

# Improving Business Performance for Smes: The Power of Co-Innovation and Business Networks Resilience in The Covid-19 Pandemic

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## ABSTRACT

The COVID-19 outbreak-induced economic crisis has been considered significantly worse than the Great Depression (1929–1939), the worst economic catastrophe in history. Small and medium-sized enterprises (SMEs) have suffered heavier losses than large organizations during the pandemic. However, empirical results regarding relationships between resilient factors and SMEs performance have been inconclusive. This study builds on the Resources-Based-View and Contingent Theory to examine one resilient factor as co-creation. Following a comprehensive literature review, quantitative research was adopted in this paper. There were a total of 450 SMEs participating in this study. SmartPLS 4.0 was performed on the relationship between co-innovation and SMEs outcomes. The findings show a positive and direct impact of co-innovation and organizational resilience and further leverage SMEs' performance. Furthermore, it was found that co-innovation also boosts the resilience of business networks, SMEs, which play a critical role in business survival. Driven by these findings, SMEs in emerging markets should consider and focus on co-innovation with their stakeholders to overcome the long-lasting impacts of the pandemic.

**Keywords:** Co-innovation, Business network resilience, Organizational resilience, SMEs' performance

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## 1. INTRODUCTION

The outbreak of Coronavirus at the end of 2019 quickly turned into a global pandemic and led to chaos for individuals and organizations worldwide. Most nations shifted to a

“new normal” - a makeshift situation, but the impact of the pandemic is significant and long-lasting for the entire global economy [1].

How organizations adapt and change to survive under turbulent environmental conditions heavily depends on their resilience. This concept refers to adjusting appropriately, overcoming disruptions, and sustaining growth during uncertainty [2]. According to several studies, [3, 4] SMEs were more heavily impacted by the pandemic than large firms since they had limited resources and capabilities to handle sudden and widespread disruptions. Most SMEs reported suffering from financial issues [2] and value chain shocks due to inadequate prior planning and forecasting [5]. The sudden turbulence threatened these firms’ confidence in survival. Although the “new normal” situation decreased tension for SMEs, the post-pandemic environment remains unstable and requires heightened attention to resolve economic consequences.

Researchers suggested some solutions to leverage SMEs’ adaptability efforts, for example, the study of Klein et al.[3] and Ciasullo et al.[5] emphasized digital transformation and innovation to respond to and anticipate environmental shocks quickly. However, due to limited resources and capabilities [2], solo innovation seems to trigger existing constraints for small firms. Thus, collaboration and openness in co-innovation will shed light on SMEs in innovation activities and practices during shortages.

Taken together, there are some gaps summarized as follows for research motivation. Firstly, the research on business resilience and factors contributing to resilience remain blurred because there is a lack of empirical studies to examine relationships among resilient factors [5]. Secondly, *co-innovation towards SMEs performance and resilience* is a reasonably recent research topic; therefore, publications still need to be made available. Thirdly, the impact of COVID-19 as a critical contextual moderator has yet to be examined under the co-innovation theme for empirical study. Hence, this study strives to investigate the relationships between *co-innovation* and *organizational resilience ability, business performance, and business network* under the impact of COVID-19 and further examine SMEs to explore *the role of co-innovation towards resilience and performance*. The researchers posed four research questions as follows.

- RQ1: What are SMEs' business performance antecedents during the COVID-19 outbreak?
- RQ2: How does Co-innovation influence the SMEs’ business networks resilience and organizational resilience?
- RQ3: Does the impact covid-19 moderate the relationships between the independent variable (co-innovation/business network/ organizational resilience) and the dependent variable (business performance)?
- RQ4: What is the key success for SMEs to survive the Covid-19 pandemic?

The results of this study reveal the vital role of *co-innovation in compensating for the limited internal resources of SMEs*, as opposed to a sole focus on *individual innovation*,

as in past research. It also considers business networks as an essential leverage factor to improve the resilience of SMEs by diversifying business opportunities from different customers, suppliers, and markets. Finally, the long-lasting impact of COVID-19 on the effectiveness of resilience and business performance improvement activities has been confirmed, especially in emerging markets such as Vietnam.

The remainder of this research is presented as follows. Section 2 reviews prior literature and explains the constructed research model. Section 3 provides the methodology adopted to answer the study's questions. Subsequently, section 4 illustrates the data analysis process and results, and finally, section 5 summarizes the findings with relevant discussion and implications and proposes further research suggestions for future study.

