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Entrepreneurial activity and economic growth: A dynamic data panel analysis of European countries

Sofia Gomes, Pedro Ferreira

ABSTRACT

Objective: The goal of this article is to analyse the impact of different measures of entrepreneurial activity, namely through attitudes and behaviour, on the economic growth of 21 European countries. The goal is to assess the impact of entrepreneurial activity, measured by perceived capabilities, perceived opportunities, entrepreneurial activity, and total early stage, on the economic growth of these countries.

Research Design & Methods: This study is based on a quantitative methodology and uses a data panel covering 21 European countries and a period from 2001 to 2019 (196 observations). A statistical analysis of the dependent, independent and control variables was performed, panel data stationarity analysis was carried out, and three multiple linear regression models were estimated using the generalized method of moments (dynamic panel data).

Findings: The results suggest that the entrepreneurial activity driven by the opportunity has a positive impact on the gross domestic product per capita and, as such, stimulate the economic growth of the European countries considered in this sample. However, entrepreneurial activity at an early stage and the skills and knowledge to start a new business have a negative impact on the economic growth of these countries.

Implications & Recommendations: In general, this study suggests that entrepreneurship driven by opportunity (directly or indirectly by perceived capacities) is a key factor in stimulating the European countries' economic growth considered in this sample.

Contribution & Value Added: This study complements the existing literature that analyses the impact of entrepreneurship on economic growth, but using a sample of countries in Europe (there are few empirical studies for this purpose on European countries), and it is innovative because three different measures of entrepreneurial activity are tested, a more generic one and two other measures of entrepreneurial behaviour and attitudes collected by the global entrepreneurship monitor (GEM) to assess their impact of entrepreneurship on countries' economic growth.

Article type:	research article
Keywords:	perceived capacity; perceived opportunity; entrepreneurship; economic growth; European countries
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INTRODUCTION

In recent years, the role of entrepreneurship as a driver of economic growth in countries and regions has been emphasized, arousing the growing interest of several authors. The first difficulty when studying a phenomenon like entrepreneurship is defining the concepts of entrepreneurship and entrepreneur but also finding a reliable, robust, comprehensive, and comparable measure of countries' entrepreneurial activity (Pittaway, 2005).

Based on the definitions found in the literature that bring together the greatest theoretical consensus among the authors, we can define entrepreneurship as an activity of innovating through a process of creative destruction (Schumpeter, 1911), the discovery of information that allows the detection of business opportunities (Kirzner, 1973) in environments of uncertainty and risk (Knight, 1921). Thus, in general terms, entrepreneurship can be understood as the intention or action aiming to generate value through products, new methods or through new businesses. In this context, the entrepreneur is the individual who develops the entrepreneurial activity, bearing risks, uncertainties and business opportunities.

If capturing the dimension of entrepreneurship and entrepreneurship in a single definition is difficult, it is even more challenging to find a measure, in empirical terms, of entrepreneurship that is robust and efficient and that allows countries to be compared in terms of entrepreneurial activity since there are numerous definitions of entrepreneurship, several international databases that collect different measures and dimensions of entrepreneurial activity, making comparison difficult.

Over time, several empirical studies have been carried out that place entrepreneurship as an important antecedent of economic growth at country level (Amorós, Fernández, & Tapia, 2012; Ács, 2006; Audretsch, 2007; Ács & Naudé, 2011; Carlsson *et al*., 2009; Baumol & Strom, 2007; Minniti & Lévesque, 2010; Hessels & Van Stel, 2011; Stam & Van Stel, 2011; Olaison & Meier Sørensen, 2014). However, there is no consensus among authors on the results of this impact, which may vary according to the macroeconomic condition of the countries (usually expressed by the gross domestic product per capita) and the variables used to measure entrepreneurial activity. In this context, our study aims to measure the impact of entrepreneurial activity measured through entrepreneurial behaviour and attitudes variables collected by GEM on the economic growth of 21 European countries (from 2001 to 2019, with European countries being selected according to data availability. The goal is to assess the impact of entrepreneurial activity, measured by perceived capabilities, perceived opportunities, entrepreneurial activity, and total early stage, on the economic growth of these countries. For this purpose, this study uses a quantitative methodology based on a panel of data composed of the aforementioned variables collected for 21 countries in Europe in the period 2001 to 2019. In terms of methods, a statistical analysis was carried out on the dependent and independent variables and three multiple linear regression models were estimated by the generalized method of moments, with cross section weights.

This study, in addition to complementing the existing literature that analyses the impact of entrepreneurship on economic growth, also contributes to further understanding of the relevance of entrepreneurship for economic growth of countries in two ways: (1) few studies use a sample of European countries (Stoica & Roman, 2020) and (2) three measures of entrepreneurial activity were used, one of the most classic measures (total early-stage entrepreneurial activity) and two other innovative measures related to entrepreneurial behaviours and attitudes (perceived opportunity and perceived capacity) as measures of entrepreneurship to assess their impact on economic growth of the European countries considered.

This study is structured as follows: firstly, a brief review of the literature on the relationship between entrepreneurship and economic growth is presented; next, there is the presentation of the data, variables and methodology used; then, the results of the statistical and econometric analyses performed and the results are discussed, and in the final section, there are the conclusions and recommendations for future studies.

LITERATURE REVIEW (AND HYPOTHESES DEVELOPMENT)

Over time, entrepreneurship has been measured in quantitative terms, through the self-employment rate (Carree & Thurik, 2008; Mojica, Gebremedhin & Schaeffer, 2009) or by the percentage of own businesses (except for the agricultural sector) as a function of the total workforce (Carree *et al*., 2007; Li *et al*., 2012; Deller, 2007) and the number of new companies created, the latter measure being widely used by several authors as the main measure of entrepreneurial activity (Alheet, 2019; Baptista, Escárcia & Madruga, 2004; Ács & Szerb, 2010; Fritsch, 2004; Gries & Naudé, 2010; Carree & Thurik, 2008; Bosma, Stam & Schutjens, 2006; Hartog, Parker, Van Stel & Thurik, 2010; Bosma, Erik & Schutjens, 2006; Mariet Ocasio & Mariet Ocasio, 2016 Hessels & Van Stel, 2011). However, several criticisms

have arisen since reducing entrepreneurial activity to the creation of new companies does not include, for example, innovation, the identified opportunity, entrepreneurial capacities, motivations and motivational appetite to undertake, being limited only to results of the entrepreneurial activity and not to the causes that motivated the action to undertake. This measure of entrepreneurship has proved to be very reductive (Baliamoune-Lutz, 2015) because, for entrepreneurial activity, it is not mandatory to have to create a new company since entrepreneurship can occur within existing companies (without the need for new companies are created) as a result of a new idea or business opportunity.

According to Wong *et al*. (2005), the use of a quantitative measure of entrepreneurship such as the rate of creation of new companies results from the difficulty of obtaining better measures that can be tested econometrically to assess the impact of entrepreneurship on economic growth, which in turn is measured, for example, through the Gross Domestic Product per capita (GDP per capita). In order to overcome the limitations of business creation as a quantitative measure of entrepreneurship and its impact on economic growth, GEM measured business creation through four indicators widely used by several authors (Ács & Szerb, 2010; Wong *et al*., 2005; Stam *et al*., 2007; Martin & Picazo, 2008; Amoros, 2007; Thurik, 2009; Audrestsch, 2007; Naudé, 2008):

1. Total entrepreneurial activity (TEA) index: percentage of individuals (in relation to the adult population, between 18-64 years old) creating a new business or owning/managing an existing start-up business up to 3.5 years, that is, they have been paying wages, salaries and other payments for more than three months, but less than 3.5 years ago (includes self-employed or self-employed workers).
2. Nascent entrepreneurial activity index: percentage of people (in relation to the adult population between 18-64 years old) actively involved in starting a business as owners or co-owners (this business does not yet pay salaries, salaries and other payments).
3. Young firm entrepreneurial activity index: percentage of people in relation to the adult population between 18-64 years old) owning/managing a new business with at least three months, and no more than 3.5 years, that is, a business that pays wages, salaries and other payments for more than three months and less than 3.5 years,
4. Established businesses activity index – percentage of people (in relation to the adult population between 18-64 years old) owning/managing a business that has at least 3.5 years and pays salaries, wages and other payments.

Even though there is consensus in the literature about the potential impact of entrepreneurship on countries' economic growth (Baumol & Strom, 2007; Minniti & Lévesque, 2010; Ács & Naudé, 2011; Stam & Van Stel, 2011; Amorós, Fernández, & Tapia, 2012; Audretsch, 2007; Carlsson *et al*., 2009; Hessels & Van Stel, 2011; Walstad, & Thomas, 2007; Olaison & Meier Sørensen, 2014; Doran *et al*. 2018), the dimension of its effect is not consensual. This impact depends on the growth stage of the economy under analysis (Bosma *et al*., 2009; Gries & Naudé, 2010; Ferreira *et al*., 2017), the same measures being possible entrepreneurs have different economic results, whether they are developed or developing countries (Valliere & Peterson, 2009). In general, entrepreneurship can drive economic growth in countries by diversifying the offer of products and/or services, increasing competition (opening up to new markets and increasing efficiency) with positive externalities for families, of knowledge spillovers, job creation, increased innovation and productivity, increased company efficiency, stimulating creative destruction, with the replacement of less competitive and innovative companies, among others (Audretsch & Keilbach, 2004; Fritsch, 2008).

Nevertheless, the results are not unanimous. Studies have concluded that entrepreneurial activity has a greater positive impact in developed countries when compared with developing countries (Stam *et al*., 2011), but for other authors, entrepreneurship has a greater positive impact on low-income countries than high-income countries (Stam *et al*., 2011). Taking into account the assumption that depending on countries' stage of development, entrepreneurship may produce different results regarding countries' economic growth, several authors have examined this relationship by distinguishing developed economies from developing economies (Bosma *et al*., 2009; Gries & Naudé, 2010; Hashi & Krasniqi, 2011; Avnimelech, Zelekha, & Sharabi, 2014; Marcotte, 2014; Ferreira *et al*., 2017), instead of using a single country data panel, regardless of their stage of development.

Although previous research establishes a connection between entrepreneurship and economic growth, some authors (Audretsch, 2007 and Audretsch & Keilbach, 2004) point out omissions in the neoclassical model of economic growth that was based on the factors of production – the connection of labour and capital to product, including, with a positive impact, the concept of entrepreneurial capital in economic growth models. Entrepreneurial capital contemplated the number of start-ups per capita, initial activity in an information and communication technology company, that is, entrepreneurial capital encompassed all factors that facilitated the start of new businesses and positively influenced the economic environment. Other authors, such as Ács and Vargas (2005), have empirically tested the impact of research and development and human capital, finding a positive influence on economic growth. Moreover, Hessels and Van Stel (2011) showed that companies with export guidance have a positive influence on entrepreneurship and are an additional contribution to economic growth.

But even with the use of more quantitative measures, they are still not enough to measure the impact of entrepreneurship on economic growth, with GEM recognizing this limitation (Bosma, 2013) and revising its model. In this review, the concept of entrepreneurship was reformulated, having introduced three essential components (Bosma *et al*., 2009), which the GEM also started to collect:

- Attitudes/behaviours related to general attitudes and behaviours towards entrepreneurship in a country or group of countries.
- Activities that contemplate the creation of new initiatives and not the reducing vision of creating new companies.
- Entrepreneurial aspirations related to business innovation, growth and prosperity.

These three components can influence the economic result of entrepreneurial activities and introduce important changes in the concept of entrepreneurship. As such, and according to Ács and Szerb (2010), entrepreneurship came to be defined as a dynamic, multifaceted interaction of attitudes, activities and aspirations, allowing a new approach to the study of the impact of entrepreneurship on the economic growth of countries.

Another study (Galindo and Méndez, 2014) examined the relation between entrepreneurship, economic growth and innovation and found a positive relationship between these factors since entrepreneurship and innovative activities contribute to the increase of the economic product. This, in turn, promotes entrepreneurial initiatives and entrepreneurship. Through an empirical analysis, Bosma *et al*. (2018) concluded that the quality of the institutional environment (including indicators like the size of government, the perceived skills for creating a new business, and financial stability) stimulates entrepreneurship and, as such, economic growth. Some authors (Marfatia, 2014; Marfatia, 2015; Hüning, 2017; Hüning, 2019) conclude that the levels of risk and uncertainty about the countries' economy, that is, a country's monetary policy influences the motivation of entrepreneurs, with consequences at the product level in macroeconomic terms.

Recently, a study showed an important effect of entrepreneurial attitudes on GDP per capita. However, this effect was only confirmed for developed countries. In low- and middle-income countries, entrepreneurial activity impact was found to be negative (Doran *et al*., 2018). Bohlmann *et al*. (2017) concluded through an empirical study that entrepreneurial activity tends to be greater when the perception of opportunities by entrepreneurs is positive. According to the authors, this is due to the fact that individuals who perceive opportunities set more challenging goals and apply higher standards to assess the achievement of their goals. In this way, increasing opportunity recognition, in turn, can increase entrepreneurial behaviour and, as such, economic growth. On the other hand, the impact of entrepreneurs' perceived opportunities on entrepreneurship is not consensual since entrepreneurial capacity includes not only cognitive skills on how to start a new business, but also skills related to persistence to overcome potential obstacles, opportunities recognition and exploration, and leadership skills in contexts of uncertainty. Entrepreneurs' perceived opportunities are negatively related to age, which may be related to losing some cognitive and physical skills. However, they are positively related to the entrepreneurial activity since the perceptions of the entrepreneurs' capacities are the basis to reach the defined objective (Bohlmann *et al*., 2017; Ackerman *et al*., 2002).

Consequently, the identification of opportunities that form the basis of entrepreneurial activity is related to individuals' skills, knowledge, and experience, which in turn are more prone to take risks. According to behavioural theory, the individual's attitude towards entrepreneurship can be enhanced by combining risk taking propensity with perceived entrepreneurial opportunities. Accordingly, it is suggested that the perception of opportunities increases the intention to start a new business (Noguera *et al*., 2013; Arab & Sofiyabadi, 2013; Walker *et al*., 2013).

The analysed studies indicate that there is a general positive effect of entrepreneurial activity measured by different indicators on economic growth, but the size of this impact is not consensual depending on the measures used to capture entrepreneurial activity. Still, most studies use quantitative and more generic measures of entrepreneurial activity, especially the creation of new businesses, not incorporating the review of the concept of entrepreneurship carried out by GEM that covers entrepreneurial attitudes, behaviours, and aspirations. In this way, our study complements the existing literature on entrepreneurship and economic growth, adding a new perspective that measures entrepreneurial activity, in addition to the most generic measure of creating new businesses (TEA), through the attitudes and behaviours of entrepreneurs (perceived capacity and perceived opportunity) using a sample of European countries (from the literature review carried out there are few studies using samples with European countries), the ultimate goal being to examine the impact of several measures of entrepreneurship on the countries' economic growth.

These prior empirical results allowed to assume the following research hypotheses:

H1: Entrepreneurs' high levels of perceived opportunities (PO) have a positive relation with countries' per capita GDP.

H2: Entrepreneurs' high levels of perceived capacity (CP) have a positive relation with countries' GDP per capita.

H3: The impact of perceived opportunities (PO) on countries' economic growth is greater than the perception of capabilities (CP).

H4: The entrepreneurial activity has a positive impact on economic growth.

RESEARCH METHODOLOGY

This study used a quantitative methodology that has the advantages of validating theories and relationships between variables, generalizing results, and replicating with different samples. The analysis considered a sample of 21 countries from the European continent (United Kingdom, Switzerland, Sweden, Spain, Slovenia, Russia, Portugal, Poland, Norway, Netherlands, Latvia, Italy, Ireland, Greece, Germany, Hungary, France, Finland, Denmark, Croatia, and Belgium). These criteria for choosing these countries were data availability in GEM, which is one of the most important databases for collecting entrepreneurship data.

The analysis considered indicators for macroeconomic conditions, entrepreneurial activity, and economic growth for each country. Gross Domestic Product per capita (GDP per capita) was the dependent variable and was collected from the World Bank's World Development Indicators (WDI) as a measure of the countries' economic growth, as suggested by Schwab and Sala-i Martin (2017) and Stoica *et al*. (2020). The independent variables were divided into two groups:

1. Indicators of entrepreneurial activity, measured by three variables – total early-stage entrepreneurial activity (TEA), perceived opportunities (PO) and perceived capabilities (PC) collected from GEM.
2. Macroeconomic condition indicators as control variables. These variables are included different factors suggested, in theoretical terms, by the literature and that affect the economic growth of the countries, such as the investment measured by the gross capital formation (GROSSCAP), the knowledge measured by the expenses in research and development (R&D) and the level of education (EDUC), the unemployment rate (UNEMPLOY), public spending (GOVEXP), population growth (POP), economic openness (EOPEN) and inflation (INFLATION). These variables were collected at World Bank's WDI.

Table 1 presents the definition and source of collection of the dependent, independent and control variables used in the study.

Table 1. Description of variables

Variable name and abbreviation	Brief definition	Source
Economic Growth – Dependent variable		
GDP per capita (current US$) (GDP_PC)	GDP per capita refers to the division of gross domestic product by midyear population.	World Bank's WDI
Measures of entrepreneurial activity – Independent variables		
Perceived opportunities (PO)	Percentage of population between 18-64 years old who identify good opportunities to start a firm in the area where they live.	GEM
Perceived capabilities (PC)	Percentage of population between 18-64 years old who think they have the necessary skills and knowledge to start a business.	GEM
Total early-stage entrepreneurial activity (TEA)	Percentage of population between 18-64 years old who are either an owner-manager of a new business or a nascent entrepreneur.	GEM
Measures of economic condition – Control variables		
Gross capital formation (% of GDP) (GROSSCAP)	Gross capital formation (formerly gross domestic investment) is defined by the outlays on additions to net changes in the level of inventories plus the fixed assets of the economy.	World Bank's WDI
Research and development expenditure (% of GDP) (R&D)	Research and experimental development (R&D) includes creative work developed on a systematic basis allowing to increase the stock of knowledge and its use to devise new applications.	World Bank's WDI
Unemployment (annual, %) (UNEMPLOY)	The share of the labour force without work but available for and seeking employment.	World Bank's WDI
Government expenditures (% of GDP) (GOVEXP)	Refers to the consumption expenditure of general governments, including current government expenditures for purchases of services and goods.	World Bank's WDI
Population growth (annual, %) (POP)	Annual population growth rate, expressed as a percentage, for year t and is calculated on the exponential rate of growth of midyear population from year t-1 to t.	World Bank's WDI
Economic Openness (% of GDP) (EOPEN)	The sum of imports and exports of services and goods measured as a share of gross domestic product.	World Bank's WDI
Inflation (annual, %) ((INF)	Measures the change in the cost of acquiring a set of services and goods, measured yearly and presented as a percentage.	World Bank's WDI
Education (annual, %) (EDUC)	The percentage of people between 25-64 years old with at least the upper secondary education level.	World Bank's WDI

Note: GEM: https://www.gemconsortium.org/data; World Bank: https://databank.worldbank.org/source/ world-development-indicators.
Source: own study.

The formulated hypotheses were tested in the Eviews10 software, and three multiple linear regression models were estimated, with differences in cross-sections, using the Arellano-Bond estimator of panel generalized methods of moments (GMM)| dynamic panel data. In this type of data sample (panel data with cross-sectional and temporal data; N = 21 and T = 19), the GMM method is more efficient than the ordinary least squares or two-stage least squares methods, allowing correct heteroscedasticity problems or auto-correlation (Greene, 2020), which are common in samples with data on panel.

The GMM model is specified by a linear model $y = x\beta + u$, which fulfils the orthogonality condition $E[x'u]= 0$. The vector of estimators of β can be considered the solution that solves the equation of moments: $E[x'(y-x\beta)]= 0$. having as a solution $\beta = E(x' x)-1\ E(x' y)$, which sample correspondent is the OLS estimator − $b = (x' x)-1\ x' y$.

If any regressor is correlated with the $E[x'u] \neq 0$ disturbance, the previous estimator will be inconsistent. An alternative is to re-specify the equation by introducing variables not correlated with this disturbance: $E[z'u]= E[z'(y - x\beta)]= 0$. Instrumental variables allow solving the equation of moments (β

= E(z'x)−1 E(z'y)), and its sample equivalent is the instrumental variable estimator (bVI =(z'x)−1z'y). The instrumental variables used were the independent variables and the control variables.

Finally, with fixed effects, the time-varying errors have zero means, constant variances and zero correlations, all conditional on the observed history of the covariates and the unobserved effect (Wooldridge, 2001).

The collected sample was subjected to a descriptive statistical analysis, a panel data stationarity analysis and, finally, we estimated the three regression models in which in each model we used a different measure of different entrepreneurial activity (Tables 2 to 4).

RESULTS AND DISCUSSION

The descriptive statistics for all the variables (dependent, independent, and control) are presented in Table 2. The number of observations was 196, and the time period was 2001-2019. In terms of GDP per capita, this variable was logarithmic (first differences), and the average value of the GDP per capita logarithm was US $ 10.41. The maximum value of $ 11.54, recorded by Norway in 2014 and the minimum value was $ 8.51 recorded by Russia in 2002.

Regarding the independent variables related to the different measures of entrepreneurial activity, TEA had an average rate of 6.57%, a maximum rate of 14.19% for Latvia in 2016 and a minimum rate of 1.63% for France in 2003. The perceived opportunities (PO) variable had an average rate of 36.75%, with a maximum rate of 87.28% in Poland in 2019 and a minimum rate of 2.85% in Hungary in 2009. Finally, the variable perceived capabilities (PC) had an average rate of 42.39%, the maximum sample rate being 61.43% for Latvia in 2016 and a minimum rate of 14.58% recorded by Hungary in 2005. Thus, statistics suggest that independent variables have different impacts on countries' economic growth, and it was confirmed that there are no lagged effects.

Table 2. Descriptive statistics

Variables	Mean	Median	Maximum	Minimum	Std. Dev.	Obs.
Log (GDP_PC)	10.41	10.61	11.54	8.51	0.6093	196
PO	36.75	35.8	87.28	2.85	16.6204	196
PC	42.39	42.19	61.43	14.58	7.7876	196
TEA	6.57	6.35	14.19	1.63	2.1979	196
GROSSCAP	22.34	22.23	41.45	11.6	4.143	196
R&D	1.84	1.68	3.75	0.36	0.8791	196
UNEMPLOY	7.99	7.52	27.47	2.49	4.0342	196
GOVEXP	20.53	19.98	27.94	11.9	2.9243	196
POP	0.39	0.44	2.89	-2.08	0.6734	196
EOPEN	50.01	44.79	110.03	18.54	20.6647	196
INF	2.46	2.03	15.53	-1.08	2.3274	196
EDUC	66.98	72.85	88.71	16.19	18.3361	196

Source: own study.

Control variables represent the macroeconomic condition of countries. Gross capital formation (GROSSCAP) had an average rate of 22.34%, with the maximum value of 41.45% recorded in Latvia in 2017; research and development expenditure (I_D) had an average rate of 1.88% and a maximum rate of 3.75% in Finland in 2009; the average unemployment rate (UNEMPLOY) was 7.99%, and the maximum rate was 27.47% in Greece in 2013; government expenditures (GOVEXP) had an average rate of 20.53% and a maximum rate of 27.94% in Denmark in 2009; the average population growth rate (POP) was 0.39%, with the maximum value of the sample being 2.89%, recorded in Ireland in 2007; economic openness (EOPEN) had an average rate of 50.01% and a maximum rate of 110.02% registered in Ireland in 2014; inflation (INF) had an average rate of 2.46% and a maximum rate of 15.53% recorded in Latvia in 2008, finally, education (EDUC) had an average rate of 66.98% and a maximum rate 88.71% recorded in Switzerland in 2009.

In Table 3, we performed a panel data stationarity analysis, and we could conclude that our data is stationary, for a mean stationarity significant at 1%, 5%, and 10%.

Table 3. Panel unit root tests

Variables	Levin-Lin-Chu (2002) – adjusted t*	Breitung (2000) – ambda (statistics)	Im–Pasaran–Shin (1997) – t-tilde-bar (statistics)
PO	-1.8611**	-1.7511**	-1.456**
PC	-1.9762**	-1.6354**	-1.6034**
TEA	-2.0054***	-1.4554*	-1.5509*
LN (GDP_PC)	-17.3456**	-1.8345***	-1.9306***
GROSSCAP	38.7563 ***	- 1.8385 **	- 1.8932 **
R&D	17.6987**	3.7537*	-1.4909*
UNEMPLOY	-22.3504***	-1.0564*	-1.5734*
GOVEXP	-33.9870**	-3.6789**	-1.5543**
POP	-6.9812**	-1.4379**	-1.7432**
EOPEN	- 12.4569**	-3.1297*	- 1.4409*
INFLATION	-8.9723**	-0.8196**	-1.7489*
EDUC	-1.1223**	-2.4560**	-2.4560**

Notes: (i) ***, **, * mean stationarity significant at 1%, 5% and 10%; (ii) In all tests, the null hypothesis (H0) is all data panels contain a unit root. (iii) In the case of the Levin-Lin-Chu (2002) test and Breitung (2000) test, we used a time trend for all variables; In the case of the Im-Pasaran-Shin (1997) test, we used the time trend for all variables, and the time trend and sub-tracted cross-sectional means for PO, PC, and TEA.
Source: own study.

As previously described, three different multiple linear regression models were estimated using the GMM method (Table 4). Because we used the Arellano-Bond estimator, in the three models estimated by GMM, the GDP_PC was introduced with a one-year delay (GDP_PC(-1)) as a dependent variable. On the other hand, to solve the problems of endogeneity, the variables of entrepreneurial activity and control (macroeconomic conditions) were used with a one-year delay as instruments.

Thus, each model represents the impact of each of the three different entrepreneurship measures on countries' economic growth: perceived opportunities (PO), perceived capabilities (PC), and total early-stage entrepreneurial activity (TEA). In Table 4, the p-values AR(1) were less than 0.10, which means we rejected the null hypothesis that there was no autocorrelation of the error terms for a significance level of 0.10. The AR(2) test was more important, because it allows detecting levels of autocorrelation (Mileva, 2007) and validating the quality of the GMM estimator. As a result of applying the AR(2) test to our three models, we concluded that there was no second-order autocorrelation because the p-value AR(2) was greater than 0.10. as defined by Lahouel *et al*. (2019). The Hasen test was also used to assess the quality of the instrumental variables (Hayashi, 2000). The finding that the p-values of the Hansen test were greater than 0.10, which means that the models were well specified and there was no evidence to reject the validity of the instrumental variables used in the regressions.

In each of the models, control variables referring to the macroeconomic condition were included, which were very significant to explain GDP per capita (verified by p-value, mostly p-value <0.01), with the exception of the Inflation variable (INF), which was not significant in all estimated models. The control variables presented a positive relation to GDP (per capita), with the exception of the unemployment rate (UNEMPLOY) and the public spending rate (GOVEXP), which had a negative impact on GDP per capita.

Perceived opportunities (PO) had a positive relation ($\beta = 0.0057$) with economic growth, *i.e.*, 0.57% of changes in GDP per capita were explained by this variable, confirming H1. Although significant but positively related to economic growth, this measure of entrepreneurial activity had a very small impact (0.57%), as obtained by Urbano and Aparicio (2016), Bohlmann *et al*. (2017) and Stoica *et al*. (2020). This means that higher GDP per capita was related to higher levels of perceived opportunities, which

means that the perceived opportunities encourage entrepreneurship as it contributed to reducing unemployment in countries and, as such, promoting their economic growth.

Table 4. Regression analysis

LOG(GDP_PC)	Model 1	Model 2	Model 3
LOG(GDP_PC)(-1)	0.7491*** (0.0462)	0.7796*** (0.0894)	0.7414*** (0.0518)
Entrepreneurial activity			
PO	0.0057* (0.0014)		
PC		-0.0042*** (0.0025)	
TEA			-0.0067** (0.0055)
Control variables – Macroeconomic conditions			
GROSSCAP	0.0205*** (0.0012)	0.0212*** (0.0073)	0.0139*** (0.0050)
R&D	0.0858*** (0.0849)	0.0410** (0.0592)	0.0842*** (0.0753)
UNEMPLOY	-0.0105*** (0.0107)	-0.0139*** (0.0188)	-0.0132*** (0.0120)
GOVEXP	-0.0002*** (0.0134)	-0.0011*** (0.0135)	-0.00023*** (0.0149)
POP	0.0148*** (0.0766)	0.0746*** (0.0842)	0.0058*** (0.0781)
EOPEN	0.0067*** (0.0046)	0.0050*** (0.0027)	0.0069*** (0.0037)
INFLATION	0.0049 (0.0072)	0.0122 (0.0092)	0.0032 (0.0084)
EDUC	0.0035** (0.0034)	0.0009*** (0.0028)	0.0023** (0.0027)
AR(1) p-value (AR1)	-0.0755 0.0000	-0.0632 0.0000	-0.0350 0.0000
AR(2) p-value (AR2)	0.1044 0.6522	0.1057 0.6989	0.1002 0.7324
p-value (Hansen test)	0.8567	0.7895	0.7456
Obs.	165	165	165
Cross-sections	20	20	20
Period Included	17	17	17

Note: *** p < 0.01; ** p < 0.05; *p < 0.10; standard errors are shown in parentheses. All models are estimate by GMM method using the Arellano-Bond estimator. All models include time and fixed effects.
Source: own study.

According to the results of Model 2, perceived capacities (PC) had a negative relation (β = -0.0042) with GDP (per capita). This means that higher GDP per capita was not related to higher levels of perceived capacities. This result, according to the studies by Bohlmann *et al. (*2017) and Ackerman *et al. (*2002), may result from the fact that the population included in the sample is older, that is, older adults have age-related cognitive and physical declines and, as such, less perceived capacities. This may function as an inhibitor of entrepreneurial activity and, as a consequence, reduce the impact on economic growth. In this way, H2 is rejected. However, perceived capacities are strongly indirectly related to entrepreneurial intention through perceived opportunities (Tsai *et al.,* 2016) and, according to the results of Models 1 and 2, we verify that entrepreneurial activity measured by perceived opportunities does have a positive impact on economic growth.

The impact of perceived opportunities on countries' economic growth was greater (β = 0.0057) than the perception of capacities (β = -0.0042), confirming hypothesis H3.

According to Model 3, total early-stage entrepreneurial activity (TEA) had a negative relation (β = -0.0067) to the economic growth of the selected countries, rejecting H4. This result could be explained by the fact that countries are not divided by their level of economic development and corroborate the conclusions of several authors that TEA may have different economic results (Bosma *et al.,* 2009 and 2012; Gries & Naudé, 2010; Valliere & Peterson, 2009; Ferreira *et al.,* 2017; Almodóvar-González *et al.,* 2020).

Thus, the impact of entrepreneurial activity on the economic growth of the European countries considered in the sample depends on the measure of entrepreneurial activity, that is, the use of perceived opportunities (PO), perceived capacities (PC), and the total early-stage entrepreneurial activity (TEA) may condition the impact of entrepreneurship on countries' economic growth.

CONCLUSIONS

Starting from the relationship between economic growth and entrepreneurship already studied in empirical terms by various authors, we tested three models with different measures of entrepreneurial activity. For the group of 21 European countries in the sample, we conclude that the impact of entrepreneurial activity on the economic growth of countries, measured by their GDP per capita, depends on the measure of entrepreneurial activity.

For this group of countries, entrepreneurial activity measured by the ability to perceive that there is a good opportunity (PO) to start a new business in the area of residence has a positive relation with the economic growth (confirming H1), *i.e.*, higher GDP per capita is related to higher levels of perceived opportunities. Furthermore, perceived opportunities have an indirect impact on countries' economic growth through perceived capacities, leading to reduced unemployment and, as such, promoting economic growth. However, perceived capacities (PC) have a negative relation to economic growth (rejecting H2), *i.e*., higher GDP per capita is not related to higher levels of perceived capacities. The explanation may be related to the age of entrepreneurs, which has a negative effect on this variable. However, the impact of perceived opportunities (OP) on countries' economic growth is greater than the perception of capabilities (CP), confirming H3. Entrepreneurship measured through TEA in the group of countries considered has a negative impact on economic growth (rejecting the H4), which can be explained by the fact that differences in the level of development of countries have not been considered (classification of countries into countries developed and developing according to the value of GDP per capita).

Thus, in general, the practical implications of this study are the entrepreneurship motivated by opportunity, and also directly or indirectly through perceived capacities. It is an important factor to stimulate the economic growth of the European countries analysed.

In terms of limitations, this research uses a somewhat small sample (21 European countries and a maximum time period of 2001-2019) as a result of the availability of data. In future studies, we will try to use a larger sample of countries, divide countries by their stage of development (developed and developing countries) and include new variables that capture the attitudes and behaviours of entrepreneurs, such as, for example, the entrepreneurial intention, the motivation index of entrepreneurs, and entrepreneurship as a career choice.

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Conflict of Interest

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Adoption of open innovation and entrepreneurial orientation practices in Malaysian furniture industry

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ABSTRACT

Objective: The main objective of this research is to integrate the resource-based view (RBV) to analyse how the relationship between firm performance and entrepreneurial orientation is mediated by outbound innovation among furniture firms in Malaysia.

Research Design & Methods: In this research, data has been poised via questionnaire from the furniture firms in Johor state, Malaysia. In this study, 391 responses were considered and analysed. The partial least squares (PLS) model was employed to test the hypothetical relationships among entrepreneurial orientation, firm performance and outbound innovation intention to adopt open innovation practices.

Findings: Research findings show that innovativeness, competitive aggressiveness, risk-taking, outbound innovation are statistically significant factors influencing entrepreneurial orientation and open innovation adoption among furniture companies in Malaysia. However, autonomy and proactiveness do not have significant effects on entrepreneurial orientation and open innovation adoption intention.

Implications & Recommendations: Few implications that are significant for academics and practitioners are also debated according to research findings. This research can serve as a guideline for successfully implementing entrepreneurial orientation and open innovation among furniture firms in an emerging economy. Thus, offering an external knowledge search-collaboration mechanisms-superior performance framework. Through using this open approach, companies will seek to find opportunities for creativity that go beyond their current capabilities to dramatically boost success.

Contribution & Value Added: This research, expanding the open innovation (OI) paradigm, explicates and measures the impact of OI's direct and mediating inputs on entrepreneurial orientation (EO) and firm performance. The results are consistent with the current OI literature demonstrating the complex connection among together outbound innovation and EO dimensions and firm performance by investigating Malaysian furniture manufacturers by building scales and evaluating their validity by developing outbound innovation. The initial findings are direct ties between entrepreneurial orientation dimensions with business performance and outbound open innovation. All the indirect (mediation) relations among the study variables were the second part of the results.

Article type: research article
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INTRODUCTION

An overwrought surge in the literature that discusses the role and essence of innovation illustrates the increasing prominence of innovation to entrepreneurship (Birkinshaw, Hamel, & Mol, 2008). Innovation is the basic step of entrepreneurship whereby entrepreneurs take advantage of transition as a

catalyst for a unique brand or a company. In both nature and academics, the premise of open innovation (OI) has drawn tremendous interest. Several scholars have provided valuable insights and have introduced strategies to help management decision-making by dwelling on key viewpoints of the OI framework (Huizingh, 2011). The current article emphasises two concerns that have been identified as an important area in the field of OI: the urge to grasp how OI can help, especially in terms of its effects on company's overall performance and the function of contextual factors (mediation or moderation) (Huizingh, 2011; Lichtenthaler, 2009; Schroll & Mild, 2011).

The entrepreneurial orientation (EO) explains how new initiation is carried out through main business processes (competitive aggressiveness, proactiveness, autonomy, innovativeness, and risk-taking), which are incontrovertibly related to organisational higher performance. By building the conceptual framework of EO performance, researching probable mediators (outbound), and analysing the significance of the correlation among EO and organisational performance, incorporating on the company's resource-based viewpoint (Barney, 1991; Barney, 2001), we enter the prevailing EO and OI literature argument by addressing the following question: How is outbound openness linked to business performance? In the relationships amid firm performance with regard to EO, what function can outbound open innovation perform?

Although prior OI efficacy studies centred predominantly on inbound OI, minimal emphasis was devoted to researching the outbound impact and combined effects (Akbar, Bon, & Wadood, 2020; Chesbrough & Bogers, 2014). This article aims to discover the function of outbound OI in the EO-Performance relationships by integration of the theoretical perspective of the resource based-view (RBV).

We claim that there are many contributions to the current literature in the article: it affirms the dimensions deemed to determine the degree of openness, level of efficiency, and the connection among the different dimensions. Secondly, to address existing limitations, it builds on existing literature, advocating the assessment of outbound openness by using entrepreneurial orientation and firm performance dimensions. These variables, as indicated, are more reliable indicators towards firm openness than in OI literature. Furthermore, the study also recommends that the effects of acquisition versus development have different performance dimensions, *i.e.* Human Capital Development, Economic Growth, and financial worthiness.

LITERATURE REVIEW (AND HYPOTHESES DEVELOPMENT)

The suggested conceptual model is primarily RBV enunciated by Covin and Lumpkin, 2011; Edmond and Wiklund, 2010; Miller, 2011; William, Wales, Gupta, and Mousa, 2013. In essence, the RBV has been broadly used to clarify the association among entrepreneurial orientation and company performance (Ferreira & Azevedo, 2007; Ferreira, Azevedo, & Ortiz, 2011; Puffer, McCarthy, & Jaeger, 2016) and also to clarify the direct influence of OI on company performance (inbound and outbound) (Carvalho, 2016; Wales, 2016). According to this theory, businesses are expected to adopt successful entrepreneurship with valuable human capital resources, which can contribute to a competitive advantage against competitors (Maritz & Donovan, 2015; Puffer *et al*., 2016; Wales, 2016). Therefore, the researchers contend that entrepreneurship is a vital resource that has significant consequences for implementing an effective open innovation strategy. In particular, RBV offers theoretical lenses for explaining the association between the EO dimensions, *i.e.* competitive aggressiveness autonomy, proactiveness, innovativeness, and risk-taking concerning firm performance where it endorses the mediation significance of open innovation (outbound innovation) for improved sustainability of organisations. But since confluence of a firm's capabilities with its entrepreneurial mind-set facilitates superior firm performance (Martin & Javalgi, 2016), and the firm's resources and capabilities impact its strategies (Hult, Ketchen & Slater, 2005; Hullova, Trott & Simms, 2016). Furthermore, RBV encourages creativity in identifying important corporate resources in order to improve R&D effectiveness (Plank & Doblinger, 2018; Camara, 2018).

Innovativeness and firm performance

The current literature shows tremendous relation among innovation within a firm with high profitability in term of overall investment, *i.e*. return on asset and sales (Calantone, Cavusgil, & Zhao, 2004). The study of Casillas and Moreno, (2010) on Spanish SMEs has the same result, i.e. that innovative firms are found to be more developed in term of sale, growth in assets, and employment generation. Besides, process innovation has also shown a positive connection among sales performance and overall organisational growth (Klomp & Van Leeuwen, 2001). Moreover, Li and Calantone (1998) studied the relationship of product innovation with firm market performance and found an expressively positive relationship. In the same vein, Wang and Yen (2012) studied the Taiwanese SMEs working in China has found that firm performance is strongly linked with firm innovativeness. The findings of Hameed & Ali (2011) on Pakistani SMEs, Yoo, Sawyerr, and Tan, (2016) on Korean SMEs, Cannavale and Nadali, (2019) on Iranian SMEs and Karacaoglu, Bayrakdaroglu, and San (2013) on Turkish SMEs found that firm innovativeness has a significantly positive relationship with overall growth. Hence, it is concluded that in this hyper-competitive environment, firms must have to search for new ideas and update their approach to becoming successful, maintain, and sustain its position. Therefore, we hypothesise that:

H1a: There is positive relationship among Innovativeness and firm performance.

Proactiveness and Firm Performance

Proactiveness is the best strategy to be a part of a competition. Most of the study shows that when a firm introduces new products, offering new services or marketing their products differently is highly rewarding. Furthermore, proactive firms have mover advantages over other firms in the industry and capture the opportunities (Ambad & Wahab, 2013). When an organisation introduces new product or services, it compels the customer to switch and gains existing customer loyalty. Moreover, the study by Coulthard (2007) on start-up companies shows that a new firm is more likely to be proactive than established firms. In this regard, Meuer and Rupietta (2015) further emphasise that due to the bureaucratic nature of larger and established firms are lacking the ability to easily grab the opportunities. Hence, we can conclude that proactiveness is the best policy, and specifically, SMEs has to be proactive toward innovation to gain a competitive advantage. In this regards, diverse investigations show how firm proactiveness has a great impact on firm performance, e.g. Becherer and Maure (1999) studied US firms, Cassillas and Moreno (2010) studied Spanish Firms, Wang and Yen (2012) studied Chinese firms, and Cannavale and Nadali (2019) wtydied Iran firms and reached the same results. Therefore, we hypothesise that:

H1b: There is positive relationship among Proactiveness and firm performance.

Risk-Taking and Firm Performance

Enterprises that seek to make substantial pledges to high-risk, high-return projects gain from enhanced company resources and revenue (Boermans & Willebrands, 2012; Kitigin, 2017; Olaniran, Namusonge, & Muturi, 2016; Rezaei & Ortt, 2018; Rossi, 2016; Wambugu, Gichira, Wanjau, & Mung'atu, 2015; Akbar *et al.,* 2021). Risk-taking ability leads organisation towards success, which is a naturally accepted phenomenon. Risk-taking behavior develops the tendency that leads from a predictable situation to grabbing the opportunities in unpredictable situations (Wiklund & Shepherd, 2005; Covin & Slevin, 1991b). As the findings of Gibb and Haar (2010) from the study on 167 large New Zealand firms confirm, organisation with risk taking profile shows high financial performance. In the same vein, the finding on Iranian technology-based SMEs shows that risk-taking ability is a highly rewarding activity and leads to success (Cannavale & Nadali, 2019). The study of Wang and Yen (2012) on Taiwanese SMEs operating in China also confirms that risk taking shows high performance in term of growth, financial reward and reputation. Therefore, we hypothesise that:

H1c: There is positive relationship among Risk-Taking and firm performance.

Autonomy and Firm Performance

The findings of different studies related to firm performance regarding autonomy as an EO dimension show varied results (Yu, *et al.,* 2019; Akbar *et al.,* 2021). In this regard, the findings of Jancenelle *et al*., (2017) and Chen *et al.,* (2014) show that firm autonomy has a significant influence on overall firm performance. On the other hand, studies of Lechner and Gudmundsson (2014) and Hughes and Morgan (2007) show no significant results. The available literature has varied research findings, and the phenomena are paradoxical (Short *et al.,* 2009; Zellweger & Sieger, 2012). Some scholars suggest that giving autonomy to all stakeholders motivates significant performance scholars (Coulthard, 2007c; Lumpkin *et al*., 2009; Prottas, 2008). Chen, Neubaum, Reilly, and Lynn, (2014), and Jancenelle, Storrud-Barnes, and Javalgi, (2017), for example, found a significant relation between autonomy and performance. Therefore, the main purpose of this investigation is to study the phenomena with an alternative solution. Therefore, we hypothesise that:

H1d: There is positive relationship among Autonomy and firm performance.

Competitive aggressiveness and Firm Performance

The main focus of a firm to develop its abilities to be competitive and do better than others in the industry is described as competitive aggressiveness (Kuivalainen, *et al.,* 2010; Yu *et al.,* 2019). Rauch *et al.,* (2009) describe competitive aggressiveness as an aggressive response and 'competitors' actions (Lumpkin & Dess, 2001) to competitors' threats. The study (meta-analytic review) of Hughes-Morganet *et al.,* (2018) regarding competitive aggressiveness about firm performance shows positive relation between the two. Whereas the finding of Kljucnikov, Belas, and Smrcka, (2016), shows a negative result among competitive aggressive and firm performance. Conversely, Lumpkin and Dess (2001) did not find any direct relationship among the phenomena. Kuivalainen *et al.,* 2010 and Yu *et al.,* (2019) argue that only few studies have directly hypothesised the phenomena. Therefore, we hypothesise that:

H1e: There is a positive relationship among Competitive Aggressiveness and firm performance.

Outbound open innovation and firm performance

Enkel *et al.,* (2009) state that outbound innovation practice allows organisations for directly implement their knowledge. It can be possible to explore their knowledge with other firms or license their intellectual property to obtain related benefits. (Oltra *et al.,* 2018; Cassiman & Valentini, 2016; Hung & Chou, 2013). Out-licensing allows organisations to properly and effectively commercialise their unexploited assets and knowledge when organisation is lacking current market knowledge. It only reduces earned profit in licensing payments (van de Vrande *et al.,* 2009). Conversely, Oltra *et al.,* (2018) and Hung and Chou (2013) found that firm perusing outbound open innovation gain some specific advantages of utilisation of their unused resources and exploiting their technical knowledge outside their boundaries. Hence, following outbound open innovation grab possibilities outside the market to create extra revenue (Gassmann & Enkel, 2004; Enkel *et al.,* 2009; Oltra *et al.,* 2018). Therefore, outbound OI positively improving a firm overall performance and profitability (Oltra *et al.,* 2018). In this regard, the discussion leads to the succeeding expected relationship:

H2: There is positive relationship among Outbound open innovation and firm performance.

