 2021). Therefore, it is necessary to extend the measures of firm performance by the resulting objects to clarify the extent to which firms benefit from competitive advantage. From this perspective, the current study measures firm performance that is composed of three main measures included operational, environmental, and financial performance (Xue *et al.*, 2019) as crucial indicators for sustainable development (Parida *et al.*,

2019) that derived from the outcomes of sustainability innovation (Cillo et al., 2019). Previous studies related to sustainability innovation are summarized in table 1.

Hypotheses were developed based on the careful literature review and discussions in section 2 and on the aforementioned theories. Accordingly, this study formulates the following hypotheses:

Hypothesis 1 (H1). Sustainability innovation has a positive relationship with firm competitiveness.

Hypothesis 2a (H_{2a}). Firm competitiveness has a positive relationship with financial performance.

Hypothesis 2b (H_{2b}). Firm competitiveness has a positive relationship with operational performance.

Hypothesis 2c (H_{2c}). Firm competitiveness has a positive relationship with environmental performance.

Hypothesis 3a (H_{3a}). Sustainability innovation has a positive relationship with financial performance, via the mediating role of firm competitiveness.

Hypothesis 3b (H_{3b}). Sustainability innovation has a positive relationship with operational performance, via the mediating role of firm competitiveness.

Hypothesis 3c (H_{3c}). Sustainability innovation has a positive relationship with environmental performance, via the mediating role of firm competitiveness.

Table 1: Related Studies on Sustainability Innovation

Author	Context	Methodology	Findings / Contributions	Limitation
Hermundsdottir et al. (2021)	Review of previous studies on the relationship between sustainability innovation and firm competitiveness	Literature review	Most studies found that sustainability innovation is positively associated with firm competitiveness.	Databases Wide range of sustainability innovation term
Madzimore (2020)	South Africa Logistics firms	PLS SEM	Firm competitiveness is positively and significantly related to firm performance.	Research context Business sector
Guangpei et al. (2019)	China Listed enterprises	Hierarchical regression analysis	Green technological innovation positively and significantly impacts firm competitiveness.	Research data Research methodology
Zanotti et al. (2018)	European	Structural equation	Competitiveness has	Research context

	Brewing industry	modeling (SEM)	a positive relationship with financial performance, but not operational performance.	Business sector
Bacinello <i>et al.</i> (2019)	Brazil	SEM	“Sustainability innovation maturity positively influence business performance.”	Research context Research data
Qiu <i>et al.</i> (2019)	China Manufacturing industry		Sustainability innovation has a positive and significant relationship with firm competitiveness.	Research context Business sector Research method
Suat <i>et al.</i> (2019)	Malaysia Manufacturing firms	Smart PLS	Sustainability innovation and firm competitiveness are positively and significantly associated.	Research context Sample size

Based on the above literature review, discussion, literature gap, and need, the authors believe that it is necessary to conduct new research on sustainability innovations, firm competitiveness, and firm performance in an integrated model as shown in Figure 1 below.

