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The COVID-19 Pandemic Impact and Responses in Emerging Economies: Evidence from Vietnamese Firms

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Abstract: A nationwide survey of 162,738 firms in Vietnam asked firms to report the impact of the COVID-19 pandemic on the health of the business, coping strategies used, and various firm and situational characteristics. More than 80% of firms reported negative impacts from the pandemic with fewer than 4% reporting positive effects; 63% of the firms adopted at least one coping strategy. The coping strategies were categorized into seven groups as follows: (1) Non-adoption, (2) promoting e-commerce, (3) transforming key products/services, (4) training employees to improve professional qualifications, (5) finding new markets for input materials, (6) finding markets for products outside of the traditional market, (7) producing new products/services according to market demand during the epidemic period, and (8) other strategies. A multinomial logit regression model showed statistically significant associations between a firm's selected coping strategy and several independent variables, as follows: (1) Firm size, (2) impact of the pandemic on firm health, firm access to inputs, and firm access to domestic markets, (3) decrease in firm revenue, and (4) receipt of government support. However, many businesses have not implemented coping strategies, leading to concerns regarding their resilience to upcoming threats and uncertainties.

Keywords: COVID-19 pandemic; impact; firms; response strategies; Vietnam

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1. Introduction

The first case of COVID-19 was reported in Vietnam on 22 January 2020, and by 21 March 2022, the Vietnam Ministry of Health had confirmed 7,958,048 cases and 41,880 deaths (Ministry of Health's Portal (MOH) 2022). The pandemic triggered a crisis with profound impacts, ranging from public health to the social and economic aspects of human life (Anh and Gan 2020; Bartik et al. 2020; Bui et al. 2022; Josephson et al. 2021; Tran et al. 2020). The pandemic has impacted firms all over the world. According to the International Labor Organization's projections, the number of full-time workers in Arab countries, Europe, Asia, and the Pacific is expected to decrease by 8.1%, 7.8%, and 7.2%, respectively (ILO 2020). In OECD countries, the social and economic impacts associated with the pandemic are expected to become much greater once the crisis is over (Sapir 2020). In EU countries, governments' responses to the pandemic have had negative economic effects as well, with the EU's GDP contracting by a record-high 6.4% in 2020 (Ţigănaşu et al. 2022). In addition, the pandemic has had a significant impact on the travel and tourism industry, as well as hotels, food services, retail, public health, and manufacturing (Alsuwailem et al. 2021; Erol and Saghaian 2022; Ganda 2021; Maliszewska et al. 2020; Meyer et al. 2022; Padhan and Prabheesh 2021). Over 80% of companies have taken action of some kind in an attempt to cope with the COVID-19 outbreak (World Bank 2020). Common coping strategies include labor-related measures and searches for alternative markets. Labor-related strategies include changing the job design, such as working from home or using flexible working hours, and cost-cutting measures, such as lowering wages, temporarily suspending contracts, and reducing the labor force.

The effects of the pandemic in Vietnam resemble its effects in other countries. The GDP growth rate during the first quarter of 2020 was the lowest of the previous ten years (3.82%) (General Statistics Office 2020). Labor-intensive industries, such as tourism, accommodation, aviation, and retail, were among the most severely impacted. Export-oriented manufacturing industries were also severely impacted (transport, footwear, wood processing, electronics, manufacturing, and food processing). The pandemic has had a significant impact on firms of all sizes, such as small and medium-sized businesses (SMEs), as well as household businesses. According to a survey conducted by the Prime Minister's Private Economic Development Advisory Board, if the pandemic continues for more than half a year, 74% of businesses in Vietnam are at risk of going bankrupt. As of mid-April 2020, the Vietnam General Statistics Office (GSO) announced that the pandemic had affected approximately 5 million workers and 84.8% of firms (General Statistics Office 2020).

The GSO surveyed 162,738 firms in Vietnam in April 2020 and September 2020, asking them to report the impact of the pandemic on the health of the business (positive impact, negative impact, or no impact), coping strategies used, and various firm characteristics. Our examination of the survey data revealed several categories of coping strategies:

- (1) Non-adoption (i.e., adopting no coping strategy).
- (2) Promoting e-commerce.
- (3) Transforming key products/services.
- (4) Training employees to improve professional qualifications/skills.
- (5) Finding new markets for input materials.
- (6) Finding markets for products outside of the traditional market.
- (7) Producing/providing new products/services according to market demand during the epidemic period.
- (8) Other strategies.

The GSO dataset included the number of employees at each firm, which allowed us to categorize the firms by the number of laborers. We used the categorization system established by the World Bank (2020), plus an additional category called "State-owned enterprises":

- (1) Micro enterprises, <9 Laborers.
- (2) Small enterprises, 10–49 Laborers.
- (3) Medium enterprises, 50–249 Laborers.
- (4) Large enterprises, >250 Laborers.
- (5) State-owned enterprises.

We then analyzed the GSO data to determine whether a Vietnamese firm's choice of coping strategy is related to firm size or other firm characteristics. Several previous studies have investigated coping strategies at the level of the firm (Hu and Zhang 2021; Lee and Yang 2022; Meyer et al. 2022; Škare et al. 2021; Thukral 2021). However, there are limited studies examining the factors behind firms' choice of coping strategies for the pandemic (Bartik et al. 2020; Umaña-Hermosilla et al. 2020). Further, the literature on the nation of Vietnam contains no overall assessment of the damage caused by the pandemic, nor does it discuss the factors driving the adoption of coping strategies or government support activities (Vinh 2021).

2. Literature Review

Several empirical studies have focused on the detrimental effects of the recent global epidemic in emerging economies, such as Vietnam. The COVID-19 pandemic is not only a global public health emergency, but also has significant effects on energy, the economy, and the environment (Priya et al. 2021). Shang et al. (2021) show that the pandemic has had short-term fiscal and long-term economic effects on nations. This study applied a general equilibrium approach to 2019–2020 quarterly economic data and confirmed the profound economic impact of pandemic outbreaks and health diseases on capital markets, labor markets, foreign trades, consumption, and production. Shen et al. (2020) analyzed

the effect of the pandemic on the performance of listed Chinese companies, using the net profit return rate across a variety of business sectors and geographical locations. The study used a Differences-in-Differences (DID) model to show that lower corporate revenues as a result of the pandemic resulted in poorer firm performance. Škare et al. (2021) verified that the pandemic was responsible for a significant drop in corporate performance. These findings are in agreement with the findings of Hu and Zhang (2021), who analyzed the impact of COVID-19 on firm performance using financial data from companies all over the world. Other empirical evidence has investigated the impact of COVID-19 on firm performance by examining the daily stock returns of Vietnamese companies listed on the Hanoi Stock Exchange (HSX) and the Ho Chi Minh Stock Exchange (HOSE) (Anh and Gan 2020). Panel-data regression models are used to assess how the daily increase in the number of COVID-19 confirmed cases during pre-lockdown and lockdown affected daily stock returns for 723 listed firms in Vietnam. In general, the study concludes that, regarding the HOSE, the financial sector was the sector that was most negatively impacted by COVID-19. This was followed by the industrial and consumer goods sectors; however, the utility sector was most severely affected by the pandemic.