Outbound open innovation and entrepreneurial orientation dimension

Autonomy (relationship):

In this current hyper-competitive marketplace, organisations have to adopt and develop multifunctional HR to solve complex nature problems and innovate exactly according to customer orientation beyond company limits (Brodner, 2013). In this regard, Markman, Gianiodis, and Phan (2009) and Carvalho (2016) developed hypothesis representing different kinds of firms with context to open innovation theories, centralisation, decentralisation, autonomous which shows positive results related to commercialisation and consideration. Therefore, in regards to commercialization and exploration of

technological advancement outbound open innovation is considered crucial in EO-FP relationship (Carvalho, 2016; Markman *et al.,* 2009). Therefore, we hypothesise that:

H3a: Autonomy affects outbound open innovation.

Competitive aggressiveness:

Leão and Mello (2007) foresee the impact of competitive aggressiveness on open innovation dimensions. In their findings, the importance and effectiveness of open innovation – also highlighted by Carvalho (2016) – to create appropriate value organisation need to be involved with third party. Furthermore, the third party, *i.e.* the customer, R&D partners and suppliers, are important tool for commercialisation of innovative ideas. Based on the previous literature about competitive aggressiveness and open innovation. Therefore, we hypothesise that:

H3b: Competitive aggressiveness affects outbound open innovation.

Proactiveness:

Martínez-Román and Romero (2013) studied in detail more than 1500 SMEs in Spain and explored basic determinants of product innovation. They used different variables to identify alternatives and identification of unexplored opportunities. In this study, the authors measure two basic factors that affect innovation, *i.e.* 1) entrepreneurial personnel characteristics (their motivations, educational background, degree of interpersonal trust and age), 2) organisations management related characteristics, *i.e.* risk-taking ability, proactivity, cooperation, growth-related policies and specific innovation (Carvalho, 2016). Furthermore, these variables may be used for discovering prospects in existing and outside markets. Therefore, we hypothesise that:

H3c: Proactiveness affects outbound open innovation.

Risk-taking:

There is high risk associated with outbound activities compared to inbound activities, because outbound activities sometimes cause firm to lose their value (Schroll & Mild, 2011). In this regard, Jeong, Lee, and Kim (2013) discuss in detail and differentiate selling and licensing. According to them, in the case of sales of licensing it lowers the basic payment of the licensee. However, it increases the uncertainty concerning overall revenue. Because the supplier will acquire technology that can be determined in a regular case by paying a licence fee. On the other hand, Carvalho, (2016) and Jeong *et al.* (2013) states that in selling, there is no risk as all associated risk is transferred to the seller. Therefore, we hypothesise that:

H3d: Risk-Taking affects outbound open innovation.

Innovativeness:

Innovativeness does not simply enable a company to be in market competition but also provides and facilitates the company to grab opportunities that refresh firm growth (Garud & Nayyar, 1994; Cho & Pucik, 2005, and Carvalho, 2016). In this regard, Hughes and Morgan (2007) state that innovativeness facilitates and also differentiates the actors from rivals. Therefore, one firm can be differentiating through exploration (inbound) while developing and offering services or new products to satisfy the customers' necessities. On the other hand, Carvalho (2016) further adds that outbound, *i.e.* Exploitation, can be achieved through a competitive offering. Furthermore, innovativeness can also increase a company reputation in the existing market while creating and maintain customers. In a nutshell, it is concluded that outbound OI has significant impact of on a firm's innovativeness (Carvalho, 2016).

H3e: Innovativeness affects outbound open innovation.

Performance Relationship of Entrepreneur Orientation and Integrated outbound open innovation:

It's indeed instantly apparent from the literature that mediating factors in the EO literature have attracted substantially less exposure than moderator variables (Carvalho, 2016). Overall, current EO literature study of mediators shows no knowledge of the causal processes of how or why EO influences

other factors in the hypothesised model. We are trying to address the following question while testing those hypotheses: What is the role of outbound open innovation in the relationship between entrepreneurial orientation and firm performance? We propose that Entrepreneurial Orientation dimensions are strongly related with Open Innovation and that both influence the company's performance.

According to Hutter, Hautz, Repke, and Matzler, (2013), internal factors such as staff are still regarded as significant sources of creativity in the investigated SMEs and have the autonomy to perform. Moreover, employees and organisations are proactive, trying to get ahead of rivals by implementing a new concept or product that is perceived to be innovative. There is research on R&D outsourcing, but none have been reported to contribute to entrepreneurial orientation. There are many case studies, and the same is effectively tested, which establishes a theory. Although evidence tying the relation with risk-taking, proactiveness, and consumer engagement dimensions are strongly linked to the network dimension. According to Chesbrough (2003), the production and appropriation of value often include outside parties with a valued chain and composed, such outside events create significant networks. Ståhlbröst (2012) argues that if it opens up as early as appropriate, the risk of keeping open the company's process reduces, because the company gets to know the customers' needs earlier on, which is known as risk-taking.

In other terms, as a result of its outbound open innovation policy, the firm uses both customer engagement and external collaboration. Hutter *et al.* (2013) illustrate that besides some external sources of innovations, inventions and motivation are predominantly other businesses and affiliate companies within the small and micro companies surveyed. In Brazilian firms, research conducted by Carvalho (2016) concludes that open innovation (outbound innovation) intervenes in the association among EO dimensions and firm performance. Therefore, from the survey of previous literature, we hypothesise in the Malaysian context that:

H4a: Outbound open innovation mediates the relationship among autonomy and firm performance.

H4b: Outbound open innovation plays a mediating role in the relationship between competitive aggressiveness and firm performance.

H4c: Outbound open innovation mediates the relationship between innovativeness and firm performance.

H4d: Outbound open innovation mediates the relationship between proactiveness and firm performance.

H4e: Outbound open innovation mediates the relationship between risk-taking and firm performance.

RESEARCH METHODOLOGY

We have used a post-positivist method in this article because of its objective orientation and to contact with participants as little as practicable. The study's major objective is to allow researchers to reproduce and validate the findings in the future using a post-positivist methodology (Teles & Schachtebeck, 2019). We gathered the data from the owners and managers of furniture manufacturing enterprises in the Malaysian state of Johor. A sample of technology-based companies has been selected from the Malaysian Technology Development Centre (MTDC), Johor Furniture Manufacturers and Trader Association Federation. We randomly contacted businesses via Facebook, e-mail, and phone calls, asking that would want to participate in the research, and 500 questionnaire were distributed. The link was emailed to the companies that agreed to participate in the survey. We approached almost all of the firms after three months. A total of 415 firms participated in our inaugural survey. However, 24 documents were marked ineligible due to incomplete responses to questions. It is worth noting that 95% of respondents were owner-managers, with the rest being CEOs, managers, or lower managers. Table 1 shows the administration of questionnaires.

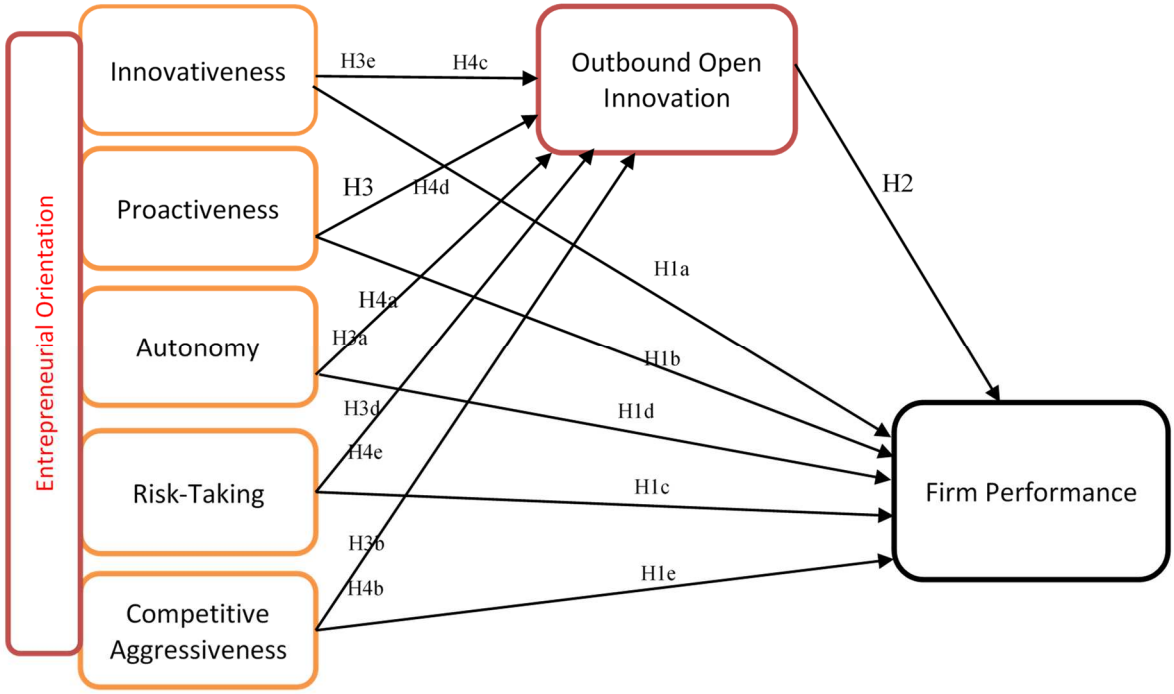

Figure 1. Conceptual framework
Source: own elaboration.

Table 1. The questionnaire distribution analysis

Questionnaire characteristics	Frequency	Percentage
Total questionnaire distributes	500	100%
Total retrieved	415	83%
Effective sample to be used	391	78.2%

Source: own study.

The survey questions were close-ended, and data collection was divided into three parts to effectively measure the response. Sections One and Two consist of 27 items using the Likert scale (Five-point scale) to know the value of individual five dimensions of EO about performance. Independent variables are divided into 5 dimensions, *i.e.* 1) autonomy, 2) competitive aggressiveness, 3) innovativeness, 4) risk-taking, and 5) Proactiveness. The top management decides and have to choose which dimension is more appropriate for their business success. The performance measurement was based on growth and profitability and adopted from previous studies (Akbar *et al*., 2020; Akbar, Razak, Wadood, & Al-subari, 2017; Birkinshaw *et al*., 2008; Wolff & Pett, 2006). The adopted performance measurement was modified accordingly. Finally, the last section consists of outbound open innovation. WE analysed the data through Smart-PLS 3.0 and SPSS.

Variables and calculations

In this research, we used previous literature for the variables. All scales were calculated by a Likert scale of five points ranging from "strongly agree" *i.e.* high to "strongly disagree" *i.e.* low. Open innovation has different magnitudes and dimensions hence based on Inauen and Schenker-Wicki, (2012) descriptions and Gassmann and Enkel, (2004) theory we operationalised open innovation into two broad variables *i.e.* inbound and outbound open innovation. However, this study considers outbound OI and measurement scales established while following Cámara, (2018); Carvalho, (2016); and Akbar *et al.,* (2020). Entrepreneurial orientation has been considered as a unidimensional variable such as firm leaning to practice innovativeness, proactiveness, risk-taking, autonomy, and competitive aggressiveness (Matchaba-Hove, Farrington, & Sharp, 2015; Arshi, 2016, Akbar *et al*., 2020). Furthermore,

Wiklund & Shepherd's measurements have been embraced to quantify organization performance such as sale, profit and growth of last three year with competitor comparison (Akbar *et al*., 2020; Akbar, *et al*., 2017; Akbar, Omar, Wadood, & Tasmin, 2017) (see Table 2).

Table 2. Questionnaire items

Construct	Number of items	Source
Entrepreneurial Orientation	28	(Tajeddini, 2013; Dai *et al*., 2014; Matchaba-Hove *et al*., 2015; Arshi, 2016; Akbar, *et al.,* 2020b)
Outbound Open Innovation	5	(Akbar, *et al.,* 2020; Cámara, 2018; Carvalho, 2016; Lichtenthaler, 2009; Sisodiya, Johnson, & Grégoire, 2013)
Firm Performance	6	(Nasir, 2013; Matchaba-Hove *et al.*, 2015; Akbar, Razak, *et al*., 2017; Rajapathirana & Hui, 2017; Akbar, *et al.,* 2020b)

Source: own study.

RESULTS AND DISCUSSION

For the evaluation of the previously adopted model, this article utilises Smart-PLS and SPSS tools. The two-stage process internal (measurement) and external model (structural) are employed to assess the conceptual or theoretical model in PLS-SEM. These two methods will be explored in-depth in the upcoming section.

Respondents socio-demographic characteristics

In this study, Table 3 shows participants socio-demographic characteristics. Its analysis shows that 42.5% of the companies are 1-4 years old. The gender distribution of the respondents indicated that about 57.3% were males while the remaining 42.7 were females. Exactly 52.9% of the companies have above 200 employees, 40.8% represent medium-size firms, while 6.3% represent small companies with less than 75 employees. The respondents' position indicates that 36.40% of the respondents were in the position of middle management. The top management respondents were 34.71%, while 28.88% of the respondents were positioned lower management in their respective company. The educational background of the respondents showed that above half (54.9%) had master's degree-level education, 35% holds degree education, 7.3% have diploma education. The location of the company in Johor state has the high establishment in Muar 45.1%. Segamat have an establishment of 20.9%, Batu Pahat has 16.3% establishment, and Kulang has 11.2%, while Johor Bharu has almost 6.6% of the 'company's establishments.

Evaluation of measurement (inner) model

Three distinct methodologies were used to adopt assessment parameters. These methods are Cronbach's alpha to check (Composite Reliability for internal consistency), average variance extracted to check (convergent validity), and discriminant validity (cross-loadings, Fornell and Larcker criteria and heterotrait-monotrait). However, to check the reliability, validity, and loading of all indicators in their respective constructs, the PLS algorithm procedure was carried out (Akbar, *et al*., 2020b; Urbach & Ahlemann, 2012). The structure's AVEs meet the necessary criterion of 0.50. However, its loadings are equal to or greater than 0.7, except five items between 0.4 and 0.6, on the advice of (Hair, Ringle, & Sarstedt, 2011), although the researcher maintains certain items if the values of the AVEs are obtained.

Individual reliability of the study has revealed that the detected variables have got $\lambda \geq 0.70$, which is the minimum required level. According to Hair, *et al*., 2017, Hair *et al*., 2011, the least required criteria for composite reliability is 0.7 and average variance extracted is 0.5 correspondingly. Hereafter, the results specify – as according to Hair *et al.,* (2011) – that the measurement model constant within and the detected items or variables measured their corresponding latent variables (Hair *et al.,* 2011). The composite reliability (CR) for the variables' innovativeness, proactiveness, risk-taking, competitive aggressiveness, autonomy, outbound innovation and firm performance are 0.924, 0.837, 0.928, 0.920,

Table 3. Respondents Socio-demographic characteristics

Variables		Frequency	Percent
1-4	Age of the company	160	42.5
5-9		126	32.0
10-14		81	19.7
15 & above		24	5.8
Total		391	100.0
Male	Gender	225	57.3
Female		166	42.7
Total		391	100.0
Large more than 200 employees	Size of the Firm	208	52.9
Medium less than 200 and more than 75		157	40.8
Small less than 75		26	6.3
Total		391	100.0
Top Management	Position in the Firm	142	34.71
Middle Management		140	36.40
Lower Management		109	28.88
Total		391	100.0
Diploma	Educational Background	30	7.3
Degree		144	35.0
Master's		217	54.9
Total		391	100.0
1-5	Working Experience	255	65.3
6-10		71	17.7
11-15		65	16.0
Total		391	100.0
Muar	Location of company	181	45.1
Batu Pahat		61	16.3
Kluang		45	11.2
Johor Bahru		28	6.6
Segamat		76	20.9
Total		391	100.0

Source: own study.

0.799, 0.887, and 0.925 respectively. Similarly, AVE ratios of study constructs innovativeness, proactiveness, risk-taking, competitive aggressiveness, autonomy, outbound innovation and firm performance are 0.669, 0.531, 0.683, 0.659, 0.513, 0.662and 0.673 in that order. All the AVE are above the recommended minimum of 0.5 (Bagozzi & YI, 1988; Hair *et al.,* 2014; Memon & Rahman, 2013).

By examining the factorial load of the items and AVEs, the number of iterations of the measurement model convergence were weighted for convergent validity as according to Wong, (2013), Memon, Ting, Ramayah, Chuah and Cheah (2017) and Hair et al., (2017). The items should sustain a higher load on their principal construct for successful convergence and must not hold a high load on other variables. The convergence validity criterion for the load factor must be 0.7 or greater (Hair *et al.,* 2017). Further, Hair *et al.,* (2011) advise that loads of items lower than 0.4 must be dropped. Nevertheless, Hair *et al.,* (2013) recommende that if the AVE ≥ 0.5 is succeeded, the items with a loading of ≥ 0.4 can be retained. The item loadings with 0.4 and beyond were retained in this research.

The Table (Appendix A) presented that maximum factor loadings are ≤0.7. Two items are less than 0.7 suggested threshold, but those items were retained, because of the AVEs surpassed the essential threshold as indicated in Hair *et al*., (2017; 2013). Furthermore, factor loads of the variables were less than 10 iterations, according to Wong (2013), which lower the 300 iterations. Hence, the measurement model defines the convergence validity of the study.

The discriminant validity is distinct as that each construct is significantly different from other constructs that are non-theoretically linked. According to Fornell and Larcker (1981), this is the primary proof that the square root of the AVE is greater than that of the collective variances amid the structure as well as other model structures (Mason & Perrault, 1991). The diagonal entries that reflect the square root of each construct's AVE are greater than that of the inter-correlations with certain factors in the model. The highest inter-correlations ratios were among EOCA and EOA with a value of 0.481. None of the values from diagonal view exceed that of inter-correlated main scores. Moreover, for additional authentication of discriminant validity, we embraced the 'Heterotrait-Monotrait' (HTMT) technique. Henseler and Sarstedt (2013) find the HTMT method the most conservative and adequate method for discriminative valuation. The rule of thumb for HTMT validity shows that the relationship between target variable and other are (r<HTMT0.85) which is below than 0.85 (Henseler, *et al.,* 2009; Kline, 1994). The highest value recorded on the diagonal of EOCA and row of EOA was 0.593. As revealed in the results, all recorded values are less than (r<HTMT0.85) lower than HTMT0.85 thresholds, which further substantiate the effectiveness of the constructs and discernment is being established.

Outer (structural) model

The achievement of the first step in the PLS-SEM assessment procedure is now the comprehensive valuation of the second step structural model. This assessment model is a five-step process. This contains collinearity assessment, significance check of the relationship among structural model, R-square assessment, effect size f^2 assessment and 'model's predictive relevance (Hair *et al.,* 2011). Table 4 illustrates the assessment of the structural models of the research.

Table 4. Path coefficient

Path	Beta (β)	Standard Deviation (STDEV)	T Statistics	P-Values	F-Square	Decision on Hypotheses
EOA -> FP	0.094	0.094	1.000	0.318	0.009	Not Accepted
EOA -> OUTBI	0.050	0.114	0.439	0.661	0.002	Not Accepted
EOCA -> FP	0.128	0.053	2.414	0.016	0.014	Accepted
EOCA -> OUTBI	-0.088	0.056	1.561	0.119	0.006	Not Accepted
EOIN -> FP	-0.219	0.057	3.847	0.000	0.042	Accepted
EOIN -> OUTBI	0.219	0.054	4.083	0.000	0.039	Accepted
EOPR -> FP	0.006	0.086	0.066	0.948	0.000	Not Accepted
EOPR -> OUTBI	0.089	0.062	1.436	0.152	0.007	Not Accepted
EORT -> FP	0.186	0.053	3.528	0.000	0.033	Accepted
EORT -> OUTBI	0.273	0.051	5.382	0.000	0.067	Accepted
OUTBI -> FP	0.350	0.043	8.078	0.000	0.136	Accepted

Source: own study.

Table 4 presents path coefficients (Beta), T-values, P-values, and respective F-square. The table shows direct relationships among the study variables. The highest positive path relationships were among outbound innovation and firm performance. Likewise, other positive path relationships were risk taking-outbound innovation, risk taking-firm performance, innovativeness-outbound innovation, innovativeness-firm performance and competitive aggressiveness-firm performance. Hypothesis H1a states that innovativeness affects firm performance, the result shows positivity (β=-0.219, t=3.847, p<0.05). Similarly, other positive results are risk-taking, competitive aggressiveness and outbound innovation with firm performance. The results for these hypotheses are, H1c risk-taking (β=0.186, t=3.528, p<0.05), H1e competitive aggressiveness (β=0.128, t=2.414, p<0.05), H2 outbound innovation (β=0.350, t=8.078, p<0.05). The associations among outbound innovation and entrepreneurial orientation dimension were

also drawn. The positive correlations were among innovativeness and risk-taking with outbound innovation. Findings for the H3e innovativeness were β=0.219, t=4.083, p<0.05 and for H3d risk-taking – β=0.273, t=5.382, p<0.05. Both the hypotheses H1b and H1d showed a non-significant relationship with firm performance. While EO dimensions with outbound innovation, H3a autonomy, H3b competitive aggressiveness, H3c Proactiveness also showed non-significant relationships.

In this regard, Cohen, Manion, and Morrison (2013) recommend that an R-squared value from 0.1 to 0.12 may be considered low, a value ranging from 0.13 to 0.25 is considered medium, and 0.26 or above is considered important. The company's average R-square on performance value is 0.265, which shows that independent variables explain 26.5% of the performance variations while outbound innovation R-square value is around 0.179, which is an explanation of around 18%. The association among independent variables and dependent variables are considered above the imperative threshold. Nevertheless, through outbound innovation, the value displays moderate effects. These assessments are used to conclude the influence of a single exogenous construct on their respective endogenous construct R-square value (Hair *et al.,* 2017).

Mediation assessment in the relationship

In this article, the outbound open innovation was defined as a mediator in the relations among the entrepreneurial orientation dimensions, *i.e.* innovativeness, Proactiveness, autonomy, risk taking, competitive aggressiveness and firm performance. Hypotheses were formulated with each construct with outbound innovation as mediation. Table 5 shows the mediation effects on each construct of EO with firm performance.

Table 5. Mediation path coefficient

Path	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values	Decision on Hypotheses
EOA -> FP	0.018	0.003	0.040	0.438	0.662	Not Accepted
EOCA -> FP	-0.031	-0.022	0.019	1.581	0.115	Not Accepted
EOIN -> FP	0.077	0.072	0.021	3.671	0.000	Accepted
EOPR -> FP	0.031	0.030	0.022	1.424	0.155	Not Accepted
EORT -> FP	0.095	0.091	0.021	4.594	0.000	Accepted

EOA, Entrepreneurial Orientation Autonomy, EOCA, Entrepreneurial Orientation Competitive Aggressiveness, EOIN, Entrepreneurial Orientation Innovativeness, EOPR, Entrepreneurial Orientation Proactiveness, EORT, Entrepreneurial Orientation Risk-Taking, FP, Firm Performance.
Source: own study.

This article embraced Preacher and Hayes (2008) recommendations to measure the mediation impact. The article employed a two-step approach. The first step is a two-way calculation of all direct path effects. The former step is conducted mediator as an indirect relationship goes through the mediator. All the effects are measured in the second level, and their values are determined by bootstrapping. Table 4 shows the EO constructs Beta (β), t-statistics, and p-value on FP with outbound innovation as mediation. Furthermore, to tests the significance bootstrapping procedure was adapted with 5000 irritations. The significantly positive path coefficients were between innovativeness and risk-taking. There are significant results for H4c innovativeness, (β=0.077, t=3.671, p<0.05), H4e risk-taking, (β=0.095, t=4.594, p<0.05). However, outbound innovation did not show positive mediation effects among other EO-FP relationships, such as H4a autonomy, H4b competitive aggressiveness, and H4d proactiveness. Consequently, in mediation tests, only H4c and H4e hypotheses were supported according to the results. While H4a, H4b and H4d hypotheses illustrate a non-significant relationship, the hypotheses were not supported.

Discussion

This research, expanding the OI paradigm, explicates and measures the impact of OI's direct and mediating inputs on EO and firm performance. The results are consistent with the current OI literature demonstrating the complex connection among outbound innovation and EO dimensions and firm results by investigating Malaysian furniture manufacturers through building measuring items and evaluating their strength by evolving outbound innovation. This study also adds to the current Open Innovation literature by stating outbound parameters for innovation based on previous theoretical foundations (Lichtenthaler, 2015). This article's results have two-dimensional implications. The initial findings are direct ties between entrepreneurial orientation dimensions with business performance and outbound open innovation. Hence the results are found consonant with the findings of (Casillas & Moreno, 2010; Wang & Yen, 2012; Yoo, Sawyerr, & Tan, 2016; Cannavale & Nadali, 2019; Jeong *et al.,* 2013; Carvalho, 2016; Carvalho and Sugano, 2016). All the indirect (mediation) relations among the study variables were the second part of the results. The findings of the article displayed mixed findings. The positive mediation associations are consistent with the article results (Carvalho, 2016; Carvalho and Sugano, 2016), whereas the other non-significant mediation outcomes are not consistent with the above studies. Overall, our findings affirm the value of outbound innovation in terms of entrepreneurial orientation and firm performance.

Hypothesis H1a states that innovativeness affects firm performance, the result shows positivity, which is consistent with the previous studies such as Akbar, Khan, Wadood, and Bon Bin, 2020; Cannavale and Nadali, 2019; Yoo *et al*., 2016; Wang and Yen, 2012; Casillas and Moreno, 2010. The results for hypotheses are H1c risk-taking, H1e competitive aggressiveness, H2 outbound innovation are supported. The finding of the study is in line with previous studies such as Akbar, *et al*., 2020; Cannavale and Nadali, 2019. The relationships between entrepreneurial orientation dimension and outbound innovation was also drawn. The positive correlations were among innovativeness and risk-taking with outbound innovation. Findings for the H3e innovativeness, and H3d risk taking. These findings are also consistent with Jeong *et al.,* (2013); Carvalho, (2016) and Carvalho and Sugano, (2017). The hypotheses H1b proactiveness, H1d autonomy, shows non-significant relationship with firm performance, which is departing from the current literature such as Cannavale and Nadali, (2019); Yoo *et al.,* (2016); Wang and Yen, (2012) and Casillas and Moreno, (2010). While EO dimensions with outbound innovation, the hypotheses H3a autonomy, H3b competitive aggressiveness, H3c proactiveness also showed non-significant relationships, which departed from literature such as the finding of Carvalho, (2016) and Carvalho and Sugano, (2017).

Consequently, in mediation evaluation, only H4c and H4e hypotheses were supported according to the results. Hypotheses. These results depart from previous studies (Akbar *et al.,* 2020; Carvalho, 2016). However, outbound innovation did not show positive mediation effects among other EO-FP relationships, for example, H4a autonomy, H4b competitive aggressiveness, H4d Proactiveness. While H4a, H4b, and H4d hypotheses illustrate a non-significant relationship, the hypotheses were not accepted. Hence, departing form the literature (Akbar *et al.,* 2020; Carvalho, 2016).

In brief, for academics and entrepreneurs, the association among EO and firm performance with outbound open innovation is crucially significant. By undertaking outbound open innovation initiatives, companies will achieve positive results, if innovative strategic actions are carried out under control environment. Also, to minimise potential risks and capture significant benefits, competent internal management of outbound OI is important. In this regard, to supplement emphasis of the previous studies on inbound OI and entrepreneurial orientation, further research on outbound OI is necessary. A recent study offers valuable guidance for future studies (Akbar, *et al.,* 2020b; West & Bogers, 2017; Brunswicker & Vanhaverbeke, 2015; Lichtenthaler, 2015; West, *et al.,* 2014; Huizingh, 2011). Hence, detailed analysis of the different elements of outbound OI with resultant firm's performance on current and entrepreneurial orientation dimensions will be a significant step. Furthermore, detailed analyses of internal and external influences concerning the intensity and direction of those effects will significantly enhance insights into the importance and function of open outbound innovation with different variables.

Theoretical implications

Such findings contrast with those of Lichtenthaler (2009b) according to whom outbound OI had a substantial influence on company's success. The following factors may cause variability in outcomes. Firstly, Lichtenthaler (2009b) was the first to use return on sales (ROS) to evaluate company productivity, but this analysis utilised Tobin's q to explain long-term company success (Lin *et al.,* 2006; Lee & Grewal, 2004; Chung and Pruitt, 1994). Using Chesbrough (2003) and similar research, this study defines multi-dimensional concepts and produces accurate measures to weigh the dimensional value of outbound OI. Secondly, as opposed to American or European businesses, Asian companies have a relative advantage in technological competence, despite having a lower level of market experience. This result implies that Malaysian companies have a cautious mind-set towards EO compared to their strategy to outbound innovation since they merely practise such tactic at the early juncture and prerequisite to acquire further experience and acquaintance to participate in this approach. In conclusion, the outcome does not emphasise the weight of outbound OI on company performance; companies must be cognisant of the constraints whereby outbound OI's strength is particularly significant.

Manufacturing companies, which are typically one of the most technology-intensive companies, are the focus of this report. At the same time, open innovation values and practices can be applied to various enterprises. As a result, the experiences from this research can be helpful to former segments of the economy, like the service industry and emerging countries. Furthermore, because of the effects of inadequacies in technology markets, most companies do not engage in entrepreneurial activities or outbound innovation, as external technology utilisation is more difficult than product or service commercialisation. The government would prosper from the transformation of technology operations, the stabilisation of the technology sector, and the resulting open environment of innovation because both entrepreneurial focus and outbound innovation are beneficial for companies and, therefore, for the overall economy. Business leaders will further address dissent by creating legislation that safeguards intellectual property rights.

Limitations and future study

This research provides guidelines for future research, but it also has its limitations. Firstly, sample is limited to Malaysian furniture manufacturers. They are not as large as their partners nor do they have the same advanced technology and marketing experience, as they primarily work with top-tier multinational corporations. To improve the generalisation of the current results, future research in diverse segments and areas are highly recommended. In-depth study from different sector of the economy is necessary to validate and generalize the findings in this area to enhance body of knowledge of entrepreneurial orientation and outbound innovation.

Thirdly, previous research has shown that performance evaluation is a complex occurrence which requires a multi-dimensional approach, which is particularly true in open innovation research. Fourthly, by inspecting the mediation impact of outbound innovation on the bond among business and consumers, the contemporary research purpose to learn how businesses can perform EO further efficiently and easily. Future studies should investigate the concurrent impact of introducing entrepreneurial behaviour and outbound innovation. Researchers are advised to look at the meaning of the two OI components as mediators, such as organisational, cultural, and leadership factors (Akbar, *et al.,* 2020; Akbar *et al.,* 2021).

CONCLUSIONS

This research has far-reaching significance for management. Because the structure and ideas broaden the comprehension of open strategic management to managers transcend closed innovation, which provides a significant theoretical and empirical framework that can be used to managers in other industries as an analytical approach. This article refers to previous literature recommendations concerning entrepreneurial orientation about furniture manufacturing industry, which plays a very important

role in the current hyper-competitive environment specifically for young entrepreneurs. Because globally, entrepreneurs are the focused area of all rapidly developing economies. On the other hand, technology is rapidly changing its design and value, which also increases interest in the field of study.

Existing literature records the extensive use of open practices in innovation. This article enhances our understanding of this phenomenon and contributes to existing entrepreneurship, open innovation and firm performance research. This article provides a model for explaining the effect on open innovation and firm performance of entrepreneurial orientation. Research capacity is enormous at the crossroads of entrepreneurial theory, innovation and performance evaluation. This work constitutes a point of departure for future theoretical growth and progress.

The findings also bestow to the literary work regarding open innovation and entrepreneurial orientation. Firstly, we verified the value of the competitive dimension of aggression identified by (Akbar *et al.,* 2020; Dess & Lumpkin, 2005), which supports the competitive dimension of aggressiveness. According to Gündoğdu (2012), existing traditional entrepreneurs should also become entrepreneurs to escape the possibility of being excluded by the system. Innopreneurs are entrepreneurs who transform into partnership and innovation. Hence, we propose that our system constructs can be combined into a single tool: open innopreneurial orientation. We are also contributing to potential experiments on new ideas. Overall, most of the previous studies has established positive relation among EO concerning performance. In a nutshell, we can conclude that the findings of the study will provide a basis for future research work on EO-Performance and outbound innovation concepts in different areas.

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Appendix A:

Variables	EOA	EOCA	EOIN	EOPR	EORT	FP	OUTBI
EOA1	0.664						
EOA3	0.799						
EOA4	0.892						
EOCA1		0.806					
EOCA2		0.880					
EOCA3		0.852					
EOCA4		0.897					
EOCA5		0.750					
EOIN2			0.801				
EOIN3			0.817				
EOIN4			0.778				
EOIN5			0.818				
EOIN6			0.812				
EOIN7			0.824				
EOPR1				0.657			
EOPR2				0.954			
EOPR3				0.940			
EORT1					0.812		
EORT2					0.786		
EORT3					0.811		
EORT4					0.882		
EORT5					0.815		
EORT6					0.820		
FP1a						0.861	
FP2a						0.853	
FP3a						0.730	
FP4						0.850	
FP6						0.857	
OutI1a							0.830
OutI2a							0.814
OutI3a							0.794
OutI5a							0.779

Authors

The share of work among authors is: Fazli Wadood 50% (draft writing), Mohammed Emad Alshaikh 20% (finalize draft for submitting), Fazal Akbar 20% (statistics & write up), Maqsood Mahmud 10% (draft correction)

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Formal sources of finance boost innovation: Do immigrants benefit as much as natives?

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ABSTRACT

Objective: The article investigates the relative benefit of formality/informality of finance sources for innovation and compares this benefit amongst immigrant and native entrepreneurs. The authors investigate whether formal finance (here, bank loan) benefit innovation more than informal sources (personal savings and friend/family loan). Then, they explore whether an entrepreneur's status strengthens or weakens the benefit finance sources for innovation.

Research Design & Methods: This study applies a quantitative approach to conduct the research. The data of 15,850 entrepreneurs surveyed by Global Entrepreneurship Monitor in 2015 were analysed using the hierarchical linear modelling (HLM) technique.

Findings: Results indicated that formal finance benefits innovation more than informal sources, and this advantage is the same for both immigrant and native entrepreneurs.

Implications & Recommendations: Despite the prevalence of some stereotypes regarding the simplistic and repetitive nature of immigrants ' businesses, the study recommends that financial institutions and policymakers plan to enhance entrepreneurs ' access to formal financial resources irrespective of their migrant status. Policymakers also can plan to increase the immigrant entrepreneurs ' access to the formal sources of finance by tailored educations to boost innovation.

Contribution & Value Added: The results highlight that immigrant entrepreneurs benefit from formal finance towards innovation similarly to their native counterparts. Such a clarification informs the studies on the liability of foreignness and innovation finance that immigration status cannot be a barrier to innovation as portrayed and conceptualized by some studies.

Article type: research article

Keywords: immigrant entrepreneurs; native entrepreneurs; entrepreneurial financing; innovation; liability of foreignness

JEL codes: G21, G23, M13

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INTRODUCTION

Research evidence has revealed that innovation positively impacts SMEs ' performance (Rosenbusch, Brinckmann & Bausch, 2011). However, relying on resource-based theory, successful innovation requires organizational resources and capabilities (Goedhuys, Janz & Mohnen, 2014), especially financial resources (Nylund *et al*., 2019; O 'brien, 2003; Bartzokas & Mani, 2004). Accordingly, entrepreneurs try different formal and informal sources of financing to cover their innovation expenses. Some firms tend to use formal sources of finance such as bank loans, venture capitals, and equity financing to fund their innovation activities. Other firms use informal sources of finance such as family/friend loans or their personal saving. Studies have shown that the firms that use the formal sources of finance are more innovative and are more likely to be capitalized based on innovation than those that use informal sources (Wu,

Si, & Wu, 2016; Wellalage & Fernandez, 2019). However, the access and the decision to use formal sources of finance depends on many factors and considerations such as firms ' credit records (Beck & Demirguc-Kunt, 2016; Buyinza, Tibaingana, & Mutenyo, 2018), ability to provide collaterals (Osano & Languitone, 2016), the intended degree of control over the firm (Atiyet, 2012; De Jong, Verbeek, & Verwijmeren, 2011), access to alternative sources of finance and financial market structure (Osano & Languitone, 2016), the firm size, reputation and its assets (Arif *et al.*, 2020; Brixiová, Kangoye & Yogo, 2020), entrepreneurs ' demographics (Dzadze, Aidoo,& Nurah, 2012), their human and social capital, the urgency of the need, loaning bureaucracy and paperwork, interest rate (Oyebamiji, 2020), *etc.* Beyond such firm-level and entrepreneur-level considerations, the relative access to the formal/informal sources of finance may vary based on the origin of the entrepreneur. Some research evidence suggests that immigrant entrepreneurs may face additional barriers (such as discrimination, language, or insufficient assets) to access such formal sources (Smallbone *et al.*, 2003). For instance, Cavalluzzo *et al.* (2002) find that African-American owners have a higher rejection rate in applying for a loan from banks. Another study by Aldén and Hammarstedt (2016) has demonstrated that the difficult access to the credit market and bank loans constrain immigrants ' businesses in the USA, specifically non-Europeans. Therefore, such difficulties in access to loans from banks and the credit market may cause immigrant entrepreneurs to use a different approach for financing their business, including using their savings (Basu & Goswami, 1999) or funds from family and friends (Altinay & Altinay, 2008; Volery, 2007; Ostrovsky *et al.*, 2019).

Such research evidence shows that individuals with migrant backgrounds have worse access to formal finance than their native counterparts. Worse access may be due to the existence of liabilities of foreignness reflected by the socio-economic, normative, and regulative limitations faced by immigrants in the context of their host countries (Dabic *et al*., 2020; Tengeh & Nkem, 2017; Zhou & Guillén, 2015; Gurău, Dana & Light, 2020). However, benefitting from formal/informal sources towards innovation is another critical aspect not fully captured and explained by the literature. Two conflicting yet inconclusive arguments can be drawn from the existing studies. On the one hand, as supported by the liability of foreignness perspective, one can assume that immigrant entrepreneurs may have lower access to the formal sources of finance due to regulative, normative and cultural limitations (Dabic *et al*., 2020; Tengeh & Nkem, 2017; Zhou & Guillén, 2015). Moreover, the size of formal finance, such as bank loans they access, may be smaller than the non-minority groups (Bates, 1997). Such constraints can affect their tolerance and tendency towards doing risky or radical innovative activities.

On the other hand, immigrants have access to different ideas originating from dual-embeddedness (Ashourizadeh & Saeedikiya, in press; Dang & Harima, 2020) and their position as the connector of structural holes (Gurău, Dana, & Light, 2020) enables them to innovate more than their native counterparts. Further, immigrant entrepreneurs have better access to cheap labour and ethnic resources (Abd Hamid, Ayob, Sidek, & Senik, 2021) to cover the risk of innovations. Such a paradoxical understanding presented by the literature on immigrant entrepreneurship does not provide us with a comparative insight into the benefits of immigrant and native entrepreneurs from their financial sources for innovation. This study aimed to fill this gap and compare the benefit finance sources for innovation between immigrant and native entrepreneurs. We first compared the benefit of bank loans (as a formal source of finance) for innovation with that of two informal sources, namely, personal savings and family/friend loans. Then, we investigated if the effect of formality/informality of finance on innovation differs amongst immigrants and natives. In other words, the research aimed to answer two main questions:

1. Do bank loans benefit innovation more than informal sources (personal savings, family/friends ' loans)?
2. Does the superiority of bank loans for innovation differ between immigrant and native entrepreneurs?

We drew upon finance, innovation, and immigrant entrepreneurship literature to answer these questions to hypothesize the effects and strengths. We tested the hypotheses using a comprehensive dataset from Global Entrepreneurship Monitor (GEM) in 2012-2013, yielding information on entrepreneurs ' innovativeness and financing sources for 15,850 immigrants and natives in 33 countries worldwide. The authors showed that innovation is a function of the formality/informality of

finance. Moreover, we showed that the superiority of bank loans for innovation is not dependent on the entrepreneur 's status (immigrant vs. native).

This study makes three contributions to entrepreneurship and finance literature; firstly, it scrutinized how finance sources, both formal and informal, may/may not be coupled with an entrepreneur 's status, i.e. being immigrant or native, affect innovativeness. Secondly, this study is a reply for further comparative research on immigrant entrepreneurs ' finance sources and their performance compared to their native counterparts (Fairlie, 2013). We answered such the call by providing a comparative insight into the role of finance formality/informality in conjunction with the immigration status of entrepreneurs on their innovation. Thirdly, while most research focuses on the supply of entrepreneurial finance and how entrepreneurs access the sources of finance (Robb & Robinson 2014; Moghaddam *et al.*, 2017), this study emphasized comparing the benefit of financing choices towards the innovative performance of immigrant and native entrepreneurs.

The remainder of this article is structured as follows: in the next section, we will review the immigrant entrepreneur financing studies and then formulate our hypotheses. Next, we will describe the research methodology for testing the hypotheses. Later, the results will be analysed, followed by a discussion, concluding remarks, and implications for policymakers and scholars.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Innovation

According to Schumpeter 's theory of innovation, a man of action introduces new combinations, intuitively selects desirable and feasible ones in the face of risk and uncertainty and transforms the imagined selected new combination into reality (Schumpeter, 2010). Innovation has different aspects and characteristics. It can be characterized as *destructive, dynamic, planned, and purposeful*. As a destructive process, innovation involves creating new means and ends or establishing new relationships between the existing ones (Schumpeter, 1942). As a purposeful activity, innovation has been defined as a new wealth-creating resource or an existing resource with the enhanced potential to create wealth (in the case of commercial innovations) (Drucker, 2014) or as an intentional implementation of novelty towards benefiting the society (Phills, Deiglmeier, & Miller, 2008). As a dynamic activity, innovation inherently carries a dynamism meaning such that Meeus and Oerlemans (2000) define it as a trade-off between change and routinization. As a planned activity, innovation is systematic, rational and organized (Drucker, 2014). It begins with intention, insight, creativity, inventing and sensing something novel and desirable but not entirely actual yet, like a poet. Still, it needs meaningful actions within their contexts (Dimov *et al*., 2021). It requires different resources, capabilities and actors whose interrelations and interactions determine innovation outcomes.

Among these factors and actors, the firm financial capital is key to the nature and the extent of the innovations. This factor has been discussed in detail below.

The formality of finance affecting innovation

Entrepreneurial financing is one of the fundamental topics in entrepreneurship research (Cassar, 2004; Chrysostome, 2010; Smallbone *et al*., 2003). Limited access to financial capital is a significant factor that hinders entrepreneurs from running and developing their businesses (Tengeh & Nkem, 2017). Entrepreneurs try to get financed by formal sources (e.g., bank loans and equity financing) and informal ones such as family/friend loans and personal savings (Smallbone *et al*., 2003). However, access to formal or informal sources of finance and the choice of the options available in each category depends on different conditions and considerations. For example, on some occasions, entrepreneurs need to maintain their control over the firm entirely. In such a circumstance, equity financing is not suitable since it necessitates the firm owners to lose some of their control (Zhang, 2015).

Moreover, on some occasions, some factors constrain entrepreneurs ' access to bank loans. They may not have enough credit and assets to secure the loan. Moreover, their business plan may not comprehensively disclose their financial and market plan, which leaves suspicions for bankers and financial managers about financing the project. Additionally, the banks and financial institutions may

use the Credit Scoring System or Secured Lending to control the enterprise ‘s potential risk (Smallbone *et al*., 2003). Under such conditions, the small and young firms cannot benefit from formal sources of finance. Therefore, informal financing such as debt from friends and family or personal savings becomes the dominant means of accumulating capital (Conning, 1999). Because of its speed, freedom from collateral requirements, and significantly lower transaction costs, debt financing can be more interactive to entrepreneurs (Armendáriz & Morduch, 2007).

While accessing the different sources of finance depends on many conditions and considerations, such access has contrasting implications for innovation. Formal financing is hard to acquire and raises the risk of disclosing the innovation to other companies and losing entrepreneurs ‘ control over their own companies. However, the large amount of financial capital gained through this method gives the entrepreneur the ability to do more innovations (Kortum & Lerner, 2000). In contrast, applying for an arranged loan from family and friends or utilizing personal savings may maintain their business control. Still, the amount of loans is smaller than the bank loan, which may force entrepreneurs to quit the innovative ideas and restrict their action (Hottenrott & Peters, 2012). Besides, the innovation process ‘s risky, idiosyncratic, and unpredictable nature needs continuous and substantial investment for R&D, invention, and innovation-related activities and practices (Ullah, 2019). Financial institutions usually provide medium-term or long-term options on their loans. The more extended payment periods allow entrepreneurs to implement innovation projects as a long-term process, including planning, designing, testing, and development stages (Wellalag & Fernandez, 2019).