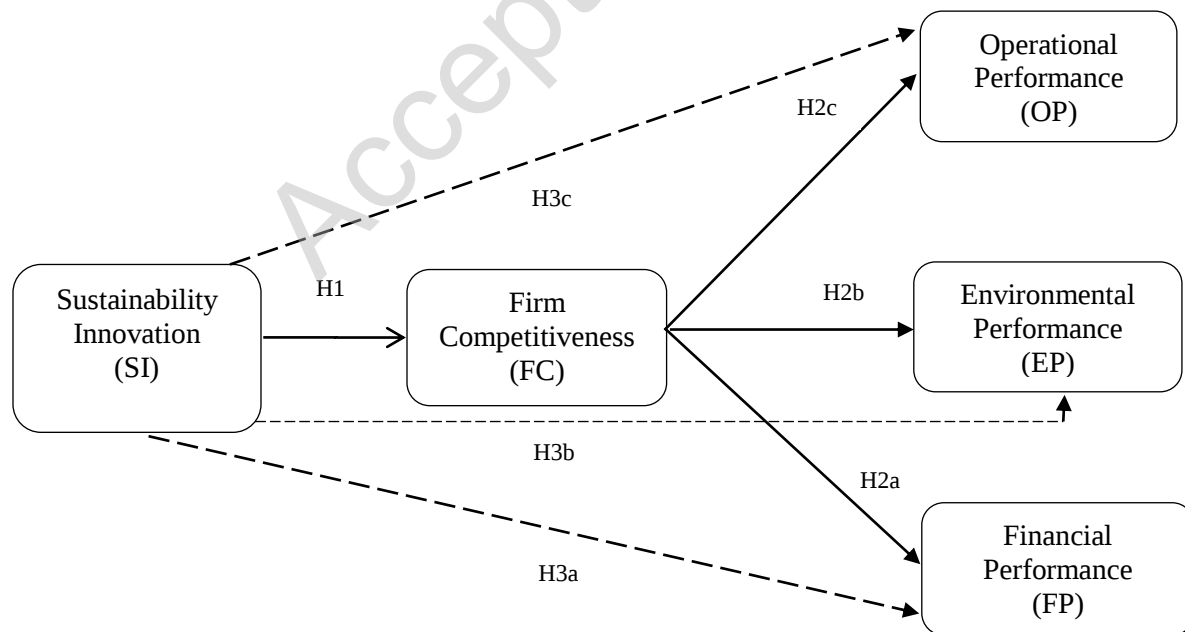


Figure 1. Conceptual Model

3. Research design and methods

This study explores the nexus between sustainability innovation, firm competitiveness, and firm performance in an integrated conceptual model whereby firm competitiveness is assumed to mediate between sustainability innovation and firm performance. This study focuses on manufacturing SMEs operating in Vietnam for ten years or more. Such firms were selected because this is a major driver of the Vietnamese economy, an emerging economy that still faces many challenges related to sustainable competitiveness, at the firm-, industry-, and nation-levels. Importantly, in the context that global integration is accelerating faster than ever, and Vietnam is in the early stages of implementing the Paris Agreement, reducing, and preventing pollutants emitted from the manufacturing process is of paramount importance to survival and growth (Yang *et al.*, 2019).

The definition of SMEs follows that by the IFC (2009), under which firms registering fewer than 250 employees are identified as SMEs. The selected companies are in the South of Vietnam. In terms of characteristics, SMEs are perceived to have different characteristics from large enterprises. In the context of this research, in developing a research model, the authors have considered the typical characteristics of SMEs in Vietnam such as the advantages of innovation ability (small scale, simple management apparatus, flexible, willing to learn, market-oriented (especially the young entrepreneur generation), those can be favorable in the innovation process, simultaneously, willing to innovate (OECD, 2021).

Authors with the perception that innovation is a complex subject, moreover, this study focuses on sustainability innovation, so it's even more complicated. From this perception, we were cautious in selecting the sample for this study. Accordingly, the authors have chosen enterprises that are applying basic standards such as ISO 9001 (quality management), 14001 (environmental management) and 26000 (social responsibility) because the authors believes that for enterprises that are applying these standards, they will be able to fully understand the relevant

concepts in this study and able to accurately answer the survey questions. Furthermore, the survey questionnaire has been validated by professionals and pilot testing by those who have similar background with the target population. Moreover, the target respondents are those at the leadership level of the business, thus, the authors believe that they are fully capable of properly understanding the concepts and meanings of the survey questions to be able to answer accurately. The conceptual model includes Sustainability Innovation (SI) as an independent variable, Firm Competitiveness (FC) as a mediating variable, and Firm Performance dimensions are separately categorized in three sectors that include Operational Performance (OP), Environmental Performance (EP), and Financial Performance (FP). The description of construct variables is outlined in table 2.

Table 2: Description of construct

Variables	Items	Description	References
SI (Sustainability Innovation)	SI1	Technological improvement	Hermundsdothir <i>et al.</i> (2021); Cho <i>et al.</i> (2020)
	SI2	Continuous process improvement	
	SI3	Reduced consumption of energy, water, other natural resources	
	SI4	Recycling and reuse	
	SI5	Environmental management by adoption of proper standard system	
	SI6	Reduce waste	
	SI7	Use environment friendly materials	
FC (Firm Competitiveness)	FC1	First mover advantage	Hermundsdothir <i>et al.</i> (2021)
	FC2	New market opportunities	
	FC3	Premium quality	
	FC4	Improved efficiency	
	FC5	Improved corporate reputation	
	FC6	Improved profitability	
OP (Operational Performance)	OP1	Outstanding product lines	Xue <i>et al.</i> (2019)
	OP2	Improved capacity utilization	
	OP3	Outstanding customer satisfaction	
	OP4	Shorter time to response to the market need	
EP (Environmental Performance)	EP1	“Reduced emissions”	Xue <i>et al.</i> (2019)
	EP2	“Reduced environmental accident”	
	EP3	“Reduced pollutants emitted”	
FP (Financial Performance)	FP1	Increased return on sales	Xue <i>et al.</i> (2019)
	FP2	Increased profitability over years	
	FP3	Increased dividend to shareholders over years	