## 2. LITERATURE REVIEW

### 2.1 Co-innovation

The external business environment is increasingly changing, urging scholars and practitioners to explore business solutions to conquer problems. *Innovation* was one of the vital determinants of sustaining competitive advantage in uncertainty [6] and alleviating performance. Among types of innovation, co-innovation is claimed to fasten innovation processes in a business [5].

*Co-innovation* is defined as an ongoing partnership or collaboration among stakeholders [7] to achieve common goals and to generate new value for all joined parties [6]. The collaboration can be implemented at any time and is not limited to the value chain, such as between suppliers and firms [8], between competitors [9], or between firms and their customers [10]. Co-innovation intensity can vary the lowest level is technology transfer [11], and the more intense levels are reflected in the higher complexity of collaboration and negotiations among parties.

Scholars have emphasized in prior papers the benefits of co-innovation, revealed in the paper of Yenyurt et al. [8], co-innovation promotes better capabilities, knowledge, and resources, which play a vital role in innovation. Notably, co-innovation results can be introduced and launched to commercialization faster under agreement and collaboration with stakeholders. However, this process is triggered by mismatched organizational cultures, ownership structure, or knowledge leakage threats [6, 12]. Most academic studies concluded that co-innovation could leverage business performance and innovation performance [8, 13]. Other findings extended to the entrepreneurship opportunity recognition [7] and network management [14]. However, studies on co-innovation and firms' ability to recover from shock are relatively unexplored. Furthermore, research on identifying business resilience was also limited [5, 15]. Therefore, this study, which focuses on co-innovation and its impact on business recovery, is indispensable.

On the other hand, evidence from regions such as Europe [16], Asia [17], or the overall emerging nations [18], SMEs (small and medium enterprises) were the most severely disrupted organizations under the impacts of the COVID-19 pandemic. Remarkably, disruptions such as cash flow, digital transformation, foresighting future scenarios, operation, and supply chain management are the main reasons leading to the bankruptcy of millions of SMEs during the pandemic [18]. Those disruptions challenge existing business models and practices that no longer fit the chaos. However, more research needs to be conducted for this target [19]. Hence, researching solutions to help SMEs retain their continuity by accelerating the introduction process of new practices is expected to benefit academics and business practitioners. The authors consider co-innovation the main factor in examining the impact of the COVID-19 pandemic on SMEs' business resilience, business networks, and business performance.

## **2.2 Grounded theory**

Resource-based view theory, which is used to explain how a company can leverage its resources (internal and external) and transform them in an effective way (known as capabilities) to achieve desired business outcomes (such as improving competitiveness and business performance), emphasizes the determinants of competitive advantage within an organization [20-22]. According to Barney [20], superior resources and capabilities must meet the following criteria: valuable, rare, inimitable, and irreplaceable (VRIN) - are essential to obtaining a competitive advantage.

Contrary to the Resource-based view theory - the internal resource-based management theory, the Contingency Theory focuses on external elements to modify how organizations interact with their external environment [23, 24]. External factors include natural disasters, shifts in demand, changes in politics, and advancements in technology, among others [25]. The theory also highlights that no one solution works for all scenarios and that different circumstances demand different management techniques. In the context of Covid-19, many authors have used this theory to explore how businesses respond and behave during the pandemic [26-29]. Hence, researchers adopted these theories to develop hypotheses in the following sections.

## **2.3 Research model and hypotheses development**

Co-innovation contributes to the overall innovation performance of [13] since it reduces the cost of exploring various new ideas concurrently [30]. Extensive capital, resources, and capabilities from the collaboration can shorten time consumption in generating and implementing new products, new business practices, or new processes. On the other hand, with a series of disruptions from the pandemic, the business environment has become more uncertain [31]. Taking an example from the service industry, extensive capital, such as social, economic, or physical, might recover disruptions more effectively [32]. With co-innovation, SMEs can share and leverage their assets, which is consequently beneficial for business resilience during a pandemic. Furthermore, the uncertainty and turbulence require firms to revise their business models and business practices quickly [33], which positions the role of fast innovation more prominently than ever. Taken all together, the first hypothesis is developed as follows:

**H1a:** SMEs' co-innovation positively impacts organizational resilience

Business performance can be measured by two types of outcomes, which are financial [34] and non-financial [35]. While the former reflects sales or growth results, the latter reflects competitiveness, customer satisfaction, and reputation. Interactions and collaboration in co-innovation leverage resource availability and capability for all sides, which can improve the higher performance level [8]. Furthermore, co-innovation outcomes also generate creativity, a key determinant of innovation and crucial in sustaining high performance. Hence, we postulate the next hypothesis as follows:

**H1b:** SMEs' co-innovation positively impacts SMEs' performance

A business network has long been defined as a series of relationships with various stakeholders [36], which firms establish throughout their operations. Prior studies conducted in co-innovation have revealed a vital part of communities and relationships scope [5, 37] to foster collaboration. As mentioned, co-innovation happens when firms interact with each other [6], particularly when firms lack resources and capabilities [7]. While the COVID-19 pandemic creates shocks and shortages for most economic actors, co-innovation can be a choice for firms, especially SMEs, to overcome obstacles.