In contrast, excessive reliance on informal finance sources can expose entrepreneurs to severe challenges, especially conflicts and entanglements. Because of devoting more time to deal with personal or community interactions and the resulting difficulties, there would be less time for innovation-related staff (Wu, Si, & Wu, 2016). Therefore, formal financial institutions reduce the financial burden for innovative firms, promoting innovation (Wellalage & Fernandez, 2019).

Moreover, financial institutions heavily rely on their expertise in the decision-making process. The impersonal and impartial nature of their decision-making process leads to accepting the right project ‘s application most of the time (Anthony, 2005). In contrast, informal debt providers offer finance through relationships (Degryse, Lu, & Ongena, 2016), leading to adverse selection of innovation projects.

To conclude, due to the abovementioned limitations mentioned by informal financing towards innovation activities, one can expect that getting finance through formal sources has a higher benefit for innovation than informal sources. Notably, two hypotheses can be derived:

H1: Formal sources of finance benefit innovation more than informal sources, making the impact of bank loans on innovation greater than that of family/friends’ loans.

H2: Formal sources of finance benefit innovation more than informal sources, making the impact of bank loans on innovation greater than that of personal savings.

The Benefit of formal finance for innovation: Is it the same for immigrants and natives?

In the above sections, we argued that formal sources of finance (for example, bank loans) might have an advantage over informal sources (personal savings and bank loans) for innovation. In this section, we argue that the existing literature is inconclusive, and it is necessary to uncover whether this advantage is higher amongst immigrant or native entrepreneurs. Being an immigrant may act like a double-sided sword when benefiting from formal finance towards innovation.

Immigrant entrepreneurship and finance are almost inconclusive regarding the relative benefit of immigrants versus natives from financial sources towards innovation. Different research streams have their implication about the possible direction of this effect. On the one hand, we know from the literature that accessing formal sources of finance is more difficult for immigrant entrepreneurs than their native counterparts due to barriers and limitations in the host country (Abbasian & Yazdanfar, 2013; Yazdanfar & Abbasian, 2014; Aldén & Hammarstedt, 2016; Ram *et al*., 2003; Smallbone *et al*., 2003; Volery, 2007). By implication, such an argument may lead us to conclude that if it is harder for the immigrant entrepreneurs to get formal finance, they probably are less risk-willing to do risky entrepreneurial activities such as radical innovations. Such a type of innovation, due to its uncertain nature, may bring the firm adverse effects.

Further, the size of formal finance that immigrant entrepreneurs can get may be smaller than their native counterparts. For example, Bates (1997) founds that the mean size of the bank loan and debt to equity ratio for Korean/Chinese entrepreneurs was lower than that of non-minority entrepreneurs. Therefore, the small size of formal finance (for example, bank loans) may make this group of innovators less innovative. Further, the smaller bank loan size can imply that they probably have a lower risk threshold for radical innovations or expensive innovations. Therefore, their innovation capability may decrease (Giudici & Paleari, 2000).

On the other hand, despite the above assumptions on the possibility of the lower benefit of formal finance for innovation amongst immigrant entrepreneurs (when compared to natives), there are other lines of reasoning to justify us that this group of entrepreneurs may benefit more from formal sources of finance towards innovation. For example, since immigrants are dual embedded in the home and host country context, we may argue that they are the source of innovative ideas (Kloosterman *et al*. 1999; Kloosterman & Rath 2001). Such an advantage provides immigrant entrepreneurs with the opportunity of filling the structural holes that exist in their network structure and transform a liability into a benefit (Gurău *et al.*, 2020). In such a situation, the innovation scope of the immigrants can increase due to the diversity of products and services, and they may be able to benefit from the formal sources of finance to take advantage of heterogeneous ideas towards more innovations (Reagans & Zuckerman 2001; Vasudeva *et al*., 2013; Storti, 2014). Apart from information and ideas, entrepreneurs can achieve critical resources by being positioned in the middle of these structural holes (Zang, 2018). The heterogeneous composition of immigrant entrepreneurs ' social networks privileges them with lesser difficulties in the host country than their counterparts positioning in homogenous ethnic networks (Kloosterman & Rath, 2006). So that, 'resource-sharing ' benefit of heterogeneous networks (Zang, 2018) facilitates integrating immigrant entrepreneurs in the host market, access to critical resources, and realize innovation outcomes (Turkina & Thai, 2013; Anwar & Daniel, 2017). Even when it comes to the risk of innovations, we may argue that they can cover the risk of innovations by economies of scale and transaction cost reductions due to their access to their ethnic resources and cheap labour. Such benefits may be used by them to cover the risk of innovations or to overcome the dark sides of the liability of foreignness. Therefore, such lines of arguments may lead us to conclude that they may benefit from sources of finance towards innovation more than their native counterparts.

As discussed above, the literature is inconclusive on the relative benefit of formal sources of finance towards innovation among immigrant and native entrepreneurs. In line with such a paradoxical yet inconclusive understanding about the direction of the effect that, we can get from entrepreneurship and finance literature, we hypothesized this possible effect without direction. Accordingly, we tried to uncover whether the superiority of formal sources of finance over informal sources for innovation is higher amongst the immigrant entrepreneurs than their native counterparts or vice versa. Therefore, we hypothesized that:

H3: The superiority of bank loans over personal savings for innovation is not different between immigrant entrepreneurs and their native counterparts.

H4: The superiority of bank loans over the friend/family loans for innovation is not different between immigrant entrepreneurs and their native counterparts.

RESEARCH METHODOLOGY

The study investigated the impact of finance sources on entrepreneurs ' innovativeness and its differences among immigrants and native entrepreneurs. The population was entrepreneurs who have established a business for at least 42 months (Bosma *et al*., 2012). Global Entrepreneurship Monitor (GEM) has measured innovation, entrepreneur 's status, and sources of finance.

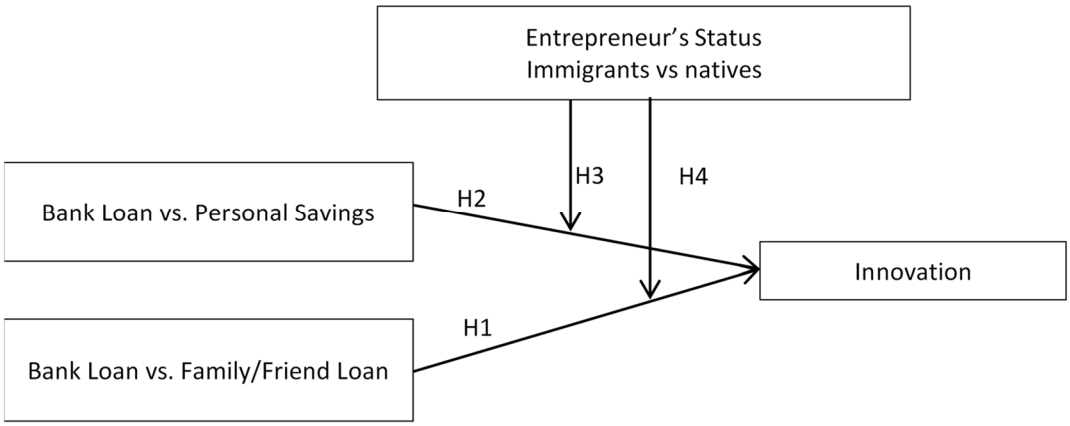

Figure 1. The hypothesized effects in this research
Source: own elaboration.

The GEM is an international consortium launched in 1999 and currently has more than 100 national country teams. The GEM carries out survey-based research on entrepreneurship activities and entrepreneurship ecosystems around the world. It is a global project that annually measures individuals ' attributes and activities and supplies unique datasets called Adult Population Survey (APS). At the individual-level (APS), GEM country teams randomly collect data through a standardized survey among adult populations between 18 to 64.

To run the descriptive and inferential analysis, we applied the cross-tabulation test and Linear Mixed Modeling, respectively. To robust our analyses, we applied bootstrapping and PROCESS models from Hayes.

Sample

In 2012, the GEM consortium 's national teams collected data on immigrant entrepreneurs in 33 countries, namely Egypt, South Africa, Argentina, Colombia, Malaysia, Philippines, China, India, Iran, Algeria, Tunisia, Nigeria, Angola, Barbados, Ethiopia, Uganda, Zambia, Namibia, Malawi, Botswana, Bosnia, Costa Rica, Trinidad and Tobago, Palestine, Qatar, Chile, Germany, Ireland, South Korea, Luxemburg, Spain, Slovakia, United States, yielding a sample of 15,850 entrepreneurs which consists of 15,096 native entrepreneurs and 754 immigrant entrepreneurs around the world. Having a representative and random sample of entrepreneurs enables us to generalize our findings to similar contexts.

Measurements

Dependent variable: Innovation

Entrepreneurs ' innovation is an indicator of an entrepreneur 's output. Previous studies found that immigrants are more innovative entrepreneurs than natives (Hunt & Gauthier-Loiselle, 2010; Saxenian, 2002). Thus, innovation was measured by asking the GEM survey participants about the newness of the technology, newness of products for customers, competitiveness, and the number of rivals in the market. These three dimensions covered different types of innovation (Varis & Littunen, 2010) based on the level of innovation; they were scaled low=1, medium=2, and high=3. The respondents answered these questions:

1. Have the technologies or procedures required for this product or service been available for less than a year, or between one to five years, or longer than five years?
2. Will all, some, or none of your potential competitors consider this product or service new and unfamiliar?
3. Will all, some, or none of your potential customers consider this product or service new and unfa-miliar?

To measure the innovation, we made an index by using the average of the three indices.

Independent variable: Entrepreneur ‘s status

Entrepreneurs ‘ being migrant or native was questioned by ‘Were you born in this country? ‘ The responses coded as 0 for ‘Yes I was born in this country, ‘ which means s/he is regarded as native, and 1 for ‘No I was not born in this country, ‘ which means s/he is considered an immigrant. The operationalization of an entrepreneur ‘s status (immigrant vs. native) aligns with the UN ‘s definition of immigrant (UN DESA, 1998).

Independent variable: Sources of financing

In the GEM survey, entrepreneurs were asked about the sources of funding. ‘Where did the majority of this money come from to start this business? ‘ and answers are categorized as follows: Personal savings coded as 1, family savings coded as 2, bank or other financial institution coded as 3, friends as 4, and other sources as 5.

To make a more robust measurement, we have combined family and friends ‘ categories and omitted other sources because the respondents who selected other sources were few. Additionally, entrepreneurs who do not use any financial sources were excluded from the analysis. Hence, the final measurement is coded 1 for personal savings, 2 for family and friends ‘ loans, and 3 for bank loans. Since it is a categorical variable, and we test it in hierarchical linear modelling, we have to transform it into two dummy variables for statistical analyses: one dummy for the bank loan vs. personal saving and another for bank vs. friend/family loan.

Control variables

We control for variables, namely age, gender (Marlow & Patton, 2005), education (Berge *et al*., 2014), entrepreneurial competencies such as self-efficacy (Ahlin, Drnovšekand, & Hisrich, 2014), opportunity-alertness (Zhuang *et al.*, 2012), risk-willingness (Nanda & Rhodes-Kropf, 2016) and role model. It is to prevent the accumulation of knowledge and exact test of the interaction effects. Prior research has confirmed that demographic characteristics and entrepreneurial competencies affect immigrant and native entrepreneurs ‘ outcomes (Baptista *et al.*, 2014). Moreover, we controlled the money entrepreneurs receive from these sources (Cooper *et al*., 1994). Since we operated the analysis amongst 33 countries, we controlled each country ‘s institutional effect in this study (Autio *et al.*, 2014). The country was a proxy for expertise level and cultural impact in this study (Ozgen *et al.,* 2014).

Method of analysis

The authors utilized Linear Mixed Modeling to test the hypotheses (McCulloch & Neuhaus, 2001). We used this modelling since the impact of finance sources and the entrepreneur ‘s status was associated with sampling procedures in countries, and this combination imposed correlations among the sample. Therefore, we introduced countries as random effects in Linear-Mixed Modeling.

To do the above procedure, in the first model, we examined the effect of control variables on our dependent variable, *i.e.* innovation, while inserting countries as a random effect into the model. Then, we tested the direct impact of the entrepreneur ‘s status and finance sources. At the final stage, the authors analysed the moderating effect of an entrepreneur ‘s status on the relationship between finance sources and innovation, controlling for other variables related to the entrepreneur ‘s characteristics and competencies.

To ensure the results, we ran two robust checks. Firstly, we checked our results through bootstrap at 95% confidence intervals and 5000 subsampling. Next, we ran model one from PROCESS to check the results ‘ match.

RESULTS AND DISCUSSION

Table 1 presents the descriptive analyses of our sample. It shows that the average years of education and age were higher for immigrants than native entrepreneurs from a demographic point of view. Moreover, as expected, the proportion of men who participated was relatively higher than women in both groups (immigrants vs. natives).

Table 1 indicates that immigrant entrepreneurs had a relatively higher innovation degree (in terms of market, customers, and technology) on average than native entrepreneurs. The average amount of money that immigrant entrepreneurs received from different sources (like bank loans or family and friends) was more petite than native entrepreneurs. Regarding the sources of finances, contrary to Bates (1997) findings, immigrant entrepreneurs received a higher percentage of money for their business from bank loans than native entrepreneurs. In contrast, native entrepreneurs received a higher percentage of money from family and friends than immigrant entrepreneurs.

Table 1. Descriptive characteristics of the sample

Characteristics		Native entrepreneurs	Immigrant entrepreneurs
Sample Size (N)		15 096	754
Education (years)		10.6	12.97
Age		34.9	37.3
Gender	Male	57.1%	70.6%
	Female	42.9%	29.4%
Sources of financing	Personal savings	54.2%	54.1%
	Family and friends ' loan	24.3%	19.8%
	Banks	21.5%	26.1%
The total amount of money (per 1000$)		11.31	10.60
Innovation		1.60	1.67

Source: own study.

Table 2 shows the correlation of variables; innovation was positively associated with entrepreneur status. It means that immigrant entrepreneurs had higher innovation than native entrepreneurs. Moreover, innovation was negatively correlated with informal finance sources, namely personal savings and family and friends ' loans. In contrast, innovation had a positive relation with bank and formal institutions loans.

The impact of finance sources of entrepreneurs upon innovation

Table 3 presents the step-wise modelling of hypotheses in this study. In model 1, the control variables were inserted, and it shows which of the control variables may have had a significant effect on our dependent variable, *i.e.* innovation. In model 2, the independent variables, namely entrepreneurs ' status and finance sources, were introduced. Here, it shows that entrepreneurs ' innovativeness did not depend on entrepreneurs ' status.

Hypothesis 1 expected about the impact of family and friends ' loans on innovation compared to bank loans. Results in Table 3, model 2, showed that the more loan from family and friends had a detrimental effect on entrepreneur 's innovativeness (β= -0.02, p-value<0.05). It means that bank loans had an essential role in entrepreneurs ' innovation compared to family and friends ' loans. Therefore, the result supports hypothesis H1.

Hypothesis H2 predicted the impact of personal savings on innovation compared to bank loans. The results revealed that personal saving is less effective for entrepreneurs ' innovation than a bank loan (β= -0.02, p-value<0.05). Therefore, hypothesis H2 is supported.

According to hypotheses H1 and H2, we may argue that bank loan has a significant role in entrepreneurs ' innovation.

The Moderating effect of entrepreneurs ' status on finance sources and innovation

Table 3, model 3, presents the results from interaction analyses. Hypotheses 3 and 4 are about the moderating impact of entrepreneurs ' status on formal finance 's benefit upon innovation. Analysis showed no significant moderating impact of entrepreneurs ' status. It means that the advantage of bank loans over personal saving for innovation did not differ amongst immigrant and native entrepreneurs. Thus, hypothesis H3 is supported.

Table 2. Mean, standard deviation and correlations of variables

Variables	Mean	St. Dev.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Innovation	1.6	0.51	1												
(2) Ent. status	0.05	0.21	0.032**	1											
(3) Personal saving	0.54	0.49	-0.028**	0.000	1										
(4) Family and friend's money	0.24	0.42	-0.008	-0.020*	-0.613**	1									
(5)Bank	0.22	0.41	0.042**	0.022*	-0.573**	-0.297**	1								
(6) Age	35.03	11.1	-0.008	0.047**	0.031**	-0.066**	0.031**	1							
(7) Gender	0.42	0.49	-0.008	-0.058**	-0.014	0.098**	-0.085**	0.008	1						
(8) Education	10.7	4.6	0.042**	0.108**	-0.073**	-0.013	0.102**	-0.013	-0.072**	1					
(9) Self-efficacy	0.87	0.33	-0.001	0.026**	0.037**	-0.017	-0.027**	0.034**	-0.008	-0.001	1				
(10) Opportunity-alertness	0.72	0.44	0.030**	-0.001	0.037**	-0.008	-0.037**	-0.065**	0.022**	-0.074**	0.142**	1			
(11) Risk-willing	0.76	0.42	-0.015	0.006	0.040**	-0.011	-0.038**	-0.023**	-0.002	-0.031**	0.166**	0.096**	1		
(12) Role-model	0.71	0.456	0.015	-0.037**	-0.005	0.004	0.002	-0.044**	-0.029**	0.022**	0.133**	0.161**	0.011	1	
(13) Amount of money	-0.002	1.01	0.034**	0.014	-0.192**	-0.023*	0.256**	0.016	-0.142**	0.174**	0.050**	0.007	0.009	0.059**	1

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Source: own study.

Hypothesis H4 expected that the advantage of bank loans over family/friends for innovation was not different amongst immigrant and native entrepreneurs. Statistical analyses in Table 3, model 3, did not show such a significant moderation effect. It means that for innovation, the advantage of bank loans over family/friend loans did not differ amongst immigrant and native entrepreneurs. Thus, hypothesis H4 is supported.

Table 3. Direct and moderating effects of entrepreneur status and finance sources

Variables	Model 1	Model 2	Model 3
Constant	1.62***	1.63***	1.64***
Age	-0.0009*	-0.001*	-0.001*
Gender	0.002	0.003	0.003
Education	0.001	0.001*	0.001*
Self-efficacy	-0.006	-0.006	-0.006
Opportunity-alertness	0.002	0.002	0.002
Risk-willingness	-0.02*	-0.02*	-0.02*
Role-model	0.02**	0.02*	0.02*
Total amount of money	0.02**	0.01**	0.01**
Entrepreneurs ' status	–	-0.01	-0.08*
Bank Loan vs. Personal Savings (Dummy variable)	–	-0.02*	-0.02*
Bank Loan vs. Family/Friend Loan (Dummy variable)	–	-0.02*	-0.03*
Entrepreneur status x personal savings	–	–	0.101
Entrepreneur status x family & friends ' loan	–	–	0.08

Significant codes: 0.0001 '*** ' 0.005 '** ' 0.05 '* '
Number of cases = 15 850.
Source: own study.

Robustness checks

We applied linear regression analysis and bootstrap at 95% confidence interval and 5000 subsampling to prevent the accumulation of knowledge and exact test of the interaction effects. Results from the bootstrapping methods confirmed our previous results. Table 4 presents the linear regression and bootstrapping of our data.

Table 4. Linear regression analysis and bootstrapping

Variables	Model 4	Model 5
Constant	1.621**	1.624**
Age	-0.001	-0.001
Gender	0.015	0.016
Education	0.002*	0.002*
Self-efficacy	-0.014	-0.014
Opportunity-alertness	0.035**	0.036**
Risk-willingness	-0.034**	-0.034**
Role-model	0.011	0.011
Total amount of money	0.023**	0.023**
Entrepreneurs ' status	.079**	-0.005
Bank Loan vs. Personal Savings (Dummy variable)	**-0.047****	-0.052**
Bank Loan vs. Family/Friend Loan (Dummy variable)	**-0.04****	-0.045*
Entrepreneur status x personal savings	–	**0.119**
Entrepreneur status x family & friends ' loan	–	**0.096**

Significant codes: *** 0.0001, ** 0.005, * 0.05.
Number of cases = 15,850
Source: own study.

Table 4 confirms our previous analyses; the family and friends ' loan and personal savings deteriorated entrepreneurs ' innovation compared to bank loans. Thus, hypotheses H1 and H2 are supported.

In these analyses, we did not find a significant effect of entrepreneurs ' status upon the relationship between finance sources and entrepreneurs ' innovation.

Process

To make our results more robust in comparison to the previous ones, specifically in the interaction section, we applied the Process model number 1 is to observe our results from another angle view (Process Macro from Andrew F. Hayes, Version 3.5). Table 5 presents results from the Process analyses. The results confirmed our initial analyses that the entrepreneurs ' status did not significantly impact the relationship between family and friends ' loans and entrepreneurs ' innovation.

Table 5. The interaction effect of family and friends ' loan and entrepreneurs ' status upon innovation

Variables	Coefficient	T- Value	LLCI	ULCI
Family and friends ' loan	-0.008	-0.78	-0.0255	0.0090
Entrepreneur 's status	0.076**	3.06	0.0354	0.1171
Family and friends ' loan × entrepreneurs ' status	-0.012	-0.21	-0.1036	0.0792
Constant	1.5878***	307.54	1.5793	1.5963

Significant codes: *** 0.0001, ** 0.005, * 0.05.
DV= Innovation
Source: own study.

Table 6 shows the analyses for the effect of the interaction between personal savings and entrepreneurs on innovation. The results confirmed the analyses presented in table 3, model 3. It indicated that the entrepreneurs ' status did not modify the impact of finance sources on entrepreneurs ' innovation.

Table 6. The interaction effect of personal savings and entrepreneurs ' status upon innovation

Variables	Coefficient	T- Value	LLCI	ULCI
Personal savings	-0.03***	-3.32	-0.0448	-0.0151
Entrepreneur 's status	0.051	1.56	-0.0026	0.1053
Personal savings × entrepreneurs ' status	0.042	0.94	-0.0312	0.1155
Constant	1.602***	241.306	1.5911	1.6129

Significant codes: 0.0001 '*** ' 0.005 '** ' 0.05 '* '
DV= Innovation
Source: own study.

As Figure 2 also shows, the entrepreneurs ' status (being immigrant or native) did not influence the effect of finance sources upon innovation.

Discussion

Immigrant entrepreneurs may suffer from discrimination in the financial system regarding access to formal sources of finance (Aldén & Hammarstedt, 2016; Smallbone *et al*., 2003). However, it is unknown whether this deficiency can hinder their innovations or be balanced or neutralized by other privileges. The current research fills this gap consistent with the calls for investigating the effect of immigrant 's financial sources and innovation (Aliaga-Isla & Rialp, 2013; Moghaddam *et al*., 2017). Therefore, it compares the superiority of formal sources of finance for innovation amongst immigrants and native entrepreneurs.

The primary motivation was to answer the inconclusive arguments presented in the literature on the benefit of financial sources for innovation amongst immigrant and native entrepreneurs. The study found that while formal sources of finance can benefit innovation more than informal sources, this advantage is independent of the entrepreneur 's status. In other words, while there is a gap in the innovation level of entrepreneurs depending on the formality/informality of finance sources, this gap is the same for the immigrant and native entrepreneurs.

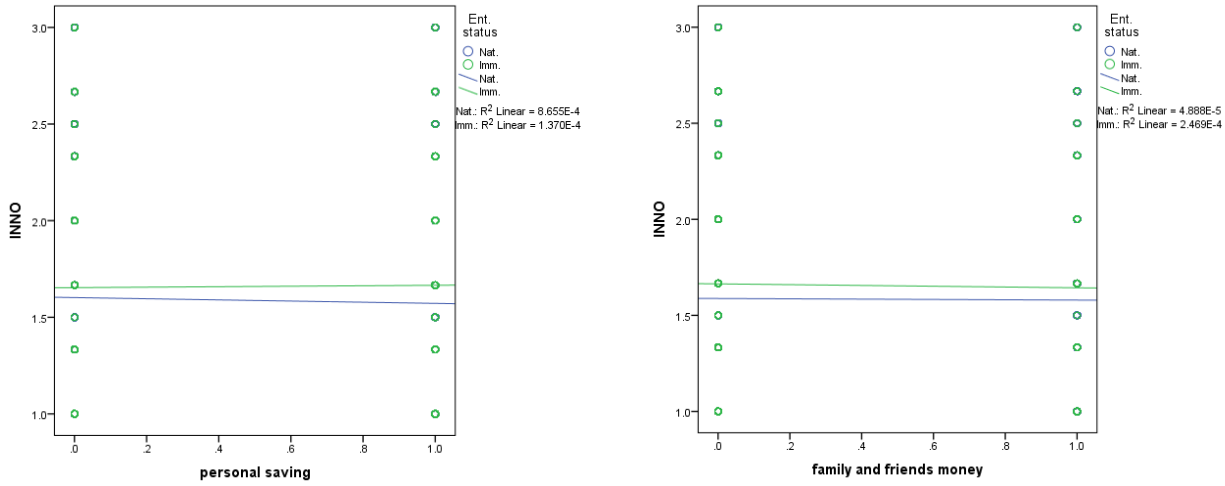

Figure 2. The interaction effect
Source: own elaboration.

Statistical analyses for hypotheses 1 and 2 showed that getting finance from informal sources (*i.e.*, personal savings or family/friends ' loans) is less beneficial than formal sources for innovation. In other words, entrepreneurs (regardless of being immigrant or native) relying mainly on financing from formal sources are more likely to innovate than those who use informal finance. These findings are in line with those provided by Wu *et al.* (2016), according to which the informal sources of finance require time for conflict resolutions, and the entrepreneurs may have less time for innovation-related stuff. Further, we may adopt the standpoint of Wellalage and Fernandez (2019), arguing that the informal sources of finance are assigned on a personal basis. Financers may provide the funds to the business ideas with lower innovation potentials to the adverse selection effect. Moreover, financial institutions use their expertise to evaluate the projects ' innovation potentials and estimate the return on the innovations. After such a scholarly investigation, funding the projects signals the project 's innovative potential (Anthony, 2005).

Statistical analyses for hypotheses H3 and H4 showed that being an immigrant or a native did not affect the relative advantage of bank loans over personal savings and family/friend loans for innovation. The literature on immigrant entrepreneurship highlights that immigrant entrepreneurs face different liabilities and constraints in the host country to finance their entrepreneurial activity (Dabic *et al.*, 2020; Tengeh & Nkem, 2017; Zhou & Guillén, 2015; Lee & Black, 2017). Such constraints may increase the cost of innovation for them and lead the scholars to be suspicious about their ability to benefit from financial sources towards innovation. However, as our findings showed, the entrepreneur 's status (immigrant vs. native) did not affect the superiority of formal finance for innovation. We argue that immigrant entrepreneurs have some privileges over native entrepreneurs, which may balance the adverse effects of foreignness liability. First, immigrant entrepreneurs can balance their liability of foreignness through other mechanisms. Mixed embeddedness (Kloosterman & Rath, 2006) in two societies can be a source of innovation (Dheer & Lenartowicz, 2018; Tavassoli & Trippl, 2019; Brieger & Gielnik, 2020). Immigrant entrepreneurs can apply the know-how they have learned and applied in their home country to innovate in their host society. Such a privilege is a source of innovation both directly and indirectly. They can directly repeat what is being done in their home country (and is unknown in the host country) and their local communities at home to address their needs. Further, they can complement the knowledge taken from their home country with their means in the host country.

Secondly, immigrant entrepreneurs can benefit from business and ethnic resources to lower the cost of innovation and the risks associated with their innovativeness in the host country. As research shows, immigrant entrepreneurs have more business collaborations (Ashourizadeh, 2017; Ashourizadeh & Saeedikiya, in press), which can affect the transaction costs for the innovation (Dheer & Lenartowicz, 2018). Therefore, while immigrants may face limitations when they try to access the formal

sources of finance, they can benefit from the economies of scale provided by their networks. Further, such business collaborations can help them in the process of value creation and delivery. Business networks can help them in addressing information asymmetry in terms of market research and future customer needs. Further, these networks can affect the information spillover about their product 's innovations and attracting demands for their innovations and affect their expected returns on innovation, leading them to innovate. The diversified network can also act as a source of innovation because the heterogeneity of information they receive can increase their awareness about desirable innovations in different sectors and regions (Wang, Chen, & Fang, 2018; Muller & Peres, 2019).

Thirdly, ethnic resources affect the innovation process. Unlike native entrepreneurs, immigrant entrepreneurs are embedded in their ethnic networks (Brzozowski, Cucculelli, & Surdej, 2017; Tong, 2019), a cheap labour and information source. Therefore, the availability of such resources can decrease the cost of innovation for the immigrant entrepreneurs and balance their innovation level compared to the native entrepreneurs.

CONCLUSIONS

This research 's contributes to the field in multiple folds. From a theoretical point of view, our results answer a paradoxical, yet inconclusive understanding portrayed by entrepreneurship and finance literature on the immigrant entrepreneurs ' benefit from formal finance towards innovation. It shows that although immigrant entrepreneurs face some limitations as the liability of foreignness in the host country, they have the advantage of insiders in ethnic and business networks (Ashourizadeh & Saeedikiya, in press). Such a privilege can balance the unproductive effects of host country limitations on their innovation. Therefore, one needs to consider the liabilities and the privileges linked to the immigrant entrepreneurs in terms of innovation through formal and informal finance. More specifically, the current findings can be used by the researchers focusing on the liability of foreignness and finance by providing insight that the liability of foreignness (when measured by being immigrant vs. native) does not sufficiently explain the conversion of formal finance sources to innovation.

From an empirical point of view, previous studies (e.g., Aldén & Hammarstedt, 2016) showed that immigrants can have difficulties accessing formal sources of finance. However, they did not answer how this deficiency affects their innovativeness compared to their native counterparts. This study highlighted that being an immigrant is not associated with benefiting from formal sources of finance towards innovation.

Implications for policy and practice

Immigrant entrepreneurs may face limitations in accessing formal sources of finance and bank loans. However, based on our results, they benefit from sources of finance towards innovation, the same as native entrepreneurs. This finding implies that policymakers need to find ways to facilitate their access to such sources of finance. Planning tailored education for the immigrant entrepreneurs to teach them how to access bank loans and other formal means of finance would be beneficial in utilizing their innovation potential similar to native entrepreneurs. Training immigrant entrepreneurs on new alternative financing methods such as crowdfunding (Belleflamme *et al.*, 2014) and peer-to-peer lending can also be fruitful to obtain financial sources (Bruton *et al.,* 2015). When their project is assessed as highly innovative, they can be supported through a team of experts specializing in finance and market sectors to avoid denial and attract financial investors to exploit the opportunity for innovation.

Limitations

The current research provides a comparative perspective on the interplay of finance-innovation between immigrant and native entrepreneurs in a sample of entrepreneurs from 33 countries. While the comprehensiveness of the data gives us a unique insight to uncover the phenomenon, we still need comparative cross-contextual studies to explore the link between finance and innovation amongst immigrant and native entrepreneurs. For example, the structure of financial markets or financial institutions in different countries can influence the translation of finance to innovation. Our study did not

consider such differences. Further, the degree of liability of foreignness perceived by immigrant entrepreneurs might be different in different countries. For example, our study did not consider cultural or language similarities between the host and home country of the immigrants. Therefore, there is a need to customize the study ‘s finance-innovation link based on such criteria.

Moreover, our study focused on bank loans as a formal source of finance. The results should be treated with caution when applied to the other formal sources of finance, such as equity financing. In this case, different stakeholders ‘ engagement in the innovation process affects the control and decision to innovate.

Future research directions

As discussed earlier, immigrant entrepreneurs have more business collaborations and are embedded in their ethnic network (Ashourizadeh & Saeedikiya, in press). Still, we need to consider the nature and structure of immigrants ‘ networks and investigate how to trust mechanism shapes around financing entrepreneurial ventures and how the effect of these networks can be contingent on the role of the host society ‘s formal and informal institutions. Further, we need to understand how these networks balance the liabilities around the immigrant entrepreneurs.

Secondly, innovative financing ways (e.g., crowdfunding, microfinance, and peer to peer lending) (Bruton *et al.*, 2015) among immigrant entrepreneurs and how these sources of financing influence their performance have not been investigated yet, and it is recommended to be explored. It will give a more comprehensive picture at the micro-level about immigrants ‘ possibilities on financing sources, which can expand our knowledge on immigrant entrepreneurship and help policymakers for more effective policies regarding immigrant entrepreneurs.

Thirdly, our research is a comparative study of native and immigrant entrepreneurs. However, the impact of context has not been considered in this article. It would be fascinating if future studies consider the impact of context as a matrix, like the origin of immigrants from emerging or developed economies to emerging or developed economies, to scrutinize the impact of contextual embeddedness in a specific society.

Finally, literature confirms the effect of ethnic networks on providing the immigrants with their necessary resources. However, there is limited knowledge of the impact of their connections in other spheres (such as a business) on accessing funding sources and their performance. From the social embeddedness view, it has been argued that relations with managers of banks and financial institutions may help them get a bank loan (Uzzi, 1999). However, it is unknown how such relationships shape and affect their access to formal sources of finance.

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Conflict of Interest

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How small printing firms alleviate impact of pandemic crisis? Identifying configurations of successful strategies with fuzzy-set qualitative comparative analysis

Marcin Suder, Rafał Kusa, Joanna Duda, Margarita Dunska

ABSTRACT

Objective: The objective of this article is to identify strategies that can help small firms alleviate the negative impact of the Covid-19 crisis. We tested six strategies (namely, entrepreneurial, market penetration, market development, product development, diversification, and cooperation). In particular, we identified combinations of these strategies that may lead to performance during the current pandemic crisis.

Research Design & Methods: This is a quantitative study that uses fuzzy-set qualitative comparative analysis (fsQCA). We identified and compared combinations of strategies that are specific for three market conditions; namely, non-crisis, the initial phase of the crisis, and the advanced phase of the crisis. The research sample consisted of 150 small printing enterprises operating across Poland.

Findings: Our findings show that combinations that may lead to firm performance during crises differ from those that are specific for non-crisis conditions. Specifically, the presence of a diversification strategy together with the absence of a market-penetration strategy along with the presence of entrepreneurial, market-development, and product-development strategies may lead to an increase in firm performance before the crisis. During the initial phase of a crisis, the presence of an entrepreneurial strategy together with a product-development strategy or a product-development strategy that is accompanied by a diversification strategy may lead to an increase in firm performance. During the advanced phase of the crisis, the presence of an entrepreneurial strategy together with a product-development strategy along with a set of entrepreneurial, market-penetration, market-development, and cooperation strategies may lead to an increase in firm performance. The most common strategies are product-development and entrepreneurial strategies; these are present under all market conditions.

Implications & Recommendations: This study confirms the role of a firm's strategy. This study exposes the necessity of adapting the strategy to changing market conditions. In particular, this study indicates which strategies and their combinations enable a firm to alleviate the impact of a crisis. These observations have meaningful managerial implications for entrepreneurs regarding the current Covid-19 pandemic crisis and possible future crises.

Contribution & Value Added: The findings of this study contribute to the literature on the response to the Covid-19 crisis. In particular, this study indicates strategies that can help firms mitigate the impact of the pandemic crisis. This study implemented the fsQCA methodology to identify combinations of strategies that enable the mitigation of the negative impact of the crisis.

Article type:	research article
Keywords:	strategy; crisis; Covid-19 pandemic; fuzzy-set qualitative comparative analysis (fsQCA); medium and small-sized enterprises (SME)
JEL codes:	L10, L22, L25

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INTRODUCTION

The crisis caused by the Covid-19 pandemic has seriously affected businesses, including small and medium-sized enterprises (SMEs) (Marjański & Sułkowski, 2021). Because the external environment has a significant impact on the activity and performance of enterprises (Cavallo *et al*., 2018), they must respond quickly and decidedly to alleviate the impact of the crisis. However, enterprises can react in different ways to a crisis (Brzozowski & Cucculelli, 2016). In particular, they can modify their business models (Ritter & Lund Pedersen, 2020) and adopt different strategies (Eggers, 2020).

Strategy plays an important role in the development of an enterprise. Researchers and practitioners propose numerous strategies; for example, market penetration, market development, product development, diversification (Ansoff, 1957), cost leadership, differentiation, and focus (Porter, 1985). Among the traditional strategies recommended for SMEs are: stressing higher product quality over lower prices, dominating a market niche, and frequent product and service innovations (Harrison & Taylor, 1996). Today, digitalisation, globalisation, and open models of activity indicate directions for strategy development (Ismail *et al*., 2014; Brunswicker & Vanhaverbeke, 2015; Kowalik *et al*., 2017). The choices and implementations of the right strategies are some of the serious challenges faced by enterprises. During a crisis, these tasks are even more challenging.

Despite the emerging body of literature on the impact of the crisis caused by the Covid-19 pandemic (*e.g*., Crick & Crick, 2020; Eggers, 2020; Dyduch *et al*., 2021), there are still many questions that are awaiting answers. Some of them pertain to a firm's strategy – what role does a firm's strategy play in mitigating the current Covid-19 pandemic crisis? How did firms change their strategies in response to the Covid-19 crisis? Which changes in firm strategies enabled firms to mitigate the impact of the current crisis? These questions constitute a research gap that stands behind this study. Although the Covid-19 pandemic crisis began more than a year ago, it continues today and constantly creates new market situations. Thus, entrepreneurs still need some indications on how to mitigate its negative impact. Moreover, they should be prepared for the next possible crises in the future.

The objective of this study is to identify strategies that enable firms to alleviate the negative impact of the crisis. In particular, this study aims to find configurations of strategies that may lead to increased firm performance under changing market conditions that are specific to crises. We assumed that strategies will change along with changes in market conditions; thus, we analysed those configurations that are specific to different market conditions. In particular, we focused our investigation on three periods; namely, before the crisis, at the beginning of the crisis (the initial three months that were characterised by the highest levels of decreased sales and activity), and the continuation of the crisis (after the initial three months of the crisis).

To achieve our aims, we employed fuzzy-set qualitative comparative analysis (fsQCA). This methodology enabled us to compare cases under analysis and, in effect, identify any causal relationships between the adopted conditions and the assumed effects (Rihoux & Ragin, 2009; Schneider & Wagemann, 2012). The analysis consisted of creating all combinations of conditions (factors) and establishing which factor configurations imply the expected results (outcome) by applying a logical inference. The fsQCA has been implemented in numerous research studies in the field of economics over the past several years (*e.g.,* Roig-Tierno *et al*., 2017; Kusa *et al*., 2021). We used the fsQCA to examine a sample that consists of 150 small printing enterprises operating in Poland.

This study intends to contribute to the management literature in the field of SMEs, firm strategy, and management during times of pandemic crises. The originality of this study lies in comparing the configurations of strategies specific for three different market conditions before and during the current crisis. The utilisation of the fsQCA methodology increases the degree of originality of this study. Furthermore, this study intends to offer managerial implications; more specifically, to indicate how entrepreneurs should configure their strategies to mitigate the negative impacts of the pandemic crisis and sustain (or even increase) performance.

The remaining parts of the article are as follows. Firstly, we will review the literature and posit propositions on the examined strategies; then, we will describe the research methodology. In the next

part, we will present our results. Finally, we will demonstrate the limitations of the study and recommend the potential direction of future research.

LITERATURE REVIEW AND PROPOSITIONS DEVELOPMENT

In the literature, various strategies have been presented. Ansoff (1957) distinguishes four strategies; namely, market penetration, market development, product development, and diversification. The Ansoff Matrix, developed in 1957 in an article called 'Strategies for Diversification' (Ansoff, 1957), helps firms plan their strategies for growth. The matrix is known as the product-market growth matrix, but the set of strategies included in the matrix is perceived as a firm's or business's growth strategies and as a part of their strategic management (Kraus & Kauranen, 2009; Alkasim *et al*., 2018). Drucker (1985) proposes entrepreneurial strategies. Nielsen (1986) and Faulkner (1995) posit cooperation as a strategy. In the strategic management literature, there is also a view that product-market strategies include differentiation, cost focus, and product-market scope (Vorhies *et al*., 2009). These strategies may apply to different types of enterprises; however, their implementation and effectiveness are determined by numerous factors (which include market conditions). Changes in market conditions force entrepreneurs to modify their strategies. These modifications can be manifested by a change in the degree of utilising the strategy; entrepreneurs may decrease the degree of using one strategy and, at the same time, increase the degree of utilising another one. This modification may also result in replacing one strategy with another.

Six strategies were selected in this study (entrepreneurial, market penetration, market development, product development, diversification, and cooperation) in terms of their associations with small firm performance during a crisis.

A negative change in market conditions (stemming from the pandemic crisis, for example) can push entrepreneurs to introduce entrepreneurial strategies that focus on the pursuit and exploitation of opportunities. An entrepreneurial strategy is associated with strategic entrepreneurship (Hitt *et al*., 2001) and entrepreneurial orientation (Lumpkin & Dess, 1996; Covin & Lumpkin, 2011). Dyduch (2019) indicates four dimensions of entrepreneurial strategy: strategic innovativeness, strategic entrepreneurship, strategic leadership, and organisational design. These support value creation. Entrepreneurial orientation needs to be related to the strategic goals of a firm – especially during a crisis. This insight is particularly important for SMEs (Lechner & Gudmundsson, 2014). Kraus and Kauranen (2009) specify that a specific managerial implication of the strategic entrepreneurship approach is the possibility of developing more entrepreneurial and innovative thinking – especially for young SMEs. Entrepreneurial strategies can be important during times of crisis. Under such conditions, new ventures that are based on market opportunity have good chances of survival (Simón-Moya *et al*., 2016). Some enterprises modify their behaviours and become more entrepreneurial in response to a crisis, which has also been observed during the current Covid-19 pandemic crisis (Szostak & Sułkowski, 2021; Kusa *et al*., 2022). We can expect that the implementation of entrepreneurial strategies can help enterprises alleviate the negative impact of a crisis. Thus, we propose the following:

Proposition 1: The presence of entrepreneurial strategy can lead to an increase in firm performance.

Another strategy enterprises follow is market penetration. It is a process in which a firm influences its strategies to increase business activities through maintaining sales to its current customers and looks for potential customers to increase its sales volume without changing its prime market and product strategy (Ansoff, 1957). Market penetration is the process of going to market with a product in an existing market in which current or similar products are already placed. Market penetration allows a firm to create a competitive advantage, increase its volume of sales, generate more revenue, enhance its operational efficiency, and improve its performance (Alkasim *et al*, 2018). During a crisis, such a strategy may not be effective, as the crisis generally worsens the market situation for all market participants and reduces opportunities to increase sales. However, if a company develops a competitive advantage over its competitors, this could help it increase its market share without actually increasing sales. A market-penetration strategy involves the sale of a firm's product through low pricing, penetration pricing (for a new product), product improvements, better promotional activities, and intensive

distribution. This means that a firm that focuses on a market-penetration strategy can use a marketing-mix approach at the operating level (Varadarajan, 2010); and during a crisis, it can adopt techniques such as offering lower prices. This suggests that the utilisation of a market-penetration strategy can enable enterprises to alleviate the negative impact of a crisis. Thus, we propose the following:

Proposition 2: The presence of a market-penetration strategy can lead to an increase in firm performance.

According to Ansoff, market development should be assessed as a firm's second growth strategy. Market development is defined as a strategy that is intended to enhance business performance through an existing product that is being marketed in current and new markets (Ansoff, 1957). A market-development strategy is a business-growth strategy that reflects firm's activities in offering/selling existing products in new markets or new market segments. Market development focuses on obtaining new users in current and potential markets (Leitner, 2014). Market-driven firms excel at finding attractive markets, determining customer needs, and developing goods and services to meet those needs (Vorhies & Harker, 2000). A market-development strategy enables SMEs to increase their competitive advantages and improve their performance (Alkasim *et al*., 2018). However, in some industries, market development is less effective than other growth strategies (Mwau *et al.*, 2016). During a crisis, the use of such a strategy can be problematic, especially in terms of geographical and international market expansion. During a traditional economic crisis, it is possible to take advantage of transnational differences during the course of an economic cycle; however, the current pandemic crisis is taking place simultaneously in all economies, creating barriers to market entry and expansion into other countries. Moreover, the current crisis is affecting most industries. We can expect that the implementation of a market-development strategy does not help enterprises alleviate the negative impact of the crisis. Thus, we propose the following:

Proposition 3: The presence of a market-development strategy does not lead to an increase in firm performance.