The sample size was initially set at 490 randomly selected samples. This study applies the principle of “10-times rule” to calculate the number of samples needed for the study (Hair,

Ringle, & Sarstedt, 2011). However, as a precaution against non-response bias, this study determined the initial sample to be 490. The study period is from December 2020 to February 2021. The respondents are senior leaders and management board of firms that are knowledgeable and have extensive experience in operating their business as well as their insights into economic, environmental, and social issues. This study uses primary data collected from the questionnaire, which was composed of three sections (Supplementary Information). The first section is respondent information. The second section is open-ended questions to determine respondents' perspectives of sustainability innovation and SMEs' competitiveness in the new context of Vietnam. The third part is close-ended questions on a five-point Likert scale where 1 represents "strongly disagree" and 5 represents "strongly agree." To validate the questionnaire, 15 experts were asked to check its content to ensure it is readable, understandable, and suitable for the research context. Additionally, to ensure the consistency of the questionnaire, 45 companies with similar characteristics to those of the target companies were selected for pilot testing. Finally, all suggestions and comments noted earlier were considered for the final assessment.

In order to achieve a high response rate, the authors have made efforts in the following processes: (a) Sampling process: the authors selected samples from a most suitable source (LinkedIn) that allows the authors perform a preliminary evaluation during sampling process. (b) Questionnaire delivery process: when the author sent the questionnaire to the respondents, the author attached an open letter clearly stating the purpose of this study and the potential value that respondents might gain in turn from this study, what it helps for their business. This motivates them to enthusiastically participate in the survey. (c) Tracking process: the authors installed a reminder mode to actively follow up with respondents according to the progress to achieve the highest possible response rate.

The questionnaire was sent to the respondents via email and Google Drive, depending on which was more convenient for the respondent. We received 475 questionnaires (96.94%

response rate) and these were then scanned and incomplete responses removed. Finally, 435 completed questionnaires remained (88.77% response rate).

Within, the study we applied Structural Equation Modelling (SEM) to analyse the causal relationships between latent and construct variables. The association analyzed in SEM depicts the hypotheses formulated in this study. Conventionally, these associations can't be statistically tested for directionality (Wang and Rhemtulla, 2021). The application of SEM is mostly used for research that is developed to confirm the linkages between the latent and construct variables. Due to this fact, the SEM has been widely used to analyse the intensifying effects of variables in a hypothesis. SEM provides numerous benefits, but the visual display of model is one of the appealing attributes. Moreover, the visual display of SEM is easy to interpret even if the statistics behind the data are quite complex. The qualified data were analyzed using Smart PLS (Partial Least Squares) and SPSS 26.

4. Results

4.1 Descriptive Statistics

The results of descriptive statistical analysis indicate that the survey sample is relatively balanced in terms of gender. Specifically, 51.72% of respondents were male and 48.28% were female. Regarding the age of respondents, the 46-50 year age group accounts for the highest proportion (49.83%), followed by over 50 (28.04%), and finally from 41 to 45 years (22.53%). Regarding education, results indicate that the group of respondents with a master's degree accounts for the majority (54.02%), followed by that with a bachelor's degree (27.13%), and finally a post-master's degree (18.85%). Regarding years of working for their company, a service period of 7 to 10 years accounts for the highest ratio (57.01%), followed by more than 10 years (29.89%), and the remaining group from 3 to 6 years (13.10%). Lastly, with regard to firm size, this study focuses on SMEs, and the criteria for determining SMEs is number of employees (IFC, 2009). However, the survey samples were further classified into subgroups into subgroups to

ensure they were representative. The proportions for the group from 101 to 150 employees and from 151 to 200 employees are quite similar at 40.92% and 38.39% respectively. The remaining group (50 to 100 employees) accounts for 20.69%. Overall, the sample characteristics are highly representative of the targeted population of this study, and therefore suitable for the purpose of the study. The descriptive statistics of the samples are summarized in table 3.

Among the samples collected, there are 145 SMEs operate in the food production sector, 126 SMEs operate in the agricultural production sector, and 48 SMEs operate in beverage and health care products industries of our interest in terms of their innovation efforts.