The partnership process requires continuity interaction expansion among organizations [37]. All participants must share their knowledge, such as human or technology, and the future goal to match and achieve the final beneficial outcomes. It can refer to high-quality networks [38]. Additionally, co-innovation is not a linear task, and it requires a series of evaluations and matching capabilities and resources among organizations [37]. Searching and evaluating can consequently recover the disruptions and further expand the business network in numbers. Thus, both network quantity and quality can be assured. Therefore, it is reasonable to posit the following hypothesis:

**H1c:** Co-innovation positively impacts business network resilience

Organizational resilience is the ability of a company to recover rapidly after a sudden, unexpected incident that leads to the company being vulnerable and requires an unusual response to the crisis [39]. This ability is crucial in determining how well SMEs function overall [40]. In addition, organizational resilience indicates how well-equipped a company may be when facing disasters in the unsettling and fluctuating conditions of the modern world [41]. Research has shown that resilient businesses are more likely to adjust to changes in their environments effectively, preserve business continuity during times of crisis, and reach new opportunities, all of which can benefit their performance. Previous studies have firmly proven that network ties are a significant resource for facilitating company operations [42, 43]. To adapt to change, the capacity for resilience is generated through various resources [14, 44]. In addition, Ragmoun [40] stated that organizational resilience can be considered a dynamic characteristic that guarantees that it can effectively and promptly adjust to the changes in the environment.

Consequently, businesses are obligated to cooperate with other organizations to access resources in the event of a catastrophic event via a dependable business network. According to [45], organizational resilience is a strategic asset that impacts the firm's success. Based on this information, the H2 hypothesis is proposed:

**H2:** Organizational resilience positively impacts SMEs' performance

The concept of business network resilience extends beyond the official or informal arrangements made within a company to promote the interchange of resources with their peers to create sustainable growth for that company. It also refers to a company's ability to establish, grow, and capitalize on internal and external connections with other businesses [46]. In addition, the capacity of a business to purchase and sell resources is the defining characteristic of a business network [47]. Several research studies have shown that businesses may benefit, increase resilience, and resolve problems from well-established networks founded on solid relationships. In particular, SMEs receive knowledge from their external partners, which enables them to negotiate differences in the institutional environment efficiently. SMEs benefit from this expertise because their external partners allow them to collaborate. According to Human and Naudé [48], establishing networks is necessary for companies to acquire this information. A study conducted by Suarez-Ortega et al. [49], the existence of existing external commercial partnerships has a substantial impact on a company's performance. These relationships make it possible for host firms to recognize and investigate market prospects—research conducted by Kale et al. [50] suggests that relational capital is a valuable metric for determining the worth of a network. In addition, De Klerk and Krron [51] discovered a widespread belief that the presence of business networks has a beneficial impact on the success of businesses. The following hypothesis can be developed from the findings of this investigation based on these insights:

**H3:** Business network resilience positively impacts SMEs' performance

In this study, authors examined the impact of COVID-19 on SMEs performance. Covid-19 is considered a global disaster, causing significant losses in property, mental health, and even deaths [52, 53]. To prevent this pandemic from spreading, governments in numerous nations have implemented harsh policies like social distancing, isolation, or lockdown - as the cause of further economic consequences [26], such as market and business operation disruptions. More specifically, the pandemic has caused a shortage of supplies of labor and a decline in market demand, leading to business operation disruption [54, 55]. Many individual enterprises (mainly small-scale organizations) faced financial difficulties and even bankruptcies [3, 26]. Hence, the fourth hypothesis would examine the effect of the pandemic on the overall performance of SMEs.