In the Ansoff matrix, a product-development strategy is in the point where the development of an existing market and a new product approach intersect. A product-development strategy is a process of sustaining a firm's existing mission and creating new products that have new and different features (Ansoff, 1957). Product development has always been a challenging task; surprisingly, each organisation considers it to be a primary tool for surpassing its competition. In general, product development aims at targeting a new/enhanced product (or a variant thereof) to a consumer (Tyagi *et al*., 2015). Product development can give a firm the ability to effectively manage its product lifecycle, providing it the opportunity to operate in line with the trends of any market changes; this can improve a firm's competitive advantage and enhance its performance. This strategy can be effective in SMEs as well. (Alkasim *et al*., 2018). In the context of the current pandemic crisis, the findings of a study on e-commerce and new product development are interesting. The strong awareness of quality and fast changes in the market have shortened the life cycle of hi-tech products; therefore, enterprises must use electronic business and adopt appropriate new product-development strategies in order to develop products that meet customer needs and improve new product-development performance (Chung, 2016). We can expect that the application of a product-development strategy can enable enterprises to alleviate the negative impact of the crisis. Thus, we propose the following:

Proposition 4: The presence of a product-development strategy can lead to an increase in firm performance.

The concluding element of the Ansoff matrix is a diversification strategy that poses the question as to how to enter new markets with new products. Le (2019) argues that the main reasons for enterprises to choose diversification strategies are enhancing their competitiveness and diversifying their risks. However, a diversification strategy is the riskiest and most expensive strategy option among the growth strategies (Kraus & Kauranen, 2009). According to Kraus and Kauranen (2009), all product/market matrix strategies can be useful for young SMEs, even though these enterprises are usually restricted in their actions due to their limited resources. In their study in the logistics industry, He *et al*.

(2021) found that small and medium-sized enterprises developed towards diversification, especially after the 2008 global crisis period; small-sized logistics enterprises are prone to trying a new business for better survival and performance. Diversification is a strategic choice of an enterprise after comprehensively measuring its resources and capabilities and identifying its core competencies. In turn, a company's core competencies can play a central role in the diversification process and determine decision-making and company performance (Le, 2019). Diversification can play an important role during a crisis (Natsubidze *et al*., 2017). We assume that diversification enables enterprises to alleviate the negative impact of a crisis. Thus, we propose the following:

Proposition 5: The presence of a diversification strategy can lead to an increase in firm performance.

Another possible strategic orientation is cooperation with different types of partners, like suppliers, customers, competitors, universities, research and development facilities, governments, etc. (Child *et al*., 2005; Lendel *et al*., 2015; Hatak & Hyslop, 2015; Li *et al*., 2021); involvement in business networks (Morgan *et al*., 2016; Parida *et al*., 2017) and other types of networks such as regional ones is another possibility (Staniewski *et al*., 2016; Della Peruta *et al*., 2018). A cooperation strategy is also considered to be a company business model and marketing strategy (Crick & Crick, 2020). According to Child *et al*. (2005), a cooperation strategy involves the effort of a company to realise its goals using cooperation with other organisations. Such partnerships make it possible to pool all kinds of resources, improve the capacity of each partner, use investment- and cost-sharing mechanisms, develop new products and market research, and address common challenges (such as the comprehensive impact of a pandemic crisis on all economic and business life) (Crick & Crick, 2020). Many studies show that cooperation and networking play a very important roles in innovation processes and develop innovativeness in partner firms, increasing the return on resources and the performance of firms. Cooperation in innovation or R&D cooperation strategies have been studied by Morgan *et al*. (2016) and Staniewski *et al*. (2016) *e.g.* in the construction industry, while by Parida *et al*. (2017) and Li *et al*. (2021) *e.g.* in connection with green investment strategies. Given the limited resources of SMEs and their inability to deal with a number of issues on their own, it is particularly important for them to work with other organisations to improve their competitive advantage in order to develop and help withstand the external environment during hard times (such as a pandemic). In their research, Morgan *et al*. (2016), Staniewski *et al*. (2016), and Li *et al*. (2021) underline the impact of cooperation and networking on SMEs. Hatak and Hyslop (2015) analysed inter-firm cooperation between family-based firms (most of which are SMEs). It is important that cooperation be effective not only between small companies but also between companies of different sizes. Noteworthy, cooperation can work along with other strategies chosen by a firm and, as a part of entrepreneurial behaviour, it can become an opportunity to solve business problems in partnerships. During crises, cooperation can help to overcome those constraints that result from limited resources. We can expect that an increase in the degree of utilising a cooperation strategy enables enterprises to alleviate the negative impact of a crisis. Thus, we propose the following:

Proposition 6: The presence of a cooperation strategy can lead to an increase in firm performance.

The propositions presented above are based on the literature review, which indicates that each of the proposed strategies can lead to an increase in firm performance in times of a crisis. However, not all strategies are examined in this study. The selection of strategies included in the analysis is the result of preliminary investigation within different types of businesses; during this stage of a study, the respondents confirmed the role of the six strategies posited above. The selected strategies are not mutually exclusive and collectively exhausted. Thus, we assume that they can occur simultaneously; however, their different combinations (that lead to increase in a firm performance) are possible.

RESEARCH METHODOLOGY

Sample and data collection

To observe the changes that have been induced by the Covid-19 pandemic crisis, we decided to identify an industry that had been significantly affected by the crisis but still remains in operation. To identify

such an industry, we conducted a series of structured interviews during the period of June-August 2020. At this stage of the research, we examined 23 enterprises representing different industries. As a result, we selected the printing industry for further examination.

Our list of the printing businesses selected for the next stage of our research was compiled based on the Polish National Court Register. This register contains 645 small firms that have declared that printing and printing services are their core business (as of 1st of December 2020). Those operating for a minimum of three years were selected from this group; this criterion was met by 602 firms (which is the number of subjects in our analysis). All of the firms were requested to complete a questionnaire via a firm that specialises in polling. The study was carried out from December 2020 through January 2021. Correctly filled-out surveys were received from 150 of the firms as a result. Of the remainder, 172 businesses asked to be contacted at much later dates, and 280 refused to complete the questionnaire. Those firms whose representatives provided their responses to the questionnaire (*i.e.* 150 firms) constituted the research group in our analysis. The total of 150 out of 602 questionnaires translates to a 7% sample error (at a confidence level of 95%), which is an acceptable value. The sample characteristic is presented in Table 1.

Table 1. Sample characteristic

Characteristic	Values	Share
number of employees	10-19 employees	51%
	20-29 employees	16%
	30-39 employees	8%
	40-49 employees	25%
firm age	3-10 years	14%
	11-20 years	28.7%
	more than 20 years	57.3%
scope of operation	local	11.3%
	regional	16.7%
	national	41.3%
	the EU market	12%
	European non-EU markets	10.7%
	global	8%
location	rural areas	8.7%
	small towns*	16%
	medium-sized cities**	42%
	large cities***	33.3%
family/non-family firms	non-family firms	56%
	family firms	44%

Note: * up to 50 000 residents; ** from 50 000 to 500 000 residents; *** more than 500 000 residents.
Source: own study.

Variables

In this study, we investigated six selected strategies in terms of their associations with firm performance. The examined strategies were an entrepreneurial strategy (ES), market-penetration strategy (MPS), market-development strategy (MDS), product-development strategy (PDS), diversification strategy (DS), and cooperation strategy (CS). We asked our respondents directly about the degree to which they utilised the examined strategies. To measure a firm's performance (FP), we built an index that is comprised of five items. The Cronbach's alpha coefficient for this index is 0.853 in the first period, 0.823 in the second period, and 0.850 in the last period; this confirms the satisfactory level of its consistency (Nunnally & Bernstein, 1967). In total, our questionnaire included 11 questions. Each item (about both strategies and performance) was assessed on a five-degree scale, where 1 stands for 'fully disagree' and 5 stands for 'fully agree.'

We measured our items under three different market conditions: non-crisis, at the beginning of the crisis, and the advanced crisis. Our study refers to the crisis caused by the Covid-19 pandemic,

which started in Poland in March 2020. Enterprises experienced a radical change that emerged in a very short time. This change was manifested in a lockdown that threatened many industries, among other things. In particular, our data refers to the period before March 2020 (non-crisis conditions), March-May 2020 (the initial phase of the crisis), and the period since June 2020 (the advanced phase of the crisis). The high pace and scale of the changes that were specific to the beginning of the Covid-19 pandemic crisis enabled us to observe the changes in strategies (introduced in response to radically varying market conditions) over a relatively short period of time (however, we can only analyse the short-term results of the implemented changes at the time of writing this article). To capture these changes, we investigated the entrepreneurs' responses separately; how they reacted during the beginning of the crisis (which was characterised by the highest levels of decreases in sales and activity), and how they responded to the crisis over the next months.

The data presented in Table 2 shows the average level of firm performance during the three examined periods. In particular, the data showed a negative change in performance between the first period (before the crisis) and the second period (the first quarter of the crisis). During the third period (after the first quarter of the crisis), the performance increased (as compared to the second period); however, it remained at a lower level than it was before the crisis. The values of the t-Student test indicated that the differences among the levels of performance are significant – with a p-value that is below 0.001 (in particular, t_{12}= 6.37645, t_{13}= 3.39298, t_{23}= -4.22119).

Table 2. Levels of firm performance during the three examined periods

Performance	Period I (before crisis)	Period II (first quarter of crisis)	Period III (after first quarter of crisis)
average	3.049	2.708	2.852
standard deviation	0.795	0.803	0.822

Source: own study.

Figure 1 presents the cumulative distribution of the degrees of utilising the examined strategies during the three investigated periods. This showed that entrepreneurs changed their strategic behaviours in response to a change in market conditions. It also shows that the role played by each strategy changed along with changing market conditions. For example, the lowest level of application of the market-penetration strategy was indicated by 21% of the respondents before the crisis strategy (the first period); this value increased by six percentage points during the second period and remained the same during the third period. In turn, this strategy was applied to the highest level by 17% of the surveyed printing enterprises during the first period; this percentage decreased to a level of 10% during the second period and then increased by one percentage point during the third period. Figure 1 highlights the variability and shows that the degrees of utilising the examined strategies changed among the distinguished periods.

Based on the significant changes in performance and the variability of the strategies, the question arises as to which strategies led to changes in performance under different market conditions.

Method

To identify those strategies that can lead to performance, we employ fuzzy set qualitative comparative analysis (fsQCA). The fsQCA belongs among the methods of configurational analysis; its original version (known as QCA – qualitative comparative analysis) was developed in 1980 by Charles Ragin – an American social scientist. The QCA was a comparative method that helped to evaluate cause or cause-and-effect relationships and, thus, became an alternative to common existing methods based on the analysis of correlation and regression. It is fundamentally designed to compare cases under analysis and, in effect, identify any causal relationships between adopted conditions and assumed effects (Rihoux & Ragin, 2009; Schneider & Wagemann, 2012). The analysis was comprised of creating all combinations of conditions (factors) and establishing which factor configurations imply the expected results (outcome) by applying a logical inference. The original version of QCA suffered from some limitations, as it could only be applied to dichotomous variables (that is, variables that take on two values). In order to

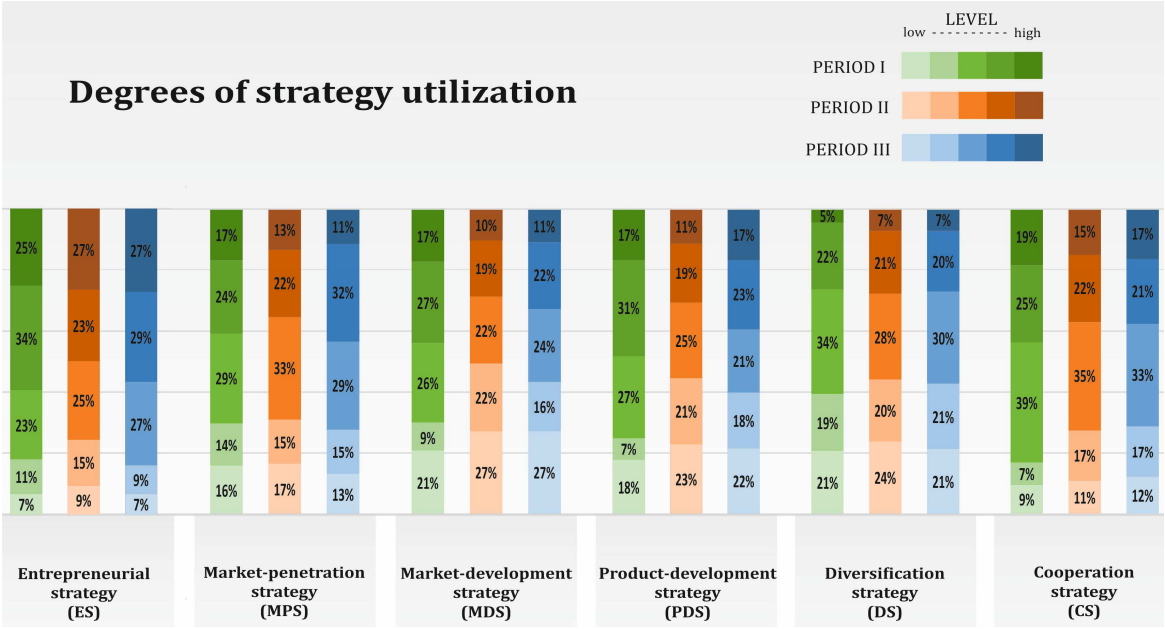

Figure 1. Cumulative frequency distribution of degree of utilising examined strategies during the three periods
Source: own elaboration based on survey results.

remedy these limitations, Ragin himself expanded his research and proposed the use of fuzzy logic and Boolean algebra (Ragin, 2008). This approach allowed for applying the method to continuous variables or interval scales. These modifications gave rise to what is now known as the fsQCA.

The major advantages of the fsQCA over traditional correlation analysis include the following (Schneider & Wagemann, 2010):

- asymmetrical relationships – the method not only helps determine which factors contribute to 'positive' outcomes (present outcome) but also searches for variable combinations that can lead to 'negative' outcomes (absent outcomes). What is also important, configurations of factors that can lead to a 'fail' are not produced by a simple negation of the outcomes that are generated for 'success,'
- equifinality (equivalence) – there are a number of paths or solutions that can lead to the same outcomes,
- the complexity of causes – the analysis does not study the impact of each separate factor on an output variable (result) but on combinations of causes and conditions as well as their effects on the outcomes.

The possibility of analysing small and medium-sized samples was an added advantage of the method (Fiss, 2011), though it has not been demonstrated that there are contraindications against applying it to large samples (Woodside, 2012).

Along with the fsQCA, qualitative comparative analysis (QCA) can be said to be an attempt at a compromise between traditional qualitative and quantitative approaches. For those studying qualitative data, QCA can be of use for systematising their searches for cause-and-effect relationships. Scientists dealing with quantitative data may find this method of interest as an alternative to traditional methods (including those that are based on regression analysis). The fsQCA method includes several steps; namely, calibration (data transformation), an analysis of the necessary conditions, and an analysis of the sufficient conditions. Within our analysis, we followed the procedure that was proposed by Schneider and Wagemann (2010).

The FsQCA procedure

As mentioned before, the fsQCA essentially consists of designating those conditions that are sufficient for an adopted model (that is, determining all of the combinations of conditions that can lead to an outcome). Within the fsQCA procedure, we can distinguish four stages:

- definition of research model (based on theory that is relevant to the researched field); in particular, dependent and independent variables need to be indicated;
- data calibration;
- building a 'truth table;'
- logical minimisation.

In this study, the results of the fsQCA served to determine which combinations of examined strategies could lead to a firm's performance and which factor configurations could actually deter its performance. Therefore, two models were taken into consideration for each of the studied periods:

$$FP = f(ES,MPS, MDS, PDS, DS, CS) \quad \text{(Model I)}$$

$$\sim FP = g(ES,MPS, MDS, PDS, DS, CS) \quad \text{(Model II)}$$

Data calibration is the first stage of the fsQCA after defining a research model; it involves the appropriate transformation of the data that are connected with both the conditioning factors (*i.e.*, variables) and the outcome itself. The calibration is aimed at transforming variables into sets that represent the degree of the former's belonging to a characteristic. Therefore, calibration is a sort of coding of the variable values in order to determine the degree of their belonging to certain categories. This degree of belonging always ranges from 0 (which signals the total exclusion from a set – the 'non-membership' of a set) to 1 (which denotes a full belonging to a set – its 'full membership') (Ragin 2008; Meuer, 2014). The method of coding (calibration) depends on the types of variables that are the subject of the analysis; *i.e.*, whether they are continuous or discrete. In the case of calibrating discrete variables (*e.g.*, for ordinal variables) in the fsQCA method, several levels of gradation of belonging to a set (in other words, the degrees of membership to a category) are usually introduced. In our examination, the variables that describe the level of strategy implementation are given on a five-point ordinal scale; therefore, they were calibrated according to the following principle: 1 on the scale stands for 0 (not belonging at all); 2 for 0.25 (little belonging); 3 for 0.5 (medium belonging); 4 for 0.75 (high belonging); and 5 on the scale for 1 (full belonging). In the case of continuous-type variables (such a variable is PERF), the calibration was performed by using the appropriate function (Theim, 2010). The logistical function proposed by Ragin (2008) was employed in our analysis.

The other element that affects the results of the calibration is the indication of so-called threshold values (cut-off points) for full membership and total non-membership and a cross-over point. In his 2008 study, Ragin suggests adopting 0.05 for non-membership, 0.5 for the cross-over point, and 0.95 for utter non-membership. In turn, Dul (2016), Beynon *et al*. (2016) propose the following thresholds: the 10th percentile as the threshold of total non-membership; the 50th percentile (median) as the cross-over point for membership; and the 90th percentile as the threshold for complete membership. The choice of thresholds and the method of calibration are key parts of the analysis since the results and, consequently, the conclusions are largely dependent on these selections. Therefore, automatic approaches need to be rejected at this stage (Ragin, 2009), and an in-depth data analysis is in order prior to making any decisions about the methods of calibration and the values of its parameters.

Therefore, the choices of our cut-off points are based on the 90th, 50th, and 10th percentiles after a careful data analysis. The FsQCA 3.0 was used in the calibration (Ragin & Sean, 2016). In Table 3, we included the threshold values for each period and Figure 2 presents the results of calibrating the outcome variable (performance).

Table 3. Cut-off thresholds for the outcome variable in each period

Variable	Period I	Period II	Period III
non-membership point	2.00	1.80	1.60
cross-over point	3.00	2.80	3.00
full membership point	4.00	3.60	3.80

Source: own study.

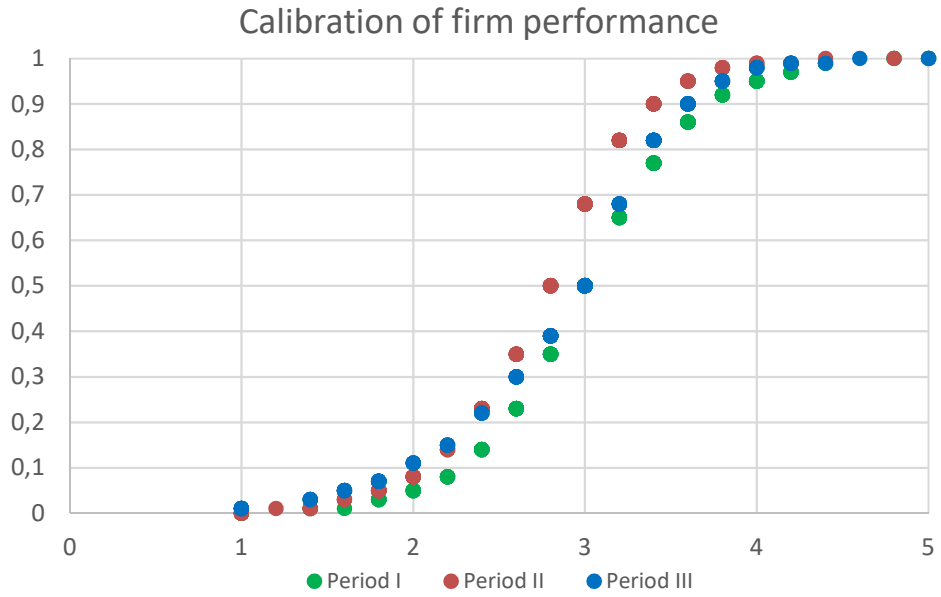

Figure 2. Calibration of outcome (performance) during the three examined periods
Source: own elaboration based on survey results.

The next step in the procedure was to create a truth table that lists all possible causal configurations and their corresponding results. The number of rows in the truth table is 2^n, in which n is the number of conditions (factors) that are used in the analysis. In this examination, the number of factors was six; therefore, the maximum number of truth table rows is $2^6 = 64$. Moreover, the truth table contains information on configurations that are covered in the analysed cases and what their number was. Therefore, we supplemented it with the number of cases that coincided with the appropriate configurations in the next step of building the truth table. The limit value on the basis of which the allocation of the calibrated data was made 0.5. If the calibrated variable had a value above 0.5 (in a given case), it would belong to one of the configurations in which this variable is represented by 1 in the truth table (which means that the given factor has a positive effect on the result) and vice versa; if the calibrated variable was specified with a number that was lower than 0.5, it would belong to any of the configurations with 0 standing for this variable (*i.e.* the given factor has a negative impact on the result).

The truth table also included the values of the indicator that are called 'raw consistency' or 'consistency,' which represented the level at which particular causal combinations (of 0 and 1 values) led to the result (Crilly, 2011). Therefore, consistency can be seen as a measure of the strength of the relationship of a given configuration of factors (conditions) with the expected outcome. It was calculated according to the formula (1).

$$consistency\ (X_i < Y_i) = \frac{\sum_{i=1}^{n} \min(X_i, Y_i)}{\sum_{i}^{n} X_i} \tag{1}$$

where:

n - number of cases;
i - case number;
X_i - is the membership score in causal combination;
Y_i - is the membership score in the outcome set.

This is an equivalent of the correlation coefficient in the regression analysis (Woodside, 2012) and takes a value from a mutually closed range from 0 to 1. Table 4 contains a fragment of the truth table for Model I that is related to Period I (only those combinations that have been present at least once).

The last step in building the truth table is selecting those configurations of factors that will be taken into account in the next stage of the analysis and on the basis of which the result combina-

tions will be determined. Noteworthy, the decision to select configurations for the further procedure was based on two parameters; namely, the consistency threshold (consistency cut-off), and the frequency threshold (frequency cut-off). As far as the first indicator is concerned, it must be remembered that the greater the consistency, the more likely a given combination is to lead to an outcome (on the basis of the analysed cases). Schneider and Wagemann (2012) suggest that each combination whose consistency is at least 0.8 should be accepted. However, these values are not 'rigid,' and the truth table should be carefully analysed before the ultimate selection of cut-off points. Determining a cut-off point may be aided by finding whether the gaps among their values are not greater than within a range of 0.75-1.00 after all of the consistencies are sorted in descending order (Ragin, 2018). When defining a cut-off point, the presence of such gaps can be treated as an auxiliary element. In line with this principle, various threshold values during the different periods and models were adopted in this study (these are presented in Tables 5 and 6). In turn, when selecting a number threshold, one should be primarily guided by the number of analysed cases. When the number of cases is low, 1 or 2 is adopted as the frequency threshold. When larger sets of data are analysed, a higher value can be adopted as the frequency threshold. In general, the cut-off point should be chosen in a such way that the selected configurations should be comprised of at least 80% of the cases in the truth table (Greckhamer *et al*., 2013). The dataset was not small; however, relying on this guidance, our analysis assumed 1 as the cut-off point in all of the cases. Given this approach to the analysis, 82-92% were selected depending on the model and phase.

Table 4. Part of truth table for Model I during first period (before crisis)

ES	MPS	MDS	PDS	DS	CS	number	raw consistency
1	1	1	1	1	1	10	0.847
0	0	0	0	0	0	4	0.690
0	0	1	0	0	1	2	0.765
1	0	1	0	0	1	2	0.812
1	1	1	0	0	1	2	0.797
1	1	1	0	1	1	2	0.839
1	1	0	1	1	1	2	0.774
0	0	1	0	0	0	1	0.763
1	0	1	0	0	0	1	0.812
0	1	1	0	0	1	1	0.825
0	0	1	1	0	1	1	0.824
1	1	1	1	0	1	1	0.854
0	0	0	0	1	1	1	0.831
0	0	1	0	1	1	1	0.857
0	1	1	1	1	1	1	0.845

Source: own study.

The last stage of the QCA method is based on the use of Boolean algebra and the appropriate algorithms that allowed for a logical minimisation of the number of combinations, each of which leads to the outcome independently of the others (Fiss, 2011). These algorithms work according to the principle that if two configurations pointing to the same result differ in exactly one condition, this condition can be considered irrelevant and not taken into account when formulating a solution (Ragin, 2008). The results of the algorithm are only such configurations of conditions that are sufficient for obtaining the expected outcome. Configurations obtained in this way are the actual result of the QCA method; they are called casual recipes.

As a result of the logical minimisation, we can obtain three types of solutions (Rihoux & Ragin, 2009): a parsimonious solution, an intermediate solution, and a complex solution. In our analysis, we present only the first of these in which the obtained causal paths are only based on those configurations that are confirmed by the empirical data. This solution identifies those analysed factors that are part of each data representation (Kocór & Worek, 2017). These factors are called 'cores' or 'core conditions.' The results of the conducted analysis using the QCA procedure can be expressed in the logical

notation used in Boole's algebra or can be presented by using a table (the latter is more common). As a result, one or more causal paths can be obtained that constitute the solution; these paths are interpreted as sufficient conditions to achieve a particular goal.

The correctness of the models that resulted from the fsQCA procedure was assessed on the basis of two parameters: consistency, and coverage. These are determined for each separate solution (each path) and for the solution as a whole (the alternative to all solutions). The first of the so-called measures of solution correctness (that is, consistency, which has already been mentioned and defined in (1) determines the degree to which the outcome configurations are subsets of the effect (outcome). Meanwhile, coverage is the measure that determines to what degree an expected outcome is explicated by the configurations that are adopted as part of the solution (each separately and all jointly). Raw coverage was calculated based on the following formula (2):

$$coverage(X_i < Y_i) = \frac{\sum_{i=1}^{n} \min(X_i, Y_i)}{\sum_{i}^{n} Y_i} \quad (2)$$

in which all items were the same as in formula (1).

In the literature, one can find some indications for the range of the values of the discussed parameters. Namely, it is assumed that the coherence for a single solution should be greater than 0.75 (Ragin, 2008), while Rihoux and Ragin (2009) claim that the coverage level should not be lower than 0.25. In this examination, the minimisation process was carried out with the use of the fsQCA v.3.0 software. The results obtained in this way are presented in Tables 4 and 5 in the next part of the article.

RESULTS AND DISCUSSION

As a result of the fsQCA analysis (which was carried out following the previously described procedure), the configurations of the strategy were obtained; this led to the outcomes (which are defined in Models I and II) during the particular periods. These results are presented in Tables 5 and 6. First of all, it should be noted that the parameters (consistency and coverage) that are used for verifying the correctness of the obtained results are correct (all consistencies are greater than 0.75, and all coverages are greater than 0.25). This proves the reliability of the obtained results.

When analysing the results contained in Tables 5 and 6, it can be seen that during each of the three examined periods two configurations were identified. Before the crisis, the presence of a diversification strategy together with the absence of a market-penetration strategy (Configuration S1a) and the presence of entrepreneurial, market-development, and product-development strategies (S1b) led to an increase in firm performance. During the initial phase of the crisis, the presence of an entrepreneurial strategy together with a product-development strategy (S2a) and a product-development strategy accompanied by a diversification strategy (S2b) led to an increase in firm performance. During the advanced phase of the crisis, the presence of an entrepreneurial strategy together with a product-development strategy (S3a) and a set of entrepreneurial, market-penetration, market-development, and cooperation strategies (S3b) have led to an increase in firm performance.

The results in Table 5 indicated that all of the examined strategies can lead to an increase in firm performance (albeit in different configurations). These configurations varied depending on the market conditions. The most common were product-development and entrepreneurial strategies; they were present in all the market conditions. This confirmed our P1 and P4 propositions. The market-development strategy was absent during the first quarter of the crisis while being present in the other two periods, the diversification strategy was present during the first two periods, and the market-penetration and cooperation strategies were only present during the advanced crisis. Thus, our P2, P3, P5, and P6 propositions were partly confirmed.

To explain the roles of the examined strategies more deeply, we conducted an analysis of the configurations that led to a lack of outcome (performance). The results of this analysis are presented in Table 6.

Table 5. Analysis of sufficient conditions leading to presence of outcome (performance) in surveyed sample

Conditions	Period I (before crisis)		Period II (first quarter of crisis)		Period III (after first quarter of crisis)	
	S1a	S1b	S2a	S2b	S3a	S3b
Entrepreneurial strategy (ES)		●	●		●	●
Market-penetration strategy (MPS)	○					●
Market-development strategy (MDS)		●				●
Product-development strategy (PDS)		●	●	●	●	
Diversification strategy (DS)	●			●		
Cooperation strategy (CS)						●
Raw coverage	0.381	0.568	0.554	0.505	0.623	0.437
Consistency	0.797	0.833	0.758	0.782	0.783	0.841
Solution coverage	0.673		0.594		0.662	
Solution consistency	0.808		0.750		0.777	
Frequency cut-off	1		1		1	
Consistency cut-off	0.83		0.81		0.86	

Note: ● = core causal condition (present); ○ = core causal condition (absent); blank spaces indicate 'do not care' condition (Fiss, 2011). Vector of expected directions (1,1,1,1,1,1) (Ragin & Sean, 2016).
Source: own study.

Table 6. Analysis of sufficient conditions leading to absence of outcome (performance) in surveyed sample

Conditions	Period I (before crisis)		Period II (first quarter of crisis)		Period III (after first quarter of crisis)	
	S1a	S1b	S2a	S2b	S3a	S3b
Entrepreneurial strategy (ES)		○		○	○	○
Market-penetration strategy (MPS)		○				
Market-development strategy (MDS)	○		○		○	○
Product-development strategy (PDS)	○			○		
Diversification strategy (DS)	○		○	○		○
Cooperation strategy (CS)			●			●
Raw coverage	0.559	0.431	0.430	0.405	0.470	0.367
Consistency	0.805	0.784	0.747	0.769	0.814	0.822
Solution coverage	0.648		0.578		0.566	
Solution consistency	0.768		0.756		0.809	
Frequency cut-off	1		1		1	
Consistency cut-off	0.82		0.75		0.81	

Note: ● = core causal condition (present); ○ = core causal condition (absent); blank spaces indicate 'do not care' condition (Fiss, 2011). Vector of expected directions (0,0,0,0,0,0) (Ragin & Sean, 2016).
Source: own study.

The results presented in Table 6 indicated that the absence of entrepreneurial, market-penetration, market-development, product-development, and diversification strategies can lead (in different configurations) to a lack of outcome (this means that it can lead to decreased firm performance). With its presence, the cooperation strategy can lead to the absence of performance (during the initial phase of a crisis when accompanied by the absence of diversification and market-development strategies and during an advanced crisis along with the absence of market-development, diversification, and entrepreneurial strategies).

The results of the fsQCA indicated that the combinations of strategies that lead to an increase in firm performance differed under three examined market conditions. This indicates the role of the changes in strategies (the degrees of their utilisations and their configurations) when responding to a crisis and adapting to changing conditions. The differences between initial and advanced crises indicate that during a crisis, market conditions change; these changes require a response as well.

Our findings are in line with the studies that indicate the roles of entrepreneurial strategies in small firms (Lechner & Gudmundsson, 2014) and during times of crisis (Simón-Moya *et al*., 2016). This can be connected with the propensity to recognise opportunities Conti *et al*. (2020) that emerge during a crisis. Our findings add explanations about the accompanying conditions that are necessary for the presence of increased performance. Moreover, our findings show that an entrepreneurial strategy can be effective under different market conditions; however, after the initial phase of a crisis, an entrepreneurial strategy is present in both of the identified combinations that lead to increased performance. This emphasises the role of an entrepreneurial strategy.

This study confirms the role of a product-development strategy. This strategy is present under all of the examined market conditions. The presence of product development among other strategies that can lead to performance during a crisis can be associated with abilities that are specific to this strategy; namely, developing products that meet customer needs (Chung, 2016). Under changing market conditions, these abilities can be crucial when accompanied by varying customer needs.

This study indicates that a cooperation strategy is present only in combination with market-penetration, market-development, and entrepreneurial strategies. Moreover, the presence of a cooperation strategy can lead to the decrease of performance during a crisis. This confirms the relatively low degree of inter-organisational cooperation that can be observed in the Polish economy (Duda, 2018). This finding is contrary to expectations that are based on numerous studies that indicate the significant role of inter-organisational cooperation, especially within the SME sector (*e.g*., Hatak & Hyslop, 2015; Morgan *et al*., 2016; Staniewski *et al*., 2016; Li *et al*., 2021). This observation raises the question of whether the absence of cooperation will decrease the changes in the examined enterprises for their after-crisis recoveries.

The absence of market penetration and market development among the strategies that can lead to increased performance during the first quarter of a crisis can be explained by the radical decrease in demand in the printing industry during this period. The absence of market penetration is in opposition to expectations that a firm can use a marketing mix to penetrate the market during a crisis (Varadarajan, 2010); however, market penetration is visible after the first quarter of the Covid-19 crisis, as is a market-development strategy. This suggests that, after the initial phase of the crisis, some opportunities for development and penetration in the market became available.

The presence of diversification among the strategies that can lead to increased performance during the first quarter of the crisis (and the observation that the absence of diversification leads to an decreased of performance during this period) is in line with Natsubidze *et al*. (2017). However, after the initial phase of the crisis, diversification is not present among those strategies that can lead to increased performance. This confirms the ambiguous role of the diversification strategy within SMEs (Harkiolakis, 2014), which calls for further research on the role of the diversification strategy.

Finally, the observation that configurations that can lead to increased performance change along with changing market conditions confirms the impact of the external environment on the behaviours and performances of SMEs (Cavallo *et al*., 2018). Specifically, this study indicates several configurations of strategies that can lead to increased performance under different market conditions (non-crisis, the beginning of a crisis, and after the first quarter of a crisis).

CONCLUSIONS

This study shows that depending on market conditions, different strategies (in different combinations) can lead to increased firm performance. This finding confirms the observation that enterprises can build their competitive advantages based on various strategies. This examination shows that during times of crisis when market conditions change, strategies (and their combinations) also change. In this study, such changes were observed in the cases of six strategies; namely, entrepreneurial, market-penetration, market-development, product-development, diversification, and cooperation. In particular, the differences in terms of the combinations of strategies that can lead to increased firm performance are visible among three different market conditions: non-crisis, the beginning of the crisis, and the advanced crisis. Product development and entrepreneurial strategy are present in combinations

leading to an increase in firm performance during the first quarter of the crisis, as well as after the first quarter. The presence of cooperative strategy is visible in combinations leading to a decrease in firm performance during both examined periods of the crisis.

The findings of this study have implications for researchers and practitioners. This study contributes to the strategic management, crisis management, and SME literature. In particular, the findings explain the roles of several strategies that were examined in the study under crisis conditions, indicate those strategies that can help alleviate the negative impact of a crisis, and explain the behaviours of small firms under changing market conditions. All of these findings contribute to the theory-building process, but they also may help improve managerial practice. In particular, this study may help increase the efficiency of entrepreneurial responses to changing market conditions. This study proposes some combinations that are specific to different market conditions (phases of a crisis) that can be applied by entrepreneurs to alleviate the negative impact of a crisis. Additionally, the strategies observed in the third period (after the first quarter of the crisis) can be used in redesigning businesses to post-crisis market conditions. This study indicates the need for researching the combinations of strategies (not only single strategies) in the context of performance improvement. Additionally, this study contributes to the development of the fsQCA methodology by employing it in the comparison of the configurations that are specific to varying market conditions and tracking the modifications that are implemented by entrepreneurs in response to market changes.

This study has several limitations. Firstly, we only investigated the roles of six strategies; some other strategies can be relevant during a crisis in terms of their impacts on firm performance. Moreover, the presence of other strategies may impact the role of the strategies investigated in this study. As a result, other configurations may appear. Secondly, the sample investigated in this study represents only one industry (printing), one size category (small firms), and one market (Poland). These characteristics should be taken into account when implementing the findings of this study. Thirdly, the findings of this study indicate those strategies that are relevant to crisis conditions; however, our only relates only to the Covid-19 pandemic crisis. When applying the results of this study, one should consider those characteristics that are specific to this crisis (which can differ from other [future] crises). Fourthly, the method of collecting data can be a source of bias in the respondents' appraisals; namely, we use the retrospective assessments of entrepreneurs and managers – moreover, we asked them to assess the situations that pertained to the three different market conditions that took place over a period of several months at the same time. Finally, the employed method is a source of limitations. The results of the fsQCA depend on the justification of the calibrations as well as the cut-off points. To obtain results that can be compared with those of this study, the described procedure should be replicated.

The limitations presented above indicate potential directions for future research. An examination of other strategies (and their combinations) along with their impacts on performance (and growth) is recommended. A replication of similar studies in other contexts (*e.g.*, firm size, industry, country) would extend our knowledge on the role of strategies under different market conditions. In particular, cross-national studies could shed light on the impact of external factors (associated with an entrepreneurial environment). To explore the roles of such strategies during a crisis more deeply, other methods can be employed. In particular, these may be methods that enable us to estimate the strengths of any relationships among strategies and firm performance (such as regression analysis). These may also be methods that may enable us to estimate the moderating and mediating effects that are played by the different variables (such as structural equation modelling [SEM]). Such research may give us a deeper understanding of those behaviours that enable entrepreneurs to mitigate the negative impact of a crisis on firm performance.

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Is business succession by the search fund model an option for Central Europe?

Jörg Freiling, Max Oestreich

ABSTRACT

Objective: Introduced in the 1980s in the USA, the search fund model as a niche financial instrument of entrepreneurship through acquisition has not yet become popular outside North America. This article responds to the question whether search fund could be an interesting model for Central European countries with an increase in business successions.

Research Design & Methods: A qualitative content analysis of interview data from eight cases from German-speaking countries allows analysing the context and experiences, as this is the region with the most cases of applications within Central Europe to date.

Findings: The results reveal the entrepreneurial intent of the searchers, the searcher's confirmation of the theoretical advantages of the search fund model, and the low popularity of the model in the German-speaking markets due to scepticism and hindering factors like the criteria catalogue, market idiosyncrasies, competition of private market investors, and lower control of choosing and running a target company. Furthermore, these markets offer well-established financing alternatives which makes searchers choose alternative models.

Implications & Recommendations: Because the search fund model as niche model does not tap its full potential, a transfer of best practices between different regions in the world is beneficial. Moreover, platforms connecting successors, funders, and predecessors may be useful in this regard.

Contribution & Value Added: The study offers first empirical insights on adoption factors of the search fund model in German-speaking markets: in so doing, it sheds light on preferences and concerns of the parties involved, with the aim to facilitate the model's future application all-over Central Europe.

Article type:	research article
Keywords:	business succession; search fund model; entrepreneurship through acquisition; management buy-in
JEL codes:	G34, G41, L26

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INTRODUCTION

Business successions are disruptions for the companies involved and often imply significant changes. New people and organizations come into play and allow new constellations of ownership, leadership, finance, and governance. Entrepreneurial revitalizations may come to the fore particularly in the case of external successions (Freiling & Poeschl, 2020).

Already in 1984, the search fund model (SFM) was developed (Johnson, 2014; Kelly & Heston, 2020). Tracing back to Grousbeck, a professor at Stanford University, the model lets fresh, but not liquid MBA graduates ('searchers') run a company as an entrepreneur, backed up by investors financing the acquisition ('funders'), while paving the way for predecessors to exit. While there is a bigger number of US SFM applications with 258 funds (Järvinen, 2019), research is rather silent on SFM. Current research on this topic addresses the unchanged model from 1984 in the original USA context

(Dennis & Laseca, 2016). Yoder *et al.* (2018) define SFM as a financial instrument which is brought to life by one or two aspiring entrepreneurs, who collect equity from investors. With this commitment, investors also take on a consulting role as board members which is critical to the success of search funds (SF) (Dennis & Laseca, 2016). Moreover, the investors will be first in-line to bring in further equity needed for the acquisition in the sense of a leveraged buy-out with the help of debt financing by a corporate bank. The searchers take on their new roles as the CEOs of the acquired business following the steps of a management buy-in. They create value for the investors by optimizing operation processes, increasing cashflow and, therefore, deliver a significant return on equity (Yoder *et al.*, 2018).

As succession problems are increasing, particularly in the German-speaking countries, small businesses and family firms are looking for useful succession options with more emphasis on external successions (Schwartz, 2018; Freiling & Poeschl, 2020) due to decomposing family structures in the society. This may favour the SFM. However, the numbers of active search funds (SF) in Germany, Austria, and Switzerland show a different picture: the SFM does not seem to have gained popularity in Central Europe. In 2018, Kolarova *et al.* (2018) could identify only 83 search funds outside the USA – with only four successful acquisitions in Germany between 2010 and 2016, while Austria and Switzerland counted only one formed search fund each but no acquisition in the same period. The 2020 IESE Search Fund Study already identified 132 first-time international search funds raised from before 2012 until the end of 2019 – with 50 of them raised in 2018 and 2019. Europe makes up only 24 of the recently formed search funds, with German-speaking countries counting only 10 formed search funds since 2010 and Poland counting only two (Kolarova *et al.*, 2020).

Comparing the number of successful applications of the SFM in various international markets to the numbers of North America, especially Germany-speaking countries lack behind. However, taking into account the development of the model's application in the US, the model needed almost 20 years from its first applications to get enough traction (Dennis & Laseca, 2016).

On this note and from an entrepreneurs' angle, this article addresses the following research question: „How and why does the SFM facilitate acquiring businesses in German-speaking countries to aspiring entrepreneurs? "Based on qualitative empirical research on the small number of cases in Germany, Austria and Switzerland, the article advances research by context-specific insights and particular adoption factors of the SFM. The results contribute to the understanding of this niche financial instrument for business succession all-over Central Europe.

After the conceptual foundations in the next section, we describe the development of research propositions and the methodology. Next, we present the findings and close with a discussion and conclusions.

LITERATURE REVIEW AND PROPOSITION DEVELOPMENT

Literature review and foundations

The SFM is one option among the various models of entrepreneurship through acquisition (ETA) (Fund & Hunt, 2012). Rather than founding a new business, ETA is 'the acquisition of an existing small or medium-sized business by an entrepreneur for the purpose of expanding and enhancing the business through transformational strategies that fundamentally reshape market processes' (Fund & Hunt, 2012, p. 31). This definition sees the entrepreneur in a pivotal position which animates this study to focus accordingly, as the entrepreneur predominantly provides the sense of direction for the company after succession. Transformational strategies, entrepreneurial mechanisms, and applied business innovation are key to ETA and its niche of the SFM, in which underperforming, undervalued business assets in low-/no-growth industries motivate the actors to capture value (Fund & Hunt, 2012). The concept of ETA uses an 'owner as agent' governance structure and creates value through using long-term growth and expansion into new products, services, and markets. The cash flow is deployed to growth initiatives in an operationally or strategically undermanaged target company.

There are different models of practicing ETA, namely: self-funded search, crowdfunded search, the single investor-based captive model, the accelerator approach and the SFM (Dennis & Laseca, 2016; Yoder *et al.*, 2018; Kelly & Heston, 2020). Figure 1 provides an overview of the different profile elements of each of the models and allows a first view on the 'anatomy' of the SFM. Yoder *et al.* (2018)

emphasize that the different approaches to ETA have their specific (dis-)advantages in terms of flexibility, risk, deal size, and economics for the searching future entrepreneur, all mirrored in the two arrows of Figure 1 as explained below.

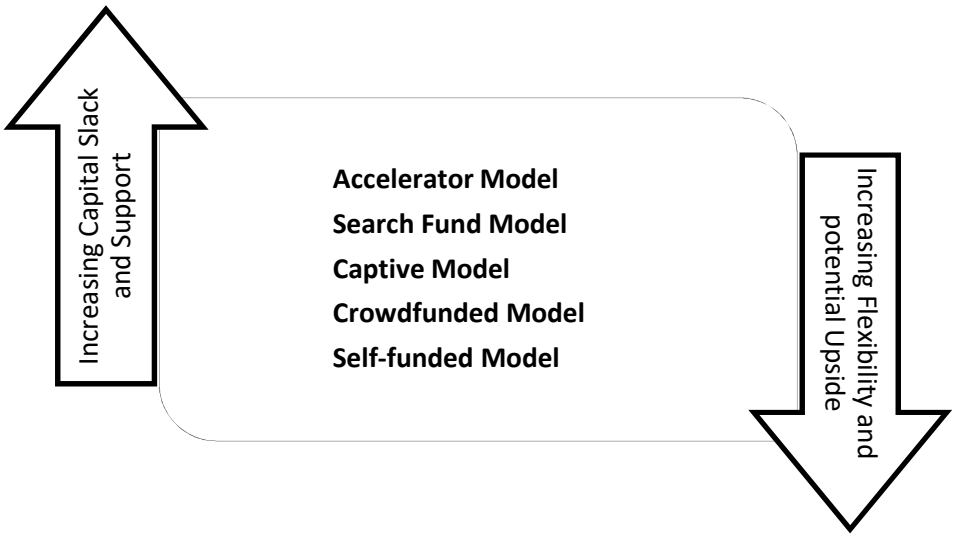

Figure 1. ETA Models in Comparison
Source: Own elaboration based on Yoder *et al*. (2018) and Dennis & Laseca (2016).

