

# Innovation, Digital Business And Frugal Innovation Type

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**Abstract:** *SME development is an important pillar of regional integration efforts. Micro, small and medium-sized enterprises represent around 97 to 99% of the enterprise population in most ASEAN countries. In Indonesia, small and medium-sized enterprises made up 99.99% of total businesses and employ 97% of the workforce. Based on data from small and medium-sized enterprises that are already using the internet in Indonesia, the use of e-commerce is still between 9 and 15%. One of the innovation types was frugal innovation, which can be defined as products, services, or solutions that arise regardless of financial, human, technological or other resource constraints, and where the end result is cheaper than competitive offers and meets the needs of customers who have not yet been served otherwise. The objective of this research is to investigate the impact of digital business adoption, frugal innovation, and organizational innovation on firm performance. The study was conducted using a descriptive quantitative method in Indonesia. A structured research questionnaire was developed using a Likert scale-four. Data from a total of 100 returned questionnaires was analysed with SEM-PLS. The results of this research show how the performance of small and medium-sized enterprises (SMEs) is affected by digital business adoption, frugal innovation and organisational innovation.*

**Keywords:** *frugal innovation, digital business, firm performance, organisational innovation,*

## 1. INTRODUCTION

Through analysing information on the internet-user population in Southeast Asian countries, the authors began a study of digital business, discovering that Indonesians, Filipinos and Malaysians spend about four hours on average on the internet daily. People in Thailand spend four hours and fifty-six minutes on average on mobile internet daily - more than any other country in the world. By comparison, web users in the United Kingdom and the United States spend only about 2 hours a day on average on mobile internet, and those in France, Germany and Japan 1 hour and 30 minutes a day on average [1].

Indonesians use the internet for long periods. However, when compared to countries that already use the internet, usage is not linear. Around 60% of Indonesian small and medium-sized companies are online but only around 15% have online shopping and transaction systems. In their development towards e-commerce, Indonesian SMEs face multiple barriers

and only a few of these barriers have been conquered [2]. Deloitte also found that more than one third of SMEs in Indonesia (36%) were not online another third (37%) only had basic internet skills, 18% had intermediate web abilities, and under one tenth (9%) had an advanced internet business [3]. Moreover, Indonesian products sold on e-commerce platforms are still below 10%, so it is a challenge to make the digital economy and e-commerce grow because Indonesia is limited to the market [4].

SME development is an important pillar of regional integration efforts. Micro, small and medium-sized enterprises represent around 97 to 99% of the enterprise population in most ASEAN countries. Micro-enterprises tend to dominate the SME market, usually accounting for 85-99% of enterprises (where data is available). The proportion of medium-sized enterprises in the region as a whole is relatively low, which may suggest a 'missing middle' in the competitive structure of the region [5]. Indonesia's Digital Islands comprise the biggest online user base in the Southeast Asian area (150 million online users in 2018), have the biggest online economy (27 billion dollars in 2018) and the fastest growing online economic climate in Southeast Asia. While e-commerce is experiencing healthy development in most Southeast Asian nations, reaching 12 billion dollars in 2018 and accounting for more than one dollar in every two dollars invested in the region [1].

SMEs in Indonesian account for more than 90% of all firms outside the farming industry, and thus are the biggest source of employment, providing livelihood for over 90% of the country's workforce, particularly women and young people [6]. In Indonesia, small and medium-sized enterprises made up 99.99% of total businesses and employ 97% of the workforce [7]. The authors conducted this particular investigation on small and medium-sized enterprises (SMEs) as they play a vital role and have a huge impact on economic development in Indonesia. Most businesses in Indonesia are small and micro-scale businesses. SMEs were involved in speeding up economic development after the financial crisis that occurred from mid-1997 to 1998 when big companies had issues building their businesses [6]. SMEs were able to contribute significantly to Indonesia in these hard times [8].

Deloitte Access Economics estimates the value of the internet for the Indonesian economy to be around 1.6% of Indonesia's GDP [3]. The market place of internet trade is expected to grow by eight times between 2017 and 2022 (around eight billion dollars in 2017 and fifty-five billion dollars to sixty-five billion dollars by 2022). This is close to China's trajectory from 2010 to 2015. The penetration of online trade is expected to increase from 74% of internet users today to 83% in 2022. In parallel, typical private spending on online transaction is expected to rise from 260 dollars to 620 dollars annually in 2022 as customer loyalty within the environment improves and a greater numbers of SMEs are online, offering a larger and more affordable product range and more reliable delivery [2].