Recent studies have investigated a wide range of pandemic effects, such as unemployment, investment, and stress-related issues, including the relationship between business-related issues and the stress caused by COVID-19 in developing countries. These studies also investigated the impact of COVID-19 on business performance. Nordhagen et al. (2021) used data from 367 agri-food enterprises in 17 countries collected in May 2020 for the study. According to the findings, 80% of the business owners who were polled had a stress score higher than four. This suggests that 80% of business owners experienced stress and anxiety as a result of the lockdown. In addition, the negative effects of the COVID-19 outbreak on working capital, employment, and future marketing campaigns have significantly increased firms' stress levels. In contrast, digital capabilities and health safety nets contributed to a reduction in stress scores. Lee and Yang (2022) examined the direct causal effect of the pandemic on local employment in South Korea; they found that regional factors have a greater negative impact on service employment than manufacturing employment, and that low-skilled workers are more affected by the pandemic than high-skilled workers. Moreover, Olczyk and Kuc-Czarnecka (2021) used microdata from a World Bank survey of over 15,729 companies conducted between April and September 2020. The logistic regression results show that COVID-19 has a negative impact on the performance of companies in almost all countries, particularly in developing countries and in the services sector. In the case of Vietnam, using mixed methods to analyze data collected from 280 respondents working in the tourism industry, Huynh et al. (2021) found that the various COVID-19 waves had varying levels of impact on local tourism destinations. In detail, compared to other stakeholders, travel agencies suffered the greatest economic losses among tourism businesses.

Furthermore, a growing body of research has focused on policy responses implemented by a number of governments to deal with the negative effects associated with the pandemic. To provide comprehensive policy directions in response to COVID-19, Hu and Zhang (2021) emphasized the macro effects of COVID-19. Examples of these macro-effects include their negative impacts on the stock market, exchange rates, and oil prices. According to the findings of this study, coordinating monetary policy, macro regulations, and fiscal policy is one of the most effective ways to mitigate the negative effects of pandemics such as COVID-19. Furthermore, based on contingency theory, Ajmal et al. (2021) conclude that prolonged movement control orders, social distancing, and lockdowns caused the global economic downturn, disrupted demand and supply chains, reduced the workforce, and cost many jobs. The Vietnamese government has exerted a significant amount of effort to control the spread of new cases by enforcing policies including the closure of borders, bans on entry, economic lockdowns, isolating affected areas, and quarantine (Tran et al. 2020). Firm owners have adopted various response measures to cope with the pandemic. In addition, because the global pandemic has a continuing impact on the economy and

businesses, evidence-based information is required to support policymaking and help individuals better cope with the pandemic. The body of research on Vietnam, on the other hand, is lacking studies on impacts and coping measures using large-scale nationally representative surveys (Anh and Gan 2020; Bui et al. 2022; Tran et al. 2020). This study addresses that shortage by using data from a large-scale nationwide survey to study the effects of the pandemic at the level of the firm.

3. Methodology

3.1. Data

We used data from a large-scale nationally representative survey covering all 63 provinces, firm types, and firm sizes with a sample of 162,738 surveyed firms. The GSO responded to a request to provide prompt information as a basis for government intervention in April 2020 by implementing a national survey on the impact of COVID-19 on enterprises and business activities. Subsequently, the GSO conducted a second round of surveys in September 2020. This survey aims to gather information on the impact of COVID-19 on the production, business activities, and coping strategies of various enterprises. These findings will enable governments and policymakers to propose appropriate policies and solutions to assist businesses in better coping with the ongoing pandemic across all economic sectors and in a variety of regions. The scope of the survey included the entirety of the country, with operations in all economic sectors (Figure 1), with the exception of Communist Party activities and businesses related to security and defence. In addition, the survey collected essential firm information such as name, address, phone, fax, and email addresses as well as tax codes, economic types, and principal business activities. The survey asked respondents to rate the overall impact of the pandemic on their firm (either positive impact, negative impact, or no impact). The survey also asked respondents to rate the impacts on the availability of domestic raw materials, the domestic consumption market, and the export market. The survey further asked about the operating status (either currently open, temporarily closed, permanently closed, or bankrupt), revenue history, and whether the firm had received government support for COVID-19 relief. Finally, the survey asked respondents to report any coping strategies used.

The survey was conducted using an online voluntary method that was based on a web-based questionnaire. Companies that work in a variety of manufacturing industries, such as agriculture, mining, processing and manufacturing, construction, wholesale and retail, transportation and warehousing, accommodation and food services, information, finance and insurance, real estate, education, and healthcare, were the primary focus of the survey. It should be emphasized that small business households and SMEs account for the large majority, approximately 90%, of the 162,738 enterprises that took part in the survey (Figure 2).