Table 3. Descriptive Statistics of Sample

Index	n = 435	Intensity (%)
Gender		
Male	225	51.72
Female	210	48.28
Age		
41–45 years	98	22.53
46–50 years	215	49.43
Over 50	122	28.04
Education		
Bachelor	118	27.13
Master	235	54.02
Above	82	18.85
Years of working for the company		
3–6 years	57	13.10
7–10 years	248	57.01
Over 10 years	130	29.89
Size of company		
50–100 employees	90	20.69
101–150 employees	178	40.92
151–200 employees	167	38.39

4.2 Construct, Reliability, and validity of measure

To check the validity of measurement model, covariance-based criteria such as composite reliability and average variance is performed. The reliability statistics indicate that all observed variables have corrected item-total correlation greater than 0.3. In addition, Cronbach's Alpha coefficients of the scales of SI, FC, OP, EP and FP are greater than 0.7 as presented in table 7; the scales thus ensure reliability (Hair *et al.*, 2016). Therefore, the proposed scale is preserved.

Kaiser-Meyer-Olkin (KMO) and Bartlett's tests were employed for factor analysis and the results are presented in table 4 below. The KMO result is 0.932 (>0.5); thus, factor analysis is appropriate. Sig. (Bartlett's Test) is 0.000 (<0.05); thus, the observed variables are mostly correlated (Kaiser *et al.*, 1974; Bartlett, 1954).

Table 4: KMO and BARTLETT'S results

Test	Results
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.932
Bartlett's Test of Sphericity Approx. Chi-Square	5864.961
df.	253
Sig.	0.000

The statistics indicate that all the outer loadings of all variables are greater than 0.7, as presented in table 7. Therefore, all observed variables are significant in the proposed model (Hulland, 1999). The statistics indicate that all composite reliability (CR) of scales is greater than 0.7 and average variance extracted (AVE) is greater than 0.5 (Hair *et al.*, 2010; Fornell and Larcker, 1981), as presented in table 7; therefore, all the scales ensure convergence or convergent validity is supported.

Discriminant validity was evaluated by assessing the square root of AVE (Fornell and Larcker, 1981) and heterotrait-monotrait ratio (HTMT) (Henseler *et al.*, 2015). According to table 5, all the square roots of AVE (the first value of each column) are greater than the correlations between the latent variables (the correlation coefficient is below the first value of the column); therefore, discriminant validity is supported. As reported in table 6, all HTMT values are smaller than 0.85; hence, discriminant validity is confirmed.

Table 5: FORNELL-LARCKER criterion

	EP	FC	FP	OP	SI
EP	0.877				
FC	0.551	0.811			
FP	0.405	0.571	0.874		
OP	0.328	0.557	0.333	0.853	

SI	0.358	0.552	0.370	0.288	0.800
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Table 6: HETEROTRAIT-MONOTRAIT RATIO (HTMT)

	EP	FC	FP	OP	SI
EP					
FC	0.632				
FP	0.478	0.656			
OP	0.379	0.626	0.384		
SI	0.404	0.608	0.418	0.322	

Table 7: Construct, Reliability, and Validity Results

Items	Variables	Outer Loading	Average Variance Explained	Composite Reliability	Cronbach's Alpha
Environmental Performance	EP1	0.868	0.909	0.768	0.849
	EP2	0.885			
	EP3	0.868			
Firm Competitiveness	FC1	0.834	0.920	0.657	0.893
	FC2	0.795			
	FC3	0.817			
	FC4	0.806			
Financial Performance	FC5	0.805	0.907	0.764	0.845
	FC6	0.807			
	FP1	0.868			
	FP2	0.885			
Operational Performance	FP3	0.868	0.914	0.728	0.875
	OP1	0.840			
	OP2	0.855			
	OP3	0.863			
Sustainability Innovation	OP4	0.854	0.926	0.640	0.903
	SI1	0.795			
	SI2	0.735			
	SI3	0.779			
	SI4	0.836			
	SI5	0.831			
	SI6	0.817			
	SI7	0.804			

4.3 Path Model Estimation

The application of structural equation modeling technique (SEM) is used to analyze the relationship between sustainability innovation, firm competitiveness, and firm performance through robustness of estimation method is presented in Figure 2 in SMEs of Vietnam. In this study, SEM was used as it is recommended as the most suitable tool for complex model evaluation (Hair et al., 2017). According to Becker et al. (2012), the model is considered

complex when it concurrent consists of direct effects, mediation and moderation as it's involved in this study. The structural model was evaluated by assessing R^2 value, the results of R^2 and R^2 adjusted are greater than 0.1, which confirms the proposed model is good (Falk and Miller, 1992). The R^2 and R^2 adjusted values of construct variables are presented in table 8.