**H4a:** Impact of COVID-19 negatively impacts SMEs' performance

According to the resource-based view and contingency theory, (1) variations in internal resources and capabilities cause different business performance between enterprises, and (2) various business contexts (related to geography or business industry) will have

different impact levels of COVID-19, necessitating different management approaches. These perspectives lead to the conclusion that the impact level of COVID-19 will moderate the effectiveness of business responses on their business performance, as well as we propose the following hypothesis:

According to the resource-based view, internal resource and capability variations cause different business performance between enterprises. As mentioned earlier, the pandemic caused tremendous losses in terms of human lives and disruptions [54, 55] throughout the value chain – from the supply side to the demand side. Lockdown policies prevent the mobility of people, goods, and other intermediaries, which inhibits organizations from achieving business objectives. It can be said that the widespread of COVID-19 caused challenges for firms to resilience and overall performance. Hence, the following hypothesis is constructed to examine the moderating effect of COVID-19 on the relationship between organizational resilience and performance.

**H4b:** Impact of COVID-19 moderates the effectiveness of organizational resilience on SMEs' performance

The COVID-19 pandemic has reached virtually every part of the globe unprecedentedly. To reduce the transmission of the virus, numerous governments have implemented nationwide or localized lockdowns to confine its spread. Consequently, due to the lockdown, business and economic operations have been impacted, depleting critical human and financial resources, including people, materials, transportation, etc. This has resulted in the closure of numerous firms and has equally impacted their performance [56]. Co-innovation is widely acknowledged as a crucial catalyst for the expansion and adaptability of small and medium-sized firms, a topic extensively studied by Rajapathirana [57] and Ciasullo et al. [58]. However, during the COVID-19 pandemic, it has been seen that the efficacy of co-innovation endeavors may be contingent upon the influence of external variables [56]. Several entrepreneurs claim that the COVID-19 pandemic has substantially altered the correlation between co-innovation techniques and the performance of small and medium-sized firms. This study examines the potential moderating influence to provide insights into the adaptability and effectiveness of co-innovation techniques in response to the unprecedented challenges presented by the COVID-19 pandemic.

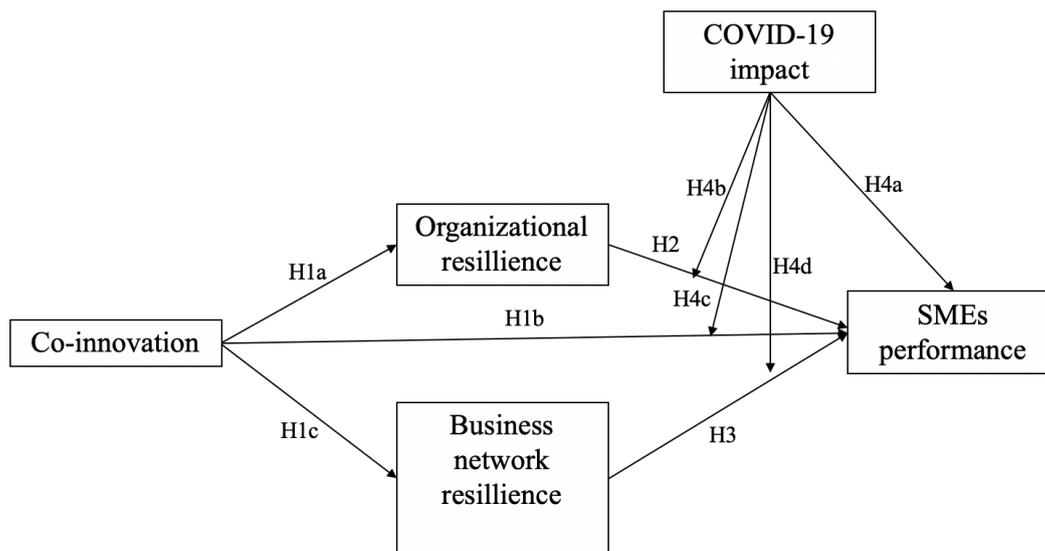
**H4c:** Impact of COVID-19 moderates the relationship between co-innovation and SMEs' performance.

Business network resilience research has drawn much interest because it tackles the pressing need to understand SMEs' risky circumstances and what steps to take in response [59, 60]. Business network resilience management involves the ability of SMEs to react to complex and changing events in their environment. The literature has examined the significance of business networks in enabling SMEs to overcome challenges and bounce back from adversity [61]. Nevertheless, this study posits that the existence of COVID-19 can have a substantial impact on the efficacy of business network resilience, as suggested by hypothesis H4d. The pandemic is anticipated to

have a considerable impact on the interaction between business network recovery plans and the performance of small and medium-sized firms, resulting in significant changes. This study seeks to investigate the impact of COVID-19 on the efficiency of business network resilience strategies in enhancing the performance of SMEs. It aims to provide valuable insights into the ability of SMEs to adapt and thrive in the current business landscape.