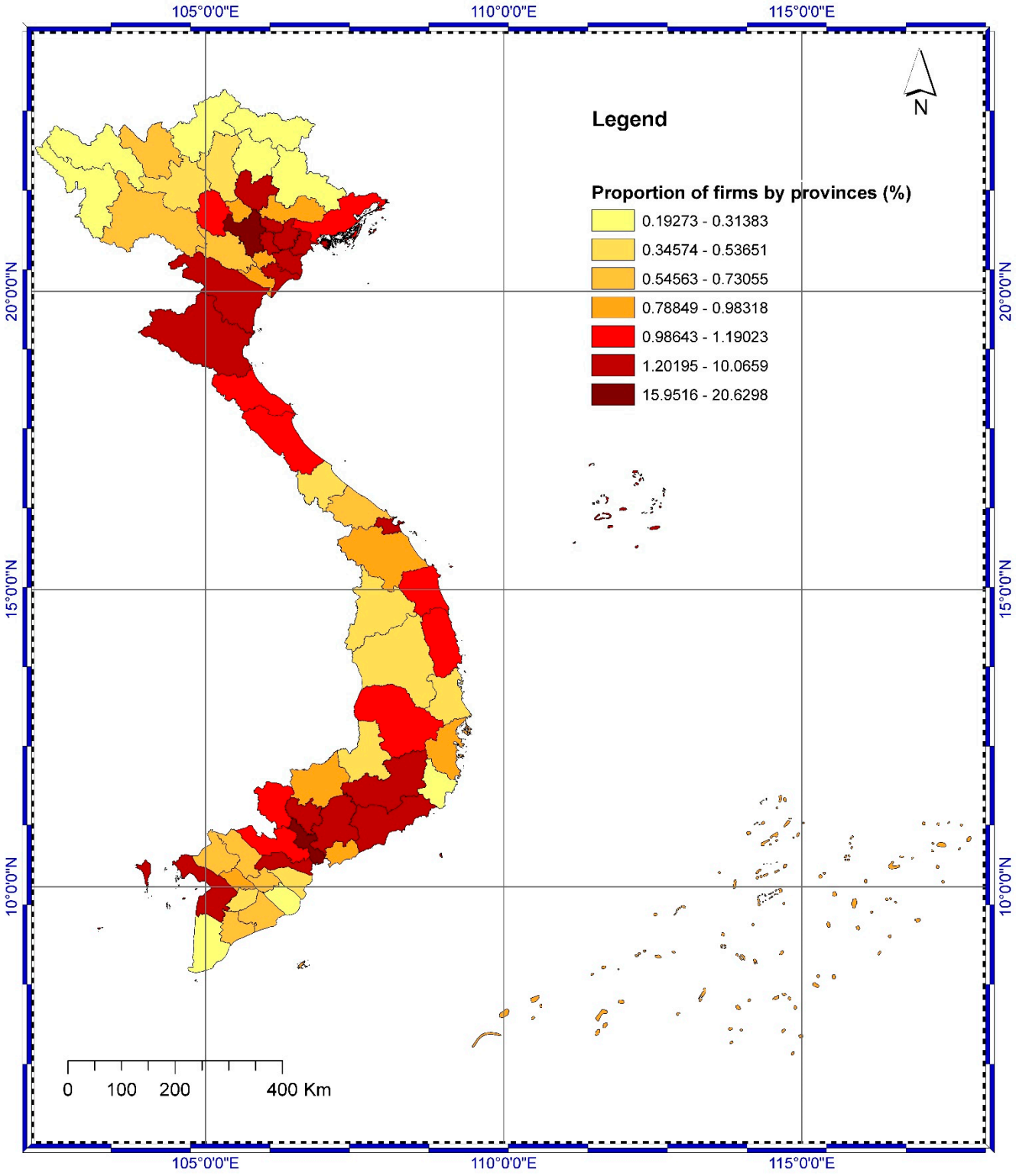

Figure 1. Geographical distribution of firms responding to the 2020 GSO firm survey in Vietnam (%). *Source: Author's calculations*.

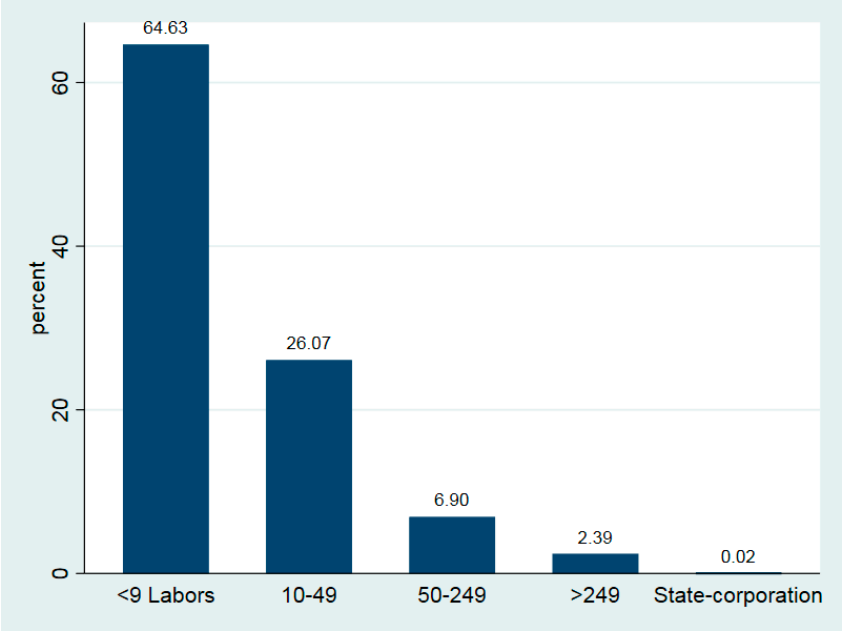

Figure 2. Firm size classifications in the 2020 GSO firm survey. *Source: Author's calculations*.

3.2. Data Analysis and Empirical Model

In this study, descriptive analyses and a multinomial logistic regression (MNL) model were utilized to investigate the overall impact of the pandemic on firms as well as the factors associated with firms' choice of coping strategies. First, we divided the firms into categories established by the World Bank (2020). The classifications of the World Bank (2020) are used as the basis for the division of firms into groups according to the number of employees they have, with micro enterprises having fewer than nine workers, small enterprises having between 10 and 49 workers, medium enterprises having between 50 and 249 workers, and large enterprises having more than 249 workers. Notably, all state-owned enterprises in the Vietnamese economy have specialized management systems, production scales, and support policies. As a result, this empirical study divides state-owned enterprises into separate groups to conduct further research and analysis. To generalize the overall picture of the differences in company revenue between 2019 and 2020, we used non-parametric local polynomial regression. If the cumulative distribution area in 2020 is smaller than that in 2020, the pandemic will have a negative impact on the revenue of a company from year to year. This can be observed graphically. It is common practice to use the non-parametric analysis as a method for obtaining a "first look" at any potential impact without making any assumptions about the distribution of the population (Krzywinski and Altman 2014).