The SFM is a small but growing and highly under-researched niche of ETA and an effective exemplary of how ETA can work. Aspiring entrepreneurs 'raise capital for the sole intent of identifying and acquiring undermanaged businesses that grow in value through an infusion of entrepreneurial strategic intent' (Fund & Hunt, 2012, p. 37). It is part of the specific profile of the search fund investment vehicle that allows an aspiring entrepreneur to search for, acquire, manage, and grow a company backed up by the financial support of investors (Stanford Business School, 2013). Figure 1 suggests that the SFM may provide access to considerable amounts of financial capital, slack resources and support on high expertise levels. Li and Grousbeck (2003) introduced this concept in the upcoming era of globalization, liberalisation, and tax laws in the mid-1980s. Raising equity from investors to leverage with debt financing for being able to acquire a company, is among the core ambitions of the SFM (Yoder *et al.*, 2018; Kelly & Heston, 2020). This goes along with limiting the searchers' flexibility and the financial upside thanks to the guidance by accompanying investors. Literature suggests that the higher the support for searchers by investors through network and capital, the lower the flexibility for the searcher (Yoder *et al.*, 2018; Kelly & Heston, 2020; Stanford Business School, 2013). The SFM distinguishes itself from other models of searching for an acquisition target by raising 'search capital' from investors first to finance a diligent search for a target company, and then, in a second step, raising 'acquisition capital' from those investors for the acquisition itself (Stanford Business School, 2013). Given a potential succession wave in the future with considerable corporate values, the expertise of investors may be an asset that could bring SFM into a favourable position.

From an overall perspective, the typical SF process comprises four different stages: raising initial capital, identifying and making an acquisition, operation and value creation, and exit. The different stages are defined by different goals and strategies to be fulfilled consecutively for being able to enter the next stage and create value for all involved stakeholders (Johnson 2014; Hines & Morrissette, 2015; Dennis & Laseca, 2016; Ruback & Yudkoff, 2017; Kelly & Heston, 2020). Typically, this vesting schedule vests one-third upon deal closing, one third over-time, and one-third upon hitting defined performance targets (Yoder *et al.*, 2018; Kelly & Heston, 2020; Pohlmeyer & Rosenthal, 2016).

To a large extent, the particular profile of the SFM rests on the trilateral constellation of actors: the (often young) entrepreneurs, the investors, and the predecessors' company. Literature deals with the horse race metaphor according to Figure 2. The analogy of the 'jockey, the trainer and the horse' (Johnson, 2014, p. 5; Dennis & Laseca, 2016, p. 16) tries to suggest a triple-win perspective.

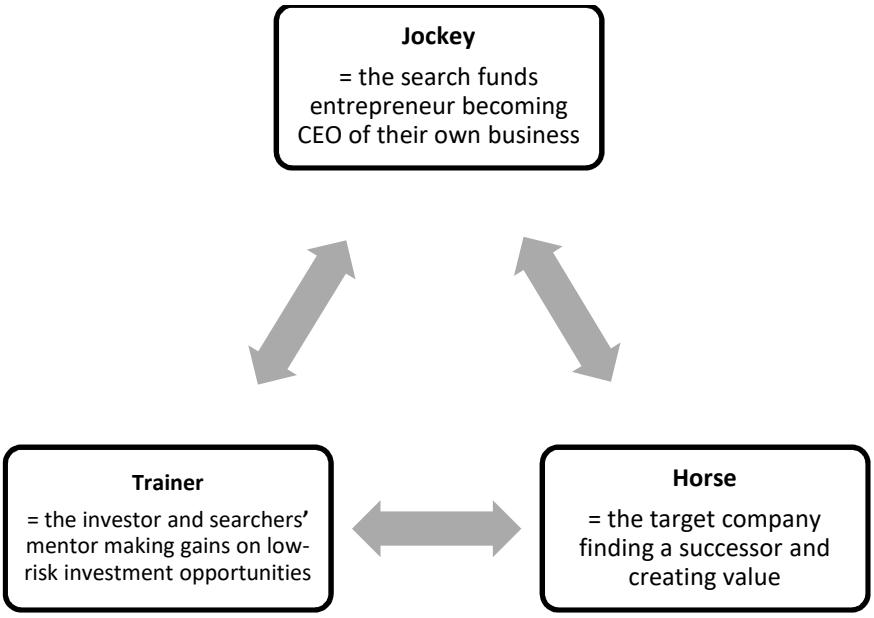

Figure 2. SFM's Trilateral Constellation
Source: own elaboration based on Johnson (2014).

Entrepreneurs' angle ('jockey')

According to literature, in 84% of all cases, the SF entrepreneur is a graduate from an MBA programme (Pohlmeyer & Rosenthal, 2016; Dennis & Laseca, 2016; Kelly & Heston, 2020). Searchers have very diverse professional backgrounds, predominantly from management consulting, investment banking or finance, private equity, general management, and engineering (Kelly & Heston, 2020; Kolarova *et al.*, 2020). Pohlmeyer and Rosenthal (2016) point out that following the path of an SF entrepreneur implies high opportunity costs in the face of attractive careers in management consulting, investment banking, finance, or private equity, which the entrepreneurs skip (Wasserman, 2013). Therefore, on top of the 'desire to own, manage, and build a company' (Stanford Business School, 2013) and the wish for realizing a high financial upside and higher risk aversion in comparison to founding a start-up (Ruback & Yudkoff, 2017), searchers need certain skills to succeed in ETA. Basic management and accounting skills, confidence and communication skills towards investors, business brokers and sellers, and employees and customers, are among the needed skills and traits. Furthermore, they need optimism, enthusiasm, and resilience as in every search stage they will encounter hurdles (Ruback & Yudkoff, 2017).

The SFM promises searchers a low-risk and high-reward way to entrepreneurship. Looking at the 2020 study from IESE Business School on international SF outside the USA and Canada, the median equity value for current business operators (former searchers) is 1.07 mln USD and 0.54 mln USD per year of operation. This is due to SF entrepreneurs taking a 15-30% equity stake in the acquired company according to the vesting schedule which capitalizes upon exit (Stanford Business School, 2013). Generally, searchers have an intrinsic entrepreneurial motivation to choose ETA over a different professional career. Furthermore, they are looking for a less risky way into entrepreneurship than creating a new venture with a more streamlined financial upside.

Investors' angle ('trainer')

When looking at the risk profile of SF as an asset class compared to other private market investment options, SF provide a higher aggregated internal rate of return and less survival, exit and liquidity risks (Fund & Hunt, 2012). In comparison to start-up companies backed by angel investments or venture capital, which display a 35% survival rate, search funds' survival rates range at a 90% level (Fund & Hunt, 2012). Private equity buyout firms operate similarly to SF, but traditionally acquire target companies with

a higher EBITDA, as SF in the US focus on targets with EBITDA below five mln USD (Johnson, 2014). Compared to traditional private equity buyout funds, SF have provided a better overall performance (Global Private Equity Report, 2020). Overall, for investors, SF are a less risky investment opportunity within the private markets than traditional private equity, angel investing or venture capital. Furthermore, in this comparison, SF have realized higher returns of investment and higher internal rates of return (Kelly & Heston, 2020; Kolarova *et al.*, 2020; Fund & Hunt, 2012; Global Private Equity Report, 2020).

Target companies' angle ('horse')

Kolarova *et al.* (2020) report that the median international SF acquisition ranges at a purchase price of 11 mln USD, providing a revenue of eight mln USD with an EBITDA margin of 23% and acquired at a purchase price to EBITDA multiple of 5.6 times with a purchase price to sales multiple of 1.3x (Kelly & Heston, 2020, for US and Canadian key figures). According to the most recent SF studies, companies out of the sectors services, software and healthcare providers, and healthcare services make up for the biggest part of successful acquisitions (Kelly & Heston, 2020). Notably, companies fulfilling traditional requirements of being asset-light, in a growing market, having mostly recurring or repeated revenue, low capital expenditure, and a high EBITDA margin (Ruback & Yudkoff, 2017; Johnson 2014; Kolarova *et al.*, 2020; Li & Grousbeck, 2003), like services, software and technology-enabled services have been on the decline, whereas education, manufacturing, and construction services have been starting to become interesting for SF (Kelly & Heston, 2020). Traditionally, manufacturing was unattractive to investors because of higher complexity and higher capital expenditures, which increases the risk in the case of management mistakes and market volatility. Similarly, investors did not provide capital for healthcare deals due to heavy regulation within this industry. However, with a rising number of deals from these industries pitched to investors, more deals are evaluated and realized on a case-by-case basis (Dennis & Laseca, 2016). Following Johnson (2014), an explanation for this trend can be that in the past many deals with very good returns have deviated from the strict SF criteria. This led investors to support more and more deals that do not fulfil all the traditional criteria (Johnson, 2014). Despite the development according to which 'business services cannot continue to be the only source of companies in search funds' (Dennis & Laseca, 2016, p. 16), the core criteria of the traditional SFM should not be altered, because they have made it an attractive asset class in the first place (Dennis & Laseca, 2016).

In German-speaking markets, succession problems are constantly increasing. In Germany, until 2022 over 842 000 business owners of mid-sized business will have retired, and another 275 000 small businesses are expected to start evaluating succession options (Schwartz, 2018). In Austria, within the upcoming years almost 90,000 companies have to deal with business succession (Wirtschaftskammer Tirol, 2017). As most of these businesses with succession problems are run by single proprietors, they often do not comply with the usual search criteria and are, thus, not among the targets for aspiring entrepreneurs utilizing the traditional SFM. Considering only the limited liability companies, limited liability partnerships and private liability companies, this leaves an indicatory pool of over 12 000 businesses. Concerning Switzerland, over 91,360 companies are facing the same problem, with 494 companies employing more than 50 people (KMU Nachfolge Schweiz, 2021) and are, thus, more likely to fit the SFM criteria.

Looking at these numbers, the prognosis of Hines and Morrissette (2015) that the SFM is likely to benefit from the rising opportunities for acquiring small businesses within the next years seems to be applicable for Central Europe and, particularly, the German-speaking markets, too. It is also evident that SFM provides sound replies to the upcoming problems in case of successions. This article targets the respective context, aims particularly at a critical assessment of SFM's practicality in the German-speaking markets and fills the research gap of understanding the factors allowing an adoption of the SFM by providing empirical evidence. The empirical fieldwork is framed by a set of research propositions to be developed below and guided by the following research question: how and why does the SFM work for aspiring entrepreneurs to acquire businesses in German-speaking markets?

Propositions

The conceptual foundations and prior research inform this study with first insights in the light of the research question. The following considerations seek to condense prior knowledge and to develop research propositions that undergo a first reality check by data from the field.

The first consideration is about the awareness of the SFM. It is evident that in the US, many actors around the 'horse race triad' are rather familiar with the SFM (Ruback & Yudkoff, 2017; Johnson 2014; Kolarova *et al.*, 2020; Li & Grousbeck, 2003). Johnson (2014) states, that even though European SF are benefitting from experiences, factors and criteria set for and by the traditional SFM, some cultures might be better suited for SF, because of not having a strong tradition of handing down businesses within the family as is a usual case in Europe (Julia *et al.*, 2010). Therefore, actors in certain cultures are more willing to back an external, young, less-experienced person. One can expect that entrepreneurs, investors, and predecessors in the German-speaking countries are simply not aware of and not familiar with the SFM. Thus, we propose:

Proposition 1: The lacking awareness of the SFM in the actors' minds and the still strong commitment to family-internal successions hinder SFM adoption in the German-speaking markets.

Particularly graduates and professionals may have chosen not to pursue the path of entrepreneurship due to perceived downside risk or limited profit. However, according to recent data, the SFM offers a way to exploit entrepreneurial opportunities with comparably low failure and exit risk (Fund & Hunt, 2012; Kelly & Heston, 2020; Kolarova *et al.*, 2020), mainly due to the guidance of experienced investors involved in the transaction (Dennis & Laseca, 2016). On top of reduced risk, the SFM may offer higher expected returns than different professional careers. These findings lead to the question whether the financial upside hand in hand with low risk may really outweigh the loss of equity and control in the target company for searchers in the German-speaking markets. Hence, we propose:

Proposition 2: Searchers from German-speaking countries favour the SFM structure and guidance to create financial upside with low risk.

Proposition 3: Searchers from German-speaking countries decide against the SFM because of a comparably lower equity stake and lower control.

The extensive list of prerequisites to decide whether to take an acquisition opportunity or not, ensures the SFM's success (Ruback & Yudkoff, 2017; Johnson 2014; Kolarova *et al.*, 2020; Li & Grousbeck, 2003). Thus, the model became an attractive asset class for investors in the first place (Dennis & Laseca, 2016). Johnson (2014) argues that although the strict criteria set for evaluating an acquisition target ensures the success of the SF entrepreneur and reduces the risk for the investors, there are not many small companies that comply with the criteria. However, industries and business opportunities can deliver unique value propositions despite a complicated business model or other shortcomings (Johnson, 2014). Dennis and Laseca (2016) admit that with a rising number of pitched deals deviating from the traditional focus on business services, investors need to be more open for industries outside the traditional SFM focus and evaluate unique opportunities on a case-by-case basis (Dennis & Laseca, 2016).

Proposition 4: Searchers not finding enough target companies fulfilling the strict SFM criteria hinders SFM adoption in the German-speaking markets.

Proposition 5: Searchers from German-speaking countries decide against the SFM because of low flexibility in choosing acquisition targets.

As Figure 1 reveals, different approaches to ETA have evolved as efficient alternatives to SFM (Yoder *et al.*, 2018; Dennis & Laseca, 2016). Depending on the searchers' needs for external capital, guidance and infrastructure, each approach to ETA has its own profile and related dis-advantages. Depending on the searchers' capacity and willingness to finance the search for and the acquisition of a target company with private capital, SFM can be an attractive option (Dennis & Laseca, 2016; Yoder *et al.*, 2018; Kelly & Heston, 2020). Thus, we conclude:

Proposition 6: Searchers from German-speaking countries choose SFM as a way into entrepreneurship for its low need for personal equity investment.

Proposition 7: Searchers from German-speaking countries decide against SFM because of a well-established debt financing infrastructure for business succession.

RESEARCH METHODOLOGY

Methodology

Due to its early research state, a considerable complexity of the research topic and the anatomy of the research question, the application of a qualitative research design based on the development of case studies deems useful (Yin, 2018; Eisenhardt & Graebner, 2007). Another reason for not employing quantitative research is the simple fact that the number of SFM applications in Central Europe still rests on a rather low level. Kolarova *et al.* (2020) could identify only 10 formed SF since 2010 in German-speaking countries and two in Poland (Kolarova *et al.*, 2020). Besides that, qualitative research is advantageous as it allows deeper dives into reality.

Building on prior research, the procedure was deductive and confronted developed causalities with reality. However, to be open for new insights from reality, the cases rest on semi-structured interviews – as prime data source – with an interview guide that starts with narrative parts prior to the reality check of the propositions. This allowed gathering data beyond the set of propositions by additional inductive research that could add to a more comprehensive understanding. After the narrative interview part, the structured section followed the research question and the developed research propositions directly. The questions were tested prior to the first interview to ensure comprehensibility by the interviewees. Following the suggestions by Yin (2018) and Eisenhardt (1989), observations made by the interviewer and secondary data analysis (websites, press releases, reports) were additional, supplementary methods for the sake of triangulation (Ndofor *et al.*, 2015).

Data sourcing

To get a thorough first overview of the SFM application, the perspective of the 'jockey' was chosen. As the aspiring entrepreneurs are the first and foremost binding element within the SFM, they are in close contact with all the stakeholders involved and hence experience the benefits and limitations of the model first-hand.

A keyword search in public press and forums sought to identify potential interview partners. Within the German-speaking countries, 10 former or still active SF could be identified and four searchers with knowledge of SFM who eventually decided to pursue a different ETA model. Eight of them (A-H) were willing to share their experience. The number of identified SFM-based ETA and their distribution over the German-speaking countries coincides with Kolarova *et al.* (2020).

Hence, the prime data source were eight interviews conducted in November and December 2020 with German, Austrian, and Swiss searchers, all of them male and between 25 and 40 years of age and familiar with SFM. The interviews lasted between 20 and 60 minutes. All interviews were held in the native language of the interviewees to avoid translation problems. The interviews were recorded and transcribed. As the data collection could unveil sensitive data on the investment process which could be subject to a nondisclosure agreement and likewise to allow the interviewees to speak frankly about their experience, the interviews had to be transcribed anonymously.

Four interview partners raised SF to search for and acquire a company. One more searcher had just started out and was in the fundraising stage when interviewed. Three interviewees followed an alternative model: A and D did a self-funded search and E decided to go with a single investor to finance multiple searches. Overall, six searchers were successful in searching for and acquiring a company. Interviewees B, C and H successfully went through all stages. Only C has successfully exited so far. Interviewees B and H are still operating their acquired targets. Table 1 provides an overview of the interviewees and SFM-related issues.

Data analysis

Supported by QCA software, data analysis followed the structuring qualitative content analysis according to Mayring (2021) based on deductively formulated categories. In detail, the method of contextually structuring content allows filtering common topics, content, and aspects from the underlying material (Mayring, 2021). Structuring according to the content helps to filter out predefined content (Mayring, 2021). As for coding, the procedure started by coding first-order data. The codification focused on the single interview first, based on individual paragraphs. In the second step, codification was applied on all interviews simultaneously using the paraphrases of the single interviews. According to the deductive category forming procedure, seven main categories and a total of 18 subcategories were identified out of the available SFM literature and the theoretical considerations in accordance with Mayring's (2021) approach. In this vein, the single interviews were reviewed by the help of the category system, single statements translated and paraphrased and then assigned accordingly to the subcategory system. After this, the abstracted material was summarized according to the categories.

RESULTS AND DISCUSSION

Results

To check the research propositions one by one, we identified and specified categories. The categories were defined deductively out of the available literature on the SFM and the abducted theoretical considerations, condensed within the set of propositions (Mayring, 2021). The propositions were confronted with the empirical findings. As the empirical research allowed both open response and structured feedback on the propositions, category development had to take this into account. Insofar, the developed categories are an umbrella to connect the literature-based structure of the propositions with field data. This explains why the terms used in the category system are similar but not identical with the factors of the propositions. Moreover, the sub-categories allowed considering all relevant factors from the field that sometimes go beyond prior research.

The further procedure rested on the three-step approach according to Mayring (2002). The first step was about defining major (sub-)categories and allocating statements to them. The second step rested on providing anchor examples with a prototypical function out of the transcribed material, while in the third step, the definition of coding rules for a guideline to assign statements to the categories took place.

Table 2 portrays the (sub-)categories and related findings in overview. For example, *P1* is about the acceptance of the SFM among relevant stakeholders in the German-speaking markets. Lacking knowledge and scepticism are typical for this category. Along the single propositions and the related constructs, all the categories were developed in this vein.

Proposition check

According to *P1*, the SFM is not yet sufficiently known among stakeholders and, hence, not accepted as a concept for business succession in the German-speaking markets. The statements of the interview partners principally supported this. Six of eight interviewees stated German-speaking markets are unfamiliar with the model and/or that they faced scepticism about SFM, particularly regarding the value proposition. Four out of eight searchers named a lack of knowledge among company owners or investors and among young graduates trying to find a way into entrepreneurship. Interviewees B, F, and G saw business schools and universities responsible for this situation.

> The smaller markets are the reason why the SFM is not as well-known as in the USA. … Another reason for this is the missing culture of MBA graduates. … In Germany, your professional career does not get interrupted by an MBA (B, ll. 342-343, all translations by the authors).
>
> You cannot tell SME owners that you are doing a SF, as they do not know the concept …. This is why we did not use the term 'search fund' but 'business succession entrepreneurship' when introducing ourselves. (C, ll. 225-119)
>
> Germany has not been an active market for search funds (F, l. 60).

Only very few institutions are currently promoting the model. Classic business schools must promote the model more intensely (G, ll. 207-208).

Table 2. Categories in overview

Category (C)	Sub-categories	Condensed findings
C1 Unfamiliarity	11 Knowledge	Stakeholders do not know SFM.
	12 Scepticism	Stakeholders do not see the value surplus compared to other models, *e.g.* management buy-in or private equity.
C2 Attractiveness	21 Acceptable risk	Searchers perceive low risks with the SFM.
	22 Experience	Searchers perceive the investor's experience and guidance as helpful in making an acquisition.
	23 Upside	Searchers perceive a comparably predictable and high upside of the SFM.
C3 Disadvantages	31 Limited control	Searchers perceive lower control over the company due to lower equity share by the SFM.
	32 Limited upside	Searchers perceive lower financial upside due to lower equity share with the SFM.
C4 Available targets	41 Search criteria	Searchers perceive the search criteria of SFM hindering in finding a target.
	42 Narrow market	Searchers perceive the German-speaking markets low on targets fulfilling traditional search fund criteria.
	43 Competition	Searchers perceive competition for targets due to the criteria of SFM.
C5 Limited flexibility	51 Freedom	Searchers perceive more freedom in choosing their target outside the SFM.
	52 Regionality	Searchers perceive more regional flexibility with choosing a target outside the SFM.
C6 Capital slack	61 Low private capital	Searchers perceive the low need of personal equity investments within the SFM beneficial for their search.
	62 Slack resources	Searchers perceive the slack resources within the SFM beneficial for their search.
C7 Financing alternatives	71 SME bank	Searchers perceive a combination with SME bank financing, *e.g.* KfW bank, a sufficient alternative for their deal financing.
	72 Bank debt	Searchers perceive traditional bank financing a sufficient alternative for their deal financing.
	73 Seller note	Searchers perceive a combination with a seller note a sufficient alternative for their deal financing.
	74 Guarantor bank	Searchers perceive a combination with a guarantor bank, *e.g.* Bürgschaftsbank, a sufficient alternative for their deal financing.

Source: own study.

Five out of eight interview partners encountered situations which relate either to scepticism of the stakeholders towards them or were sceptics themselves. Young age and lack of experience were core hindrances.

> There was some uncertainty, because nobody knew who I was and why I am so young. … They asked themselves if I am another corporate raider (A, ll. 380-382).
>
> Nobody would take us seriously, as we have never bought a company before and because we have no money to bring into the deal. They said that it could not work (C, l. 88).
>
> The sourcing depends on your credibility if you really have the money. This is difficult to indicate as a searcher. … As an investor, I prefer not to pay for the search of the searcher. Because in such a case, I carry the risk of the searcher not finding a suitable target (E., ll. 319-334).
>
> It is not easy to sell a company to something as random as a search fund. … The seller will tell you that … your search fund is nothing else than a traditional private equity fund. … The seller believes that … you also just want to make a quick buck by flipping his business (F, ll. 369-370).

All in all, the interviewees shared how unfamiliar and, thus, sceptical German-speaking markets are when it comes to deciding on SFM adoption. On this note, we alter *P1* moderately.

> P1 new. Considerable unfamiliarity of actors with SFM hinders its adoption in the German-speaking markets.

Next, *P2* points to factors why young aspiring entrepreneurs favoured the SFM and ETA. The SFM seems to offer entrepreneurs low entrepreneurial and financial risk, a clear structure, and support of experienced investors to realize an attractive upside. For this reason, *P2* seeks to find out whether searchers see these advantages and decide for SFM accordingly, keeping in mind that *P3* targets disadvantages. Therefore, *P3* tries to elaborate reasons for pursuing alternative ETA models. On this note, only B, C and F, G and H had actual SFM experience, whereas A, D, and E chose alternative models. The searches of A, B, C, D, E, and H were successful, F has not found anything, and G was just starting out at the time of the interview. For six of eight interviewees low risk was one of the advantages of following the SF.

> You have a clear risk structure (A, l. 163).
>
> A SF is more risk averse than a self-funded search. … Your downside is also low (D, ll. 74-76).

Both F and G were not successful, yet, in following SFM. These two were the only ones not confirming the advantage of low risk.

Seven searchers found the experience of investors and their guidance helpful in going through the steps of the SF process and making an acquisition, even though two of them did not pursue the SFM track.

> And you get a lot of due diligence experience and external professional experience. … The investors are your sparring partners (A, l. 165 and 299).
>
> It is like a founding board to whom you can talk (B, l. 480).

Half of the interviewees confirmed the factor of financial upside as a key decisive factor for choosing SFM. Three of them pursued the SFM track.

> You receive 30% equity stake of a very good company. … The terms are reasonable the way they [were] originally designed (B, ll. 334-335).
>
> It does not work every time, but when it works, it is awesome. … You will be an established entrepreneur after five years and will have built up wealth (F, ll. 390-395).

Most searchers agreed on the factors making SFM attractive. The subcategories of low risk, experience, and upside can be found with a total number of seventeen out of twenty-four possible times. These advantages were seen by searchers with SF experience and those without. Hence, we see a need to modify P2 slightly by speaking of acceptable rather than low risks. All the developed sub-categories of C2 find high levels of support so that they should remain in P2.

> P2 new. Searchers from German-speaking countries favour the SFM structure and guidance to create financial upside at an acceptable risk level.

When it comes to *P3*, it addresses the lower equity share in the case of SFM and related issues of limited control and upside. In fact, half of the interviewees confirmed lower control because of a lower equity stake. They considered this lower control off-putting, as the paraphrases reveal.

> The disadvantage is your minority equity position in the SF. … You report to the investors, not only yourself (A, ll. 170-172).
>
> With a search fund, you only own 25-30%; self-funded you own 100%, which frees you in your decisions (B, l. 475).
>
> Especially on the investor's side, there are people, that must get involved in every detail and tell the searcher to check this and that (C, l. 710).

While not explicitly stated, the inconvenience effect of SFM is apparent. Besides that, interviewees stated a higher financial upside without the need to fulfil the financial expectations of investors, who otherwise would have an equity stake in the target company.

> You do not have to fulfil the investors' growth and return expectations. … This is a kind of freedom (A, ll. 173-179).
>
> If you buy the company on your own with debt-financing, your personal upside is higher than with a search fund (B, l. 474).

While the interviewees were rather unanimous regarding the factors causing the SFM attractiveness, only half of all interviewees confirmed the factors leading to low attractiveness and the final choice of alternative ETA models. The subcategories of higher control and higher upside outside SFM play a role but obviously only limited so and depending on context. It takes more empirical work to specify these contingencies. Insofar, it deems useful to formulate *P3* more cautiously.

> P3 new. Lower equity stake and lower control in the case of SFM make searchers from German-speaking countries more alert of other ETA models.

Next, *P4* addresses the availability of a sufficient number of target companies. The related subcategories of C4 are (strict search) criteria, (narrow) markets and competition. Four interviewees addressed the strict criteria sets.

> No production industries fit the criteria because they are too capital- and labour-intensive and have too low margins (A, l. 217).
>
> But of course, there are many filter criteria like asset-light and others which make the search phase difficult (C, l. 299).

Only three of eight interview partners directly touched on the German market size.

> In Europe, markets are smaller. It is relatively more difficult to find a good deal than in America with a five-times bigger market. … It is a high risk that you do not find a company (B, ll. 337-353).
>
> Good companies, that are for sale, do not hang like apples on trees, ready to pick (F, l. 131).

However, six of eight interviewees pointed to competition-based hurdles as restriction of SFM adoption.

> In Germany, there are a lot of small-cap family offices, which are competing against you (B, ll. 408).
>
> Because if somebody has a good business, he will be asked to sell it, not the other way round. … But a typical searcher can also just call a PE fund and start as a manager and receive equity instead of salary. (E, l. 194 and 375).

The considerations of this section require a specification of *P4*.

> P4 new. Strict search criteria, ETA model competition, and to some extent limited market size hinder SFM adoption in the German-speaking markets.

As for *P5*, it addresses the limited flexibility of SFM in choosing acquisition targets with considerable opportunities. Freedom in choosing their target outside SFM and regional alternatives beyond SFM explain this limited flexibility. All interviewees voiced downsides of SFM in terms of flexibility. Some of them perceived more freedom in choosing a target company outside SFM.

> With a self-funded search, you can also buy [smaller companies], which you cannot with a search fund (B, l. 465).
>
> There may be investors that tell you not to buy an IT company because they already own several IT companies and want to diversify their portfolio (C, ll. 509-514).
>
> For some deals, you need two years. You cannot do this with a search fund, because until then the fund will have expired (E, ll. 242-243).

Four searchers mentioned higher flexibility in searching regionally beyond SFM. This downside about the freedom of choice in terms of staying regional is relevant to searchers with actual SFM experience.

> If you do not want to or cannot move, a self-funded search is better for you (B, l. 462).
>
> Most searchers also have life partners or spouses. … you have to move to where your target company is situated (C, l. 556).

Half of the interviewees mentioned the perception of higher flexibility in following unique opportunities, which does not comply with traditional target criteria of SFM like carve-outs, turnarounds, spin-offs, or start-up ideas.

> You have lower decisive power because you have to stick to the SF statutes (A, l. 306).
>
> We have asked the investors, but they said that we cannot do the deal in that way we and the sellers wanted. … But sometimes you have to look for unusual solutions and make compromises. … Normally, the traditional SF way would fail because some people have their own idiosyncrasies (B, ll. 269-296).

Interviewees stressed the obstacles related to the trilateral constellation of investors, searchers, and predecessors that can make situations complicated. Insofar, there is no need to modify P5.

According to *P6*, searchers choose SFM for the low level of personal capital investments. This holds over time for the investments in the initial search and later for the acquisition itself. Moreover, it allows the availability of slack resources. Data reveals searchers' willingness to finance the search and the acquisition by themselves as decisive factor for the decision on choosing SFM. Half of the interviewees saw a clear advantage of SFM in terms of limited equity investments.

> [B]ecause you as an individual need to invest less capital (D, l. 75).
>
> Right after my MBA, a self-funded search was out of question for me (F, l. 38).

Six of eight searchers considered the availability of financial resources for the search and due diligence (including broken deal fees), and committed investor capital, which can be used in the acquisition financing, an SFM advantage over self-funded ETA.

> With a search fund, the financial resources are higher, so that you can look at larger deals (A, l. 167).
>
> As a search funder, you are financed in advance, you have all the time in the world to find a good business (F, l. 391).
>
> I was concerned that if I finance the search myself, I would not be as objective in my decision making (H, l. 181).

On this note, we can leave P6 unchanged. The statements suggest interesting backgrounds associated with capital availability future research can build on to refine the causal background.

As for *P7*, the well-established debt financing infrastructure for business succession comes into play that may be disadvantageous for SFM adoption and privilege financial alternatives. Four searchers explicitly mentioned special SME bank loans of the KfW Bank being available in German markets allowing debt financing at a low interest rate for ETA purposes.

> In Germany, there is the KfW founder's debt financing, where you can get up to 500,000 Euro at a very low interest rate (D, l. 101).

In this vein, four searchers stated that deal financing with bank debt is possible in German-speaking markets and can replace venture capital of investors.

> In Germany, you can easily finance an SME deal with your house bank (A, l. 66).
>
> Until … a deal size of five million Euro, I recommend doing a self-funded search if you have between 5 to 10% own equity capital. (D, l. 132).

Three searchers mentioned the possibility of a seller note, meaning financing by the seller directly to the buyer. This financial capital can be used as equity in financing the deal with a bank. Furthermore,

three out of eight interview partners pointed to guarantor banks as a helpful tool to secure debt financing with banks.

> In Germany, there is the guarantor bank Bürgschaftsbank. … They help with guarantees …. In fact, this is a credit default swap. They partially cover the default risk (A, ll. 83-86).

Against this background, as most of the interviewees confirmed, also P7 holds. When it comes to the individual combination of financing instruments, less statements were given. It appears, that the instruments of a seller note and the guarantor bank, which reduce personal liabilities and risks, are not commonly known among searchers. This can also be subject to future inquiries.

Discussion

This study is the first one dealing with a Central European background and specifying the peculiarities of SFM adoption in German-speaking countries. The findings deviate from those concerning other regions of the world (Dennis & Laseca, 2016; Kelly & Heston, 2020; Kolarova *et al.*, 2020). Particularly, the results from this qualitative research reveal that SFM is an attractive model for niches in the regional market. However, despite this finding there is still a long way to go to become an established and recognized model of ETA. Among the prime factors hampering SFM adoption, we found unfamiliarity. Moreover, the particular profile and the advantages of SFM are not evident enough to make this model more popular in the German-speaking countries. While insiders perceive SFM's pros (low risk, available experience and guidance, attractive financial upside, limited investments of searchers) and cons (lower control, reduced upside, inflexibility, limited number of targets) with the according impact on model attractiveness, the contingencies for SFM in Germany are not favourable in all regards. Market structure and competition of alternate models cause a slow adoption.

Regarding the question how and why does the SFM facilitate acquiring businesses in German-speaking countries to aspiring enterpreneurs, there is evidence from data that the trilateral constellation of searchers, investors, and predecessors provides opportunities that are absent in the case of alternate ETA models. However, the set of propositions developed from literature does not entirely hold when confronting it with data from the field. Insofar, four out of seven propositions underwent at least slight adaptations. Moreover, field data helped specifying the background of the causalities derived from prior research (Ruback & Yudkoff, 2017; Dennis & Laseca, 2016; Johnson 2014; Fund & Hunt, 2012; Kelly & Heston, 2020; Kolarova *et al.*, 2020; Li & Grousbeck, 2003). The involvement of investors enables young searchers to go for ETA with a specific opportunity/risk profile. While there are evident perspectives of realizing rents, searchers are to some extent framed by the investors with considerable discretion regarding decisions to be taken. Limited, shared profits on the one hand side and limited risks on the other may look like a somewhat 'fair' compromise. In fact, investors allow opening doors that would be shut otherwise, as young searchers need guidance and advice as much as financial support when trying to make successions happen. This unveils the enabling role of SFM that is still not fully realized in German-speaking ETA settings. On this note, the response to the 'how and why' question rests on (i) the trilateral governance constellation with its steering potential, (ii) the additional financial resources brought in by the investors, (iii) the higher level of expertise and motivation, and (iv) the potential match of the triad's actors. Over and above the findings are in line with typical contextual factors of entrepreneurial behaviour in German-speaking countries, particularly when it comes to risk-related issues, other studies deal with by pointing to the extraordinary fear of failure or 'German Angst' (Berger & Freiling, 2017).

CONCLUSIONS

On this note, the study contributes to prior research as follows. Firstly, the study specifies factors that favour or hinder SFM adoption. With the sub-categories, 18 constructs underwent a first empirical test that revealed specific relevance. Secondly, the study allows insights regarding the SFM profile *vis-à-vis* competitive ETA models. Thirdly, the study sheds light on the situation in Central Europe, exemplified by the German-speaking countries with their strongholds in family business and small- and medium-sized entities.

As the awareness of SFM is low even in the entrepreneurship and investor scenery, it is necessary to inform actors more comprehensively than before. This may be a task for both academicians (studies and courses) and practitioners. Certain platforms connecting successors and predecessors may be useful in this regard. The impact of role-models and benchmarks should be considered to increase awareness.

Another issue is the transfer of best SFM practice between different regions in the world. The US experience is already very comprehensive due to the early launch and the bigger number of SFM cases. Experience from other regions may also be useful. Moreover, we need to understand the contingencies of SFM more comprehensively to tailor regional SFM models. As for next steps of SFM development, interviewees explicitly suggest a further refinement of the model for a better support of searchers with infrastructure, guidance, and experience and accessibility to investor capital. This could work within the framework of an incubator or accelerator model. Like this, searchers experience more flexibility and can take advantage of a stronger focus on a single role within the process.

The cases rest on triangulated data from different sources. While employing typical means of assuring the data quality in qualitative research, prime information sources are the interviews for the cases. In every case, we conducted only one interview. Although meaningful and rich data could be sourced this way, this procedure is prone to key informant bias.

Another limitation is the focus on the searchers' perspective. The point of view of the other stakeholders in this three-sided relationship, like the seller and the investor, might render different results and a more holistic view on the underlying research topic.

Interview and other data stem from different points in time. However, the interviews as prime source were conducted at one point in time. One can argue that ETAs as SFM are dynamic phenomena with the need to analyze developments. The snapshot view can, thus, be myopic. Finally, we followed primarily a deductive procedure. However, we conducted semi-structured interviews allowing for searchers' narrations that were not influenced by the interviewer. Nevertheless, it is possible that the results of a purely inductive procedure may deviate from the findings of this study.

There are many options to build on the findings of this study. Future research may go for modelling the factors influencing SFM's adoption process. The different sub-categories inform future endeavours by providing constructs for modelling.

Future studies could have a closer look at why the identified factors hinder the model's application. Related to this, it could be of interest how SFM could be adapted to decrease or circumvent these hurdles. As already shown (*P6*), it could be interesting to look behind the causalities of the research propositions more comprehensively. This study was a first dive with results that range both on the descriptive and analytical level.

It would be useful for a better understanding of the SFM adoption processes to increase the analytical depth.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Modelling the interactions among enablers of technology entrepreneurship: An ISM and Fuzzy-MICMAC approach

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ABSTRACT

Objective: The objective of the article is to explore the enablers for technology entrepreneurship and model them into a contextual relationship through a qualitative approach. Moreover, the article presents a guiding framework for adopting technology startup by budding entrepreneurs through modelling the enablers.

Research Design & Methods: Factor analysis was applied to identify the significant factors, and Interpretive Structural Modelling (ISM) and Fuzzy-Matriced' Impacts Croises-Multiplication Applique' and Classment (MICMAC) were used to model the factors.

Findings: It was found that 'supportive government policies,' 'more funding options,' and 'intellectual property benefits' are the three significant driving factors. These factors impact 'personal interest' of entrepreneurs through linkage factors and 'attraction for financers' as enablers for adopting technology startup by entrepreneurs.

Implications & Recommendations: This research highlights government and policy initiatives' established role in harnessing innovation and technology growth in any ecosystem. It further propagates that the individual attitude of an entrepreneur towards accepting new ideas for startup based on technology makes a huge difference to the industry. The role of quality investors in promoting technology startup is highlighted.

Contribution & Value Added: This research suggests the roadmap for market players and policymakers to shape the policies and resources so that the budding entrepreneurs get sufficient support and motivation to pursue technology-based startup. The study is unique because it adopts ISM and fuzzy-MICMAC for modelling the factors into a meaningful contextual framework.

Article type:	research article
Keywords:	technology entrepreneurs; enablers; factor analysis; Interpretive Structural Modelling (ISM); Fuzzy-MICMAC
JEL codes:	L11, L26, M13

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INTRODUCTION

Entrepreneurs are the source hub of innovation for any economy, and while working towards their goals, they contribute to the nation's economic and social upliftment (Aljuwaiber, 2020). Within the field of entrepreneurship, an emerging field of technology entrepreneurship is making its mark. Technology entrepreneurship consists of two significant areas: technological innovation and entrepreneurship (Mollaei & Gelard, 2016; Sanjaya *et al*., 2015). Technology entrepreneurship is defined as setting up a new business by exploiting technological innovations (Willie *et al.*, 2011). This field reflects entrepreneurs' adaptive and innovative characteristics. Technology entrepreneurs utilize their technical knowledge to come up with naïve concept-based startup to exploit opportunities. Entrepreneurial initiatives concerning new technology contribute in a real sense towards achieving

substantive growth and renovation for any economy (Bailetti, 2012; Nazarov *et al.,* 2017). Technology entrepreneurs act as tangible assets for profit generation, employment creation, and innovation centers (Giacon, 2008). The technology ecosystem is developing gradually in India. At the same time, there is a paucity of research on the entrepreneurial ecosystem for emerging economies like India, which is much needed (Kumar & Das, 2019). People realize that a supportive ecosystem involving different agents, i.e., consumers, supply chains, government, and investors, is required for successful technological entrepreneurship (Baier *et al*., 2021). The ecology, system dynamics, and various internal and external factors impacting technology entrepreneurs are worth exploring to deeply understand the concept of technology entrepreneurship.

Therefore, the objective of the article is to explore the enablers for technology entrepreneurship and provide an insight into the internal and external forces shaping individuals into technology-based entrepreneurial activity. The article has two-fold objectives, *i.e.,* to identify the factors which enable the adoption of technology-based startup by entrepreneurs and to suggest a guiding framework for adopting technology startup based on the contextual relationships among the identified factors through ISM and fuzzy-MICAMC.

From the perspective of this study, the entrepreneurs who focus on adopting technology as a core in their startup (rather than just facilitators) are considered technology entrepreneurs. Several factors identified in the literature act as enablers for the entrepreneurs to pursue the technology-based startup. The relevant factors were identified from the literature and industry participants and verified by domain experts for their relevancy. The selected factors were modelled through interpretive structural modelling (ISM) and Fuzzy MICMAC techniques based on industry feedback and expert opinion. This research suggests a rational framework for policymakers and industry participants to promote technology startup in emerging economies and fetch its uniqueness in employing ISM and fuzzy-MICMAC for modelling the enabling factors for technology startup. Section 2 will present literature review, and section 3 will discuss the research methodology; section 4 will present results and provide a discussion, and section 5 will provide the conclusions.

LITERATURE REVIEW

The impact of entrepreneurial activities on any nation's economy differs across countries (Villegas-Mateos, 2020); the impact may depend on whether entrepreneurship is necessity-based or opportunity-based. Researchers have considered technology entrepreneurship in various ways, *i.e.*, an individual or group initiative towards the application of technology for managing a business (Allahyary & Meigounpoory, 2013); capturing the value of the business (Bailetti, 2012), or considering it just another way of being an entrepreneur (Giacon, 2008), or a solution in search of problems (Bailetti, 2012), and many more. Technology entrepreneurs's opportunity-seeking can lead to business sustainability (Asim *et al.,*2019). Technology entrepreneurship by observing consumer behaviour can foster sustainable product innovations (Bhardwaj, 2020). It can promote new products and markets to revamp the regional economy (Sung *et al.,*2015). Jafari *et al.*(2021) studied relationships (technology readiness factors and digital technology exploration factors) between digital transformation and entrepreneurship towards developing an ecosystem supporting the technological market expansion and technology-driven entrepreneurship. Giones and Alexander (2017) studied and highlighted digital technology entrepreneurship and technology entrepreneurship concepts. Yami *et al.* (2021) advocates that integrating social and human capital in academic technology centres supports innovation and technology entrepreneurship. Innovation is considered the central point for a technology startup. Glukhikh and Golovina (2021) identified four strategies for serial entrepreneurs to set up a technology business and advocated that mass strategies to promote technology entrepreneurs do not work well. As per Badzińska (2016), technology entrepreneurship is primarily impacted by an organisation's internal factors and the business ecosystem. Venkataraman (2004) advocates that tangible factors like govt influence technology entrepreneurship. Support, financial support, infrastructure, etc., and *intangible forces* like access to markets, role models, novel ideas, etc. Similarly, Maysami *et al.* (2019) studied the framework for technology entrepreneurship and proposed 12 dimensions and six criteria.

Literature highlights various factors as motivators or enablers for technology entrepreneurship. As per Allahyary and Meigounpoory (2013), technological features provide differentiation opportunities for an entrepreneur. This provides a competitive edge (Pathak *et al.*, 2013) as technology is required to sustain in today's market scenario (Chalmers *et al.*, 2020; Nazarov *et al.*, 2017). It further helps in fetching Intellectual property rights (IPRs) benefits, matching the customer demand, competing with competitors or fetching more market opportunities and keeping the business updated (Nazarov *et al.*, 2017). The motivation for starting a technology business comes with familiarity and good knowledge about the technologies (Giacon, 2008; Shane & Venkataraman, 2003), or from entrepreneur's prior experience in the domain (Nazarov *et al.*, 2017; Roberts, 1991). The personal interest of the entrepreneur in technology (Allahyary & Meigounpoory, 2013; Chatterjee et al., 2020) or their matching educational qualification (Giacon, 2008; Karyaningsih *et al.*, 2020; Nazarov *et al.*, 2017) can also be one of the motives. Sometimes, an entrepreneur adopts a technology startup, either because of family demands or the expansion of the family business (Roberts, 1991). Availability of funding options for a technology-based startup (Allahyary & Meigounpoory, 2013), support from government policies (Kamarudin & Sajilan, 2013; Kennett & Sun,2021), and financers' interest (Allahyary & Meigounpoory, 2013) also motivate entrepreneurs to pursue a technology-based startup. As per Nacu and Avasilcăi (2014), an entrepreneur's personal and professional traits and environmental factors impact technology entrepreneurship decisions.

Petti and Zhang (2011) state that technology entrepreneurship depends on internal and external factors and institutional factors like intellectual property right (IPR), government policies, social norms, and environmental factors.