Table 8: Evaluation result of structural model

Variables	R^2	R^2 Adjusted
EP	0.304	0.302
FC	0.305	0.304
FP	0.326	0.325
OP	0.310	0.308

Moreover, Standardized root mean squared residual approximation (SRMR) confirms the fitness of model. Statistical results indicate that SRMR value is 0.053 (<0.08), therefore, the estimated model is suitable and has good fit (Hu and Bentler, 1999). Further, multicollinearity was evaluated by assessing variance inflation factors (VIF) values. The maximum acceptance threshold is 10. Accordingly, multicollinearity does not exist if VIF values are smaller than 5 (Hair *et al.*, 2011). All VIF values are satisfied; therefore, there is no multicollinearity problem persist among variables of the research model in the study.

4.3.1 Bootstrapping of measurement model

To validate the results of the PLS algorithm, we used the bootstrapping procedure by running the 5000 bootstrap-ping samples, for the model with replacement. Table 9 shows the importance of items in each construct. The statistical results indicate that the direct effects are all significant ($\text{sig.} < 0.05$) and the order of standardized regression coefficients (original sample) shows that firm competitiveness as mediating factor between sustainability innovation and firm performance, has a strongest impact on FP, then OP, then EP. This process ensures that the measurement model is reliable enough and all the items are loaded well on their respective scales.

Table 9: Bootstrapping result of the measurement model

Effects	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	CI-2.5%	CI-97.5%	P-Values
FC -> EP	0.551	0.549	0.038	14.424	0.468	0.615	0.000
FC -> FP	0.571	0.569	0.040	14.310	0.485	0.643	0.000
FC -> OP	0.557	0.556	0.038	14.840	0.473	0.626	0.000
SI -> FC	0.552	0.553	0.041	13.498	0.470	0.633	0.000

4.3.2 Bootstrapping of the path model

As shown in table 10 the t values between the SI, FC and EP are 8.631 at p -value of 0.000, this indicates the significant relationship. Similarly, the t value for relationship between SI, FC and FP is 8.458 at p value 0.000 and the t value for relationship between SI, FC and OP is 8.894 at p value 0.000. In addition, result shows that all relationships are significant at 97.5% confidence interval. Therefore, it concludes that the indirect effects are all significant ($\text{sig.} < 0.05$) and the order of these indirect effects is consistent with those of direct effects of FC on firm performance dimensions.

Table 10: Path coefficients bootstrapping results

Effects	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	CI-2.5%	CI-97.5%	P-Values
SI -> FC -> EP	0.305	0.304	0.035	8.631	0.235	0.369	0.000
SI -> FC -> FP	0.316	0.315	0.037	8.458	0.245	0.393	0.000
SI -> FC -> OP	0.308	0.308	0.035	8.894	0.241	0.374	0.000

The level of impact was evaluated by assessing the effect size through f -square values. According to Cohen (1988), the lowest comparison threshold is 0.02, meaning that there will be no effect if the corresponding f -square value is less than 0.02. On the contrary, the larger the f -square value, the stronger the influence. Specifically, there are four specific thresholds to determine the level of impact (f -square < 0.02 : no effect, f -square ≥ 0.02 : small effects, f -square ≥ 0.15 : medium effects, f -square ≥ 0.35 : large effects). The results show that f -square values are all greater than 0.35 as shown in the table 11 below; therefore, all effects in this model are large. In summary, the above analysis of impact proves that all assumed hypotheses are supported, and

all effects are strong. Figure 2 presents the final SEM model that shows the aforementioned parameters and paths.