Vietnamese companies have implemented many different forms of responses (see Table 1), including fostering growth in online business, transforming essential goods and services, training aimed at enhancing the professional qualifications and skill sets of employees, discovering untapped markets for the materials used, finding alternative markets for the consumption of output products that are not the traditional market, manufacturing or providing newly developed goods or services in response to changes in market demand, and alternative strategies. The survey data allowed us to identify and categorize the coping strategies used by each firm. These responses can be categorized as nominal outcome variables. Multinomial logistic regression was used to model the nominal outcome variables. The microeconomic analysis of choice behavior using the MNL model has been well-documented (McFadden 1974; McFadden 1984) and widely applied in the literature (Ovchinnikov et al. 2014; Matějka and McKay 2015). Within this methodology, the log odds of the outcomes were modeled as a linear combination of predictor variables. The model estimates the probability of belonging to a category as a dependent variable using a number of other factors as independent variables. In this study, the dependent variable

is a categorical variable, which means that it can be either the coping strategy used by companies with a base category of zero or the non-adoption of any coping measure. In light of this, an MNL model is the appropriate choice for predicting the probabilities for the eight categories of a qualitatively dependent variable Y using a set of explanatory variables X, as is the case here.

$$\Pr(Y_{ik}) = \Pr(Y_i = k|\boldsymbol{x_i}; \boldsymbol{\beta}_1, \boldsymbol{\beta}_2, \ldots, \boldsymbol{\beta}_m) = \frac{\exp(\beta_{0k} + \boldsymbol{x_i}\boldsymbol{\beta_k'})}{\sum_{j=1}^{m} \exp\left(\beta_{0j} + \boldsymbol{x_i}\boldsymbol{\beta_j'}\right)} \text{with } k = 0, \ldots, 7 \quad (1)$$

Table 1. Descriptive statistics for response strategies by firm size.

Strategies	Micro Enterprises		Small Enterprises		Medium Businesses		Large Businesses		State-Owned Enterprises		Full Sample	
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**	**Freq.**	**%**
0	36,274	36.54	11,827	29.54	2610	24.64	9845	76.96	0	0	60,556	37.21
1	6247	6.29	2074	5.18	518	4.89	144	1.13	3	10.71	8986	5.52
2	3599	3.62	1260	3.15	225	2.12	59	0.46	2	7.14	5145	3.16
3	6042	6.09	3475	8.68	1051	9.92	343	2.68	2	7.14	10,913	6.71
4	4473	4.51	2005	5.01	572	5.40	223	1.74	0	0	7273	4.47
5	19,172	19.31	8708	21.75	2611	24.65	953	7.45	2	7.14	31,446	19.32
6	11,078	11.16	5555	13.87	1640	15.48	748	5.85	12	42.86	19,033	11.70
7	12,399	12.49	5137	12.83	1365	12.89	478	3.74	7	25.00	19,386	11.91
Total	99,284	100	40,041	100	10,592	100	12,793	100	28	100	162,738	100

Source: Author's calculations. Note: Coping strategies (1) non-adoption; (2) promoting e-commerce; (3) transforming key products/services; (4) training to improve professional qualifications/skills for employees; (5) finding new markets for input materials; (6) finding markets for products outside of the traditional market; (7) producing/providing new products/services according to market demand during the epidemic period; and (8) other strategies.

Thus,

$$\Pr(Y_{i1}) = \frac{1}{1 + \sum_{j=2}^{m} exp\left(\beta_{0j} + \boldsymbol{x}_i\boldsymbol{\beta_j'}\right)} \quad (2)$$

And

$$\Pr(Y_{ik}) = \frac{exp(\beta_{0k} + \boldsymbol{x}_i\boldsymbol{\beta_k'})}{1 + \sum_{j=2}^{m} exp\left(\beta_{0j} + \boldsymbol{x}_i\boldsymbol{\beta_j'}\right)} \text{ with } k = 0, \ldots, 7 \quad (3)$$

where X represents a set of explanatory variables, β represents the set of coefficients to be estimated, and the base category is $(k = 0)$. The selection of explanatory variables was based on a review of the literature and the availability of the variables of interest in the dataset. Key variables include the firm size, labor availability, revenue change, ranking of the effect of the pandemic on firms, the impact of the pandemic on the market, and support from the government.

The probability (log odds) ratio for the kth category Y was as follows:

$$\ln\left(\frac{\Pr(Y_{ik})}{\Pr(Y_{i1})}\right) = \beta_{0k} + \boldsymbol{x}_i\boldsymbol{\beta_k'} \text{ with } k = 0, \ldots, 7 \quad (4)$$

The regression model is estimated by maximizing the log-likelihood function as follows:

$$\textbf{max} \qquad \sum_{i=1}^{n} \ln[Pr(Y_i = y_i|\boldsymbol{x_i}; \boldsymbol{\beta})] \quad (5)$$

$$\beta \in \mathbb{R}^{(m-1)\cdot(c+1)}$$

The results of the MNL model were interpreted in terms of odds ratios (ORs) or ratios of the probability of selecting one outcome category to the probability of selecting the category of references. Thus, the coefficients from the multinomial logit can be difficult

to interpret, and another way to evaluate the effect is to calculate the marginal effects. To better comprehend the sensitivity of the probability of adoption given the explanatory variables, we estimate and report the marginal effects using Equation (6).

$$\frac{\partial \Pr(Y_{ij})}{\partial x_{ik}} = Pr_{ij}[\,\beta_{jk} - \sum_{k=0}^{j} \Pr(Y_{ik})\beta_{k0}\,] \text{ with } k = 0, \ldots, 7 \quad (6)$$

A positive parameter indicates that the relative likelihood of adopting a strategy increases proportionally with the likelihood of non-adoption. The larger the marginal effect, the greater the influence of the explanatory variable on the dependent variable. As is typical for discrete variables, the marginal effect is calculated as the difference between the probabilities estimated from the sample means and actual probabilities.

4. Results and Discussions

4.1. Assessment of the Impact of the COVID-19 Pandemic on Firm Performance

4.1.1. Impact of Pandemic by Firm Size

Based on a cross-country enterprise survey using an electronic questionnaire (web form) by the GSO, we classify firms into five categories according to their labor size: micro, small, medium, large, and state-owned enterprises. The results showed that the COVID-19 pandemic has dramatically affected the production and business activities of all enterprises in Vietnam (Figure 3).