The literature highlights the factors responsible for the growth of technology entrepreneurship and the challenges perceived by the stakeholders in different ways. However, a holistic study focusing on the contextual relationship between the responsible factors suggesting a meaningful framework for promoting technology entrepreneurship is missing. This research is an effort towards synergising the factors mentioned in the literature in a meaningful contextual mapping framework.

RESEARCH METHODOLOGY

This study explored the factors that motivate entrepreneurs for a technology startup in India and then modeled them through ISM and fuzzy-MICMAC approaches. The detailed methodology adopted for the same is discussed further:

1. **Identification of significant variables:** Literature was screened, and initially, a total of 21 variables were identified from the literature review (Table 1).
2. **Variable grouping into relevant factors:** Further, to identify the relevancy of variables in this research, primary data was collected from entrepreneurs/potential entrepreneurs in India through a structured questionnaire. The contact details of entrepreneurs were extracted from various internet sources. Both online and offline surveys were floated to a list of 96 entrepreneurs during July 2020. An appropriate response was received from 58 respondents, including different Indian cities, including Delhi, Sonipat, Pune, Surat, Baddi, Dehradun, Chennai, Bangalore, etc. The descriptive statistics of the respondents, including their age, years of experience, education levels, are depicted in Table 2. The respondent's profiling was done, and it was observed that respondents belonged to different designations either in their startup or their company. The responses reflected that only two respondent entrepreneurs out of 58 respondents use technology as a core of their business, which may be called a technology startup in the real sense, while others use technology as an enabler for their food startup. However, when asked about interest in starting a pure technology startup, mixed responses were received. The responses collected were analyzed statistically through SPSS software. The descriptive statistical analysis was done to identify the awareness level and extent of adoption of technology-based entrepreneurial activity. Factor Analysis was carried out to define the responsible factors towards technology-based entrepreneurial inclination among individuals. The KMO and Bartlett's

test values came as significant. Principal component analysis with varimax rotation was used to extract the factors. Accordingly, the rotated component matrix is shown in Table 1. A total of 20 variables (one insignificant variable) with factor loading higher than 0.5 were grouped into six major factors. Six factors explaining a total 73.705% variance are labelled and discussed in Table 3. Factor analysis was used to reduce and group the variables into significant factors, and accordingly, six significant factors were derived (Table 3).

3. **Factor Validation and Modelling**: Further, a focus group discussion was conducted with the domain experts to validate the identified factors. The discussion was organized at one of the author's workplaces in Delhi (India) via online mode on September 21, 2020. A total of five experts were invited to contribute to the discussion. Out of these five experts, three were entrepreneurs in the food sector, and the rest were from academia and research affiliated. The experts were chosen through a professional acquaintance and LinkedIn search. The experts were made aware of the need of the study and the identified factors were shared with them. The experts suggested four more factors in addition to the six factors identified by factor analysis and suggested dropping one factor, viz. family expectations. Therefore, a total of nine factors were identified (Table 4) based on this three-step approach, which was modelled through the interpretive structural modelling (ISM) approach (Agrawal *et al.*, 2017; Chaudhary & Sindhu, 2015; Hassannezhad *et al.*, 2020; He & Pan, 2019).

Table 1. Rotated component matrix

Significant variables	Component					
	1	2	3	4	5	6
To get differentiation opportunity	-0.002	0.605	0.099	0.314	0.062	0.351
Familiarity with the latest technology	0.181	0.128	0.350	0.728	0.090	-0.047
Good knowledge about technology	0.401	0.084	0.078	0.782	0.228	0.134
Wants to expand my family business	0.292	-0.045	-0.023	0.185	0.752	-0.255
I have prior experience	0.485	0.170	0.120	0.335	0.261	-0.488
Avail of adequate external resource for establish techno venture	0.599	0.121	0.101	0.430	0.219	-0.036
Funding Option	0.826	0.120	0.026	0.143	0.061	0.190
To get benefits from IPR	0.716	0.135	0.164	0.033	0.459	0.175
Technology startup get competitive advantage over other	0.735	0.278	0.134	0.115	0.155	-0.145
Seems more profitable	0.657	0.347	0.375	0.085	-0.230	0.054
To match customer demand	0.101	0.829	-0.012	0.176	0.032	-0.055
To compete with competitors	0.314	0.772	0.210	-0.242	0.039	0.114
More market opportunity at national and international level	0.164	0.870	0.084	-0.048	-0.013	-0.250
My family demands so	0.080	0.010	0.164	0.105	0.808	0.225
Supportive government policies	-0.053	-0.127	0.392	0.392	0.439	0.315
This is require to sustain in today's market scenario	0.269	0.688	0.078	0.190	-0.115	0.292
My education matches with technology	-0.115	0.088	0.642	0.362	0.200	-0.047
Personal interest	0.168	0.119	0.075	0.077	0.095	0.842
To keep the business updated	0.170	0.192	0.737	0.448	-0.148	0.099
To attract financers	0.291	0.075	0.812	-0.006	0.070	0.126
To gain advantage from government schemes	0.290	0.098	0.663	-0.022	0.490	-0.136

Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 10 iterations.
Source: own study.

Table 2. Descriptive demographic characteristics

Categories / Description		No. of Responses	Percentage
Age	>40	1	1.7
	20-30	55	94.8
	30-40	2	3.4
Education Level	12th	1	1.7
	Graduation	37	63.8
	Post-graduation other than MBA	8	13.8
	MBA	12	20.7
Professional status	Entrepreneur	33	56.8
	Managing family business	18	31.03
	Potential Entrepreneur	7	12.06
Scale of the Organization	Large scale	16	27.6
	Medium scale	16	27.6
	Small scale	26	44.8
Usage of latest technologies in the Company	Yes	32	55.2
	No	13	22.4
	Not sure	13	22.4
Number of respondents interested in starting a purely Technology-based startup	Yes	16	27.6
	Maybe	24	41.4
	No	16	27.6
	Already started	2	3.4

Source: own study.

Table 3. Factors identified through factor analysis

Sr. No.	Factors	Description
E1	More Funding Options	Entrepreneurs feel that there are much broader funding options available for Technology startup (Kamarudin & Sajilan, 2013; Nazarov *et al.*, 2017). External resources also exist for establishing a technology venture (Nazarov *et al.*, 2017).
E2	Better Market Opportunities	Entrepreneurs feel technology can help them gain differentiation opportunities (Allahyary & Meigounpoory, 2013). It has also been perceived that technology entrepreneurship can be a workable solution to sustain in ever-changing and highly competitive market structures (Nazarov *et al.*, 2017).
E3	Supportive government schemes	As technology entrepreneurship is an emerging field, various government schemes keep coming up in this area, and entrepreneurs want to gain an advantage from these upcoming govt. schemes (Kamarudin & Sajilan,2013; Nazarov *et al.*, 2017).
E4	Knowledge of Technology	Familiarity with the latest technologies makes entrepreneurs realize great potential and reason to initiate a technology-based startup (Giacon, 2008; Shane & Venkataraman, 2003).
E5	Family Expectations	Sometimes family culture and family members' demand make the entrepreneurs pursue technology entrepreneurship options or a desire to expand their family business (Giacon, 2008; Roberts, 1991).
E6	Personal Interest	The personal interest of the entrepreneurs towards technology entrepreneurship is also one of the major factors impacting the decision of entrepreneurs to go for technology-based options (Allahyary & Meigounpoory, 2013).

Source: own study.

Further, the ISM approach was adopted to model and establish the directional relationship between the identified nine enablers for technology entrepreneurship. The ISM is a qualitative technique with a set of defined steps (Hassannezhad *et al.*, 2020; He & Pan,2019; Maleki & Hajipour, 2020; Sage, 1977; Warfield, 1974). The complete ISM methodology is described in detail below in steps 1-4 (Tables 5-9).

Table 4. Factors identified through literature review, factor analysis and expert opinion

Sr. No.	Enablers
1	Competitive advantage
2	Knowledge and experience of technology
3	More funding options for technology entrepreneurs
4	Better market opportunities
5	Supportive government policies
6	Personal interest
7	Attraction for financers
8	IPR benefits
9	Technology adoption by competitors

Source: own elaboration of Agrawal *et al.* (2017), Chaudhary and Sindhu (2015), Hassannezhad *et al.* (2020), He and Pan (2019).

Step 1: Factor identification for the study:

As discussed in the previous section, a set of nine factors were identified from the literature review, primary data collection, and expert opinion.

Step 2: Formation of Structural self-interaction matrix (SSIM):

SSIM was framed (Table 5) by identifying the 'influence' type of contextual relationship amongst the factor by using the following rule (He & Pan, 2019; Warfield, 1974):

V = Factor i will influence factor j;
A = Factor j will influence factor i;
X = Factor i and j influence each other; and
O = Factors i and j are not related to each other.

Table 5. Structural self-interaction matrix (SSIM)

Factors	E9	E8	E7	E6	E5	E4	E3	E2	E1
E1	X	A	V	V	O	V	O	O	
E2	O	V	V	X	A	O	A		
E3	V	A	V	V	A	X			
E4	V	A	V	V	A				
E5	V	V	V	V					
E6	A	A	A						
E7	V	A							
E8	V								
E9									

Source: own study.

Step 3: Formation of Final Reachability Matrix (Transitivity):

The SSIM formed in step 2 above was converted into a binary matrix by putting 1 for every (i,j) entry of V, X in SSIM and 0 for every (j, i) entry of V, X in SSIM; and similarly 0 for every (i,j) entry of A, O in SSIM and 1 for every (j, i) entry of A, O in SSIM entry respectively was termed as Reachability Matrix (Agrawal *et al.*, 2017; Mani *et al.*, 2016). Further, transitivities were included in the initial reachability matrix by following the rule that if factor R was influencing factor S, and factor S was influencing factor T, then factor R should hace influenced factor T as well. Accordingly, the final reachability matrix with transitivities, driving power, and dependence of each factor was summarized in Table 6.

Step 4: Carrying out level partitioning for the factors

Levels were identified for all the factors by carrying out step-by-step partitioning of the reachability matrix. For this purpose, reachability set (having the factors themselves and the factors that influence it) and antecedent set (having factor itself and its influence) were generated for each factor, and the intersection set was generated. Wherever intersection and reachability sets became equal, the level

was given to that factor, which was removed from further calculations (Agrawal *et al.*, 2017). In this study, a total of five iterations were required to get levels to all the factors (Table 7).

Table 6. Final reachability matrix (transitivity)

Factors	E1	E2	E3	E4	E5	E6	E7	E8	E9	Driving Power
E1	1	1*	0	1	0	1	1	0	1	6
E2	1	1	1*	1*	0	1	1	1	1*	8
E3	1	1	1	1	0	1	1	1*	1	8
E4	1*	1*	0	1	0	1	1	1*	1	7
E5	1	1	1	1	1	1	1	1	1	9
E6	0	0	0	0	0	1	0	0	0	1
E7	0	1*	0	0	0	1	1	0	0	3
E8	1	1*	1	1	0	1	1	1	1	8
E9	1*	1	0	0	0	1	1*	1*	1	6
Dependence	7	8	4	6	1	9	8	6	7	

Note: *denotes transitivity.
Source: own study.

Table 7. Consolidated level of factors

Factors	Reachability Set	Antecedent Set	Intersection Set	Level
E1	1,2,4,6,7,9	1,2,3,4,5,8,9	1,2,4,9	**III**
E2	1,2,3,4,6,7,8,9	1,2,3,4,5,7,8,9	1,2,3,4,7,8,9	**II**
E3	1,2,3,4,6,7,8,9	2,3,5,8	2,3,8	**IV**
E4	1,2,4,6,7,8,9	1,2,3,4,5,8	1,2,4,8	**III**
E5	1,2,3,4,5,6,7,8,9	5	5	**V**
E6	6	1,2,3,4,5,6,7,8,9	6	**I**
E7	2,6,7,9	1,2,3,4,5,7,8,9	2,7,9	**II**
E8	1,2,3,4,6,7,8,9	2,3,4,5,8,9	2,3,4,8,9	**IV**
E9	1,2,6,7,8,9	1,2,3,4,5,7,8,9	1,2,7,8,9	**II**

Source: own study.

The diagonal entries of the reachability matrix were converted to zero to develop the binary relationship matrix (Table 8).

Table 8. Binary relationship matrix

i,j	E1	E2	E3	E4	E5	E6	E7	E8	E9	Driving Power
E1	0	0	0	1	0	1	1	0	1	4
E2	1	0	0	0	0	1	1	1	0	4
E3	1	1	0	1	0	1	1	0	1	6
E4	0	1	0	0	0	1	1	0	1	4
E5	1	1	1	1	0	1	1	1	1	8
E6	0	0	0	0	0	0	0	0	0	0
E7	0	0	0	0	0	1	0	0	0	1
E8	1	0	1	1	0	1	1	0	1	6
E9	0	1	0	0	0	1	0	0	0	2
Dependence	4	4	2	4	0	8	6	2	5	

Source: own study.

The Fuzzy-MICMAC was chosen instead of MICMAC considering the point that MICMAC analysis deems only binary relationships (*i.e.,* 0 and 1) between the factors while Fuzzy-MICMAC identifies the qualitative relationship between the factors on a scale of 0-1 (Kumar *et al.*, 2019; Mohanty, 2018) as depicted in Table 9 and further discussed in this section.

Table 9. Possible numerical value of factor interrelationships

Relationship Possibilities	No	Very low	Low	Medium	High	Very high	Complete
Value	0	0.1	0.3	0.5	0.7	0.9	1

Source: own study.

The below-mentioned procedure was adopted to develop the Fuzzy-MICMAC matrix. Two of the subject experts were contacted to give factor interrelationships as per their understanding, and an average score for responses from both the experts was noted in the form of a Fuzzy-MICMAC matrix. The Fuzzy-MICMAC matrix was then multiplied using the fuzzy matrix multiplication rule, as stated below as formula (i):

$$C = A, B = \max k\ [\min(a_{ik}, b_{kj})] \text{ where } A = [a_{ik}] \text{ and } B = [b_{kj}] \quad (1)$$

Accordingly, the final standardized Fuzzy-MICMAC matrix so obtained (including the values of driving power and dependence) is placed as Table 10.

Table 10. Final standardized fuzzy MICMAC matrix

i,j	E1	E2	E3	E4	E5	E6	E7	E8	E9	Driving Power
E1	0	0	0	1	0	0.9	0.9	1	1	4.8
E2	0.9	0	0.1	0.1	0	1	0.9	0.7	0	3.8
E3	0.7	0	0	1	0	1	1	0	0.9	4.6
E4	0.5	0.3	1	0	0.3	0.9	1	0.1	1	5.1
E5	0.9	0.5	1	1	0	1	1	0.7	1	7.1
E6	0	0.7	0	0	0	0	0	0	0	0.7
E7	0	0	0.5	0.3	0	1	0	0	0.9	2.7
E8	1	0	1	1	0	1	1	0	1	6.0
E9	0.9	0.5	0.5	0.7	0	1	0.7	0.7	0	5.0
Dependence	4.9	2.0	4.1	5.1	0.3	7.8	6.5	3.2	5.8	

Source: own study.

RESULTS AND DISCUSSION

Technology entrepreneurship has been finding grounds to develop in a growing economy like India for two reasons. Firstly, since the early 2000s, Indian IT Industry has been booming with the growth of the electronic and defense industry. Secondly, India has witnessed a great improvement in its research facilities and education policies. Today, India boasts of its highly skilled human resources in science and technology. The other major factors contributing to the growth of technology entrepreneurship in India relate to improved government policies and the emergence of multinational firms in India, especially technology (Meil *et al.,* 2017). The technology ecosystem is improving remarkably in India. The government is developing infrastructural and policy support for the technology entrepreneurs. India's science, technology and innovation policy are improving the national knowledge base, subsidising and research and development, promoting industry-academia collaborations, improving technology flow, fostering the ecosystem for intellectual property rights Tripathi and Brahma (2018). The upcoming schemes by the Government of India will greatly benefit technology entrepreneurs in terms of technology incubators. The department of science and technology (DST) provides the institutional framework for promoting technology-based firms. This role is extensively played by Science & Technology Entrepreneurship Development Board (NSTEDB), promoting science and technology entrepreneurs park and the technology business incubators. The Indian government is surfacing success in motivating young entrepreneurs towards technology-based startup, which leads to the social and sustainable growth of the economy (CIS-India report).

Fuzzy MICMAC Diagram

Following the procedure described in the methodology section, the fuzzy-MICMAC Diagram and the ISM model obtained are discussed in this section. The driving power and dependence of each factor were plotted on the X and Y axis, and the Fuzzy-MICMAC diagram so obtained is placed in Figure 1.

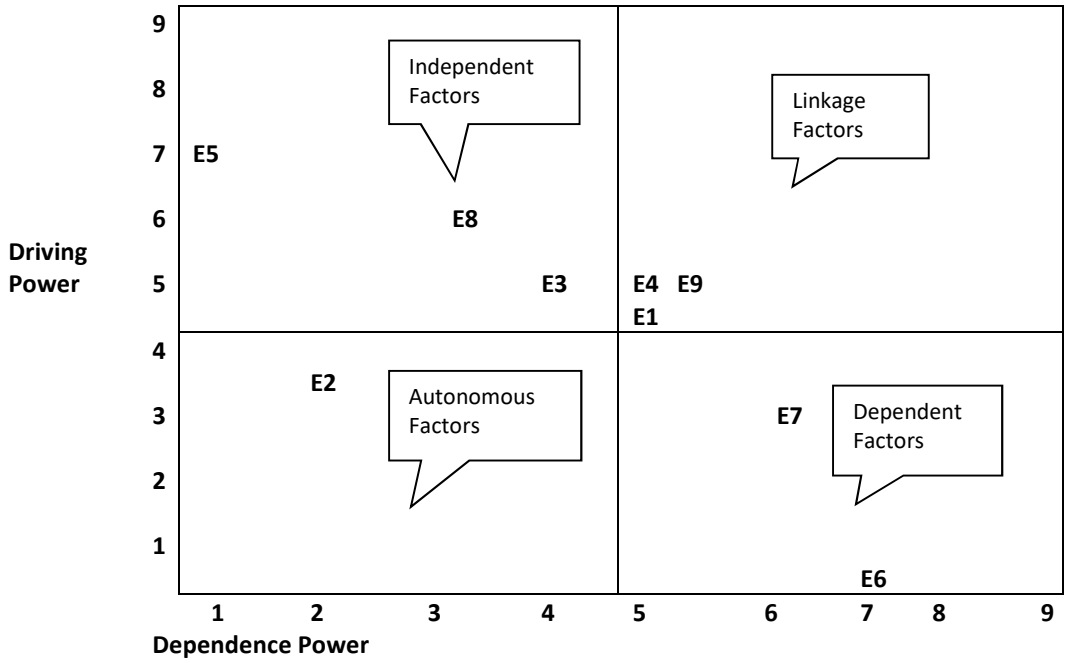

Figure 1. Fuzzy-MICMAC Analysis
Source: own elaboration.

The fuzzy-MICMAC diagram groups all the factors under study into four different clusters based on each factor's driving power and dependence. In this research, the factor viz. knowledge and experience of technology (E2) emerged in the first cluster, *i.e.*, 'autonomous factors' characterized by weak driving power and weak dependence. This factor usually remains disconnected from the system. Factors in the second cluster are 'dependent factors.' Factors in this cluster are characterized by very high dependence on other factors and weak driving power. Here, personal interest (E6) and attraction for financers (E7) emerged as dependent factors. These two factors depend on all other factors to successfully enable the adoption of technology entrepreneurship.

Factors in the third cluster are 'linkage factors' which are the most unstable, but they significantly impact other factors. Four factors emerged as linkage factors viz. competitive advantage (E1), better market opportunities (E4), and technology adoption by competitors (E9). Finally, the fourth cluster has the 'Independent factors,' which have strong driving power but weak dependence. Supportive government policies (E5) emerged as the most significant independent factor, followed by more funding options (E3), and IPR benefits (E8).

The ISM model is a diagrammatic reflection of interrelationships between the factors, as per the level identified for each factor (He & Pan, 2019). The model (Figure 2) reflects, Supportive Government Policies (E5) as the most significant driver, followed by More Funding Options (E3). These factors drive other factors to a great extent as enablers for technology entrepreneurship. If government policies favour entrepreneurs, they get more funding options and access to other resources. Getting timely and sufficient funding options drives entrepreneurs to take a technology-based startup initiative. These results are in line with previous studies, which advocate that the ecosystem for technology entrepreneurship needs to be developed and the policy framework needs to be strengthened (Sung *et al.*, 2015). The IPR benefits (E8) also emerged as the influencing force for other enablers. Entrepreneurs wish to protect their intellectual property from getting benefits from that. If government policies support IPR protections, entrepreneurs can reap the benefits. The study by (Maysami & Elyasi, 2020; Willie *et al.*, 2011) demonstrates the results in a similar way, in which the role of support facilities in the form of government, IPR, legal and financial support has highlighted the promotion of technology entrepreneurs.

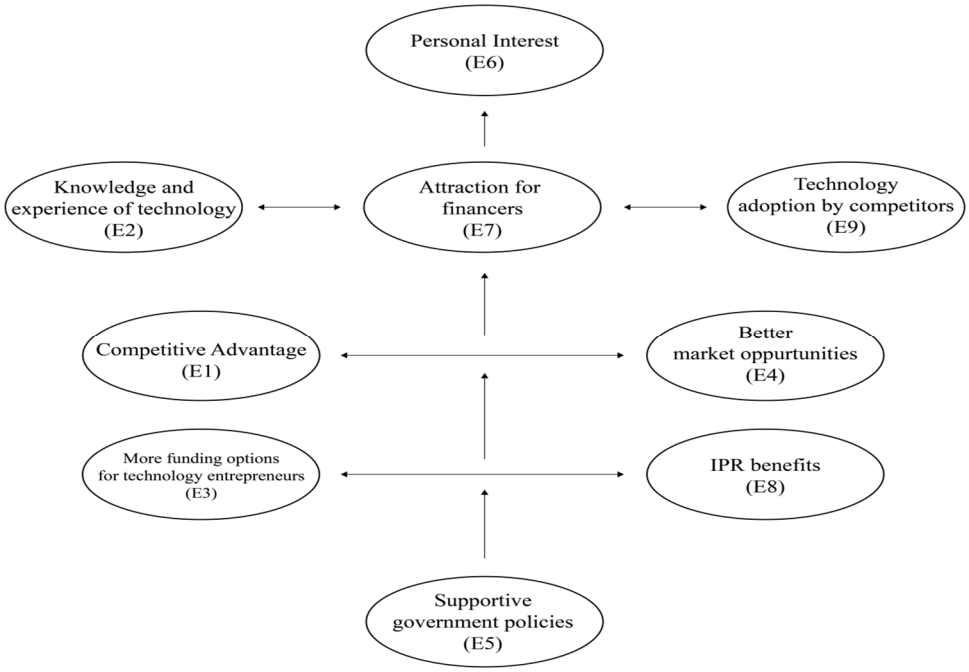

Figure 2. Diagraph of the ISM model development
Source: own elaboration.

In turn, the IPR benefits influence other factors like Competitive Advantage (E1). These days, many entrepreneurs wish to get associated with such businesses where they can get differentiation opportunities to stand ahead of their competitors. Gaining a competitive advantage through IPR protection helps an entrepreneur fetch Better Market Opportunities (E4). Entrepreneurs will adopt technology entrepreneurship only if they can see any scope for a better market or consumers. Furthermore, entrepreneurs get impacted by the moves and strategies of their competitors. If an entrepreneur finds Technology Adoption by Competitors (E9), then the entrepreneur also explores the option by choice or force. Similarly, Badzińska (2016) highlights that organizational factor and the external business environment impact the establishment of a technology entrepreneur.

Moreover, Knowledge and Expertise of Technology (E2) is one of the significant enablers for adopting technology entrepreneurship. Entrepreneurs may think about developing their skills or enhancing their knowledge about technical aspects if they get support from the driving forces like government support, funding opportunities, better market opportunities, competitive advantage, etc. Kankipati (2017) too suggested in their study that technology-related skills and knowledge are the base for a technology startup. These driving forces also become a reason for the technology startup's Attraction for Financers (E7). Financers find growth opportunities and promising financial models in such avenues. Eventually, all such enablers become a source of a significant driving force for entrepreneurs to develop Personal Interest (E6) for technology entrepreneurship. Therefore, an individual's interest is the most strategic factor deciding the success or failure of this model. Willie *et al.* (2011) also advocates similar outcomes. The authors proposed that a study in Nigeria projects that most entrepreneurs pursue technology-based startup either because of their interest or family motivation.

Practical Implications

This research significantly contributes to the industrial ecosystem for technology entrepreneurs. It highlights government and policy initiatives' established role in harnessing innovation and growth of technology in any ecosystem. One of the most significant contributing factors for the growth of technology entrepreneurship in India is improved government policies and the emergence of multinational firms in India, especially in technology (Meil & Salzman, 2017). The government of India is coming up with infra-

structural and policy support for the technology entrepreneurs. The DST provides an institutional framework for promoting technology-based firms. This role is extensively played by Science & Technology Entrepreneurship Development Board (NSTEDB) through the advancement of science and technology entrepreneurs park and the technology business incubators. The Indian government is surfacing success in motivating young entrepreneurs towards technology-based startup, leading to the social and sustainable growth of the economy (CIS-India report). Worldwide, companies take advantage of technology-enabled business models to impact value chains. The World Bank's framework proposed by Bessant *et al.* in 2000 (Rush *et al.*, 2007) advocates nine dimensions for evaluating companies' technological capabilities. The factors identified as enablers for technology entrepreneurship support the proposed framework. As depicted in Table 11, all the factors identified match with any one of the dimensions from the World Bank Framework, therefore justifying the need for enabling factors for the industrial ecosystem.

Table 11. Congruence between enabling factors and World Bank's framework

Sr. No.	Factor(s) identified	Matching dimension as per World Bank Framework
1	Competitive advantage	Core Competency
2	Knowledge and experience of technology	Awareness
3	More funding options	Search
4	Better market opportunities	Search
5	Supportive government policies	Linkages
6	Personal interest	Learning
7	Attraction for financers	Linkage
8	IPR benefits	Strategy
9	Technology adoption by competitors	Technology Paradigm

Source: own study.

This research further propagates that the individual attitude of an entrepreneur towards accepting new ideas for startup based on technology makes a huge difference to the complete industry, and that is where the role of small businesses is significant enough to mark the difference. Similarly, IPRs play a major role in developing a sustainable advantage for small technology-based startup (Preston, 2001). Indian science, technology, and innovation policy is working towards improving the national knowledge base, subsidizing and research and development, promoting industry-academia collaborations, improving technology flow, fostering the ecosystem for intellectual property rights (Tripathi & Brahma, 2018). The upcoming schemes greatly benefit technology Entrepreneurs for technology incubators by the Government of India. Moreover, the research highlights the role of quality investors in promoting technology startup. There is a need to rapidly get high-quality products to support technology adoption in small startup (Preston, 2001).

CONCLUSIONS

The growth of technology startup in an economy reflects development. Being a developing economy, India needs the support of budding entrepreneurs to make the country tech-savvy. Although many entrepreneurs show a strong inclination towards a technological startup, very few have a purely technology-based startup, with technology as the core. The most important drivers for adopting technology entrepreneurship are supportive government policies, which lead to better funding options for the entrepreneurs and support in getting IPR benefits. The strong drives, in turn, influence other underlying and related enablers like getting a competitive advantage for their business and having better market opportunities. Additionally, entrepreneurs realize the need for updated knowledge and skills related to technology. An increase in the push from the market forces and knowledge of the technology increases the probability of interest in opening the technological startup to the maximum extent. The strategies and technologies adopted by competitors also impact any entrepreneur's decision and financers' decision to support the technology entrepreneurs. Eventually, all such drivers influence the personal interest of an entrepreneur to get inclined towards technology entrepreneurship.

The article indicates the roadmap for market players and policymakers to shape the policies and resources in such a manner so that the budding entrepreneurs get sufficient support and motivation to go for purely technology-based startup. Hence, there is a need to emphasize the development of required market infrastructure and disseminate new knowledge and technology to establish and expand technology-based startup.

The key limitations include the amount of primary data, maybe because very few entrepreneurs consider technology as a core for their startup and mostly use technology as an enabler for their business. Future studies may focus on establishing a framework for the technology entrepreneur's ecosystem, the growth potential of a technology-based startup in developing Vs. developed nations, the digital divide of resource and knowledge availability for a small startup. Finally, future studies may consider qualitative tools for analysis.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Internal market knowledge sharing in medium-high-tech manufacturing company

Marcin Soniewicki

ABSTRACT

Objective: The goal of this study is to verify new research model among medium-high-tech manufacturing companies. First of all, the model assumes the influence of both the market knowledge base itself, and the efficiency of internal market knowledge sharing on the competitiveness of analysed entities. Second of all, it analyses the impact of market knowledge perception within business entities and the openness of technical staff on internal market knowledge sharing efficiency.

Research Design & Methods: The survey consisted of five latent variables (constructs). The research was conducted by telephone among managers of medium-high-tech manufacturing companies in Poland. The sample consisted of 130 firms. The data was analysed using the PLS-SEM technique.

Findings: The research findings proved that both, market knowledge and market knowledge sharing efficiency, had a strong and significant influence on the competitiveness of medium-high-tech manufacturing companies. The results also showed that market knowledge perception and openness of technical staff had statistically significant influence on knowledge sharing efficiency in such companies.

Implications & Recommendations: Above all, the study implies that it is not the possession of market knowledge alone, but also importance of sharing this kind of knowledge internally. The article suggests factors that are important for market knowledge sharing, e.g. through properly trained and competent knowledge brokers that enable the examined businesses to gain a competitive edge. The efficiency of market knowledge sharing may be strengthened by putting more attention to market knowledge perception in the company and openness of technical staff.

Contribution & Value Added: This study adds to the research on sharing a specific type of knowledge, i.e. market knowledge, within business enterprises and influence of this process on companies' competitiveness. Various factors important for efficient internal sharing of market knowledge have been proposed in the subject literature, however they have not been verified by quantitative research so far. Moreover, the study focuses on the oft-overlooked type of business entities, i.e. medium-high-tech manufacturing companies.

Article type: research article

Keywords: knowledge; market knowledge; knowledge transfer; competitiveness; manufacturing

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INTRODUCTION

The notion of market knowledge and its direct influence on the competitiveness or the different processes tied to this factor, *e.g.* product innovation and product success, have been analysed in the subject literature, among others by Cillo (2005), De Luca and Atuahene-Gima (2007), Johnson, Piccolotto and Filippini (2009), Lin, Che, and Ting (2012). As a result, market knowledge is perceived as an important factor that directly or indirectly influences the competitiveness of a business.

However, each type of knowledge base must be adequately managed. One of the crucial and most challenging knowledge management factors is knowledge transfer, in particular knowledge sharing

among company employees (Riege, 2005; Du Plessis, 2007; Lee and Ahn, 2007; Smith, McKeen and Singh, 2010; Distanont *et al.*, 2012; Razmerita, Kirchner & Nielsen, 2016). The importance of knowledge sharing is tied to the fact that even if a business is in possession of a specific type of knowledge, the said knowledge must be relayed to a proper division to be properly used by that business and generate advantages to it such as increased innovativeness (Alavi & Leidner, 2001; Tsai, 2001; Oyemomi *et al.*, 2016; Saide *et al.*, 2019). Hence, knowledge sharing is vital for the success and efficiency of modern-day enterprises (Kane, Argote & Levine, 2005; Liao & Hu, 2007; Foss, Husted & Michailova, 2010; Rutten, Blaas-Franken & Martin, 2016).

The primary reason behind the research conducted as part of this study is the fact that market knowledge sharing has not been examined in detail in the subject literature. The most important issue is the fact that the great majority of articles analysing knowledge sharing in companies do not concentrate on a specific knowledge type (e.g. Razmerita, Kirchner & Nielsen, 2016; Farooq, 2018). Narrowing analysis to specific type of knowledge enables better understanding of the processes of sharing the discussed resource and their impact on the company's results. What is more, this study focuses on the specific type of enterprises, i.e. medium high-tech manufacturing entities, as specified in the typology proposed by Galindo-Rueda and Verger (2016). Narrowing the analysed businesses to this sector enables the research findings to be more specific. In the literature, we may find number of articles concentrating on high tech companies in terms of many aspects of their operation (e.g. Xia & Liu, 2017; Braja & Gemzik-Salwach, 2019; 2020). Authors also often analyse high- and medium-high-tech companies together (see e.g. Villamizar, Cobo & Rocha, 2017; Hu, Wang & Zhang, 2020). However, the analyses of medium-high-tech companies are rather rare. They represent industries that are very important for economies of many countries. The typical example might be motor vehicles manufacturers that are crucial element of German economy. What is more, in China, medium-high-tech companies are considered crucial for the country's competitive advantage in export (Lei & Zongsen, 2017). The goal of this study is to verify new research model among medium-high-tech manufacturing companies. Firstly, the model assumed the influence of both the market knowledge base itself, and the efficiency of internal market knowledge sharing on the competitiveness of analysed entities. Secondly, it analysed the impact of market knowledge perception within business entities and the openness of technical staff on internal market knowledge sharing efficiency.

This article is comprised of the following sections. The first section will focus on the theoretical background. The section includes a typology of medium high-technology manufacturing businesses, along with the main factors that make up the research model: market knowledge, market knowledge sharing, market knowledge perception, openness of technical staff. This is followed by the presentation of a research model comprised of the five aforementioned latent variables (LVs) or constructs. The subsequent section will delineate the methodology of quantitative empirical analysis. This is followed by the key section of the study, which details the obtained research results. The study will end with three sections devoted to the discussion, practical implications, limitations, and future research on the subject.

LITERATURE REVIEW

Medium-high-technology manufacturing companies

Hatzichronoglou (1997) is the author of the division of enterprises into four groups: low, medium-low, medium-high, and high technology. It is based on the share of research and development (R&D) expenses in the added value, and on the purchases of technologies characteristic of a given sector. Hatzichronoglou's concept focuses solely on manufacturing companies. Nineteen years later, the classification was updated by Galindo-Rueda and Verger (2016). Galindo-Rueda and Verger update focuses on the share of R&D in GVA. Moreover, it specifies five, rather than four, categories of businesses – low, medium-low, medium, medium-high, and high R&D intensity. The new classification is not limited to manufacturing businesses, but also includes non-manufacturing entities. As a result, there are minor changes as to the range of the respective manufacturing sectors in the specific categories when compared with the previous classification. In the subject literature, the Galindo-Rueda and Verger classification (2016) is often applied alongside the notion of the 'technological' level of businesses, see e.g.

Lampón and González-Benito (2019), Srhoj, Škrinjarić and Radas (2021), Carrillo-Carrillo and Alcalde-Heras (2020) or Culot *et al.* (2020). As the authors of the classification stress in their publication, the sectoral division is based solely on the level of R&D expenditure. However, the said division does not include such factors as technology purchases.

The scope of this study is limited to medium-high-tech manufacturing sector. It is an important part of economies of many countries. The largest industries (or subsectors) in the European Union by value added are manufacturing of machinery and equipment as well as motor vehicles and trailers (Eurostat, 2018). Medium-high-tech sector is also considered to be a critical area by China when it comes to its competitiveness in export (Lei & Zongsen, 2017). It must be underlined that this field has been understudied, as authors often concentrate on high tech companies (*e.g.* Xia & Liu, 2017; Braja & Gemzik-Salwach, 2019, 2020) or analyse high- and medium-high-tech industries together (see *e.g.* Ambrammal & Sharma, 2014; Sandu & Ciocanel, 2014; Villamizar, Cobo & Rocha, 2017; Hu, Wang & Zhang, 2020). Still, these clusters can differ in certain aspects, as evidenced by the considerable differences in R&D expenditure between these two groups – see Galindo-Rueda and Verger (2016, p. 10). One factor that ensures the competitiveness of manufacturing high tech industries is R&D. In medium-high-tech entities, the share of R&D expenditure is much lower, forcing these businesses to engage in other areas of market competition. One of these areas can involve effective market knowledge operations. The pharmaceutical sector (high tech) can serve as a case in point – its most burning need is no secret and involves the need development of an effective Covid-19 vaccine. For pharmaceutical companies, technical knowledge remains key, while market knowledge plays a far less significant role. For motor vehicles companies (medium-high tech) to produce a competitive car, they must not only possess advanced technological knowledge but also extensive market knowledge with regard to customer needs and preferences, which change over time, too.

Market knowledge

Market knowledge is often defined in the subject literature in line with Narver and Slater (1990), *i.e.* as the company's knowledge of its customers and competitors, *e.g.* by Li and Calantone (1998) or De Luca and Atuahene-Gima (2007). Nevertheless, it can be argued that the above definition needs to be extended by including the company's knowledge of market trends and economic phenomena significant for the company. It seems so because, according to Vicari and Cillo (2006), too much concentration on current customers and competitors may lead to the replication of old frameworks and lead to the loss of the company's competitiveness. Moreover, according to Schlegelmilch and Penz (2002, p. 5) 'the difference between competitive success and failure often only hinges on an early recognition of market trends.'

Market knowledge is important for companies because it is difficult to emulate it quickly, and because it is continuously updated, in particular in the high-tech sectors. This is why market knowledge-based products cannot be copied in short time frames. On the other hand, technologies can be copied by competitors through reverse engineering process (Slater, Olson, & Sørensen, 2012). Even if one disregards the difficulty of market knowledge imitation, it nonetheless is another entry barrier for competitors.

Market knowledge is also important with regard to the companies' innovation processes. In order to generate innovations, companies need to constantly acquire market knowledge (Schlegelmilch & Penz, 2002). Otherwise, entities with inferior market knowledge may take longer to identify new market opportunities than their competitors (Lichtenthaler, 2008). Let us look into this issue in more detail. Sorescu, Chandy, & Prabhu (2003) distinguished three types of innovation: technological breakthroughs, market breakthroughs and radical innovations; their division has been used by many other authors, *e.g.* Jin, Shu, and Zhou (2019), Osta and Maamari (2020), and Zhou, Yim, and Tse (2005).

Technological innovation (or technological breakthroughs) is often perceived as a major factor in the success of specific products or companies (Kock *et al.*, 2011). However, the research conducted by the aforementioned authors shows that technological innovation can affect the commercial success of

a product both positively and negatively (Kock *et al.*, 2011). This shows that a reliance on market innovation might be more conducive to the product and company competitiveness, which effectively overlaps with the main goal of every company.

Market knowledge sharing

Knowledge is a strategic resource for contemporary companies, but its management poses a number of challenges (Dasgupta & Gupta, 2009). Knowledge sharing processes pose a particular difficulty (Hendriks, 1999). This resource is not distributed evenly among people, industries or employees of organizations, however, knowledge of some individuals or groups can help solve the problems of others (Hargadon and Sutton, 1997). Hence, apart from creating market knowledge resources, companies must implement effective processes of their dissemination. Slater, Olson and Sørensen (2012) underline that market knowledge may contribute to company competitiveness in as much as it can be shared among company employees who in turn can use it in their work. According to Day (1991, p. 21), 'market knowledge is not fully captured in a usable form until the lessons and insights are transferred beyond those who gained the experience.' Unfortunately, knowledge sharing between employees is often impeded, as people are naturally predisposed to think that being knowledgeable increases their uniqueness, prestige, and power (Hendriks, 1999; Gray, 2001; Husted & Michailova, 2002; Lee & Al-Hawamdeh, 2002; Slater, Olson & Sørensen, 2012; Akhavan *et al.*, 2015). However, it should be stressed that at times effective knowledge sharing is not a matter of employees' intentions, but rather their capacities, since the root cause of the problem may *e.g.* be linked to infrastructure deficits (Lesser & Prusak, 2004).

Effective knowledge sharing lies at the root of many large companies such as Xerox (Liebowitz & Yan, 2004). Similarly, one of the critical elements of a famous manufacturing concept – just-in-time – are the rules by which market knowledge is first gathered and subsequently communicated. These rules enable the companies that introduce them to be agile and flexible (Zander & Kogut, 1995). By far, the most difficult among them is the transfer of the most complex, tacit knowledge. One of the solutions which may increase the efficiency of this process in a company involves creating specific positions, *i.e.* internal knowledge brokers. Such internal knowledge brokers are persons whose task is to manipulate and facilitate the delivery of market knowledge to the right people or groups. Knowledge brokers may deliver the necessary knowledge to the right places and strengthen the understanding between market experts and technology experts (Kramer & Cole, 2003; Cillo, 2005; Lichtenthaler & Lichtenthaler, 2010).

Market knowledge perception

Internal market knowledge perception among employees can significantly influence their actions with respect to this resource. Such a state of affairs has caused a number of authors such as Li and Calantone (1998), Hoe (2008), and Hoe and Shane (2010) to conduct research on this very problem. Research results demonstrate that the management's approach to market knowledge sharing or, by extension, to market-related issues, is absolutely vital (Jaworski & Kohli, 1993; Li & Calantone, 1998). According to Li and Calantone (1998), without recognizing and understanding the value of market knowledge by the management, the company is unlikely to undertake actions that result in the production of market knowledge. Hoe (2008) argues that the management should clearly articulate the crucial value of market knowledge to their enterprise, while also communicating their expectations towards the employees in this regard. Moreover, Hoe stresses that market knowledge perception matters because it shapes behaviours, among others with reference to market knowledge activities. This is corroborated by Li and Calantone (1998), whose research indicates that the more the top-level management appreciated market knowledge, the more their company intensified its processes with regard to customer and competition knowledge.

Openness of technical staff

In the analysis of market knowledge sharing, the study also concentrated on technical staff. These are all company's employees in technical positions such as R&D personnel that constitutes the spine of every medium-high-tech company. Such people often lack soft skills. The term 'soft skills' is most often used to

denote communicative skills, teamwork abilities, kindness, and other interpersonal skills. These skills are usually complementary to hard skills, which refer to the ability to perform specific tasks (Cimatti, 2016). Pierce and Steele (2016) contend that businesses can benefit from investing in soft skills. What's more, Shallock *et al.* (2018) argue that in an era of industry 4.0, the development of human resources is even more important than technology itself. Unfortunately, research demonstrates that soft skills are frequently overlooked in academic courses (Ghislieri, 2017). When looking for employees (including at technical positions), many modern-day employers focus on soft skills. According to Wheelahan and Moodie (2011), soft skills gain significance once the basic (*e.g.* technical) requirements are satisfied. Moreover, due to the fact that in a number of cases employers can choose between many candidates of equal technical ability, their decisions often lean on soft skills. What is more, some positions do not require any official qualifications aside from the indispensable soft skills (Lauder, Brown & Ashton, 2008). Unfortunately, the labour market often lacks in candidates with adequate soft skills. For instance, American employers have repeatedly signalled the need for the inclusion of soft skills courses, such as communication and problem solving, in university curricula (Javdekar *et al.*, 2016).

Purpose of the study and hypotheses development

The purpose of this study was to provide a model comprised of a range of factors related to market knowledge and the ways in which it is shared internally and examine how they impact the competitiveness of medium-high-technology manufacturers. Figure 1 shows the research model, which includes five latent variables: CO – competitiveness; MK – market knowledge; MKS – market knowledge sharing; MKP – market knowledge perception (in a company); OTS – openness of technical staff.

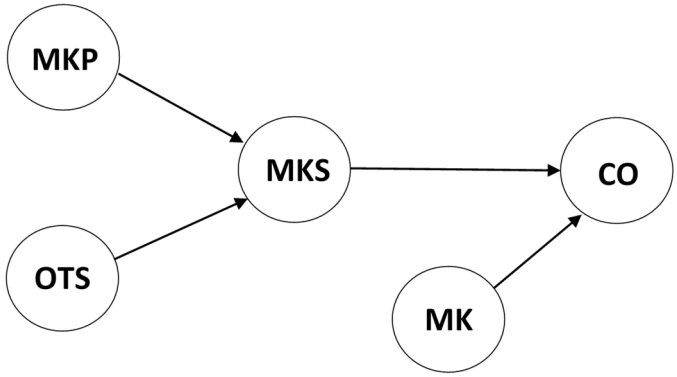

Figure 1. The research model
Source: own elaboration.

Li and Calantone (1998) corroborate that market knowledge perception among the company management, and its resulting perception among the employees influence the market knowledge competence at the company. On another note, Szulanski (1996) identifies the 'recipient's lack of absorptive capacity' as one of the chief problems in knowledge transfers. One may, therefore, expect that if a given company considers market knowledge as insignificant, market knowledge will not be appropriately shared or adequately absorbed, in particular by technical staff, which in turn shall render its transfer ineffective. Thus, it can be surmised that:

H1: Market knowledge perception within a business influences the effectiveness with which it is shared in medium-high-technology manufacturing companies.