The Indonesian E-commerce Association (Idea) has stated the same in the past, agreeing with Google and Temasek's research that indicated that Indonesia's digital economic climate this year hit 27 billion US dollars or around 391 trillion Indonesian rupiahs. This particular value ranks Indonesia's electronic economy transactions first for the Southeast Asian area, with a contribution of 49%.

Based on data from small and medium-sized enterprises that are already using the internet in Indonesia, the use of e-commerce is still between 9 and 15%. As a comparison, the percentage of digital economic development in other Southeast Asian countries is: Thailand 29%, Malaysia 67%, Vietnam 44%, Philippines 37%, Brunei 65%, Singapore 73%, Myanmar 1%, and Cambodia 6% [1]. Other additional data are: Egypt 32% [9] and Australia 16% [10].

## 2. LITERATURE REVIEW

The authors support the previous research on the organisational effect of internet technology, which tested the relationship between e-business and firm performance in small and medium-sized companies, especially in the manufacturing sector [11]. However, the authors researched SMEs in the culinary or food and beverages sector. Regarding the the phases of the process of using information or stages in adopting e-business, previous research on e-business in one country in Europe mentioned that the final stage in the use of e-business is more appropriate for developed countries. The authors used the adoption of e-business (Digital Business Adoption) in research that was conducted in a developing country – Indonesia.

The authors considered the previous research on the relationship of organisational innovation to firm performance. Previous research suggested that future research designs should take into account different levels of innovation and other forms of innovation [11]. The authors, in this case, tried to continue the prior research above by linking the type of frugal innovation with the following questions: What does frugal innovation mean? What drives frugal innovation from various other types of innovation? [12].

This study aims to develop a conceptual model linking digital business adoption to firm performance, digital business adoption to organisational innovation and organisational innovation to firm performance. This will be implemented in developing countries such as Indonesia.

### *2.1 Digital Business Adoption and the SME's Performance*

E-business refers to a broader definition of e-commerce, not only buying and selling goods and services, but performing all forms of online business, such as customer service, partnering with business partners, delivering e-learning and carrying out electronic transactions within organisations [13]. "In its scope, online business is wider than e-commerce. It is similar to the word e-business (which was first coined by IBM), which in 1997 defined it as: E-business (e'biz'nis)—a transformation of key business processes by using Internet technology" [14].

There is a six-phase view of the IT system which combines initiation, adoption, adaptation, acceptance, routine, and infusion. The dependent variable – innovation use – is usually coded in six stages from 1 to 6 [15]. E-business usage rates review e-business for business processes throughout the value chain: production, after-sales, marketing/sales, product design, distribution [11].

A previous study has shown that the adoption of digital business has a significant impact on the performance of the company [11], [17], [18]. One of the benefits of using digital technology in Indonesia for SMEs [3] is an increase in revenue of up to 80%. Nevertheless, issues such as online marketing [17], limited technical literacy [18], below-optimum access to the e-commerce platform [19], as well as lack of online expertise and skilled human resources [2] affect Indonesia. Therefore, the use of e-commerce in Indonesia's small and medium-sized enterprises market is still only between 9% and 15%. Nevertheless, earlier

research expressed another view that business innovation has a partial mediating effect on the use of e-business and business performance [11].

## *2.2 Digital Business Adoption and the SME's Innovation*

Innovation represents a corporate propensity to participate in and support new developments, experiences and creative processes that can produce new goods, services or innovation technology processes [20]. Innovation is knowledge application to generate new knowledge [21]. In other words, development is also a way to change the company, whether in response to internal or external changes or as a precautionary measure with regard to environmental impact. Even when the world is mostly static, companies continually implement technology over time [22]. Prior research has analysed the use of e-business and its effect on corporate development and quality in small and medium-sized manufacturing companies (Soto-Acosta et al., 2015a). In contrast, the authors conducted research in the culinary field (food and beverages). Previous studies have shown that the use of information communication technology has a positive relationship with the SME's innovation performance [24].