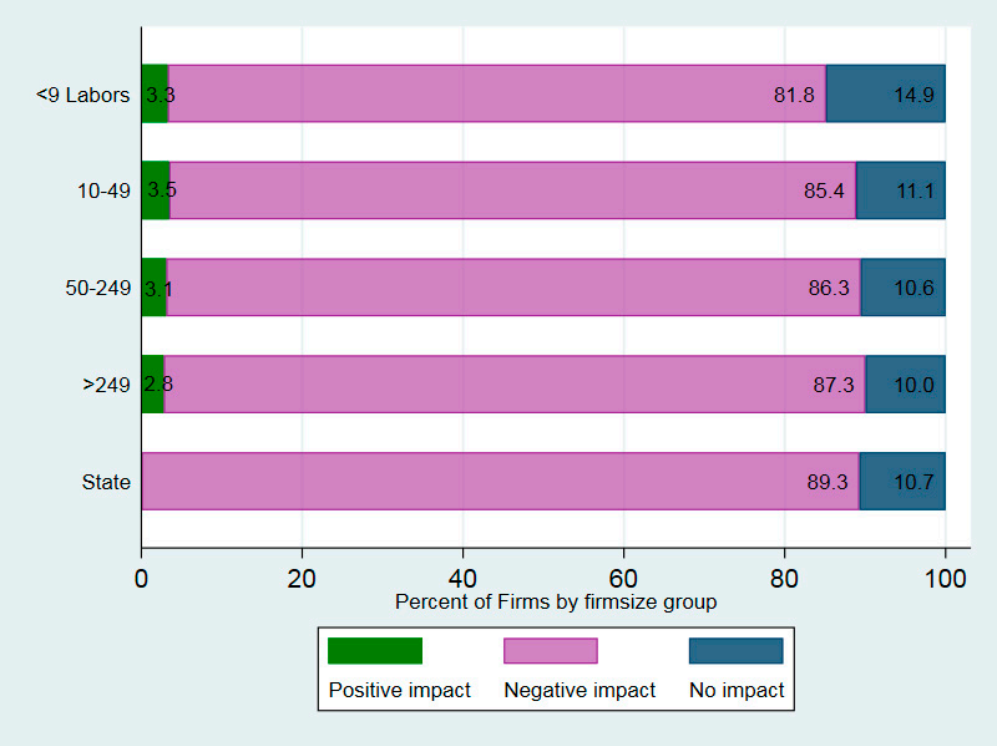

Figure 3. Overall assessment of businesses on the impact of the COVID-19 pandemic by firm classifications. *Source: Author's calculations*.

Figure 3 shows that the majority of the companies responding reported negative impacts as a result of the pandemic, with larger companies being more severely impacted. More specifically, large-scale businesses with more than 249 employees, accounting for approximately 7.8% of the sample, reported that they were heavily affected by the COVID-19 pandemic, accounting for 96.3% of the total sample. Additionally, it was confirmed that the pandemic had a negative impact on over 80% of businesses on the smaller side. This result contradicts the findings of Nordhagen et al. (2021), who investigated the impact of

COVID-19 on micro-, small-, and medium-sized enterprises in the food industry across 17 countries and concluded that the youngest firms (i.e., those that had been operating for less than one year) with fewer employees were less likely to be severely impacted by the virus. In addition, many state-owned corporations, accounting for approximately 89% of the surveyed businesses, were negatively affected by the pandemic. It is important to note that no state-owned enterprises have benefited in any way from the COVID-19 pandemic.

On the other hand, approximately three percent of small-to-medium businesses saw a positive impact from the pandemic. These companies have altered their business models in response to the COVID-19 crisis to convert the challenges associated with pandemics into opportunities, particularly through the expansion of their online trading systems (Thukral 2021). Thus, some agile firms have been able to innovate and reap benefits from the pandemic.

4.1.2. Impact of Pandemic on Firm Operating Status

The operating status of Vietnamese businesses has suffered as a direct result of the spread of pandemics, social isolation, and lockdown. The pandemic had a negative impact on all businesses that had to be shut down for good or declared bankruptcy (Figure 4). In addition, 83.1% of businesses in the economy that are still open for business experienced a negative effect as a result of the COVID-19 outbreak, followed by 87.5% of businesses that temporarily closed their doors. This was observed. Although the crisis brought on by the COVID-19 outbreak has had a negative impact on the operational status of most businesses in Vietnam, only a few have managed to find profitable business opportunities despite the pandemic. More specifically, the percentage of operating businesses that have seen positive effects as a result of the pandemic is 3.3%, which is lower than that of temporarily closed businesses (3.8%). Consequently, the outbreak of the COVID-19 pandemic may present business opportunities for certain types of businesses that can successfully adapt to "new normal" circumstances.

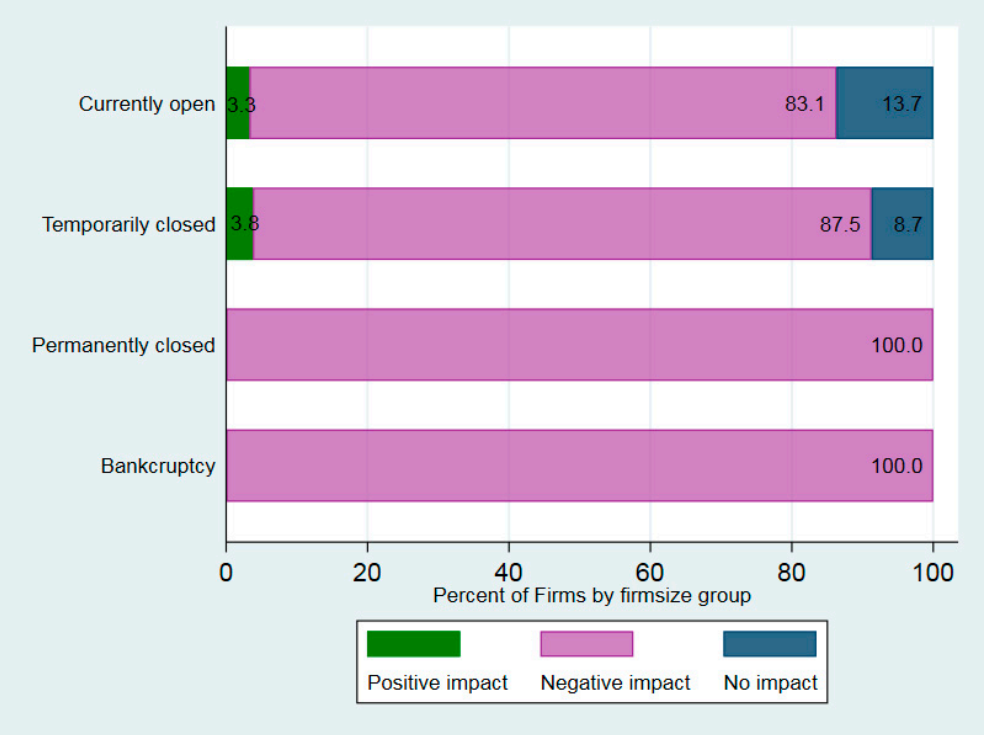

Figure 4. Overall assessment of businesses on the impact of the COVID-19 pandemic by operating status. *Source: Author's calculations*.