**H4d:** Impact of Covid-19 moderates the relationship between business network resilience on SMEs' performance.

Figure 1 illustrates the proposed research model in this study.



**Figure 1.** Research model (Source: Authors' desk research)

### 3. METHODOLOGY

#### 3.1 Research design

This study employs a quantitative approach and a questionnaire for Vietnamese small and medium enterprises. The survey consists of two parts. In the first part, participants were questioned about the respondent's company information, including the company size, industry field, respondent position, gender, and location. In the second part, there are a total of 31 questions that are applied from the previous research to measure variables in this study. Eleven items measured co-innovation, and the Impact of COVID-19 was measured by 5 items (such as “Our industrial sector was strongly affected by the COVID-19 crisis”, or “Our company was strongly affected by the COVID-19 crisis”) adopted from Mota et al.[62], 3 items from Xie et al. measured field [63] Business network resilience (such as “The actors within the business network have access to or share timely information about collaboration management that they consider key or useful to their operations”). [64] Organizational resilience was measured with 5 items adopted from Do et al. [65] (such as “Employees have assigned roles for incident planning activities”), and SMEs performance was measured with 7

items adopted from [66] (such as “service quality” or “customer engagement”). On a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree), respondents indicated how SMEs' performance is influenced by co-innovation and resilience in Covid-19.

In the pilot test, the research team surveyed fifty managers of SMEs in different industries to collect feedback on any questions that needed clarification or were inaccessible to non-professionals. After rewording, the questionnaires were ready to be distributed to participants.

### **3.2 Sampling**

The sample size for an exploratory study requires at least 4-5 times the number of items. The sample size was determined for each processing method using empirical methods, such as sample size calculations for factor analysis [67] and regression analysis [68]. The number of observations in the research sample must be determined according to the formula:  $n \geq 8m + 50$ . In addition, Hair et al. [67] recommended using SEM, CFA, and EFA on sample sizes higher than 200 and no less than 100 participants. In short,  $N = 298$  is the minimum sample size required for factor analysis and multiple regression analysis, and the population sample in this study produced 450 valid responses, which is efficient and reliable for further analysis.

### **3.3 Data collection and data analysis**

Researchers distributed questionnaires by sending emails to the SMEs in Vietnam. The collection period lasted 8 months, from March 2022 to November 2022. 468 respondents participated in the survey; however, only 450 valid responses were used for data analysis. All demographic information was kept confidential and only utilized for this study. To execute descriptive and inferential statistical processes, SPSS 25 and Smart PLS 4.0 software were adopted because they have been shown to have high statistical power for investigating regression analysis.

### **3.4 Data analysis**

#### **Sample characteristics**

Table 1 indicate that the largest proportion of the sample was female respondents (54.2% of total respondents). It is recognized that over the past few years, Vietnam has experienced considerable growth in the number of women occupying important positions and heads of departments. This is an encouraging trend. The study focuses on SMEs in Vietnam that are technologically innovative and where individuals not only work but also build a sense of community similar to that found in their homes. The primary industries represented in the survey were heavy industry (54%) and light industry (also known as the service industry), which had a response rate of 40.6%.

**Table 1.** Sample characteristics

<b>Value</b>	<b>Number</b>	<b>%</b>
<i>Female</i>	244	54.2
<i>Male</i>	206	45.8
<b><i>Total</i></b>	<b><i>450</i></b>	<b><i>100.0</i></b>
<i>Heavy industry</i>	243	54
<i>Service industry</i>	183	40,6
<i>Agricultural industry</i>	24	5,3
<b><i>Total</i></b>	<b><i>450</i></b>	<b><i>100.0</i></b>

### **Reliability and validity test**

The research project used an exploratory methodology to identify the underlying concepts represented by the first 31 measurement items. For parameter estimation, the maximum likelihood technique was chosen due to the consistency of its methodology, which enables it to be applied to a wide range of estimated situations [69]. Through exploratory factor analysis, many variable constructs were simplified to one component. To determine the validity and reliability of the variables, Cronbach's Alpha was applied. Higher values indicate that the items on the measurement scale have greater internal consistency. The alpha values for Cronbach can range anywhere from 0 to 1. A higher alpha value than 0.7 is recommended for optimal performance. According to the study's findings, all variable constructs had alpha values greater than 0.7, indicating that they are sufficiently reliable [70]. All 31 study items had loadings larger than 0.7, meaning they satisfied the criteria for the specified scale [67]. This was discovered during the examination of convergent validity. In addition, the composite reliabilities, or CRs, were more significant than 0.7, considered an acceptable benchmark [71]. In addition, each variable construct's average variance extracted (AVE) was higher than 0.5, indicating flourishing outcomes [70]. In addition, as seen in Table 2, every aspect of the research exhibited impressive levels of internal consistency, as indicated by Cronbach's alpha values that were higher than 0.7. The findings were within the acceptable range when the collinearity of the variables was evaluated using tolerance and the variance inflation factor (VIF) [70, 72]. Consequently, all of the scales demonstrated convergent validity and sufficient differentiation, which contributed to an increase in confidence in developing a hierarchical regression model.