## *2.3 Organisational innovation and the SME's performance*

Previous research explored client success using four different development approaches relating to a different product, system and organisational innovation combinations. Although they did not officially test for complementarity, it found that companies with more than one type of innovation increased firm performance more rapidly than companies with a focus on one form of innovation [25]. Process innovation is where companies are able to offer better production processes or services to achieve better performance [26]. The adoption of innovation is generally intended to help the adopting organisation perform better or be more effective [22]. For the long term, a broad theoretical question has been formed regarding the ability of information technology to drive major developments in company business processes, products and services and to boost their business performance considerably [11]. Another study indicated that companies depend on innovation as a key value improvement activity that transforms the advantages of formal strategic planning into increased business performance [27].

## *2.4 The SME's Innovation and Firm Performance, Moderated by Frugal Innovation*

Past research has demonstrated that innovation can result in potential losses in a short period of time, but can drive positive effects on growth, markets and financial performance in the long term [28], [29]. In this respect, there are arguments that the relationship between innovation and corporate performance is linear and non-linear (U-shape) because of the cost distribution that negatively affects corporate performance [30].

The innovation costs in the context of small and medium-sized enterprises are often associated with upfront investment in the development of company-specific innovations, as well as development research expenses that follow the early stages of innovation tasks. The cost for shifting SMEs from being low to moderate innovation members may be larger than moderate to high, but the benefits can be higher than the cost if SMEs move from a moderate to high level of innovation [30]. Normally, innovative technology requires a lot of effort.

However, frugal creativity reacts to and profits from resource constraints, whether cultural, material, or structural. Frugal innovation produces dramatically affordable products and services by growing and using resources for development, production and distribution [31].

Frugal innovation can be described as goods, services or solutions that emerge regardless of the financial, human, technical or other resource limitations and where the final result is less costly than competitive offers (if possible) and meets the needs of customers who have not yet been served otherwise [32]. The authors' moderation of the various types of innovation can affect organisational efficiency further (by comparing frugal innovation with low resource constraints and traditional innovation).

The authors suggest a connection between digital business adoption, organisational innovation and firm performance (Figure 1):

H1: Digital business adoption has a positive impact on organisational innovation

H2: Digital business adoption has a significant direct impact on firm performance

H3: Organisational innovation has a strong direct effect on firm performance

H4: Organisational innovation has a strong direct effect on firm performance, moderated by frugal innovation type

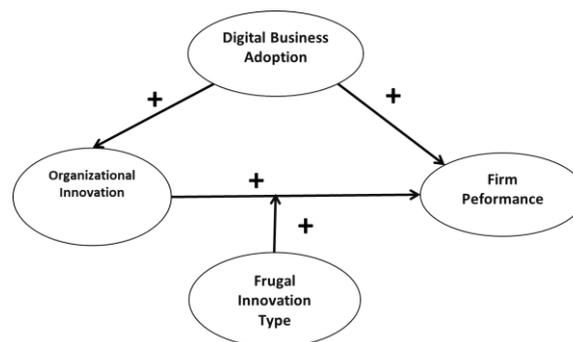


Figure 1. Research Framework

### 3. METHODOLOGY

#### 3.1 Participants

Most of the food and beverage service activities were located in shopping centres or office areas (70.58%), while only 6.46% were located in tourism areas. 22.96% were located in industrial estates, hotels, and other (residential areas, settlements) [33].

For this study, we used the concept of SMEs by the Indonesian government, based on law Number 20 of 2008 on SMEs, in selecting and classifying possible SMEs as the units of our research. SMEs (small sector) are defined primarily as undertakings with annual sales not exceeding Rp2.5 billion dollars, according to the law.

This research was conducted on SMEs in the culinary sector (small sector) in Jakarta, Indonesia. The participants of the survey were owners, heads or shift leaders, others who had roles at the store-head or shift-leader level, including people trusted by the owner.

Lastly, after eliminating all the incomplete responses, the authors analysed 100 responses. These responses were based on a questionnaire in Google form, which respondents were asked to fill in. The authors used a simple random sampling method to collect the responses.

### 3.2 Data Collection

The survey responses were collected over a period of two months from October to November 2019. The authors chose to follow a 4-point scale, known as the Likert scale, that ran from 1-4, where 1 meant ‘strongly in disagreement’ and 4 meant ‘strongly in agreement’, to obtain responses from the respondents.