Table 11: F-Square values

	EP	FC	FP	OP	SI
EP					
FC	0.437				
FP			0.484		
OP				0.449	
SI		0.439			

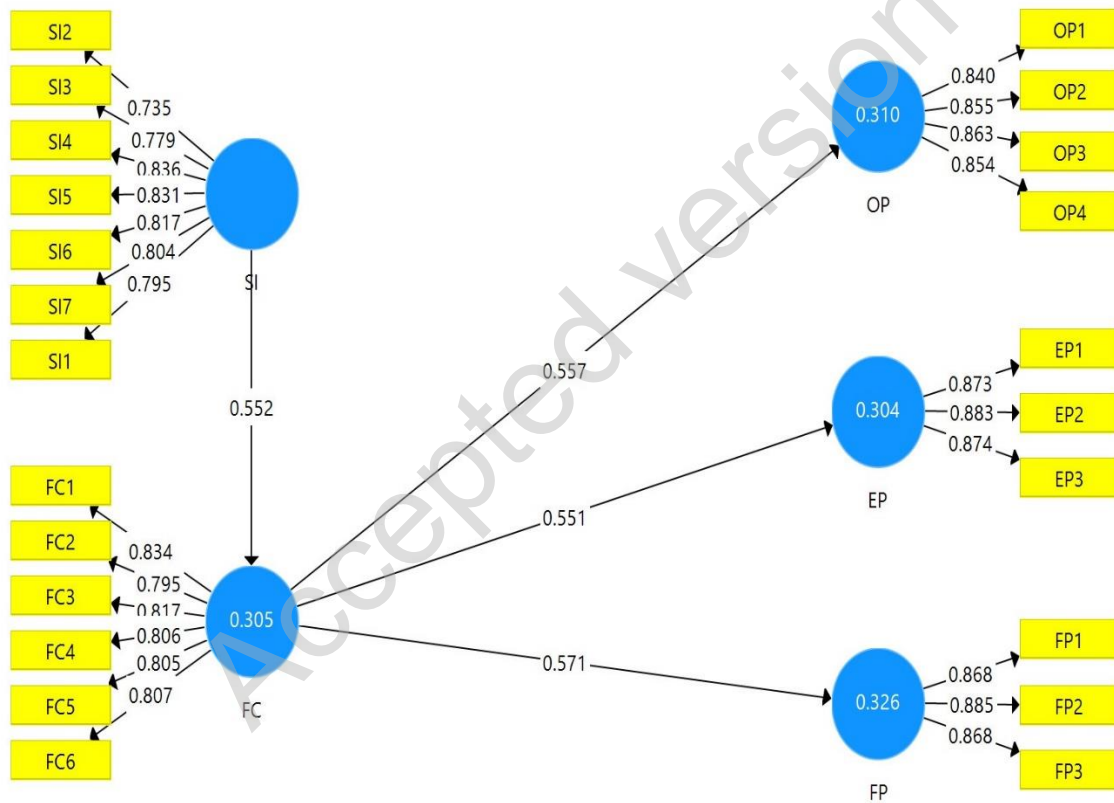


Figure 2. Final SEM model

5. Discussion and Research Implications

5.1 Discussion

The statistical results provide databases to discuss relationships in the model of this study. The path coefficient between SI and FC is positive and p-value is 0.000 (<0.05); therefore, hypothesis 1 (H1) is confirmed (+0.552; <0.05). This determines that sustainability innovation positively and significantly affects firm competitiveness. This finding supports previous studies Kiveu et al. (2019), Borsatto and Amui (2019). Sustainability innovation is found to lead to enhanced corporate reputation, improved product quality, enhanced customer satisfaction, increased values for stakeholders, and expanded business opportunities, which help improve firm competitiveness.

The path coefficient between FC and FP is positive and p-value is 0.000 (<0.05); therefore, hypothesis 2a (H2a) is supported (+0.571; <0.05). This proves that firm competitiveness has a positive and significant relationship with financial performance. This finding supports Madzimore's (2020) recent research implying that by taking advantage of being the first mover, businesses can access higher markets and higher volume, which contribute to improve firm performance. The path coefficient between FC and OP is positive and p-value is 0.000 (<0.05); thus, hypothesis 2b (H2b) is confirmed (+0.557; <0.05). This determines that firm competitiveness positively and significantly affects operational performance. This supports the previous findings of Hove-Sibanda *et al.* (2017) and Kotler *et al.* (2011) implying that by taking advantage of advanced quality management systems, improved efficiency, and first mover advantage helps improve product quality and product line, shorten time to market, shorten time to respond, and enhance customer satisfaction, which drive operational performance (Severo *et al.*, 2017; Boons *et al.*, 2013).

The path coefficient between FC and EP is positive and p-value is 0.000 (<0.05); thus, hypothesis 2c (H2c) is supported (+0.551; <0.05). This proves that the relationship between firm competitiveness and environmental performance is positive and significant. The finding implies that by taking advantage of advanced quality management systems and improved efficiency,

firms can reduce waste, reduce consumption of materials, energy, water, and so on, which reduce emissions and pollutant emitted. This will result in conserving and protecting the environment.

The indirect effect coefficient of SI-> FC->FP is positive, and p-value is 0.000 (<0.05); therefore, hypothesis 3a (H3a) is confirmed (+0.316;<0.05). This result determines that sustainability innovation indirectly positively and significantly affects financial performance and firm competitiveness mediates this relationship. This finding implies that sustainability innovation benefits businesses by continuously improving processes for efficiency improvement, waste reduction, recycling, and reuse, and improving the quality management system, which increases firm competitiveness toward improved financial performance indicators such as profitability, return on sales, and return on investment.