In the USA, many managers bemoan the shortage of communication skills among their technical employees (Javdekar *et al.*, 2016). Such an approach among employers stems from the fact that, for a technical enterprise to be successful, it must think beyond a team of well-educated engineers. Nowadays, successful companies rely on a positive atmosphere and efficient teams that are capable of working together across departmental divides. The results generated by businesses rely primarily on the ability to act as a unit, which entails the human factor and the adequate use of soft skills (Cimatti, 2016). Therefore, it may be surmised that:

H2: The openness of technical staff translates into a greater efficiency of market knowledge sharing in medium-high-technology manufacturing businesses.

According to Slater, Olson, and Sørensen (2012) effective knowledge management needs taking good ideas originating from various functions and applying them in other areas of an enterprise. The importance of effective knowledge management, including the quick and efficient internal transfers of knowledge, is vital *e.g.* due to the ever-shorter life cycle of market products (Tseng, 2009). Knowledge transfers are particularly problematic at the cross-section of marketing and technology. As per Szulanski (1996), one of the most common problems in internal transfers of knowledge is that of the 'arduous relationship between the source and the recipient' (p. 27). Employees in the marketing and R&D departments operate in different environments and have different educational backgrounds and priorities. As a result, a proper organization of knowledge transfers across different departments is indispensable. By hiring a knowledge broker (as defined *e.g.* by Cillo, 2005), the company may facilitate the transfer of market knowledge to technical staff, thus effectively improving the company's competitiveness. Thus, it can be surmised that:

H3: The efficiency of market knowledge sharing in medium-high-technology manufacturing businesses has an influence on their competitiveness.

Slater, Olson, and Sørensen (2012) argue that market knowledge, in particular in high-tech markets which are particularly dynamic, is difficult to copy in short spans of time, as its durability is very short. What is more, the impact of market knowledge on performance or competitiveness of businesses, and on the factors that determine these aspects, has been well researched for different types of businesses (see Leskiewicz Sandvik & Sandvik, 2003; Hou & Chien, 2010; Lin, Che & Ting, 2012; Jin & Jung, 2016; Rakthin, Calantone & Wang, 2016; O'Connor & Kelly, 2017; Jin, Shu & Zhou, 2019; Scandura, 2019), however this impact has not yet been examined for medium-high-technology manufacturing companies. The results of the aforementioned studies, along with the high competitiveness of the markets in which the examined entities operate, seem to suggest that the results of analyses presented in this study will be similar to the aforementioned sources. Therefore, it may be surmised that:

H4: Market knowledge of a medium-high-technology manufacturing business has an impact on its competitiveness.

RESEARCH METHODOLOGY

Survey instrument

I delevoped the instrument based on the literature (Deshpande, Farley & Webster, 1993; Hooley *et al.*, 2000; Fonfara, 2009; Paliszkiewicz & Koohang, 2013) and qualitative research in which in-depth interviews were conducted across 16 companies. The qualitative study and instrument development constituted a part of wider research project concerning both medium-high and high tech firms. The sample was diversified in order to understand functioning both types of enterprises, among medium-high-tech manufacturing companies industries such as electrical equipment, medical and dental equipment or machinery and equipment n.e.c. were represented. Based on the research model, five constructs were created:

Market Knowledge Perception (MKP):

1. The company believes that creating a well-selling product requires a team with high level of technical and market knowledge.
2. The company perceives the employees responsible for marketing and the market as equally important to the technical employees.

Openness of Technical Staff (OTS):

1. The company's technical employees are open and willing to share knowledge within the company.
2. The company's technical employees are willing to accept comments/suggestions from customers or employees with market knowledge.
3. The employees working in technical areas are required to go outside their comfort zone and enter into a dialogue with people with market knowledge.

Market Knowledge Sharing (MKS):

1. When working on a product or service, the company usually delegates a person who constantly supervises the delivery of customer knowledge or market knowledge to technical employees, e.g. product owner, product manager or product director.
2. The competences of the person who coordinates the cooperation with clients or acquires market information are of key importance for the success of a given product or service.
3. In the company, the communication between people responsible for the technical development of products and services and the people responsible for marketing, the market, and customers is very intensive.

Market Knowledge (MK):

1. Our commitment to serving customer needs is closely monitored.
2. Salespeople share information about the company's competitors.
3. We devote significant resources to active market monitoring in order to search for trends and economic phenomena deemed important for the company.

Competitiveness (CO):

1. The company's speed of development compared to its closest competitors (in 2019).
2. The company's value of sales compared to closest competitors (in 2019).
3. The company's market share compared to closest competitors (in 2019).

The answers were provided on a 5-point Likert scale, using the following values: 1 – I completely disagree; 2 – I disagree; 3 – I neither disagree nor agree; 4 – I agree; 5 – I completely agree. Due to the fact that the competitiveness of the analysed companies was measured in comparison to their closest competitors, the descriptions of individual values were verbalized as follows: 1 – much lower; 2 – lower; 3 – comparable; 4 – higher; 5 – much higher.

Subjects and procedure

The anonymous, quantitative survey was conducted by the marketing company Indicator in April and May 2020 using the method of computer-assisted telephone interviewing (CATI). The Bisnode database served as the sampling frame. The entire survey focused on manufacturing and non-manufacturing companies operating in high and medium-high R&D intensity industries, according to Galindo-Rueda and Verger's (2016) classification. However, this study concentrated on companies from the medium-high-technology (or R&D intensity) manufacturing industries only. In the study, low-, mid-, and high-level managers were questioned. Nevertheless, this article concentrates on mid-level management. Such a choice is dictated by the fact that this group is considered by many as the best-informed personnel in companies (Floyd & Wooldridge, 1997). The final step involved an analysis of data from a total of 130 enterprises. The detailed industry division of the surveyed enterprises is presented in Table 1, the distribution of companies in the sample by the number of employees is presented in Table 2, and ownership structure of companies in the analysed sample is presented in Table 3.

Table 1. Distribution of companies in the sample by industry

Companies' industry	Number of companies in the sample	Share in the sample
Weapons and ammunition	2	1.5%
Motor vehicles, trailers and semi-trailers	16	12.3%
Medical and dental instruments	10	7.7%
Machinery and equipment n.e.c.	37	28.5%
Chemicals and chemical products	33	25.4%
Electrical equipment	14	10.8%
Railroad, military vehicles and transport n.e.c.	18	13.8%
Total:	130	100.0%

Source: own study.

Table 2. Distribution of companies in the sample by the number of employees

Number of employees	Number of companies in the sample	Share in the sample
1-9	21	16.2%
10-49	34	26.2%
50-249	30	23.1%
250 or more	45	34.6%
Total:	130	100.0%

Source: own study.

Table 3. Ownership structure of companies in the analysed sample

Dominant share in business ownership	Number of companies in the sample	Share in the sample
Polish private	88	67.7%
Property of the Polish State Treasury	4	3.1%
Foreign	38	29.2%
Total:	130	100.0%

Source: own study.

Data analysis

The data has been analysed with the use of PLS-SEM – partial least squares (PLS) path modelling, a variance-based structural equation modelling (SEM) with use of SmartPLS 3 software (Ringle, Wende & Becker, 2015). This method requires that several analyses be conducted before the testing of the actual hypotheses. The first analysis seeks to establish convergence validity, the second helps determine discriminant validity, while the last identifies the model goodness of fit (Hulland, 1999).

In order to establish convergence validity, several conditions must be met. The loadings of each indicator should be greater than 0.70. Nevertheless, values above 0.60 are also acceptable in the subject literature (*e.g.* Birkinshaw, Morrison & Hulland, 1995; Chin, 1998; Moores & Chang, 2006). The average variance extracted (AVE) should be greater than 0.50 for each latent variable (Fornell & Larcker, 1981). Composite reliability (CR) should be higher than 0.70 for each latent variable (Hair, Ringle & Sarstedt, 2013).

To establish discriminant validity, one needs to compare the AVE of every construct with the shared variance of the constructs. If the AVEs of every construct are greater than the shared variance of the other constructs, discriminant validity is confirmed (Fornell & Larcker, 1981).

Another issue that needs to be verified involves the R^2 values of the dependent variables. These determine the predictability of the model (Koohang, Paliszkiewicz & Goluchowski, 2017). According to Falk and Miller (1992) the values of R^2 need to amount to at least 10% in order to be considered meaningful.

The hypotheses may be tested once the aforementioned steps are successfully completed. Their acceptance or rejection is determined by the t-statistic. For the significance level of 5%, the critical value of t = ±1.96 (Hair, Ringle & Sarstedt, 2011; Koohang, Paliszkiewicz & Goluchowski, 2017).

RESULTS AND DISCUSSION

Establishing convergence validity

In order to establish convergence validity, the results of each latent value were checked, *i.e.* the indicators' loadings, the AVE, and composite reliability – see Table 4. The loadings of all indicators should be greater than 0.7. Almost all of them were, save for one of them, which value amounted to 0.685. Nevertheless, such exceptions – if minor and approximate to the appropriate values – are acceptable (Birkinshaw, Morrison & Hulland, 1995; Chin, 1998; Moores & Chang, 2006). Another issue involves the fact that all AVE values should be greater than 0.50 and all rho_A values need to be greater than 0.70. As we can see in Table 3, these two conditions were met. Similarly, the composite reliability index should be greater than 0.70 – a condition that was likewise fulfilled.

Table 4. Research model reliability and validity

Variables	*Loadings*	*AVE*	*rho_A*	*Composite Reliability*	*Cronbach's alpha*
MKP (Market Knowledge Perception)	–	0.835	0.854	0.910	0.806
Creating a product requires market knowledge (MKP-1)	0.888	–	–	–	–
Market employees perceived as important (MKP-2)	0.939	–	–	–	–
OTS (Openness of Technical Staff)	–	0.702	0.793	0.874	0.778
Technical employees share their knowledge (OTS-1)	0.914	–	–	–	–
Members of technical staff accept comments/suggestions from customers or fellow employees (OTS-2)	0.896	–	–	–	–
Technical employees are required to go outside their comfort zone (OTS-3)	0.685	–	–	–	–
MKS (Market Knowledge Sharing)	–	0.800	0.879	0.923	0.875
Market knowledge broker position present in the company (MKS-1)	0.917	–	–	–	–
Competences of market knowledge broker (MKS-2)	0.915	–	–	–	–
Intensive communication between technical and market employees (MKS-3)	0.849	–	–	–	–
MK (Market Knowledge)	–	0.634	0.707	0.838	0.709
Commitment to customer satisfaction (MK-1)	0.866	–	–		–
Information about competitors (MK-2)	0.763	–	–	–	–
Significant resources allocated to active market monitoring (MK-3)	0.755	–	–	–	–
CO (Competitiveness)	–	0.830	0.903	0.936	0.898
Speed of development (CO-1)	0.872	–	–	–	–
Value of sales (CO-2)	0.923	–	–	–	–
Market share (CO-3)	0.937	–	–	–	–

Source: own study.

Establishing discriminant validity

To establish discriminant validity, first the Fornell-Larcker Criterion was used – see Table 5. As we can see, the square roots of the AVE values (in bold) in the diagonal are greater than the correlations between the latent variables. Table 6 presents the cross loadings. It is evident that the correlation of every indicator was at its highest in the case of the latent variable to which it has been assigned. We may conclude that a sufficient discriminant validity for the research model was established.

Table 5. Discriminant Validity – Fornell-Larcker Criterion

Construct	MKS	CO	MK	MKP	OTS
MKS	**0.8945**	–	–	–	–
CO	0.4833	**0.9113**	–	–	–
MK	0.2512	0.5182	**0.7961**	–	–
MKP	0.3003	0.1594	0.1044	**0.9162**	–
OTS	0.2468	0.2154	0.1942	0.0332	**0.8380**

Source: own study.

In the opinion of Henseler, Ringle, and Sarstedt (2015), the method establishing discriminant validity using the Fornell-Larcker criterion together with the assessment of cross-loadings has unacceptably low sensitivity. Another way of establishing discriminant validity is the HTMT criterion (heterotrait-monotrait ratio of correlations). The values of HTMT are computed 'based on the mean of the correlations of indicators across constructs measuring different constructs, relative to the average correlations of indicators within the same construct' (van de Wetering, 2018, p. 6). According to the most conservative criterion HTMT values need to be lower than 0.85. Table 7 shows that the values obtained were much smaller. This means that discriminant validity using the HTMT criterion has been established.

Table 6. Cross Loadings

Indicator	MKS	CO	MK	MKP	OTS
MKS-1	**0.9171**	0.4239	0.2378	0.2804	0.2733
MKS-2	**0.9155**	0.4584	0.2214	0.2587	0.2296
MKS-3	**0.8495**	0.4144	0.2148	0.2676	0.1526
OTS-1	0.2180	0.2184	0.2424	-0.0351	**0.9137**
OTS-2	0.2140	0.1482	0.1612	0.0069	**0.8956**
OTS-3	0.1857	0.1742	0.0716	0.1250	**0.6853**
MKP-1	0.2311	0.0461	0.0161	**0.8880**	-0.0089
MKP-2	0.3085	0.2211	0.1553	**0.9388**	0.0594
MK-1	0.1368	0.3858	**0.8660**	0.1671	0.1647
MK-2	0.2423	0.3889	**0.7626**	0.0902	-0.2076
MK-3	0.2151	0.4505	**0.7548**	0.0039	0.0984
CO-1	0.4128	**0.8723**	0.4296	0.1581	0.1579
CO-2	0.4350	**0.9230**	0.5042	0.1071	0.1983
CO-3	0.4717	**0.9372**	0.4799	0.1721	0.2293

Source: own study.

Table 7. Heterotrait-monotrait ratio of correlations (HTMT)

Indicator	CO	MKP	MKS	MK	OTS
CO	–	–	–	–	–
MKP	0.172	–	–	–	–
MKS	0.545	0.352	–	–	–
MK	0.642	0.161	0.316	–	–
OTS	0.258	0.113	0.297	0.260	–

Source: own study.

The structural model

The values of R^2 for the company's internal market knowledge sharing (MKS) and competitiveness (CO) amounted to 0.15 and 0.40, respectively. The MKS value is relatively low, however, according to Falk and Miller (1992) R^2 values of 0.10 or more can be deemed meaningful. Nevertheless, the R^2 for the most important value – CO – was quite high at 0.40.

Accepting/rejecting the hypotheses

Table 8 shows the standardized path coefficients results and the t-values that determine the acceptance or rejection of the proposed hypotheses. H1, which stated that 'market knowledge perception within a business influences the effectiveness with which it is shared in medium-high-technology manufacturing companies,' was accepted (β=0.292; t=3.508; p<0.001). H2, which stated that 'the openness of technical staff translates into a greater efficiency of market knowledge sharing in medium-high-technology manufacturing businesses,' was accepted (β=0.237; t=2.412; p<0.05). H3, which stated that 'the efficiency of market knowledge sharing in medium-high-technology manufacturing businesses has an influence on their competitiveness,' was accepted (β=0.377; t=5.605; p<0.001). H4, which stated that 'market knowledge of a medium-high-technology manufacturing business has an impact on its competitiveness,' was accepted (β=0.424; t=7.261; p<0.001).

Table 8. Acceptance/rejection of hypotheses

Variables	Path coefficient	t-value	p-value	Hypothesis – accepted or rejected
MKP -> MKS	0.292	3.508	0.001	Accepted
OTS -> MKS	0.237	2.412	<0.05	Accepted
MKS -> CO	0.377	5.605	0.001	Accepted
MK -> CO	0.424	7.261	0.001	Accepted

Source: own study.

CONCLUSIONS

The goal of the study was to create a research model that consisted of five latent variables (constructs) which included: market knowledge perception, openness of technical staff, market knowledge sharing, market knowledge, and competitiveness. Four hypotheses were tested in the course of the study. The first and the second concerned the factors influencing market knowledge sharing, *i.e.* market knowledge perception and the openness of technical staff. According to the third hypothesis, the efficiency of market knowledge sharing in medium-high-technology manufacturing businesses has an influence on their competitiveness. As per the fourth hypothesis, the level of market knowledge in a medium-high-technology manufacturing business influences its competitiveness. All hypotheses were tested with the use of PLS path modelling method.

The results showed that market knowledge perception in a company, along with the openness of its technical staff, significantly influenced market knowledge sharing in the examined type of companies, albeit not very strongly. More importantly, the following conclusions were made in the course of the study. The research findings indicated that market knowledge had a strong and significant influence on the competitiveness of the examined type of companies. In particular, the findings indicated that internal market knowledge sharing had an equally strong and significant impact on the competitiveness of the analysed business entities. The results obtained in the course of the study indicated that both market knowledge and its internal transfer were required across the examined group of businesses, since they had a comparable impact on the competitiveness of medium-high-technology manufacturing companies in the analysed sectors.

The research corroborated a range of hypotheses based on the publications of Hou and Chien (2010), and Slater, Olson, and Sørensen (2012) that for both the level of market knowledge (MK) and the processes of market knowledge sharing (MKS) have a significant impact on the competitiveness (CO) of medium-high-tech manufacturing companies. As for the successive hypotheses based, among others on Cimatti (2016), they proved to be less apposite. The research results showed that the openness of technical staff and market knowledge perception played a slightly less significant role than expected, yet their impact on internal market knowledge sharing was nonetheless noticeable and statistically significant. Above all, the study implied that it is not the possession of market knowledge alone, but also efficient sharing this knowledge internally – *e.g.* through properly trained and competent knowledge brokers, as suggested by Kramer and Cole (2003), Cillo (2005), Van den Berg *et al.* (2014) and Haas (2015) – that enable the examined businesses to gain a competitive edge. Research findings on the importance of knowledge sharing for company competitiveness were consistent with the literature (*e.g.* Eidizadeh, Salehzadeh & Esfahani, 2017; Farooq, 2018), however, they deepen our knowledge on this topic. It is, among other things, related to the fact that this article is the first to present the results of a quantitative analysis of knowledge sharing with respect to the importance of internal market knowledge brokers for business entities. To date, empirical research on this phenomenon has been conducted using qualitative methods, *e.g.* by Cillo (2005).

As a result, it can be concluded that an important contribution to the literature of this article is to prove the importance of the importance of sharing market knowledge inside medium-high-tech manufacturing companies. Most publications dealing with the topic of knowledge sharing do not focus on a specific type of knowledge (*e.g.* Razmerita, Kirchner & Nielsen, 2016; Farooq, 2018; Ouakouak & Ouedraogo, 2019), neither do many focus on entities in specific industries (*e.g.* Nguyen *et al.*, 2019). The approach used in this publication enabled a more detailed analysis of the importance of knowledge sharing and the factors that influence it. Narrowing the analysis to market knowledge and manufacturing companies in the medium-high-tech sector made it possible to explore, among other things, the importance of the role of the previously mentioned knowledge brokers. This would not be possible without using this approach. For example, Ouakouak & Ouedraogo (2019) consider more general factors influencing knowledge sharing in a company in their analyses, as they do not focus on a specific type of knowledge. As a result, their analyses are less detailed. An important contribution of this article lies also in proving the importance of

the market knowledge resource itself for the competitiveness of medium-high-tech manufacturing companies. However, for this resource to have a sufficiently strong impact on the competitiveness of medium-high-tech manufacturing companies it must be adequately disseminated.

Practical implications

In view of the presented findings, hiring a well-educated market knowledge broker, equipped with adequate technical knowledge, constitutes the main practical recommendation of this study. Granted, it would be considerably expensive. Still, given the presented research findings, such an investment would likely generate profits for the analysed businesses. Unfortunately, due to the current Covid-19 pandemic, enterprises are more inclined to cut down on their expenditure than pursue innovative solutions. However, it should be noted that the current time is particularly demanding in terms of market knowledge and its transfer to appropriate positions within a business, given the rapidly changing market demand and the resulting need to adapt to these changes by delivering desirable products. As research has proven that good relations between technical and market employees are important element of effective knowledge sharing in medium-high-tech manufacturing companies. That is why managers should try not let pandemic to cut ties between both groups. The research also showed that openness of technical staff constitutes support to market knowledge sharing in analysed group of enterprises. That is why it also proved the importance of the need signalled by American employers and mentioned by Javdekar *et al.* (2016) to include soft skills courses in university curricula. Such courses should among others educate students why it is worth sharing market knowledge in the enterprise and how to do it effectively. This issue is especially important for technical universities so that their graduates in the future in their professional life, appreciate the analysed issue.

Presented analyses and their practical implications may be beneficial to every medium-high-tech manufacturing company. Nevertheless, it may be useful mostly to independent ones that are not just manufacturing facilities. This is because this type of entities cannot rely on clear guidelines based on orders from other branches. They need to acquire and transfer market knowledge to the appropriate places and people in the company. This is especially difficult in case of large companies. The larger the enterprise, the more challenging this task will be. This is due to more complex structure of larger companies.

Limitations and future research

This article has several limitations. The collected data was procured by means of self-reporting, which may have produced a bias and limited the generalization of the obtained results. Moreover, empirical research was conducted in Poland only, and was limited to medium-high manufacturing business only. Future research could potentially seek to corroborate these results with enterprises based in other countries and sectors. The applied research model indicates a relatively low, yet statistically significant impact of market knowledge perception and the openness of technical staff to market knowledge sharing. Given the considerable significance of market knowledge sharing on the competitiveness of the examined enterprises, future research should focus on identifying other factors that have an impact on the effectiveness of internal knowledge sharing.

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How corporate entrepreneurship affects the performance of small and medium-sized enterprises in Korea: The mediating and moderating role of vision, strategy, and employee compensation

Hyeong Min Kim

ABSTRACT

Objective: The objective of the article is to provide implications for improving the competitiveness of SMEs by analysing the structural impact relationship of the corporate entrepreneurship of Korean SMEs on business performance.

Research Design & Methods: The established research model based on precedent studies was empirically analysed with PLS-SEM by employing the 3299 survey data collected by the Ministry of SMEs and Start-ups in 2018.

Findings: Empirical analysis revealed that corporate entrepreneurship affects business performance through a relationship between moderation (employee compensation) and mediation (vision and strategy). Hence, the findings suggest that, along with the importance of corporate entrepreneurship, the proper management of vision and strategy and employee compensation has a significant influence on the business performance of SMEs.

Implications & Recommendations: The implications of this research are expected to be applied by the government in establishing policy direction to enhance the corporate entrepreneurship of SMEs in the future.

Contribution & Value Added: This study provides empirical evidence that shows the relationship between corporate entrepreneurship and business performance by using the data of Korean SMEs. In particular, it incorporated the effects of vision and strategy, and employee compensation and rendered theoretical and managerial implications.

Article type:	research article
Keywords:	corporate entrepreneurship; vision and strategy; employee compensation; business performance; moderated mediation
JEL codes:	L26, M13

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INTRODUCTION

Previous studies have labelled the orientation for entrepreneurial activity variously, including entrepreneurial orientation (EO), intensity, propensity, style, proclivity, and posture (Covin & Wales, 2012). If the tendency to pursue innovation by responding to market opportunities in a proactive manner is dominant, based on the entrepreneurship of a company's chief executive or enterprise, competitive advantages are likely to emerge (Ferreira, Coelho, & Moutinho, 2020; Jespersen, 2012). In this regard, EO not only has a positive impact on business performance (Wahyuni & Sara, 2020; Zahra, 1991), but also serves as a key factor that triggers the development of new products by the entity (Liao & Zhao, 2020; Wang & Yen, 2012).

Researchers have had a growing tendency to study individual-level entrepreneurship or EO by extending it to the culture and characteristics of the entire organisation. Lumpkin and Dess (1996) argue that entrepreneurship can be applied to individual, organisational, and overall levels that existing entities and start-ups can perform. Furthermore, Drucker (2015) argues that the application of entrepreneurship can be extended to all levels of the entity other than to entrepreneurial individuals. Therefore, entrepreneurship could be practised by entrepreneurs, managers, executives, and general members of SMEs or large corporations at the individual level; its value and importance have been shared by start-ups, SMEs, and large companies alike (Kao, 1991).

So far, entrepreneurship in start-ups has been actively studied, and innovative activities of large corporations have attracted a lot of attention. Compared with these prior efforts, entrepreneurship in SMEs has been relatively underexplored. However, in most countries, the participation and influence of SMEs in their economies are undoubtedly substantial. Therefore, we need to find an effective way to boost entrepreneurship in SMEs. By and large, SMEs necessitate more entrepreneurial elements, because they do not have sufficient resources compared with large corporations. Despite this drawback, corporate entrepreneurship (CE) can have a significant impact on business performance for SMEs (Chang & Zhu, 2012). Therefore, an attempt to understand CE to improve the competitiveness of SMEs and to reveal the structural relationship between CE and business performance can be very meaningful.

As of 2018, the number of SMEs in Korea stood at 6.63 million, accounting for 99.9% of all companies. Meanwhile, the number of SME workers was 17.1 million, accounting for 83.1% of all business workers. The number of SMEs has increased 5.4% year-on-year, and the number of employees has grown by 2.5% (Hwang, 2020). In general, SMEs form the basis of the national industry in Korea and play a crucial role in economic growth and social development. Therefore, without the sound growth of SMEs, countries can neither increase the competitiveness of national industries nor improve people's quality of life due to a vast gap between the rich and the poor. In this background, CE or EO has been attracting attention as a factor that strengthens the competitiveness of SMEs (Zahra & Covin, 1995).

In summary, this study aims to analyse the causal relationship among CE, vision and strategy, and employee compensation on the business performance of SMEs. In particular, it predicts that the vision and strategy presented by the leader will have a mediating effect on the influence of SMEs' CE on business performance. In addition, this mediating effect is expected to be moderated by employee compensation.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Corporate entrepreneurship (CE) and business performance (BP)

Corporate entrepreneurship refers to the entrepreneurial propensity of the members of an organisation. This concept has been actively studied, and it highlights the concept of EO. In particular, the research on EO originated from Mintzberg's approach for establishing entrepreneurial strategies (Mintzberg, 1973), and the dimensions of EO have been classified and structured into innovativeness, risk-taking, and proactiveness in Miller's research (Miller, 1983).

Later, Lumpkin and Dess (1996) modify these five dimensions by adding autonomy and competitive aggressiveness, including Miller's three dimensions. Follow-up studies on CE are mainly based on the three factors suggested by Miller (1983) and Covin and Slevin (1991) or the five factors of Lumpkin and Dess (1996) as shown in Table 1. In these studies, the measurements were devised by consulting EO questionnaires.

In this study, five EO dimensions proposed by Lumpkin and Dess (1996) were adopted to measure CE. Firstly, innovativeness refers to the willingness of an organisation to undertake creative experiments to launch or pursue new products and services that have not been commercialised in the existing market. Secondly, risk-taking pertains to the organisation's voluntary nature to bear the calculated risk. Thirdly, proactiveness refers to the characteristics of an organisation that incurs changes in the current market environment, pursues new opportunities, and embodies future-oriented products and services. Fourth, autonomy is the characteristic of proactively defining and solving problems free from the constraints of the surrounding environment. And finally, competitive aggressiveness means pursuing direct competition with other organisations with limited resources and opportunities (Lumpkin & Dess, 1996).

Table 1. Dimensions of entrepreneurship orientation

Researcher	I	R	P	A	C
Mintzberg (1973)		●	●		
Miller (1983)	●	●	●		
Covin and Slevin (1989, 1991)	●	●	●		
Zahra and Covin (1995)	●	●	●		
Lumpkin and Dess (1996)	●	●	●	●	●
Dickson and Weaver (1997)	●	●	●		
Becherer and Maurer (1997)	●	●	●		
Lee and Peterson (2000)	●	●	●	●	●
Wiklund and Shepherd (2005)	●	●	●		
Lee and Lim (2009)	●	●	●		●

Note: I – innovativeness, R – risk-taking, P – proactiveness, A – autonomy, C – competitive aggressiveness.
Source: own study.

In fact, the dimensions of EO interact with one another and shape a company's strategic orientation. Consequently, these correlations can affect business performance (BP). Representatively, an organisation's proactive tendency is to seize new market opportunities and trigger innovation to preempt the market. In addition, activated innovativeness enables organisations to take risks and react aggressively to market competitors. Lastly, the autonomy of the members of the organisation is the foundation for strengthening this system. To sum up, the dimensions of EO interact with one another to determine the level of EO, thus enabling companies to secure a competitive advantage (Covin & Slevin, 1989, 1991; Wiklund & Shepherd, 2005).

The literature generally agrees that organisations with higher EO tend to seize new opportunities and put these possibilities into action. Moreover, such organisations outperform those with lower EO. Thus, a positive correlation between EO and BP can be postulated (Gupta & Govindarajan, 1984). In recent studies, empirical research results have been reported on the positive effect of EO on BP. Bhatti, Rehman, and Rumman (2020) reported that the EO of Pakistani SMEs had a positive effect on the financial and non-financial performance of the organisation, and that organisational capabilities mediated this relationship. Onwe, Ogbo, and Ameh (2020) presented the conclusion that a hostile environment motivates firms to adopt EO, which ultimately improves their performance, as shown in a study of small firms in Nigeria. In addition, studies on Ghana, Yemen, and SMEs in the United States of America have reported that EO improved firms' performance (Al-Awlaqi, Aamer, & Habtoor, 2021; Amankwah-Amoah, Danso, & Adomako, 2019; Poudel, Carter, & Lonial, 2020).

The BP can be defined as the accomplishment of organisational goals related to profitability and growth in sales and markets share, and the achievement of innovative performance for new products (Hult, Hurley, & Knight, 2004; Laursen & Salter, 2006). Most of the previous studies that analyse the BP of a company measure general financial indicators, such as sales, sales growth, profit rate, profit rate growth, and market share. However, in the case of SMEs, as few public data are available and each variable is difficult to measure, subjective performance evaluation (self-reported) is commonly used as a measurement tool (Stam & Elfring, 2008). In this study, BP was also measured by combining the subjective performance evaluation for general financial performance and the subjective performance evaluation related to the development and launch of new products or new services. Therefore, the following hypotheses can be set by adopting the five EO dimensions suggested by Lumpkin and Dess (1996).

H1: Innovativeness has a positive effect on the BP of SMEs.

H2: Risk-taking has a positive effect on the BP of SMEs.

H3: Proactiveness has a positive effect on the BP of SMEs.

H4: Autonomy has a positive effect on the BP of SMEs.

H5: Competitive aggressiveness has a positive effect on the BP of SMEs.

Vision and Strategy (VS)

The consistency and direction of the vision and strategy (VS) in corporate management are very important factors in forming the entrepreneurial characteristics of organization's members. In addition, the organisation's leadership acts as a driving force behind the change of various corporate components, such as the unique culture and structure at the organisational level, and the operating system for innovation and commercialisation.

Koontz and O'Donnell (1972) define 'leadership' as the process of exerting influence to manage organisational goals, motivate members, participate in goal setting, and maintain organisational members' continuous behaviour. Giese and Stogdill (1974) define it as orienting the members of an organisation towards a specific goal and exerting influence to act to achieve that goal. Nanus describes leadership as a process of innovating an organisation and transforming it into a new organisation with greater potential by inducing and energising the followers' voluntary commitment through the presentation of a vision (Riggs, 1994).

One of the most important virtues for organisational leaders is to create a motivational mechanism that shows the strategic direction of a company to its members and encourages them to work for a single goal (Hitchcock & Stavros, 2017). In addition, a long-term VS for creating new opportunities and values is needed for the strong and continuous motivation and visible innovation performance of the organisation members (Hoffman & Hegarty, 1993).

Vision is an organisational goal that guides strategies, policies, and tasks, and it is a key source of organisational culture formation and sustainable management. Therefore, it plays an important role in the development of the company and can serve as a beacon that guides the business towards the mission (Liao & Huang, 2016). All organisations benefit from developing strategies that describe the values they intend to create, based on which they shall sustain themselves. The most widely used model for developing organisational strategies can be drawn from private sector (Miller & Dess, 1996; Moore, 2000). Jagersma (2003) found that vision and strategy are correlated and that a clear vision helps formulate business strategies. Thus, the extent to which organisational members support and understand its vision may become a key driver for improving performance (James & Lahti, 2011).

Based on this precedent research, we can infer that the leadership of the management is projected into the VS of the organisation and that it has a significant effect on the company's performance by strengthening the organisation's competitiveness. Therefore, in this study, we predicted that the VS affects the entrepreneurial performance by mediating the EO of the organisation. We then set the following hypotheses.

H6: VS mediates the relationship between innovativeness and BP.

H7: VS mediates the relationship between risk-taking and BP.

H8: VS mediates the relationship between proactiveness and BP.

H9: VS mediates the relationship between autonomy and BP.

H10: VS mediates the relationship between competitive aggressiveness and BP.

Employee compensation (EC)

Human capital has been one of the major sources to enable firms to gain sustainable competitive advantage (Prahalad, 1983; Wright, McMahan, & McWilliams, 1994). Therefore, companies invest a lot of efforts to recruit talented human resources to attain employee-based innovation (Pandher, Mutlu, & Samnani, 2017), and this approach ultimately leads to increased BP (Wright, Gardner, & Moynihan, 2003). In particular, SMEs must acquire rare, inimitable, and valuable resources to obtain a sustainable competitive advantage (Barney, 2016). More often than not, SMEs offer better conditions and benefits to recruit and maintain quality human capital, thereby positively affecting BP (Branco & Rodrigues, 2006). In this process, SMEs that compensate for employees in advantageous ways have a high possibility of contributing to excellent BP (Youndt *et al*., 1996).

Compensation has been considered a crucial element for both employees and employers in terms of motivation. In most cases, one of the most effective ways to motivate employees is to offer monetary rewards (Brockner, 2002). When employees are satisfied with the level of monetary compensation, firms can expect better job performance (Mulvey *et al*., 2002), less turnover rate (Griffeth & Gaertner, 2001), and more organisational attractiveness for job seekers (Heneman & Berkley, 1999; Lambert, 2000). Therefore, compensation is deemed to be a very important factor that affects the BP.

Previous research suggests that stock options and retirement benefits are useful tools to lower employee turnover rate (Dunford, Oler, & Doudreau, 2008; Sutton, 1985). Sometimes, employees place more emphasis on independence and flexibility of a work environment than on other benefits (Sauermann, 2018). These benefits affect employee retention rate (Hausknecht, Rodda, & Howard, 2009) or job satisfaction (Barber, Dunham, & Formisano, 1992) and are one of the powerful elements to affect positive BP (Koys, 2001).

Furthermore, EC has shown that the management team's strategic vision has an interaction effect on the relationship that affects the firm's innovation performance (Camelo-Ordaz, Fernández-Alles, & Valle-Cabrera, 2008). Some studies also demonstrate that the compensation system, one of the important factors in human resource management (HRM), has an interaction effect among various factors and affects the BP of the organisation (Angela, Sari, & Oktavianti, 2020; Weon, 2007).

Based on these theoretical and empirical arguments, we set the following hypothesis.

H11: The indirect relationship between CE and BP via VS is moderated by EC so that the relationship is stronger with increasing levels of EC.

On the basis of the hypotheses established in this study, a conceptual research model was constructed, as shown in Figure 1. It shows that CE, which consists of innovativeness, risk-taking, proactiveness, autonomy, and competitive aggressiveness, affects BP. In this process, VS mediates the relationship between CE and BP. In addition, EC moderates the relationship between VS and BP.

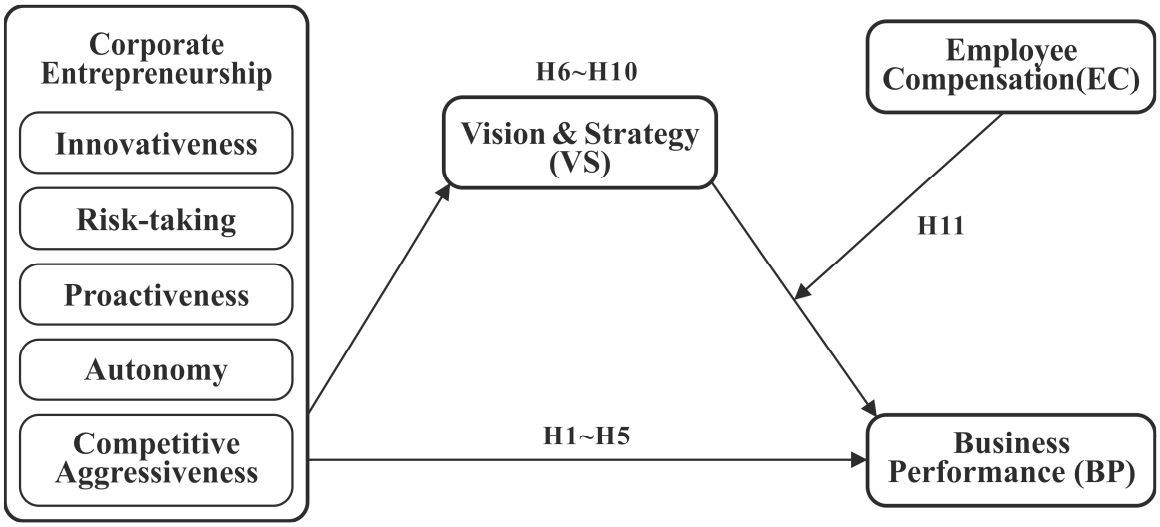

Figure 1. Research model
Source: own elaboration.

RESEARCH METHODOLOGY

Instruments

The items used in the survey were composed by selecting the measurement items used in related previous studies (Table 2).

Table 2. Instruments

Construct	Item	Source
Innovativeness	3 items using a 7-point Likert scale	Covin & Slevin (1989)
Risk-taking	3 items using a 7-point Likert scale	
Proactiveness	3 items using a 7-point Likert scale	
Autonomy	3 items using a 7-point Likert scale	Lumpkin & Dess (1996)
Competitive Aggressiveness	5 items using a 7-point Likert scale	
Vision and Strategy	4 items using a 7-point Likert scale	Chrisman *et al.* (1998), Covin & Slevin (1991), Morris *et al.* (2008)
Employee Compensation	2 items using a 7-point Likert scale	Green *et al.* (2008)
Business Performance	8 items using a 7-point Likert scale	Covin & Slevin (1991), Laursen & Salter (2006), Kantur & İşeri-Say (2013)

Source: own assignment of the items based on previous research.

Sampling and data collection

The Ministry of SMEs and Start-ups surveyed SMEs in Korea on the level of CE from September to October 2018. As a result, data from 3299 SMEs were collected. In this study, the hypothesis established using the collected data was tested. Table 3 indicates the characteristics of respondents. Among the data, SMEs with three-to-45-year business histories and 10 to 49 employees had the highest portion, and the locations of companies were evenly distributed throughout Korea. As for the industry, the total service business was the largest, followed by manufacturing, wholesale, and retail.

RESULTS AND DISCUSSION

Common method variance

As the data used in the analysis involved the same person simultaneously responding to the independent and dependent variables, a potential problem of common method variance (CMV) may have occured.

To ascertain whether a CMV problem existed, the two methods were verified according to the recommendations of (Babin, Griffin, & Hair, 2016). Firstly, Harman's single-factor test was performed. The unrotated first factor was 47.974% and is less than 50%; thus, no CMV problem occured (Podsakoff & Organ, 1986). Secondly, a full collinearity assessment with PLS-SEM revealed no CMV problem because all the VIF values of the variables for the random dummy variable are less than 3.3 (Table 4) (Kock & Lynn, 2012).

Measurement model

To assess the convergent validity, the factor loadings, Cronbach's alpha, rho_A, composite reliability, and average variance extracted (AVE) were calculated (Table 5). All loading values exceed 0.7 except for Bizpf3 which was therefore excluded. The Cronbach's alpha, rho_A, and composite reliability values of the variables exceed 0.7. Moreover, the AVE values were more than the threshold value of 0.5. Therefore, the latent variables met convergent validity (Hair, Hult, Ringle, & Sarstedt, 2017).

The heterotrait-monotrait criterion was used to test discriminant validity. As shown in Table 6, the values are under 0.85, thereby providing evidence of discriminant validity (Henseler, Ringle, & Sarstedt, 2014).

Table 3. Sample characteristics

Categories		Freq.	Pct.(%)
Employees	1~9	580	18
	10~49	1 313	40
	50~99	472	14
	100~299	617	19
	300 and above	317	10
Industry	Agriculture, forestry, and fisheries	42	1
	Manufacturing industry	466	14
	Wholesale and retail trade	336	10
	Accommodation business	198	6
	Total service business	1 293	39
	Financial and insurance industries	195	6
	Real estate and rental business	134	4
	Etc.	635	19
Business Years	~3	6	0
	3~7	342	10
	7~44	2 750	83
	45 and above	201	6
District	Gangwon-do	85	3
	Gyeonggi-do	644	20
	Gyeongsangnam-do	203	6
	Gyeongsangbuk-do	152	5
	Gwangju	62	2
	Daegu	252	8
	Daejeon	74	2
	Busan	287	9
	Seoul	931	28
	Sejong	8	0
	Ulsan	68	2
	Incheon	124	4
	Jeollanam-do	112	3
	Jeollabuk-do	70	2
	Jeju-do	36	1
	Chungcheongnam-do	104	3
	Chungcheongbuk-do	87	3
Total		3 299	100

Source: own study.

Table 4. Full collinearity assessment

Variable	Random Dummy Variable
Innovativeness	2.483
Risk-taking	2.991
Proactiveness	3.039
Autonomy	2.618
Competitive Aggressiveness	1.995
Vision and Strategy	1.522
Employee Compensation	1.406
Business Performance	2.195

Source: own study.

Table 5. Results summary for measurement model

Latent Variable	Indicators	Loadings	Cronbach's Alpha	rho_A	Composite Reliability	AVE
Innovativeness	Innov1	0.894	0.907	0.913	0.942	0.843
	Innov2	0.943				
	Innov3	0.917				
Risk-taking	Rskta1	0.895	0.889	0.889	0.931	0.819
	Rskta2	0.920				
	Rskta3	0.899				
Proactiveness	Proac1	0.891	0.888	0.890	0.931	0.817
	Proac2	0.914				
	Proac3	0.907				
Autonomy	Autno1	0.879	0.885	0.889	0.929	0.814
	Autno2	0.931				
	Autno3	0.895				
Competitive Aggressiveness	Compe1	0.847	0.922	0.928	0.941	0.762
	Compe2	0.894				
	Compe3	0.851				
	Compe4	0.883				
	Compe5	0.890				
Vision and Strategy	Vinst1	0.917	0.940	0.941	0.957	0.847
	Vinst2	0.918				
	Vinst3	0.929				
	Vinst4	0.917				
Employee Compensation	Emplo1	0.894	0.785	0.794	0.902	0.822
	Emplo2	0.920				
Business Performance	Bizpf1	0.789	0.902	0.904	0.923	0.630
	Bizpf2	0.777				
	Bizpf4	0.786				
	Bizpf5	0.790				
	Bizpf6	0.817				
	Bizpf7	0.794				
	Bizpf8	0.803				

Source: own study.

Table 6. Heterotrait-monotrait ratio (HTMT)

Variable	1	2	3	4	5	6	7
1. Innovativeness							
2. Risk-taking	0.787						
3. Proactiveness	0.803	0.807					
4. Autonomy	0.687	0.827	0.788				
5. Competitive Aggressiveness	0.678	0.803	0.765	0.749			
6. Vision and Strategy	0.522	0.610	0.520	0.622	0.578		
7. Employee Compensation	0.609	0.656	0.675	0.654	0.665	0.546	
8. Business Performance	0.645	0.680	0.740	0.698	0.662	0.502	0.715

Source: own study.

Structural model and hypothesis testing

Assessment of structural model was conducted to test the hypotheses. As suggested by Hair *et al*. (2017), variance inflation factor (VIF), effect size (f^2), coefficient of determination (R^2), and predictive relevance (Q^2) were reported. Firstly, as shown in Table 7, all VIF values were clearly below the threshold of 5. Therefore, collinearity among the predictor constructs was not a critical issue in the structural model.

Next, the bootstrapping method was employed with a resampling of 5 000 to test the significance of the path coefficient (Hair *et al*., 2017). Risk-taking showed an insignificant relationship with BP (β = 0.033, t = 1.479, p > 0.05, f^2 = 0.001). Thus, H2 was not supported. By contrast, H1: innovativeness (β = 0.097, t = 5.097, p < 0.01, f^2 = 0.009), H3: proactiveness (β = 0.260, t = 11.938, p < 0.01, f^2 = 0.051), H4: autonomy (β = 0.157, t = 7.782, p < 0.01, f^2 = 0.021), and H5: competitive aggressiveness (β = 0.089, t = 4.399, p < 0.01, f^2 = 0.007) were found to have significant positive relationships. The mediation results for VS (proactiveness to VS to BP) were insignificant, thereby indicating that H8 was not supported. However, other mediation results were supported for H6, H7, H9, and H10.

Lastly, in the path coefficient results, BP yielded a coefficient of determination (R^2 = 57.0%) that can be described as having a moderate level of predictive accuracy. Moreover, the relationship between CE on VS exhibited an R^2 of 38.8%. In addition to evaluating the magnitude of the R^2 values as a criterion of predictive accuracy, the Q^2 values were obtained by using the blindfolding procedure to examine the model's predictive relevance. The Q^2 values for the endogenous constructs were more than zero and thus indicate the out-of-sample predictive power of this path model (Geisser, 1974; Stone, 1974).