4.2. Assessment of the Impact of the COVID-19 Pandemic on Firm Revenue

Figure 5 shows the results of the kernel density estimation comparing the distribution of revenue in 2019 (in Vietnamese Dong) to the distribution of revenue in 2020 for each firm size. When we compare the revenue of the company between the two years of interest, we find that their unconditional distributions will move further to the left by 2020. According to these findings, there are likely to be adverse effects on revenue in 2020 compared to 2019 (Figure 5). Consequently, the COVID-19 pandemic has had a detrimental impact on companies' production and business activities. Figure 5 demonstrates how compliance with social distancing and government policies meant to combat the COVID-19 pandemic has impacted the majority of businesses. This finding is consistent with that of Brucal et al. (2021), who reported a decrease in sales of nearly 63% in South Asian businesses located in developing countries. Figure 5 also illustrates how the decrease in firm revenue caused by the COVID-19 outbreak varied according to firm size. According to our findings, the revenue of state-owned enterprises decreased most significantly among all business groups examined in this study. Lockdowns and social distancing are two examples of policies implemented by the government that have contributed to a negligible decline in revenue for businesses employing 50 people or more. In addition, businesses with 50 or more staff members continued to have a higher employee turnover rate than other groups.

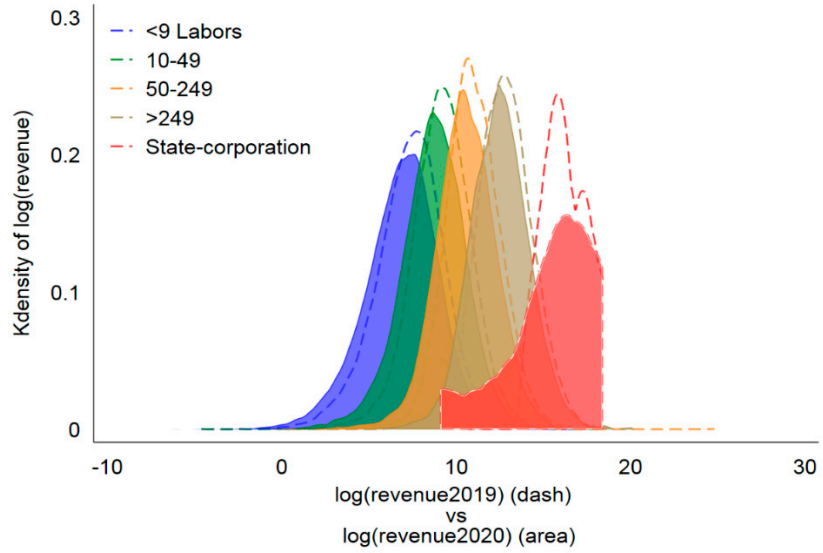

Figure 5. Overall assessment of the impact of the COVID-19 pandemic on firm revenue. *Source: Author's calculations.*

4.3. Assessment of Firm Responses to the Impact of the COVID-19 Pandemic

Figure 6 shows various ways in which different company groups dealt with the impact of the COVID-19 pandemic. In response to the pandemic, approximately 40% of the smaller companies with nine or fewer employees did not implement any strategy (Figure 6). Thirty percent of the market share was held by businesses that utilized the updated market search strategy but had fewer than nine employees. In the meantime, only ten percent of the businesses that were surveyed implemented additional strategies, such as promoting e-commerce, transforming products and service methods, training employees, and finding source input, and the "finding many new markets" strategy was applied by approximately 30% to 40% of large enterprises and SMEs, respectively, as a means of coping with the COVID-19 pandemic.

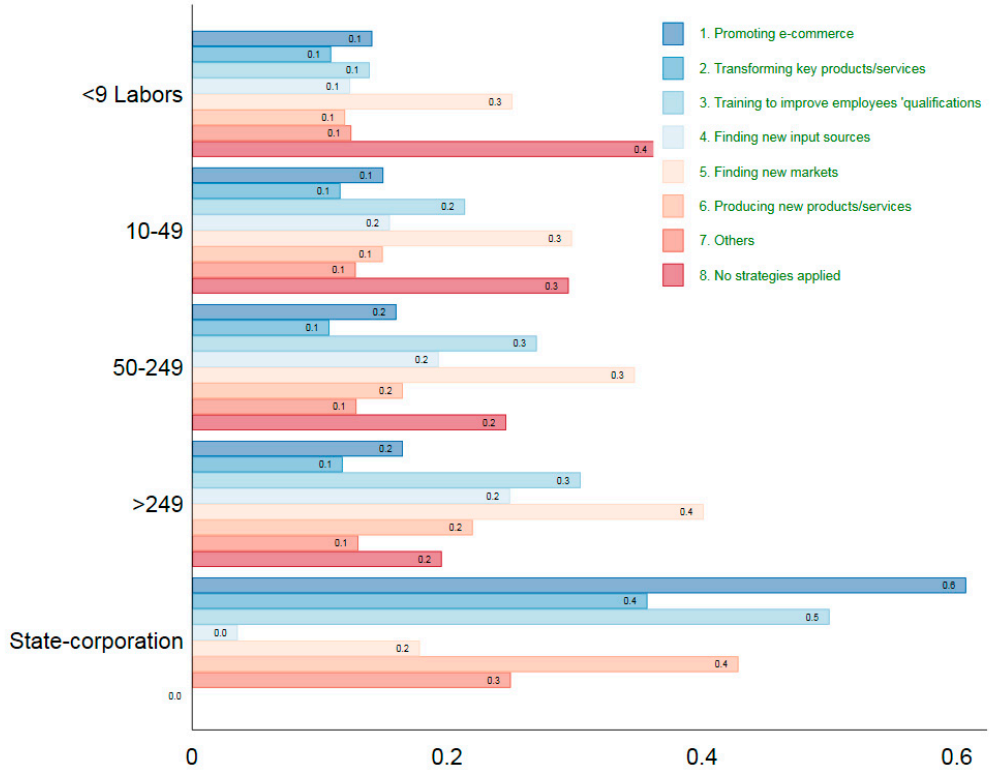

Figure 6. Firm response strategies to the impact of the COVID-19 pandemic by firm size. *Source: Author's calculations*.