**Table 2.** Reliability and validity analysis

	<b>Cronbach's alpha</b>	<b>Composite reliability (rho_a)</b>	<b>Composite reliability (rho_c)</b>	<b>Average variance extracted (AVE)</b>
<i>Business network resilience</i>	0,799	0,801	0,882	0,713
<i>Co-innovation</i>	0,937	0,938	0,946	0,613
<i>Impact of Covid-19</i>	0,871	0,874	0,912	0,721
<i>Organizational resilience</i>	0,790	0,803	0,864	0,616
<i>SMEs Performance</i>	0,878	0,879	0,905	0,577

In order to determine the reliability of the sample data, we employed SmartPLS 4.0, and the findings are presented in Table 2. Cronbach's Alpha for each scale was more significant than the threshold value of 0.7, which indicates that the scales are reliable [73]. Then, the convergent validity test findings revealed that the factor loading was greater than 0.7, the composite reliability (CR) was greater than 0.8, and the average variance extracted (AVE) was greater than 0.5. This suggested good convergent validity between the variables [70]. The fact that the square root of the AVE of any variable was higher than the absolute value of the correlation coefficient between that variable and all of the other variables was indicative of good discriminant validity between the variables, as shown by the results of the discriminant validity test [71]. The results of the tests are presented in Table 3.

**Table 3.** Discriminant analysis

	<b>Business network resilience</b>	<b>Co- innovation</b>	<b>Impact of Covid-19</b>	<b>Organizat ional resilience</b>	<b>SMEs Performa nce</b>
<i>Business network resilience</i>	0,844				
<i>Co-innovation</i>	0,490	0,783			
<i>Impact of Covid- 19</i>	0,361	0,399	0,849		
<i>Organizational resilience</i>	0,463	0,584	0,275	0,785	
<i>SMEs Performance</i>	0,534	0,554	0,380	0,520	0,760

In addition, we examined the multicollinearity issue among the variables by monitoring the variance inflation factor (VIF), and the findings indicated that there was no multicollinearity issue when the VIF was lower than 5 [67].

### Hypothesis tests

The findings of the hypothesis test are presented in Table 4 and were obtained by applying the bootstrapping method on SmartPLS 4.0. The Co-innovation, the Business network resilience, and the Impact of COVID-19 all significantly positively impacted the performance of SMEs ( $b=0.257$ ,  $p < 0.001$ ;  $b=0.242$ ,  $p < 0.001$ ;  $b=0.12$ ,  $p=0.005$ ). According to the study's findings, there is a significant positive influence on the association between co-innovation and business network resilience ( $b = 0.49$ ,  $p < 0.001$ ). In addition to this, co-innovation has a significant impact on the organizational resilience of an organization ( $b = 0.584$ ,  $p < 0.001$ ). In addition, we investigated the impact of COVID-19 as a moderator on both connections on SMEs performance. The findings indicate that the impact of COVID-19 moderates the relationship between organizational resilience and the SMEs performance ( $b=-0.114$ ,  $p < 0.05$ ). Although the findings suggest that the connection between Co-innovation, Business network resilience, and SMEs performance has not been affected by the impact of COVID-19 ( $b = 0.027$ ,  $p > 0.05$ ;  $b = -0.054$ ,  $p > 0.05$ ), these findings are inconclusive. Because of this, the H4c theory is rejected.

**Table 4.** Results of hypothesis testing

Hypothesis	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics ( O/STDEV)	P values	Results
<i>H1a</i>	0.466	0.466	0.042	10.994	0.000	Accepted
<i>H1b</i>	0.244	0.245	0.049	4.991	0.000	Accepted
<i>H1c</i>	0.411	0.411	0.044	9.360	0.000	Accepted
<i>H2</i>	0.206	0.207	0.050	4.104	0.000	Accepted
<i>H3</i>	0.257	0.256	0.042	6.135	0.000	Accepted
<i>H4a</i>	0.119	0.119	0.041	2.871	0.004	Accepted
<i>H4b</i>	-0.114	-0.113	0.055	2.060	0.039	Accepted
<i>H4c</i>	0.027	0.026	0.052	0.522	0.602	Rejected
<i>H4d</i>	-0.054	-0.051	0.046	1.164	0.244	Rejected