The questionnaire was checked for content and face validity as part of a pilot test involving some doctoral students and 5 SME owners/managers. The wording and order of the questions were changed based on the resulting feedback. The empirical validation tool was evaluated using partial least squares structural equation modelling (PLS-SEM) to make sure of construct reliability and discriminant validity. Data analysis was done using SmartPLS software using PLS-SEM. Due to its advantages over covariance-based modelling for a small sample size, PLS-SEM was selected [34]. The model was tested for structural evaluation, measurement evaluation and hypothesis testing.

Table 1. Descriptive analysis of indicators

Variable	Indicator	Likerts' Scale				Avg Score
		1	2	3	4	
Digital Business adoption	DBA1	0	3.06	48	29	3.06
	DBA2	1	3.06	55	26	3.06
	DBA3	0	2.99	53	23	2.99
	DBA4	0	3.10	50	30	3.10
	Digital Business Adoption					3.05
Organisational Innovation	OI1	0	3.16	70	23	3.16
	OI2	0	3.28	68	30	3.28
	OI3	0	3.22	60	31	3.22
	OI4	0	3.13	65	24	3.13
	OI5	1	3.16	59	29	3.16
	Organisational Innovation					3.19
Firm Performance	SG1	0	3	67	30	3.27
	SG2	0	1	70	29	3.28
	SG3	0	6	68	26	3.20
	SG4	0	5	69	26	3.21
	SG5	0	4	69	27	3.23
	SG6	0	4	73	23	3.19
	SG					1938
	PG1	0	9	68	23	3.14
	PG2	0	6	70	24	3.18
	PG3	0	6	71	23	3.17
	PG4	0	6	69	25	3.19
	PG					3.17
	Firm Performance					3.21
	Frugal Innovation Type	IF1	0	11	60	29
IF2		0	11	68	21	3.10
IF3		0	6	62	32	3.26
IF4		0	3	66	31	3.28
IF5		0	8	56	36	3.28
IF6		0	8	63	29	3.21
Frugal Innovation Type					3.22	

## 4. RESULTS

Out of 125 questionnaires, 100 questionnaires were collected and screened based on the completeness of the questionnaire. 100 questionnaires were eligible to be further analysed.

From a total of 100 respondents, who were all from the Jakarta area, 51% were female and 49% were male. 51% were the owners and the remainder were people responsible for running the business. Most of the business owners were considered very young. 84% were below 45 years old. Only 16% were above 45 years old. In terms of educational background, only 6% had a university degree. 82% had a high school certificate and the remainder had various levels of primary and secondary education.

In terms of type of business, all were from the F&B industry. 90% had 5 or less employees. 9% employed between 6 and 15 people, and only 1% employed more than 11 people. Most were medium and small-scale businesses with a business turnover of less than Rp1 billion annually (97%); only 2% had a turnover of more than Rp1 billion annually. 90% were relatively newly established (the owner is the first generation).

Table 1 shows the descriptive analysis of each indicator from 4 variables involved in this study. The lowest score was DBA3 with a score of 2.99, while IF5 had the highest score at 3.28. The average score of each variable was >3. This means that respondents agreed with the indicators. However, the score was still less than 3.5, which means that there was room for improvement for each indicator and variable.

The outer model analysis is shown in table 2. Analysis results show that all indicators had loading factors of >0.7; therefore, it can be concluded that the indicators are valid for measuring the indicated variable. The AVE score was above 0.5 and CR was above 0.7 for all indicators; therefore, the indicators are reliable for measuring the indicated variable.

Discriminant validation tests show that all indicators had the highest loading to the indicated variable; therefore, it can be concluded that each indicator has a good discriminant validity. The Fornell Lacker Criterion test also shows (table 3) that the root square AVE of each variable was higher than the correlation inter-variable. This further proves the good discriminant validity.