The indirect effect coefficient of SI->FC->OP is positive, and p-value is 0.000 (<0.05); therefore, hypothesis 3a (H3a) is supported (+0.308;<0.05). It indicates that sustainability innovation has an indirect relationship with operational performance, and this relationship is positive and significant, and firm competitiveness mediates this relationship. The finding implies that sustainability innovation benefits businesses by continuous quality improvement, continuous process improvement, and use of environment friendly materials, which enhance firm competitiveness toward improved operational performance indicators such as improved product quality and product lines, enhanced customer satisfaction, shortened response time, and improved capacity utilization.

The indirect effect coefficient of SI->FC->EP is positive, and p-value is 0.000 (<0.05); therefore, hypothesis 3a (H3a) is confirmed (+0.305;<0.05). This result indicates that the relationship between sustainability innovation and environmental performance is positive and significant and is mediated by firm competitiveness. This finding implies that sustainability innovation increases firm competitiveness in the sense of improved efficiency, reduced waste, reduced consumption of materials, energy and water, advanced quality management systems, use

of more environment friendly material, which result in enhancing environmental performance indicators such as reduced emissions and pollutants, reduced environmental accidents, and improved environmental situation. This contribution is of great significance to business practitioners and managers in planning their strategic sustainability innovation.

5.2 Theoretical Implications

This study provides important contributions to extend the current literature in the domain of firm innovation and firm performance in some ways. First, this study provides a dynamic approach on the firm innovation in the new context. Specifically, firm innovation in the context of international integration should focus on sustainability innovation to improve the competitiveness of SMEs. As a result, this leads to improved firm performance towards sustainability.

Second, this study provides an integrated model of the relationship of sustainability innovation, firm competitiveness, and firm performance dimensions, which was rarely found in the current literature. Moreover, examining the intermediary mechanism of firm competitiveness in the link between sustainability innovation and firm performance dimensions in the context of this research is timely and necessary because different mediators may have different effects on the performance of sustainability innovation (Hermundsdottir *et al.*, 2021).

Third, this study particularly supports stakeholder theory (Freeman, 1984) by asserting that sustainability innovation represents the efforts of enterprises towards the interests of stakeholders on the basis of balancing economic, social and environmental benefits. In turn, this will generate a positive response from stakeholders to the business. As a result, this will enhance the various aspects of firm competitiveness leading to improved operational, environmental and financial performance of the business.

Fourth, its application into the context of SMEs in emerging economy reinforces its theoretical contribution towards a multifaceted approach to the role of innovation in enhancing

SMEs' competitive advantage towards improving sustainable performance because different contexts will influence the outcomes of sustainability innovation (Hermundsdottir *et al.*, 2021). The fifth theoretical implication of this study is the provision of the measures of sustainability innovation, firm competitiveness, and three distinct firm performance metrics for manufacturing SMEs in emerging economy that contribute to diversify the approach to the measures of firm sustainability innovation, firm competitiveness and firm performance dimensions in the context of international integration and uncertainties.

5.3 Practical Implications

This study has some important practical implications as follows. First, this study provides additional evidence about the positive impact of innovation on firm performance. Through which, it provides an insightful mechanism of how sustainability innovation enhances firm competitiveness and how this improves firm performance dimensions. Accordingly, business leaders are encouraged to consider a strategic long-term plan for sustainability innovation as this is the only way for businesses to survive and develop sustainably, especially in the new challenging context of emerging economy as Vietnam.

Second, this study provides insight into the important role of sustainability innovation in ensuring sustainability for businesses on the basis of balancing the economic, environmental and economic values. It suggests that sustainability innovation should be considered from the revisionist view that sustainability innovations can create win-win situations for a firm whereby such innovation benefits firms by continuously improved processes that help reduce consumption of input materials, energy, water, and waste, improved product quality, recycling and reuse, avoid using hazardous substances for products, and use environmentally friendly packaging and materials. Furthermore, improved managerial process by using evaluation methods such as environment management system that drives to improve sustainability performance, realization of cost savings and increase productivity (Abid et al., 2021). Delivering

sustainability products to the market is an effective way to exploit new business opportunities associated with new customers who care about the environment and society. This approach can lead to product differentiation, increased customer database, and improved brand awareness and market position (García- Sánchez *et al.*, 2019). These will in turn enhance firm competitiveness through advantages of the first mover position, new market entry capabilities, outstanding quality management systems, outstanding efficiency, enhanced corporate reputation, and improved profitability, which consequently improve firm performance dimensions.