As a response strategy to the pandemic, "improving employee capacity" was selected as a response strategy by 30% of businesses. However, approximately 20% of businesses with more than 50 employees did not use any strategy. Additionally, the findings of this study indicate a significant gap between state-owned companies and other types of companies. At least one plan to reduce the risks and consequences of the COVID-19 pandemic has been implemented across the boards of state-owned businesses. For instance, most state-owned businesses (80%) use promotions related to online commerce. In light of the pandemic, approximately half of the state-owned businesses have encouraged employee education and development. In addition, approximately the same proportion of SMEs was involved in the transformation strategy and development of new products and services.

4.4. Factors Affecting Firm Choices of Response Strategies

Table 1 presents descriptive statistics of the dependent variable—firms' response strategies by firm size—used in the multinomial logistic regression model. The dependent variable is a categorical variable representing the seven coping strategies with values ranging from 1 to 8 where the base category is (k = 1), or non-adoption. Overall, the majority of firms (67.3%) reported applying one or more response strategies to cope with the pandemic (Table 1). Among the different strategies applied, 'finding markets for products outside of the traditional market' is by far the most popular one. For independent variables under consideration in Table 2, the revenue per labor change (in log form) over the 2019–2020 period has an average value of 5.16. It is important to note that firms' revenue had declined significantly due to the impact of the pandemic, as shown in Figure 5. In addition, the majority of Vietnamese enterprises in the sample are micro and SMEs, accounting for 61% and 31% of the sample, respectively. The pandemic also affected firms' workforce at different levels. In the assessment of the impact of the COVID-19 pandemic on the input, export, and domestic markets of surveyed firms, firms generally reported a decline in access to those markets as a consequence of various intervention policies such as social distancing, travel bans, and lockdowns. Further, the percentage of firms that received

support from the government is moderate (17.5%). The Vietnamese government constantly supports enterprises in the form of credit support, tax extensions, and policies to support employers and employees. However, due to budget constraints, only a limited number of firms have access to those policies.

Table 2. Descriptive statistics of the sample characteristics.

Numerical Variables	**Mean**	**Std. Dev.**
Revenue per labor change 2020 vs. 2019 (log)	5.16	1.94
Number of employees temporarily taking unpaid leave (persons)	1.07	18.8
Number of employees on leave/rotational leave (persons)	2.17	84.5
Categorical Variables	**Frequency**	**Percent**
Firm size (smallest to largest, 1–5)		
1	99,284	61.01
2	40,041	24.60
3	10,592	6.51
4	12,793	7.86
5	28	0.02
Enterprises overall assessment on the impact of Covid-19 (1 = negative, 2 = neutral, 3 = positive)		
1	5073	3.12
2	136,962	84.16
3	20,703	12.72
Impact assessment on source of domestic raw materials (1 = decrease, 2 = unchanged, 3 = increase)		
1	38,516	34.53
2	69,946	62.71
3	3074	2.76
Impact assessment on domestic consumption market (1 = decrease, 2 = unchanged, 3 = increase)		
1	97,247	68.56
2	42,546	30.00
3	2042	1.44
Impact assessment on export market (1 = decrease, 2 = unchanged, 3 = increase)		
1	15,595	46.97
2	17,088	51.47
3	516	1.55
Received support from government (yes = 1)		
0	134,240	82.49
1	28,498	17.51

Source: Author's calculations.

To investigate the factors associated with the decision to adopt any given coping measure to deal with the pandemic, we estimated a multinomial logistic regression model with the base category of non-adoption (k = 1). The coefficients from the MNL model can be difficult to interpret; therefore, we report the marginal effects indicating the change in the probability of falling into a specific category (1–8). Table 3 presents the estimated results of the marginal effects of the MNL model.

Table 3. The estimated results of marginal effects by multinomial logistic regression model.

Variables	Strategy (2)	Strategy (3)	Strategy (4)	Strategy (5)	Strategy (6)	Strategy (7)	Strategy (8)
Revenue per labor change 2020 vs. 2019 *(log)*	−0.004 *** (0.001)	−0.002 * (0.001)	−0.004 *** (0.002)	−0.001 (0.001)	−0.013 *** (0.003)	−0.004 * (0.002)	−0.002 (0.002)
Number of employees temporarily taking unpaid leave *(persons)*	−0.000 (0.000)	0.000 *** (0.000)	0.000 *** (0.000)	0.000 (0.000)	−0.000 (0.000)	0.000 * (0.000)	−0.000 (0.000)
Number of employees on leave/rotational leave *(persons)*	−0.000 (0.000)	−0.000 (0.000)	0.000 *** (0.000)	−0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 * (0.000)
Firm size							
2 Small	−0.028 *** (0.007)	−0.003 ** (0.004)	0.011 *** (0.006)	0.001 * (0.008)	0.044 *** (0.014)	0.020 * (0.010)	−0.009 (0.012)
3 Medium	−0.035 *** (0.008)	−0.022 * (0.005)	0.007 *** (0.008)	−0.009 * (0.007)	0.108 *** (0.024)	0.037 * (0.016)	−0.045 *** (0.014)
4 Large	−0.047 *** (0.009)	−0.019 * (0.005)	0.014 *** (0.008)	0.006 * (0.013)	0.087 *** (0.023)	0.063 * (0.036)	−0.035 ** (0.014)
Enterprises overall assessment on the impact of COVID-19 *(1 = negative, 2 = neutral, 3 = positive)*							
2 Neutral	−0.069 *** (0.016)	−0.007 * (0.013)	0.017 * (0.01)	−0.026 * (0.012)	0.035 (0.024)	0.022 (0.014)	−0.000 (0.013)
3 Positive	−0.082 *** (0.017)	−0.023 * (0.014)	0.032 ** (0.013)	−0.020 (0.021)	−0.014 (0.033)	0.011 (0.026)	−0.057 * (0.024)
Impact assessment on source of domestic raw materials *(1 = decrease, 2 = unchanged, 3 = increase)*							
2 Unchanged	−0.024 *** (0.004)	−0.007 (0.004)	−0.003 (0.005)	−0.072 *** (0.006)	0.049 *** (0.012)	−0.014 * (0.007)	−0.003 (0.008)
3 Increase	−0.031 * (0.017)	0.001 (0.015)	−0.037 *** (0.009)	−0.015 (0.013)	0.065 * (0.028)	0.034 (0.027)	−0.022 (0.023)
Impact assessment on domestic consumption market *(1 = decrease, 2 = unchanged, 3 = increase)*							
2 Unchanged	−0.001 (0.005)	0.002 *** (0.005)	0.023 *** (0.008)	0.015 * (0.009)	−0.094 *** (0.010)	−0.041 *** (0.011)	0.013 (0.009)
3 Increase	−0.040 *** (0.015)	0.012 ** (0.016)	0.006 (0.025)	0.078 *** (0.028)	−0.006 (0.037)	0.046 (0.057)	−0.018 (0.036)
Impact assessment on export market *(1 = decrease, 2 = unchanged, 3 = increase)*							
2 Unchanged	0.014 *** (0.005)	0.004 *** (0.004)	0.029 *** (0.008)	0.009 (0.006)	−0.028 (0.014)	−0.037 *** (0.010)	−0.012 * (0.009)
3 Increase	0.097 * (0.05)	0.014 ** (0.019)	0.015 (0.027)	0.026 (0.027)	0.023 * (0.055)	−0.019 (0.035)	−0.092 (0.023)
Received support from government *(yes = 1)*	−0.010 * (0.006)	−0.006 * (0.004)	−0.001 (0.005)	0.002 (0.005)	0.026 ** (0.011)	0.009 (0.009)	0.000 (0.009)