Table 2. Convergent and Reliability Test

Latent Variable	Indicator	Convergent Validity			Internal Consistency Reliability	Conclusion	
		Loadings	Indicator Reliability	AVE			Composite Reliability
		> 0.7	> 0.5	>0.5	> 0.7		
Digital Business Adoption	DBA1	0.881	0.776	0.769	0.93	Reliable	
	DBA2	0.858	0.736			Valid	
	DBA3	0.883	0.780			Valid	
	DBA4	0.886	0.785			Valid	
							Valid
Organisational Innovation (OI)	OI1	0.718	0.516	0.674	0.911	Reliable	
	OI2	0.917	0.841			Valid	
	OI3	0.896	0.803			Valid	
	OI4	0.776	0.602			Valid	
	OI5	0.781	0.610			Valid	
Frugal Innovation	IF1	0.802	0.643	0.624	0.909	Reliable	
	IF2	0.772	0.596			Valid	
	IF3	0.781	0.610			Valid	
	IF4	0.814	0.663			Valid	
	IF5	0.801	0.642			Valid	
	IF6	0.767	0.588			Valid	
<b>1<sup>st</sup> Order Firm Performance</b>				0.64	0.914	Reliable	
SG	SG1	0.836	0.699				Valid
	SG2	0.848	0.719				Valid
	SG3	0.802	0.643				Valid
	SG4	0.760	0.578				Valid
	SG5	0.781	0.610				Valid
	SG6	0.768	0.590				Valid
PG	PG1	0.851	0.851	0.703	0.904	Reliable	
	PG2	0.777	0.778			Valid	
	PG3	0.850	0.850			Valid	
	PG4	0.873	0.873			Valid	
<b>2<sup>nd</sup> Order Firm Performance</b>				0.901	0.948	Reliable	
Firm Performance							
SG	0.966	0.933	Valid				
PG	0.932	0.869	Valid				

Table 3. Discriminant Validity Test (Fornell Lacker Criterion)

	Digital Business Adoption	Firm Performance	Frugal Innovation Type	Organisational Innovation
Digital Business Adoption	<b>0.877</b>			
Firm Performance	0.746	<b>0.776</b>		
Frugal Innovation Type	0.830	0.809	<b>0.790</b>	
Organisational Innovation	0.630	0.715	0.676	<b>0.821</b>

The structural model was tested with predictive relevance and R *square*. Predictive relevance was used to measure the Goodness of Fit of the structural model. To test the moderation effect, 2 models were analysed. Table 4 shows that the model has Q<sup>2</sup> above 0. It means that the model has predictive relevance.

Table 4. Predictive Relevance (Q<sup>2</sup>)

		SSO	SSE	Q <sup>2</sup> (=1-SSE/SSO)	Remark
Model 1	Firm Performance	1,000	636.41	0.364	Predictive Relevance
	Organisational Innovation	500	380.539	0.239	Predictive Relevance
Model 2	Firm Performance	1,000	593.258	0.407	Predictive Relevance
	Organisational Innovation	500	380.429	0.239	Predictive Relevance

The R *square* test was used for hypothesis testing. Table 5 shows that, in model 1, the R<sup>2</sup> co-efficient of organisational innovation was 0.397. This means that digital business adoption had a 39.7% influence on organisational innovation. The R<sup>2</sup> co-efficient of firm performance was 0.655. This means that digital business adoption and organisational innovation had a 65.5% influence on firm performance. From the path analysis, it is shown that digital business adoption had the most dominant influence on firm performance with a path co-efficient of 0.489 (36.5%), followed by organisational innovation with a path co-efficient of 0.406 (29.0%).

Relationship		Path	T Statistics	P Values	R Square
Model 1	Digital Business Adoption -> Organisational Innovation	0.630	8.615	0.000	0.397
	Digital Business Adoption -> Firm Performance	0.489	5.219	0.000	0.655
	Organisational Innovation -> Firm Performance	0.406	3.982	0.000	
Model 2	Digital Business Adoption -> Organisational Innovation	0.631	9.236	0.000	0.747
	Digital Business Adoption -> Firm Performance	0.237	2.055	0.040	
	Organisational Innovation -> Firm Performance	0.142	1.288	0.198	
	Frugal Innovation Type -> Firm Performance	0.464	4.433	0.000	
	Moderating Effect 1 -> Firm Performance	0.191	3.657	0.000	

Table 5. Path Co-efficient and R<sup>2</sup>

In model 2 (moderation), organisational innovation had R<sup>2</sup> of 0.398, or digital innovation had a 38.9% influence on organisational innovation. The R<sup>2</sup> of firm performance was 0.747. This means that digital business adoption, organisational innovation and frugal innovation type, which moderated organisational innovation, had a 74.7% influence on firm performance.