## 4. CONCLUSIONS AND IMPLICATIONS

The study makes an effort to emphasize the crucial roles that collaborative innovation and business network resilience play in assisting organizations in surviving the COVID-19 pandemic. This purpose will be clarified by answering the four research questions below:

### **RQ1: What are SMEs' business performance antecedents during the Covid-19 outbreak?**

The results show that SMEs' business performance antecedents are the impact of co-innovation, business network resilience, organizational resilience, and COVID-19. Similar to prior findings, co-innovation, business network resilience, and organizational resilience positively influence SME business performance. In which, co-innovation

also creates and inherits invaluable resources (tangible and intangible) and competencies to businesses; such as (1) the co-innovation in innovative product development with suppliers and customers - businesses might acquire value from their suppliers' innovative technology investments, be shared proprietary technologies, and gain new external knowledge and skills [8, 74-78] or (2) the co-innovation in innovative process development with multiple actors (e.g., government, supplier, manufacturer, employee, and customer) - businesses can create innovative value chain processes with the goal of faster, cheaper, and better innovation; be mutually shared unique technologies and mutual intellectual property; and improve existing processes (such as Just-in-time, TQM, Six Sigma, Lean Manufacturing) [79, 80]; or (3) the co-innovation in innovative business model development with partners specialist in manufacturing, finance, distribution, etc. - business might create a new value generation, and new distribution and consumption channels [80]. Meanwhile, a business network is viewed as an intangible external resource that may provide profitable information and knowledge to enterprises through effective exchanges in the network [81-83]. A network breadth may provide enterprises access to extensive and heterogeneous resources, whereas network depth can provide intensive, unique, and rare resources [83]. Hence, business network resilience might assist firms in leveraging their strengths and surpassing their weaknesses through the gathering of similar and complementary resources [84, 85].

Furthermore, business networks provide significant learning opportunities for organizations [86]. Therefore, co-innovation and business networks will improve SMEs' performance through operational efficiency and create new business opportunities. Moreover, the business performance of SMEs will be enhanced with high organizational resilience because an SME with solid organizational resilience has a more remarkable ability to manage disruptions, sustain operations during a crisis, and be highly responsive to changes (from market conditions, customer needs/demands, and technological advancements).

In contrast to earlier findings, this study suggests that COVID-19 positively impacts SMEs' business performance through co-innovation and business network resilience. This result can be explained as follows: (1) The modest size of SMEs gives them greater flexibility in responding to external influences [87-89]; (2) SMEs with great co-innovation and business network resilience will become more resilient and adaptable by sharing and inheriting supplementary or specialized resources, readily transforming obstacles into possible opportunities that other firms will not be able to achieve; (3) Along with other invisible external elements at the host nation in the research model, such as successful COVID-19 preventive policies or COVID-19 business support policies. Therefore, the more severe the impact of COVID-19 is, the more responsive businesses will be in their strategic practices related to co-innovation and business network resilience, thereby making the firms stronger and more efficient in challenging situations.

**RQ2: *How does Co-innovation influence SMEs' business networks and organizational resilience?***

The results indicate that a successful co-innovation could aid SMEs in strengthening their organizational resilience and business network resilience. In terms of business network resilience, effective co-innovation enables SMEs to use their partners' expertise, resources, and technologies to develop new goods and services, opening the potential for SMEs to access new markets and client fields [77]. Above all, the company will benefit from their innovative collaboration by extending their technical capabilities and improving worker skill levels. Consequently, SMEs can improve their reputation by accessing high-quality partners [14].

Effective co-innovation, on the other hand, may help SMEs enhance their organizational resilience in several ways, including (1) sharing the innovative risks and costs with partners to lessen their financial burden (during crisis times); (2) assisting businesses in acquiring new skills and competencies to improve their adaptive capacity to changing conditions; and (3) supporting businesses in accelerating the development of new solutions through synergy [5, 11]. However, SMEs must be aware that co-innovation also raises obstacles due to differences in industry, culture, and geography or intellectual property rights and ownership issues.

**RQ3: *Does the impact of COVID-19 moderate relationships between independent variables (co-innovation/business network/organizational resilience) and the dependent variable (business performance)?***

COVID-19 impacts only moderate the effectiveness of organizational resilience on business performance. That means the more robust the impact of COVID-19, the less effective organizational resilience is on company performance.