Third, this study suggests to the firm's management that any decision-making on strategies for innovation must be carefully considered based on specific firm's resources, identified as primary resources of competitive advantages, and specific firm context to be doable and achievable. Otherwise, such activities may slow business operations or reduce competitive advantage because it requires time to analyze the real impact of sustainable innovations (Ikram *et al.*, 2019). Indeed, it can be argued that sustainable innovation is imperative for survival and development. However, based on the current situation of capacity and nature of operation of SMEs in Vietnam, innovating in a new spirit can be a challenge for SMEs. Therefore, firms should break down innovation goals for each stage and optimize internal and external resources, create a connection with external resources to complement each other, and optimize each other's strengths. Importantly, sustainability must be integrated into the company's strategy to realize innovation activities in a sustainable direction.

Fourth, this study suggests government bodies to consider strict environmental regulation, which is considered as external pressure to boost firms to implement sustainability innovations. This may be a great motivator for businesses to undertake sustainability innovation. This may give them greater determination in planning and implementing their strategic long-term planning for such innovation for improving their firm competitiveness and performance as "stricter regulators" are positively associated with firm competitiveness and firm performance

through innovative activities. In the current context in Vietnam, where the development of the national innovation system is still in its infancy, while SMEs majorly implement product and process innovations aimed at improving financial results, it is necessary to introduce institutional regulations, policies, incentives to encourage SMEs to innovate sustainably. This recommendation is specifically aimed at addressing the existing issues of SMEs in terms of limitations in their internal capacity to plan and implement sustainability innovation, and limited access to outside supports. Therefore, practical government support and incentive policies are essential for businesses to have the motivation and linkage to plan and implement sustainability innovation. This brings about sustainable benefits to businesses, the environment, society, and the nation as a whole.

6 Conclusions

The results of this study show that the objectives of this study were successfully achieved. Accordingly, the first research question was responded with the affirmation that sustainability innovation has an important role in promoting firm competitiveness and boosting the sustainable-oriented firm performance indicators. Likewise, the second research question was responded with the determination that firm competitiveness mediates the relationship between sustainability innovation and operational performance, environmental performance and financial performance.

The above findings can also be interpreted as follows. Sustainability innovation has a positive and significant relationship with the multidimensional performance of the business. Further, sustainability innovation positively and significantly affects firm competitiveness ($\beta = 0.552$, $t = 13.498$, $p < 0.05$). Meanwhile, firm competitiveness is proven to mediate the relationship between sustainability innovation and firm performance. Through which, it determines that firm competitiveness has a positive and significant relationship with environmental performance, financial performance, and operational performance, respectfully

supported by $\beta = 0.551$, $t = 14.424$, $p < 0.05$; $\beta = 0.571$, $t = 14.310$, $p < 0.05$; $\beta = 0.557$, $t = 14.840$, $p < 0.05$).

In summary, sustainability innovation has a positive and significant relationship with environmental performance, financial performance, and operational performance through the mediation mechanism of firm competitiveness in the context of SMEs in emerging economy. This conclusion is respectively supported by $\beta = 0.305$, $t = 8.631$, $p < 0.05$; $\beta = 0.316$, $t = 8.458$, $p < 0.05$; $\beta = 0.308$, $t = 8.894$, $p < 0.05$. This study provides interesting finding whereby sustainability innovation has a similar effect on environmental, economic and operational performance of the business. In which, sustainability innovation has a strongest impact on financial performance, followed by operational performance and finally environmental performance. This is seen as a big motivation for SMEs in emerging countries like Vietnam to break through in sustainability innovation because the values it brings to stakeholders are balanced as expected.

Based on the findings, this study discusses the theoretical and practical implications as above. Beyond that, the contributions of this study are particularly important in practical terms because manufacturing business sector is known to have a high probability of adverse effects on the environment due to emissions and pollutants emitted during production processes (Ritchie and Roser, 2020). While SMEs account for the majority of SMEs in Vietnam, this implication may be of interest to agencies of government bodies and departments related to sustainable economic development and environmental resources.

The originality of this study is the provision of insights into the relationship of sustainability innovation, firm competitiveness, and firm performance dimensions in an integrated model for SMEs in an emerging economy. Importantly, the contribution of this study is even more meaningful to SMEs in the current context in Vietnam where global integration is faster than ever, and competition pressure is fiercer than ever. This study provides important

implications that may be of great interest to business practitioners, managers, economists, and policy makers.

This study has some limitations which should be considered in future research. First, data were collected from enterprises in the South of Vietnam. Hence, future research should consider other regions. Second, this study focused on manufacturing firms, thus, other business sectors could be of interest for future research. Third, firm competitiveness was employed as a mediator in the relationship between sustainability innovation and firm performance, therefore, other mediators or moderators could be an interesting choice for future studies. Fourth, this study particularly focused on SMEs with representative characteristics as presented in the table 3. Thus, larger-sized enterprises or different sample characteristics could be an interesting object for future research.

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