The hypothesis shows that hypothesis 1 is accepted since the T-Stat was 8.615 and P Value was 0.000. Hypothesis 2 shows a T-Stat of 5.219 and P Value of 0.000; therefore, it can be concluded that hypothesis 2 is also accepted. Hypothesis 3 also had a T-Stat of 3.982 and P Value of 0.000, which confirms that hypothesis 3 can be accepted. The indirect effect of digital business adoption on firm performance with organisational innovation as mediator is

also confirmed and accepted. The co-efficient of the total effect was 0.746, which was higher than the co-efficient of the direct effect, which was only 0.489. Therefore, H4 is also accepted. H5 is also accepted because the moderating effect had a T-Stat of 3.657 and P Value of 0.000. (table 6)

Table 6. Hypothesis Testing

Hypothesis	Path	T Statistics	P Values	Hypothesis Test Conclusion
Digital Business Adoption → Organisational Innovation	0.63	8.615	0.000	H1 Accepted
Digital Business Adoption → Firm Performance (Direct Effect)	0.489	5.219	0.000	H2 Accepted
Organisational Innovation → Firm Performance	0.406	3.982	0.000	H3 Accepted
Moderating Effect 1 → Firm Performance	0.191	3.657	0.000	H4 Accepted

## 5. DISCUSSION

Innovation is widely considered an important element in achieving economic and social change. Innovation at the enterprise level is seen as critical to the competitive survival of the company [35]. Studies claim that innovation is one of the key factors for firms' survival, success and sustainable competitive advantages [36]. To stay relevant, all organisations, whether big or small, need to innovate [37].

Essentially, there are three types of innovation: product innovation, process innovation and organisational innovation [37]. Product innovation is the most understood and most common type of innovation. It involves the introduction of either a completely new product or a new feature of a product. Process innovation is innovation regarding how a product or service is produced or delivered.

Organisational innovation is a holistic and organisation-wide transformation. Organisational innovation is important and most often seen in start-up companies establishing their business structure to be relevant to current market needs. However, it can also occur in well-established companies to leverage their large customer base or in times of transformation.

Digital business is defined as “all electronically mediated information exchanges, both within an organization and with external stakeholders supporting the range of business processes” [38]. Digital business helps organisations to remove location barriers, streamline workflows, reduce time and costs, expedite customer service and keep the business relevant. Ultimately, the adoption of digital business leads to an improvement in firm performance. However, it is also known that the adoption of digital business is not easy. [39] referring to reports stated that SFA implementation failure rates are as high as 55-80%. The impact of digital business adoption directly on firm performance is therefore relatively low. The impact should be mediated by organisational innovation.

Frugal innovation is a method to reduce the complexity, expense and production of goods. Usually, this involves the elimination of non-essential features. It does not always result in lower quality, but must result in cheaper production. Frugal innovation is associated with good-enough performance. The results of this study show that when organisational innovation is implemented along with frugal innovation, it can improve firm performance even more. The more frugal innovation is pursued, the more firm performance is achieved.

## 6. CONCLUSION

This study was based on technological, organisational, and environmental (TOE) theory and diffusion of innovation (DOI), and intended to shed light on the factors that affect digital business adoption and its effect on organisational innovation and firm performance within culinary SMEs.

The empirical results support the previous study in manufacturing SMEs, which stated that e-business use has a significant effect on company performance [11], [40], [16]. Even considering the different stages of adoption of digital technology between a developing country (Indonesia: adoption stage) and a developed country (Spain: cover all stages), the same result is produced, according to this research. This study also supports other research from Deloitte showing that one advantage of using digital technology for SMEs in Indonesia is that revenue can increase by up to 80% [3]. Moreover, the results show a positive effect of digital business adoption on organisational innovation. This second finding confirms existing research [11], which demonstrated the use of e-business and its effects on organisational innovation and company performance in manufacturing SMEs.

This study was limited to small-scale SMEs, with a very limited sample size from the culinary sector in one city (Jakarta, Indonesia). The authors hope that further research will not be limited to small-scale SMEs, and will include other sectors. Further research should be done in other sectors (not just culinary), possibly in many cities with a larger number of samples. This study was limited to innovation in companies in general, but it is hoped that, in the future, research can include other types of innovation, such as radical or incremental.

Regarding organisational innovation, the effect of firm performance was analysed. The findings show a positive relationship between these two elements. Although innovation can lead to possible losses in the short term [28], over a long period, it can produce positive effects on production, markets, and financial performance [29]. However, half of the 100 responses received in this study were from companies that had been established for 2-4 years, not for 0-2 years (short-term innovation).

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