**RQ4: *What is the key to SMEs' success in the Covid-19 pandemic?***

Integrating co-innovation and business network resilience into the strategies of SMEs is one of the keys to helping businesses survive COVID-19. Besides numerous approaches recommended in earlier research, such as government support [4, 16, 90-92], digital transformation [18, 89, 93, 94], and innovation practices [27, 91, 95], it was evident that focusing on co-innovation and business network resilience is a long-term, sustainable, and safe alternative. First, businesses can actively control the situation rather than passively rely on government support (especially in nations with weak supportive policies). Second, compared to the digital transformation method, regarded as a costly strategy, Collaboration from various sources will help businesses reduce the burden on resources (materials, people, and finance). Pursuing a digital transformation strategy can involve several risks: (1) certain enterprises - that are extremely small in size, have limited capital, or are less adaptable to the changes - may unintentionally suffer financial challenges as a result of digital transition [96] or (2) developing nations frequently face numerous barriers to the digital transformation of their economies, such as poor communication network infrastructure and expensive equipment, which are beyond the risk management capabilities of SMEs [54]. Third, innovation is a vital remedy during a crisis [97-99]. However, SMEs, especially those in developing nations,

usually need more personal resources and capabilities to handle challenges in the innovation field [2, 100, 101]. As a result, focusing on co-innovation and business network resilience is a strategy worth considering during this crisis.

#### **4.1 Theoretical contributions**

Given the attempts of studies investigating the impact of co-innovation on the overall performance and resilience capability of SMEs, this study makes several contributions to the current literature. First, the originality of this research is empirically tested the research model based on RBV and Contingency Theory, confirming the generalization of these theories. Second, as mentioned in the Introduction, studies focusing on resilient factors are still blurred; the research results further explain co-innovation in crisis management and recovery. This would give a signpost for scholars for such empirical studies and practitioners to conquer the challenges caused by turbulent environments. Third, the results of this study also emphasized the Industry Organization (I/O) view when highlighting the role of the external environment towards business effectiveness. Specifically, COVID-19 has been examined the moderator role towards the ability to resilience and SMEs performance, which shows an alert for stakeholders to develop preparation for uncertainty and turbulence.

#### **4.2 Practical contributions**

The article's practical significance lies in examining the co-innovation's function as a crucial factor in aiding SMEs in the aftermath of the COVID-19 crisis. The epidemic has resulted in economic instability that surpasses the severity of the historic Great Recession. This has led to a significant concern regarding the disproportionate impact on SMEs. This study aimed to investigate the correlation between co-innovation and the performance of SMEs during times of crisis. This study revealed significant findings through a quantitative research methodology, including the participation of 450 SMEs and the use of SmartPLS 4.0 software for data analysis. The empirical data reveal a clear and favorable correlation between co-innovation, business network resilience, and the success of SMEs. These results offer a distinct plan for SMEs, emphasizing the crucial significance of co-innovation in improving their ability to withstand challenges and their overall effectiveness in a diverse economic setting.

Moreover, this study enhances comprehension of the correlation between co-innovation and business network resilience. It recognizes that co-innovation has a dual effect on SMEs, directly influencing them and playing a vital role in enhancing the resilience of their business networks. This conclusion emphasizes the crucial importance of co-innovation in sustaining the collaborative networks essential for the survival and prosperity of SMEs, considering the inherent difficulties and uncertainties posed by the epidemic. This study has significant implications that offer practical recommendations for SMEs, particularly in emerging countries. The approach emphasizes collaborating with stakeholders in co-innovation endeavors to lessen the enduring consequences of environmental volatility. Through co-innovation, SMEs can bolster their ability to adapt and recover, reinforce their connections within the business community, and improve their capacity to navigate and surmount the enduring ramifications of this

unparalleled catastrophe. This research emphasizes the practical significance of co-innovation for SMEs, providing a clear direction for these organizations to enhance their ability to adapt, reinforce their business connections, and ultimately succeed in overcoming the ongoing obstacles presented by the COVID-19 epidemic.

### **4.3 Limitations and future research**

While this study enriches the current knowledge for scholars and practitioners, some areas for improvement still encourage further research attempts. First, this study draws attention to Vietnam SMEs. Further research should extend the sample size to cross-country, such as the ASEAN cluster, so scholars can generalize results to broaden the scale. Second, this research highlighted the role of co-innovation in conquering the tremendous impacts of COVID-19. Almost all nations are moving to a 'new normal' pace; however, the pandemic influences are long-lasting on economic performance. Further studies should extend the research scope to investigate antecedents of organizational performance to provide navigation for enterprises.

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