Note: (i) Coping strategies: (1) Non-adoption; (2) promoting e-commerce; (3) transforming key products/services; (4) training to improve professional qualifications/skills for employees; (5) finding new markets for input materials; (6) finding markets for products outside of the traditional market; (7) producing/providing new products/services according to market demand during the epidemic period; and (8) other strategies. (ii) * Sig. $\leq$ 0.05, ** Sig $\leq$ 0.01, *** Sig $\leq$ 0.001. (iii) Robust standard errors in parentheses.

Overall, the results indicate that factors such as revenue change, firm size, and the assessment of the impact of the pandemic have a significant relation to the probability of adopting a particular coping strategy in response to the pandemic. Adverse changes in the firm's external environment, as measured by the self-reported overall impact of the pandemic, the impact on domestic markets, the impact on export markets, and on the availability of domestic raw materials typically increased the probability of adoption of any given coping strategy. In contrast, the number of employees on leave, whether paid or unpaid, had little effect on the choice of coping strategy. Somewhat surprisingly, a decrease in revenue per laborer correlates with decreased adoption of several strategies. Firm size had a mixed effect: Larger firms showed an increased likelihood of adopting certain coping strategies but a decreased likelihood of adopting others.

Specifically, the results show that a one-unit decrease in the level of revenue per laborer (2020 versus 2019; in log form) is associated with a statistically significant decrease in the probability of applying the following response strategies: (2) Promoting e-commerce, (3) transforming key products/services, (4) training to improve professional qualifications/skills for employees, (6) finding markets to consume output products outside the traditional market, and (7) producing/providing new products/services according to market demand during the epidemic period.

The impact of increasing firm size on the probability of adopting a particular coping strategy varies across coping strategies, with negative signs for strategies (2-3-8) and positive signs for strategies (4-6-7). Thus, larger firm size is associated with a higher probability of adopting '(3) training to improve professional qualifications/skills for employees', '(5) finding markets for products outside of the traditional market', and '(6) producing/providing new products/services'. Firm size is a key variable among the factors affecting a firm's decision to adopt coping measures. All seven coping strategies applied by firms were associated with different levels of firm size. This indicates that Vietnamese firms of different sizes can cope actively with external shocks that affect their performance, but they cope in different ways.

With regard to firms' self-assessment of the impact of the pandemic, the adoption of an e-commerce strategy is positively associated with firms that reported decreases in input and export markets. The marginal effects for "received support from government" are statistically significant and negatively correlated with the adoption of (2) e-commerce (-1%) and (3) transforming key products/services (-0.6%), but positively correlated with firms' 'choice of (6) finding markets for products outside of the traditional market', (+2.6%). This indicates a moderating effect of support policies on Vietnamese firms in overcoming the detrimental consequences of the COVID-19 pandemic.

Finally, government support has both negative and positive impacts on firms' decisions to apply coping strategies, with the largest effect being an increase strategy (6), seeking new markets. Note that a relatively small number (17%) of firms were able to access government funds.

5. Conclusions

A nationwide survey of 162,738 firms shows that the pandemic had both positive and negative effects on businesses, depending on the size of the company and its current status as an operating entity. Unsurprisingly, the majority of firms—well over 80%—reported negative impacts while fewer than 4% reported positive impacts. Firms have implemented a wide range of coping strategies in response to the pandemic and its intervention policies, such as social distancing. Finding new markets or sources of input is one of the most common coping strategies, as it promotes online commerce, retrains employees, produces new products, and renews existing key products. Firm size is a key variable among the factors affecting a firm's decision to adopt coping measures. The results also indicate that government support policies mitigated the detrimental consequences of the COVID-19 pandemic.

However, there remain important avenues for further research on the impact of the COVID-19 pandemic on firms in Vietnam. This study used only cross-sectional data from the 2020 GSO firm survey for the MNL models; thus, we were unable to evaluate the long-term impact of the COVID-19 pandemic on business operations. Therefore, additional research with longitudinal data is recommended in order to gain an all-encompassing analysis of the pandemic's long-term effects. Finally, the causal relationship between a firm's situation and its selection of coping strategies was beyond the scope of this study and deserves further research. Additional studies might also help to inform government policy. In recent years, the Vietnamese government has introduced various measures to support enterprises and their employees in maintaining production and supply chains during the COVID-19 pandemic. However, due to budget constraints, the availability of support funds cannot satisfy all firms' needs. Studies of the long-term effects of government support would help to target government aid for maximum benefit.

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