Table 7. Results summary for structural model

Hyp.	Path	β	t-value	95% BCa CI		VIF	f^2	R^2	Q^2
				LB	UB				
H1	I[1] -> BP	0.097	5.097**	0.060	0.134	2.526	0.009	0.570	0.349
H2	R[2] -> BP	0.033	1.479	-0.011	0.076	3.336	0.001		
H3	P[3] -> BP	0.260	11.938**	0.215	0.301	3.048	0.051		
H4	A[4] -> BP	0.157	7.782**	0.116	0.195	2.772	0.021		
H5	C[5] -> BP	0.089	4.399**	0.049	0.129	2.694	0.007		
H11	VS * EC -> BP	0.060	4.518**	0.034	0.086	1.069	0.008		
	VS -> BP	0.037	2.283*	0.006	0.069	1.698	0.002		
	EC -> BP	0.229	12.814**	0.194	0.263	1.821	0.067		
	I -> VS	0.106	4.869**	0.062	0.147	2.494	0.007	0.388	0.326
	R -> VS	0.175	6.854**	0.125	0.225	3.278	0.015		
	P -> VS	-0.063	2.512*	-0.112	-0.015	2.982	0.002		
	A -> VS	0.280	11.814**	0.234	0.326	2.619	0.049		
	C -> VS	0.202	8.649**	0.156	0.246	2.559	0.026		
H6	I -> VS -> BP	0.004	2.029*	0.001	0.009	–			
H7	R -> VS -> BP	0.006	2.154*	0.001	0.013				
H8	P -> VS -> BP	-0.002	1.644	-0.006	0.000				
H9	A -> VS -> BP	0.010	2.248*	0.002	0.020				
H10	C -> VS -> BP	0.007	2.199*	0.001	0.015				

Note: I – innovativeness, R – risk-taking, P – proactiveness, A – autonomy, C – competitive aggressiveness; * p<0.05, ** p<0.01.
Source: own study.

To explore the mediation effects (H7) further, the approach proposed by Nitzl, Roldan, and Cepeda (2016) was used. Firstly, by employing the bootstrapping procedure with a resample of 5 000, the indirect effect was generated to test the mediation effect of VS (Preacher & Hayes, 2008). As shown in Table 8, zero was not included in the 95% bias-corrected bootstrap and accelerated confidence interval (BCa CI). Therefore, the mediation effect of VS between risk-taking and BP was significant. Moreover, H7 showed a full mediation result given that the relationship between risk-taking and BP was insignificant.

In the pathway of the indirect effect of CE on BP, EC showed a moderating effect, thereby resulting in a moderated mediating effect (Hayes, 2018). In other words, CE affected the magnitude of the indirect effect according to the value of EC. To assess this conditional effect, a test called the index of the moderated mediation was conducted (Hayes, 2015). The index of moderated mediation represents the extent of the linear relationship between the moderator and the indirect effect. The hypothesis about the moderated mediation (H11) was therefore supported as zero was not included in the confidence interval (95% CI: 0.013 to 0.035). Thus, the indirect effect of CE on BP through VS depended on the levels of EC.

Table 8. Index of moderated mediation

Mediator	Index	SE (Boot)	95% BCa CI	
			BootLLCI	BootULCI
VS	0.024	0.006	0.013	0.035

Source: own study.

If the index of moderated mediations had supported the existence of moderated mediation, we would have to investigate the indirect effect at the representative values of the moderator (depicted as the conditional indirect effect) to explore further the condition under which mediation did (not) exist (Preacher & Hayes, 2008). As shown in Table 9, no significant indirect effect for VS with a low EC (effect: -0.016; 95% CI: -0.035 to 0.004) was observed. In contrast, the effect was significant both for moderate (effect: 0.013; 95% CI: 0.001 to 0.029) and high EC (effect: 0.043; 95% CI: 0.021 to 0.065) groups. Therefore, we concluded that CE affected BP via VS and the mediation relationship, which increased with the increment of EC.

Table 9. Conditional indirect effect at values of the EC

Mediator	Moderator (EC)	Effect	Boot SE	BootLLCI	BootULCI
VS	(-1 SD EC) -1.243	-0.016	0.010	-0.035	0.004
VS	(Mean EC) 0	0.013	0.008	0.001	0.029
VS	(+ SD EC) 1.243	0.043	0.011	0.021	0.065

Source: own study.

Figure 2 shows that the indirect relationship between CE and BP was conditional depending upon the effect of EC such that the path became solid at the high levels of EC. Therefore, these results supported H11 in an overall sense.

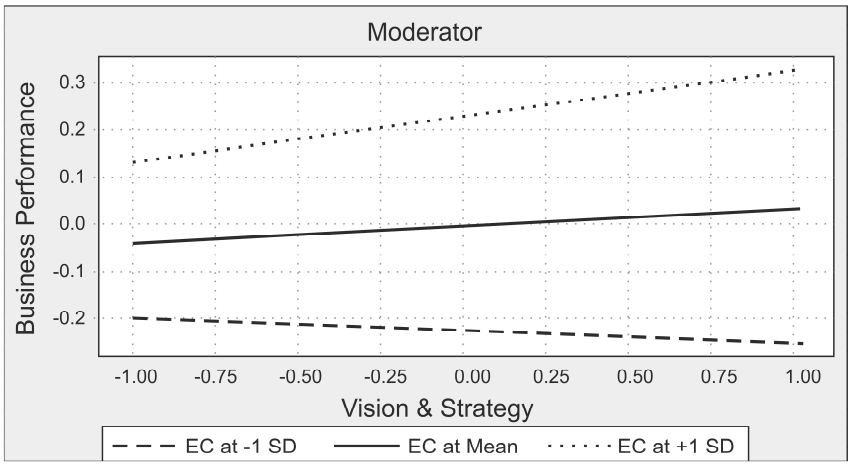

Figure 2. The plot of conditional indirect effect
Source: own elaboration.

CONCLUSIONS

This study examined the relationship among the CE, VS, EC, and BP of 3 299 Korean SMEs. As a result, firstly, we found that all four dimensions of CE, excluding risk-taking, had a direct positive effect on BP (H1, H3, H4, and H5). Most preceding studies targeting start-up companies share a common consensus that all dimensions, including risk-taking, positively affect BP (Rauch, Wiklund, Lumpkin, & Frese, 2009). However, the ages of SMEs vary between three and 45 years. Habib's previous research results suggested that 'the tendency for risk-taking becomes higher in the introduction and decline stages of the life cycle, but lower in the growth and mature stages' (Habib & Hasan, 2017). Accepting

the results of this study, we can infer the cause of the ineffective relationship between risk-taking and BP in this research. In other words, we presumed that the relationship did not show consistent direction because the sample firms' ages were varied.

Secondly, we determined that risk-taking did not have a positive effect on BP (H2). However, with the influence of VS, a positive effect between risk-taking and BP was observed, which epitomised complete mediation (H7). This outcome explained the important role of VS in helping companies strengthen their organisation's competitiveness and improve their performance. In previous studies, Guth and Ginsberg (1990) asserted that the VS established by strategic leaders have a structural impact on organisational performance and CE. The results of this study can be understood in the same context.

Thirdly, innovativeness, risk-taking, autonomy, and competitive aggressiveness were also found to positively affect BP via VS (H6, H7, H9, and H10). However, no mediating effect was observed on proactiveness. Proactiveness was found to have the strongest positive effect on BP but a negative effect on VS. In the end, VS did not mediate proactiveness (H8). Thus, we could infer that the negative relationship between the proactiveness of Korean SMEs and VS was probably due to Koreans' 'ppalli-ppalli culture ("hurry up" culture)' (Crawford, 2018). Several economists note that the Korean ppalli-ppalli culture is behind the rapid economic growth after the ruins of the Korean War. Although proactiveness can contribute to improving BP in this cultural background, we should note that it was far from promoting work systematically or stepwise on the basis of vision or strategy.

Fourthly, we found that VS had a conditional mediating effect incurred by EC (H11), which meant that the EC below the average showed a negative control effect on BP. Meanwhile, a positive control effect appeared above the average level. This result was in line with Burgelman's research findings (Burgelman, Christensen, & Wheelwright, 2004), which revealed that entrepreneurship in the process of corporate strategy formulation influences and reinforces structural contexts, such as performance measurement and compensation systems. In other words, determining the appropriate level of employee compensation imposes an enormous responsibility on managers, and their decision-making affects a company's BP. This finding is the most important practical implication that was empirically verified in this study.

As one of the success factors of SMEs, this study focused on CE and identified the structural relationship between VS and EC provided by the management. SME leaders should strive to present and implement a VS that can gather the consensus of members in the long term. In addition, given that the wage level of SME employees is relatively lower than that of conglomerates, various compensation systems suitable for each SME must be devised and implemented. Korea's SME support policy has so far focused mainly on external support, such as tax relief or financial support. However, researchers need to explore more diverse measures in the future, including the development and implementation of educational programs that can promote the CE of SME members. This practice may eventually create more economic value for SMEs, thereby enhancing the sustainability of SMEs in Korea.

Despite the aforementioned contributions, this study has some limitations that future research could address. Firstly, the results of this research, as shown in the R^2 of 0.570 for BP, imply that innovativeness, risk-taking, proactiveness, autonomy, competitive aggressiveness, VS, and EC jointly explained a 57.0% variance in BP. That is, 43.0% variance in BP was explained by factors not included in the model. More explanatory models can be proposed in future research by discovering and adding more internal and external factors affecting BP. Secondly, this study used self-reported questionnaires whereby common method variance may occur. While Herman's single factor analysis and full collinearity assessment indicated that common method variance was not present in this study, future studies should rule out this issue by obtaining more objective responses. Finally, the sample used in this study covered SMEs in various industries. However, the characteristics of each industry on BP was not included in this work. Therefore, a detailed analysis of the differences among SMEs by industry is deemed necessary in a follow-up study.

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Appendix A: Table Scale Items

Corporate Entrepreneurship (Covin & Slevin, 1991; Lumpkin & Dess, 1996)

Innovativeness

1. Our organisation emphasises R&D, technological superiority, and innovation.
2. Our organisation has had a large number of product and service lines over the past three years.
3. Our organisation has seen significant changes and innovations in product and service lines over the past three years.

Risk-taking

1. Our organisation believes that bold and broad action is the best way to achieve corporate goals.
2. Our organisation has a strong tendency to pursue projects with high-risk, high-profit opportunities.
3. Our organisation is bold and aggressive to explore potential opportunities when making decisions in uncertain situations.

Proactiveness

1. Our organisation takes action before our competitors and our competitors take action accordingly.
2. Our organisation often introduces new products, new management techniques, and new process technologies first in the industry.
3. When it comes to introducing new products or ideas, our organisation takes a 'be ahead of competitors.'

Autonomy

1. Our organisation often works by individuals or teams to create and complete ideas or action plans independently.
2. Members are self-directed in creating market opportunities.
3. Members are free to perform their duties regardless of their own regulations or restrictions.

Competitive Aggressiveness
1. Our organisation enjoys competition and is motivated by competition.
2. Our organisation tends to take a bold and aggressive approach to competition.
3. Our organisation tends to neutralize and overwhelm its competitors.
4. Our organisation acts very aggressively to win the competition with other companies in the same industry.
5. The management style of our organisation's management is very aggressive and is always competitive.

Vision and Strategy (Chrisman, Bauerschmidt, & Hofer, 1998; Covin & Slevin, 1991; Morris, Kuratko, & Covin, 2008)
1. I (our leader) constantly explain and present the vision and objectives to the members.
2. I (our leader) encourage challenging, innovative thinking and behaviour of members.
3. I (our leader) am change-oriented and constantly evidence motivation.
4. I (our leader) have a long-term vision and strategy for creating new business opportunities.

Employee Compensation (Green, Covin, & Slevin, 2008)
1. Separate compensation for the entrepreneurial performance of members is operated.
2. Systems such as compensation, education, and career management for employees' innovative performance are operating as prescribed.

Business Performance (Covin & Slevin, 1991; Kantur & İşeri-Say, 2013; Laursen & Salter, 2006)
1. Our organisation has a high percentage of new products and new services compared to its competitors.
2. Our organisation continuously emphasizes the development of new products and new services of its members.
3. Our organisation's top executives emphasize cost reduction rather than new product development.
4. Our organisation has launched more new products and new services than its competitors in the last three years.
5. Our organisation has a higher sales growth rate than its competitors.
6. Our organisation has a higher return on investment than its competitors.
7. Our organisation has a higher return on sales than its competitors.
8. Our organisation has a higher market share than its peers.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Identifying the key factors of sustainable entrepreneurship in the Nigerian food industry: The role of media availability

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ABSTRACT

Objective: The article's objective is to identify how media could facilitate the effect of sustainable entrepreneurship on consumer purchase behaviour, based on evidence from the food industry in Nigeria.

Research Design & Methods: The research population was experts who have sufficient information, expertise, and experience in the field of sustainable entrepreneurship and marketing, and pay attention to online social platforms and consumer purchase behaviour. There population amounted to 33 interviewed experts. A combination of Delphi-ANP (Analytic Network Process) approaches was used. Results showed that customers' satisfaction was the key dimension that affects sustainable entrepreneurship in the Nigerian food industry.

Findings: 'Access to the internet' had the highest rank (F15) (0.33741), which showed that it was the most important factor in developing sustainable entrepreneurship of food industry, regarding to media role in Nigeria. 'production process and the environment' (F1) (0.33461) ranked second and was close to the 'price satisfaction' (F17) (0.32049) in importance. In addition, managers should not ignore the 'excellent functional quality of the brand,' 'personal attributes of customers' care' and 'packaging quality,' since these three factors were ranked fourth, fifth and sixth, respectively.

Implications & Recommendations: The entrepreneurs should focus more on this dimension to develop a sustainable food industry in Nigeria. Meanwhile, media availability had a significant role in developing sustainable entrepreneurship in Nigeria.

Contribution & Value Added: Most researchers focused on sustainable entrepreneurship without considering the impacts of media as a channel of achieving it by changing the consumers' behaviours towards consuming a particular product. Therefore, this research -investigated how media could moderate the effect of sustainable entrepreneurship on consumer purchase behaviour, taking evidence from the food industry in Nigeria.

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INTRODUCTION

Many customers of the food customers are unaware of the effects of the use of chemicals on the natural environment and their health (Organization, 2019; Schreinemachers & Tipraqsa, 2012; Ivanov *et al.,* 2021; Pilelienė & Tamulienė, 2021). However, through the use of media, it will be made known to them, and it will change their purchasing behaviour that will also affect production processes. Most researchers, however, focus on sustainable entrepreneurship without considering the impacts of media as a channel of achieving it through changing the consumers' behaviours towards the consumption of a particular

product. Therefore, this research investigated how media could facilitate the effect of sustainable entrepreneurship on consumer purchase behaviour, taking evidence from the food industry in Nigeria. To have sustainable food production, new innovation needed to be put in place, which is termed 'agropreneur.' To meet the food demand of the growing Nigerian population and reduce economies of scale, the food processing industries in Nigeria need to increase their production scale (Ogori & Joeguluba, 2015). Therefore, marketing becomes a vital tool in increasing productivity and making the products acceptable to the teaming customers. The media provide a better channel for communicating with customers and changing their purchasing behaviours towards locally made food products.

Decision making and evaluation of products are greatly affected by the flow of information, which give social media the great advantage of changing customers' purchase behaviours and their preferences for products' brand (Kotler & Armstrong, 2012; Kohli *et al*., 2015, as cited in Vafaei *et al*., 2016; Streimikiene & Ahmed, 2021). Therefore, social media has become a vital tool in need by industries to express their operation and attract customers (Kaplan & Haenlein, 2010). The introduction of social media into entrepreneurship has significantly removed time constraints by providing online tools that facilitate sharing multimedia contents with easier interfaces that allow non-professionals to share content (Fotis, 2015). Through social media, consumers can access a lot of vital information on utility on given products, costs, and reviews of satisfaction ratings by other customers. These change consumers' behaviours and business activities, greatly impacting e-commerce (Vafaei & Farkas, 2015). Meanwhile, knowledge sharing based on e-commerce may also affect consumer behaviour.

Various environmental developments over the past years has resulted in a hope for a better environment in future. One may even state that recently, there has been a shift to a circular economy, where materials are reused, and if new materials are needed, they must be obtained sustainably so that the environment is not damaged (Shpak et al., 2021; Richterová *et al*., 2021; Skvarciany *et al*., 2021). This resulted in a challenge to make all activities of economic development sustainable. This led to the emergence of many pieces of research on sustainable agriculture and entrepreneurship (Sargani *et al.,* 2020). The need for sustainable economic development gave rise to sustainable entrepreneurship, bringing together economic gain, environmental protection and social equity (Henriques & Richardson, 2013; Jaki & Siuta-Tokarska, 2019; Yeasmin, 2016; Androniceanu & Georgescu, 2022).

Through the past decades, there have been positive achievements on the environmental protection attitudes and activities that resulted from customers that have good orientation on the need of the environment, and this affects people and set values that make them realise the impact of their purchasing behaviour on the physical environment and change their consumption choices (Zhuang *et al.,* 2021). However, this change in activities affects only the informed consumers about the need for sustainable entrepreneurship, while customers without the knowledge of the green products make no impact on the production and consumption of the products. Therefore, media has a role to play in informing and reaching consumers about the new business innovation that offers both the present and the future needs of the environment, which is sustainable entrepreneurship (Onete *et al.,* 2013). This may involve using social networks such as Facebook, Twitter, YouTube, Instagram, etc. Ellison *et al.,* (2007) point out that Facebook gives the company the ability to pass messages to customers freely. Consumers normally respond to a product based on the adequate knowledge and information they have about it at a given time (Falkowl, 2010; Musova *et al.* 2021). This allows the customers to assess different companies and organisations based on their content and offer. The green products should then be advertised through media to educate the potential customers to know how their purchasing power affects their social environment both now and in the future.

Once the consumers are informed, it may affect their decisions, which will significantly impact sustainable entrepreneurship. Family members, peers, associates, and relatives can easily be influenced by a committed customer who has more information about the products, which will affect consumers' purchasing behaviours (Belwal & Amireh, 2018; Mnerie *et al.,* 2014; Herhausen *et al.,* 2019; Cong *et al*., 2021). Social media is a good messenger that can easily be advertised and allow review of products by customers and also recommendations from benefited customers (Kaplan & Haenlein, 2010). Channelling the use of media in the food industry will therefore be of great value and importance to both the producers and consumers.

However, the major concern should be on sustainable entrepreneurship according to which the food industries should adhere to the green economy and focus of the sustainable development goals (Baldesku & Ilysheva, 2022). Due to demand in increased production, many farmers that provide the raw material for food industries are adopting the use of chemicals in their production as means to reduce time waste and increase their yields (Valbuena *et al.,* 2021). However, this contrast with the need for a green economy that offers sustainable entrepreneurship.

The article's objective is to identify how media can facilitate the effect of sustainable entrepreneurship on consumer purchase behaviour based on evidence from the food industry in Nigeria. The article answers the following research questions:

RQ1: How can the media facilitate the effect of sustainable entrepreneurship on consumer purchase behaviour of the Nigerian food industry?

RQ2: What are the main dimensions and factors of sustainable entrepreneurship?

RQ3: Which factor has more priority in comparison with other factors?

This article is structured as follows. Firstly, we will present the literature review to introduce our research variables. Secondly, we will introduce the study's methodology and discuss the results of data analysis, and finally, we will present the theoretical and practical contributions, along with the limitations and suggestions for future research.

LITERATURE REVIEW

Sustainability refers to a conscious effort of carrying out development or any form of activity to avoid depleting the natural settings. This shows that sustainability is the ability to maintain the social, economic, and environmental factors equally in activities that provide the present needs without harming future generations' needs (Strange & Bayley, 2008; Matuszewska-Pierzynka, 2021; Stanek-Kowalczyk, 2021; Florek-Paszkowska *et. al.*, 2021). The act of teaching or training individual's innovation, combining factors of production into products, taking a financial risk of investing capital, social risk of efforts and time into a business to achieve profits and satisfaction is termed entrepreneurship (Ismail Kayode *et al.,* 2016). The diverse nature of the natural endowment in Nigeria has made entrepreneurial activities very possible in the early period (Raimi *et al.,* 2010). One should add entrepreneurship is the vehicle through that which the economic system is entered (Meyer & Krüger, 2021). Entrepreneurship, therefore, provides the platform to exploit different business opportunities with the available resources using new ideas and innovation. Therefore, sustainable entrepreneurship is a key factor in pursuing economic opportunities that bring into existence future products that have both economic and non-economic gains to society and individuals ((Ibe *et. al*., 2020; Chigozirim *et. al.*, 2021; Gregori & Holzmann, 2020; Hahn *et al.,* 2018; Bouzari *et al.,* 2021). This made businesses consider the impacts of all activities economically, environmentally and socially to ensure a greener way of life both now and in the future. This enables linking economic activities with social and environmental values to sustain well-being for future generations rather than limiting all activities to financial gain to the detriment of environmental standards (Tiba *et al.,* 2021; Davidson *et al*., 2021). It is needed to provide solutions to environmental problems rather than adding to the existing ones. Sustainable entrepreneurship should bring changes in the market products and services that require less use of natural resources and energy, which adheres to the productive empowerment and decent work of UN sustainable development goal 8 (Moya-Clemente *et al.,* 2020). Therefore, a business should always look for ways of consuming less energy, recycling or renewing resources to protect social and environmental conditions while achieving profits (Delibasic, 2022).

Although the concept of sustainable entrepreneurship is becoming an emerging topic in some African countries, there is a need to study how key factors of sustainable entrepreneurship in specific countries, such as Nigeria, have evolved, especially in such a significant sector as the food industry (Lin, & Ayegba, 2020). Moreover, the role of media availability in promoting sustainable entrepreneurial activities in these countries needs major attention. Nevertheless, only a few studies have implicitly mentioned such an important topic. For instance, Ibidunni *et al.* (2021) have generally investigated the disruptive power of innovation to improve sustainable entrepreneurship through small and medium

firms in Nigeria. They suggest that by focusing more precisely on improving sustainable entrepreneurship in Nigeria through SMEs, the country's socio-economic situation will improve significantly. In another study, Moya-Clemente *et al.* (2020) identified a number of factors to develop Nigeria in terms of environmental and economic aspects by highlighting sustainable entrepreneurial activities. They used the approach proposed in sustainable development goals, which is used predominantly in African countries. Chukwu *et al.* (2021) also highlight the need for sustainable entrepreneurship education in Nigeria. Nevertheless, they overlooked the role of media in such an approach. In another relevant research, Baporikar and Fotolela (2020) explored the main socio-cultural aspects for sustainable entrepreneurship development in African countries. Their analysis was focused on particular aspects of sustainable entrepreneurship development at a micro-level.

The literature on the connection between sustainable entrepreneurship and media is also rare. For instance, in a relevant study, Giessen (2015) studied the two concepts of sustainable entrepreneurship and media-based learning. The research sheds light on how the media could contribute to sustainable entrepreneurship development. Besides, in their seminal work, Gregori and Holzmann (2020) explore the concept of digital sustainable entrepreneurship as an emerging topic. Their study was firm-level research that highlighted the business models that could help embed digital technologies to create socio-environmental values. Crecente *et al.* (2021) also believe that sustainable entrepreneurship could impact media. They implicitly indicate this issue, but their research does not provide specific insights. Verdugo and Villarroel (2021) measured the relationship between how students were exposed to social media and their insights about sustainable entrepreneurship. This research also was mainly focused on how students' attitudes could be changed to improve sustainable entrepreneurship. Moreover, Matzembacher *et al.* (2020) mention that promoting sustainable entrepreneurship education campaigns on the Internet, social media platforms, and other types of media could help improve sustainable entrepreneurial activities. Anderson *et al.* (2017) also believe that using social media could empower communities to engage in sustainable entrepreneurial activities.

In sum, although a series of studies shed light on various aspects of the questions raised in this research, many aspects of the topic have remained unaddressed. Therefore, this research contributes to the extant body of the literature by providing more precise answers to the research questions.

RESEARCH METHODOLOGY

Variables for the Delphi method

Based on the in-depth literature review, we used five various groups of variables (D1-D5) for our Delphi methdo (Table 1), which we discuss in detail below. Each group included a couple of factors and in total we investigated 20 various factors (F1-F20).

Green innovation

Entrepreneurship can greatly influence consumers' purchase behaviours by bringing about scientific innovation and employment opportunities that will boost competitiveness (Schultz *et al.,* 2011). Over the decades, green entrepreneurship was significantly investigated by diverse scholars and policymakers, which resulted from the growing need for new ideas that result in profitable ventures (Hussain *et al.,* 2021).

Media availability

The advance of social media means and their accessibility facilitates reaching out to all customers while saving transportation costs. The availability of social media is a vital tool that aids green entrepreneurs' promotion amongst young people (Himel *et al.,* 2016; Mazurek *et al.,* 2019). Therefore, it is of utmost importance to determine the number of customers that have access to *e.g.* the Internet, social networking sites, mobile phones, and laptops, as it directly affects the flow of information. Hennig-Thurau *et al.* (2004) and Ismail (2017) maintain that social media has taken over consumers lives which affects their interactions with producers and marketers.

Products quality

Although media has a vital role in advertising green products, the product quality goes a long way in attracting consumers and affecting their behaviours. The quality of the products provides consumers with functional benefits that satisfy their needs, this describes products' quality as conformance to requirements or fitness for it uses (Russell & Taylor, 2019). In addition, Lakhal & Pasin (2008) support the International Organisation for Standardisation's definition of product quality 'as the ability to satisfy the customer and market.' Therefore, product quality deals with the features, reliability, and conformance of products presented to the customers via social media advice and physical products.

Quality of service

The quality of service provided by either the manufacturers or marketers to the consumers has a major role in influencing their purchase behaviours. This has to do with all the services provided before and after the sale. Shaharudin *et al.* (2010) state that an after-sale service could create a long-term customer relationship with producers or distributors. Unconsumable products like electric appliances require different services such as repair, replacement, installation, warranty, cashback, and assistance in their operations and maintenance (Bei & Chiao, 2006). The quality of service should never be compromised as it greatly affects customers' ways of thinking.

Customer satisfaction

The satisfaction derived from the use of a product influences the demand for the product again. Kotler & Armstrong (2012) define consumer satisfaction 'as a condition in which consumer expectations is met by a product.' This is consumers' psychological response to the positive evaluation of their actual consumption experience that meets their expectations of a product (Shukla, 2004). This revealed the customer assessment in respect to sacrifice, efforts, and cost incurred in accessing a product or service and the benefits derived from the products or service (Chitty *et al.,* 2007). Therefore, consumer satisfaction is paramount for all entrepreneurs from start to end of the production process, which is meeting its final user or consumer.

Table 1. Dimensions and factors based on Delphi technique and literature review

Dimensions	Factors	References
D1: Green Innovation	F1: Production process and the environment	Schultz *et al.* (2011) Hussain *et al.* (2021)
	F2: Production and social value	
	F3: Minimising risk and maximising profit	
	F4: Opportunities created	
D2: Media Availability	F5: Access to the internet	Hennig-Thurau *et al.* (2004) Himel *et al.* (2016) Ismail (2017)
	F6: Access to social media gadgets	
	F7: Availability of social networking sites	
	F8: Ability to provide a comparison between brands	
D3: Products Quality	F9: Excellent functional quality of the brand	Lakhal & Pasin (2008) Russell & Taylor (2006)
	F10: Durability of the products	
	F11: Reliability of the products	
	F12: Aesthetic features of the products	
D4: Quality of Service	F13: Packaging quality	Bei & Chiao (2006) Shaharudin *et al.* (2010)
	F14: Delivery time reliability	
	F15: After-sale service provisions	
	F16: Personal attributes of customers' care	
D5: Customers' Satisfactions	F17: Price satisfaction	Chitty et al. (2007) Kotler & Armstrong (2018) Shukla (2004)
	F18: Distribution satisfaction	
	F19: Brand satisfaction	
	F20: Quantity satisfaction	

Source: own study.

Expert sample

This study population included experts who had sufficient information, expertise, and experience in the field of sustainable entrepreneurship and marketing, with special attention to online social platforms and consumer purchasing behaviour. There were 33 experts interviewed in this study. Data were collected from experts within three months (July-September). In the research sample, 51.5% and 48.5% of the respondents were men and women, respectively. The highest number of respondents (54.5%) were in the age groups of 40-50 years, 45.6% of the respondents held master's degrees suggesting that most respondents have completed higher education. Most of the respondents were entrepreneurs (online and offline businesses). The pairwise questionnaire sheets were sent via email to respondents.

To check the validity of the measurement tool, content validity was used (Moghadamzadeh *et al.,* 2020), and a pairwise questionnaire was provided to experts to confirm question's accuracy. The purposeful sampling of the present study was a purposeful judgmental sampling, and 33 experts answered the questions. The experts had at least 15-years of experience in work or marketing research related to entrepreneurship, the food industry, and consumer purchase behaviour.

Most of the respondents were entrepreneurs in the field of online social platforms and answered pairwise questionnaires via an online link sent to them in online social platforms channels. Sampling continued until the theoretical saturation stage. To determine the reliability, the ICC coefficient value was confirmed in terms of consistency (Ebrahimi *et al.,* 2020; Janavi *et al.,* 2021; Salamzadeh *et al.,* 2021). Experts were asked to rate the questionnaire based on 'average measure of every factor,' and these scores were used to calculate the ICC coefficient. Meanwhile, the absolute agreement coefficient value was also confirmed in 95% confidence intervals.

Analytic network process (ANP)

The ANP, a method derived from the analytic hierarchy process (AHP) proposed by Saaty (1996), adds the dependence and feedback relationships to the AHP and provides a more generalised framework than the AHP for dealing with decision-making problems in which there is a need to consider assumptions about dependencies between criteria and alternatives (Matin *et al.,* 2020). The ANP uses a super matrix algorithm to determine the priority weights of the goals, criteria, and alternatives. The ANP (Saaty, 1996), the general form of the AHP (Saaty, 1980), was used in Multiple-Criteria Decision-Making (MCDM), which allows for inclusion of interdependent relationships. This method has been widely applied to many fields (Chang *et al.,* 2013). This research follows the steps proposed by Saaty (1996).

The Delphi method

A case study is presented here to examine the practicality of the proposed evaluation framework. A group of experts in entrepreneurship was formed to define the key constructs regarding sustainable entrepreneurship. With an previously mentioned review of the literature and consultation of the group based on the Delphi technique, 17 factors were determined. A list of factors constructs was identified (Table 1). This study followed the steps proposed in previous studies (Brooks, 1979; Kamble & Raut, 2019; Mehta *et al.,* 2014). In the next step, outputs of the ANP approach are interpreted.

RESULTS AND DISCUSSION

The ANP method was employed to rank the importance of all factors in this section. The nine-point scale pairwise comparison by Saaty (1996) was used to prepare a questionnaire. The consistency property of each matrix from each expert was checked first to ensure the consistency of judgements in the pairwise comparisons. The results of pairwise comparisons showed the priorities of dimensions and factors with respect to dimensions when the inter-relationship among factors was not considered. In fact, pairwise comparisons are used to establish the element relationships within each cluster.

Each column of a super-matrix was either a normalised eigenvector with possibly some zero entries or all of its block entries are zero. The unweighted super-matrix illustrated in the first part of

Appendix 1 was then multiplied by the priority weights from the clusters (calculated by super decision software), which yields the weighted super-matrix (second part of appendix 1). This was done because a matrix must be stochastic, *i.e.* its columns must add to one. Finally, the system solution was derived by multiplying the weighted super-matrix of model variables by itself, which accounts for variable interaction, until the system's row values converge to the same value for each column of the matrix. This 'power method' process yields the limiting matrix, which provides the relative importance weights for every factor in the model (Appendix 1).

In brief, the unweighted super-matrix was normalised to form a weighted super-matrix. The weighted super-matrix was then raised to limiting powers to capture all the interactions and achieve convergence. In the weighted super-matrix, we could obtain the priorities shown in Table 2.

According to Table 2, the importance weighted of the five dimensions were D5=0.33245, D2=0.31103, D1=0.13505, D3=0.12987 and D4=0.09159. Customers' satisfaction (D5) was the key dimension that affects sustainable entrepreneurship in the food industry of Nigeria. The entrepreneurs should focus more on this dimension on developing the sustainable food industry in Nigeria. Meanwhile, Media availability had an important and significant role in developing sustainable entrepreneurship in Nigeria.

Moreover, considering the global weights, the priorities of factors were F5>F1>F17>F9>F16>F13>F18>F2>F10>F6>F15>F8>F12>F20>F11>F3>F19>F14>F4>F7. 'Access to the internet' had the highest rank (F15) (0.33741), which shows that it is the most important factor to develop sustainable entrepreneurship of food industry, regarding to media role in Nigeria. 'Production process and the environment' (F1) (0.33461) ranked second and was close to the 'price satisfaction' (F17) (0.32049) in importance. In addition, managers should not ignore the 'excellent functional quality of the brand,' 'personal attributes of customers' care' and 'packaging quality,' since these three factors were ranked fourth, fifth, and sixth, respectively.

Table 2. Priorities of dimensions and factors

Dimensions	Factors	Weights (Normalised by cluster)	Limiting
D1: Green Innovation (0.13505)	F1: Production process and the environment	0.33461	0.04168
	F2: Production and social value	0.25248	0.03145
	F3: Minimising risk and maximising profit	0.20756	0.02585
	F4: Opportunities created	0.20535	0.02558
D2: Media Availability (0.31103)	F5: Access to the internet	0.33741	0.08209
	F6: Access to social media gadgets	0.23723	0.05772
	F7: Availability of social networking sites	0.20450	0.04975
	F8: Ability to provide a comparison between brands	0.22086	0.05373
D3: Products Quality (0.12987)	F9: Excellent functional quality of the brand	0.31681	0.03839
	F10: Durability of the products	0.24873	0.03014
	F11: Reliability of the products	0.21550	0.02611
	F12: Aesthetic features of the products	0.21896	0.02653
D4: Quality of Service (0.09159)	F13: Packaging quality	0.27969	0.02537
	F14: Delivery time reliability	0.20548	0.01864
	F15: After-sale service provisions	0.22746	0.02063
	F16: Personal attributes of customers' care	0.28738	0.02607
D5: Customers' Satisfactions (0.33245)	F17: Price satisfaction	0.32049	0.13470
	F18: Distribution satisfaction	0.25554	0.10740
	F19: Brand satisfaction	0.20642	0.08676
	F20: Quantity satisfaction	0.21755	0.09143

Source: own study.

CONCLUSIONS

Regrettably, Nigerians have lots of challenges in their food sectors; this has resulted in 65% of Nigerians facing challenges of food insecurity (Federal Ministry of Agriculture and Water Resources, 2010). Despite all agricultural programmes aimed at improving agricultural productivity in the country, fewer results were achieved as billions of dollars are being spent annually on the importation of processed agricultural food such as rice, wheat, sugar, frozen fish etc. Owing to the population growth rate in Nigeria, it is paramount to improve its food productivity by setting up new agro-allied enterprises that will bring innovative measures into agribusiness in the country (Owoade, 2017).

This article analysed how media could moderate the effect of sustainable entrepreneurship on consumer's purchase behaviour based on evidence taken from the Nigerian food industry. Different dimensions with their respective factors were considered, as presented in Table 1. According to their weights, all the dimensions and their respective factors were ranked using ANP. Therefore, this shows that consumer satisfaction plays a vital role in influencing the food industry's sustainability in Nigeria and should be an area of focus and concern for all entrepreneurs who work in the food industry or planning to join it. The ability of the product to meet the consumer's expectation is what Kotler and Armstrong (1999) term as 'consumers satisfaction.' Therefore, food industries should prioritise the ability of their products to satisfy the consumers and their environment. There is no iota of doubt that once the products meet the expectation of the consumers, they are willing to sacrifice their means, efforts, and time to access the products (Chitty *et al.,* 2007). Amongst the five dimensions, consumers' satisfaction carried the heavyweight in influencing the sustainability of food industries, and this should be prioritised if the goal of sustainable entrepreneurship is to be achieved.

Adding to the costumers' satisfaction, media availability was also ranked second in influencing consumer purchase behaviour in Nigerian food industries. The availability of media provides access to the dissemination of information about products and the process of production. Since the target of sustainable industries is meeting both the need of their customers and also maintaining process of production that maintains the environment, this should be made known to the customers, so they should know the production process has no negative impact on the environment and purchasing such products helps in preserving the environmental quality and standards. Various forms of media should be used in achieving this. Currently, there is no overstatement in saying that social media has taken over consumers' lives and this greatly affects their interaction with both the producers and the marketers (Hennig-Thurau *et al.,* 2004; Ismail, 2017).

Looking at the global weights, that is considering the rank priorities of all the factors in the dimensions, access to the Internet was ranked first (0.33741). This implies that for sustainable entrepreneurship of food industry in Nigeria, the Internet should be made available to offer connectivity of all the social platform that will enable advertisement and dissemination of vital information about the products and quality rendering customers services with less cost. Social networks is playing an ever-increasing role in economics, and will play it in years to come (Ebrahimi *et al.,* 2019). Social media remains the vital tool for entrepreneurship promotion amongst young people (Himel *et al.,* 2016). According to the ranking, the second factor was the production process and the environment (0.33461). The production process has an essential role in sustainable entrepreneurship in Nigeria, influencing the customers' decisions concerning environmental quality. The production processes should consider economic opportunities that bring products that have both economic and non-economic gains to society and individuals (Gregori & Holzmann, 2020; Hahn *et al.,* 2018). The food industries should consider both the impacts of all activities economically, environmentally and socially to ensure a greener way of life both now and in the future. Economic activities should be linked with social and environmental values in their production process to sustain good well-being for future generations rather than limiting all activities to financial gain to the detriment of environmental standards (Tiba *et al.,* 2021). It is needed to provide solutions to environmental problems rather than adding to the existing problems.

In addition, the satisfaction of consumers on the price of products, functional quality of the brand and brand satisfaction also have good weight amongst factors that influence costumers' behaviours in the food industry.

The results provided a perspective on the development of sustainable entrepreneurship in the developing country of Nigeria. The results emphasised the importance of the two dimensions of 'customers' satisfaction' and 'media availability.' In fact, the first step in developing sustainable entrepreneurship is creating public interest in it and the media is a powerful tool to do it. Especially online social platforms can play a significant role in this regard. The research results emphasise the important role of media availability in developing sustainable entrepreneurship. Internet access and presence on social networks can lead to transfering data very quickly. Although this study does not mention the role of government in the development of the Internet, it seems that government support is needed to further develop sustainable entrepreneurship in the Nigerian food industry. Creating and developing an Internet infrastructure should be a priority. From another point of view, it should be noted that innovation is the key to success in entrepreneurship and the need to pay attention to innovation, especially in the food industry, which has experienced high competition in recent years. The fact that the Internet access is the most important factor in sustainable entrepreneurship development is a testimony to the high importance of social media and online commerce. Concerns about the production process and environmental issues also have an important place that the research results emphasise. It is important to note that price is also mentioned as an essential factor in the direction of sustainable entrepreneurship, and specifically, price satisfaction is an important factor in sustainable entrepreneurship research. From a managerial point of view, the need to pay attention to customer satisfaction and environmental issues has always been discussed. In the developing country of Nigeria, the food industry plays a vital role. Therefore, the scientific and economic views of this field should be considered.

There are some limitations to this research. Access to field experts was one of the most important concerns of researchers. On the other hand, data collection in COVID-19 pandemic conditions made the research difficult (Androniceanu, 2020). Due to the limitations of the ANP method, this research has only emphasised prioritising and weighting dimensions and factors. Future researchers are suggested to use a combination of ANP and ISM methods to identify strategic factors. Furthermore, due to the importance of resource allocation in the food industry, innovative methods such as the Non-Compartmental Analysis (NCA) analysis are recommended. Future researchers are encouraged to use the Importance Performance Map Analysis (IPMA) approach to develop the present study to identify the 'importance' and 'performance' of research factors and dimensions. Finally, research variables can be predicted in the form of a practical model using machine learning.

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Appendix A: ANP super-matrices and limit matrix

	F17	F18	F19	F20	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15	F16
Unweighted supermatrix																				
F17	0.000	0.000	0.000	0.000	0.422	0.185	0.175	0.391	0.138	0.451	0.096	0.443	0.138	0.552	0.483	0.431	0.431	0.401	0.096	0.569
F18	0.000	0.000	0.000	0.000	0.266	0.415	0.383	0.276	0.195	0.261	0.205	0.278	0.195	0.250	0.257	0.246	0.246	0.360	0.183	0.218
F19	0.000	0.000	0.000	0.000	0.174	0.293	0.135	0.195	0.276	0.169	0.289	0.183	0.276	0.080	0.147	0.189	0.189	0.147	0.278	0.124
F20	0.000	0.000	0.000	0.000	0.137	0.107	0.307	0.138	0.391	0.119	0.409	0.096	0.391	0.118	0.113	0.135	0.135	0.092	0.443	0.089
F1	0.391	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.383	0.461	0.138	0.431	0.138	0.391	0.138	0.483	0.138	0.414	0.120	0.431
F2	0.276	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.328	0.236	0.195	0.246	0.195	0.276	0.195	0.276	0.195	0.295	0.168	0.246
F3	0.195	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.168	0.168	0.276	0.189	0.276	0.138	0.276	0.141	0.276	0.157	0.328	0.189
F4	0.138	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.120	0.135	0.391	0.135	0.391	0.195	0.391	0.101	0.391	0.135	0.383	0.135
F5	0.391	0.000	0.000	0.000	0.391	0.461	0.138	0.391	0.000	0.310	0.528	0.493	0.104	0.100	0.418	0.391	0.391	0.115	0.458	0.508
F6	0.276	0.000	0.000	0.000	0.276	0.236	0.195	0.276	0.196	0.000	0.333	0.311	0.165	0.129	0.261	0.195	0.276	0.140	0.260	0.220
F7	0.195	0.000	0.000	0.000	0.195	0.168	0.276	0.195	0.310	0.196	0.000	0.196	0.322	0.267	0.197	0.138	0.195	0.313	0.179	0.169
F8	0.138	0.000	0.000	0.000	0.138	0.135	0.391	0.138	0.493	0.493	0.140	0.000	0.409	0.504	0.124	0.276	0.138	0.432	0.104	0.103
F9	0.391	0.000	0.000	0.000	0.431	0.391	0.138	0.391	0.094	0.402	0.113	0.490	0.000	0.000	0.000	0.000	0.420	0.195	0.124	0.391
F10	0.276	0.000	0.000	0.000	0.246	0.276	0.195	0.276	0.165	0.325	0.188	0.231	0.000	0.000	0.000	0.000	0.289	0.391	0.188	0.276
F11	0.195	0.000	0.000	0.000	0.189	0.195	0.276	0.195	0.309	0.157	0.283	0.163	0.000	0.000	0.000	0.000	0.168	0.138	0.299	0.195
F12	0.138	0.000	0.000	0.000	0.135	0.138	0.391	0.138	0.433	0.115	0.417	0.116	0.000	0.000	0.000	0.000	0.123	0.276	0.389	0.138
F13	0.391	0.000	0.000	0.000	0.083	0.116	0.138	0.391	0.431	0.414	0.096	0.080	0.096	0.429	0.104	0.431	0.000	0.000	0.000	0.000
F14	0.138	0.000	0.000	0.000	0.214	0.140	0.195	0.276	0.246	0.295	0.183	0.195	0.205	0.348	0.146	0.246	0.000	0.000	0.000	0.000
F15	0.195	0.000	0.000	0.000	0.301	0.280	0.276	0.195	0.189	0.157	0.270	0.299	0.289	0.130	0.311	0.189	0.000	0.000	0.000	0.000
F16	0.276	0.000	0.000	0.000	0.401	0.465	0.391	0.138	0.135	0.135	0.443	0.425	0.409	0.092	0.439	0.135	0.000	0.000	0.000	0.000
Weighted supermatrix																				
F17	0.000	0.000	0.000	0.000	0.251	0.110	0.104	0.232	0.075	0.244	0.052	0.239	0.067	0.269	0.235	0.210	0.185	0.171	0.041	0.244
F18	0.000	0.000	0.000	0.000	0.158	0.247	0.228	0.164	0.105	0.141	0.111	0.150	0.095	0.122	0.126	0.120	0.105	0.154	0.078	0.093
F19	0.000	0.000	0.000	0.000	0.104	0.174	0.080	0.116	0.149	0.091	0.156	0.099	0.135	0.039	0.072	0.092	0.081	0.063	0.119	0.053
F20	0.000	0.000	0.000	0.000	0.081	0.064	0.182	0.082	0.211	0.064	0.221	0.052	0.191	0.057	0.055	0.066	0.058	0.040	0.190	0.038
F1	0.097	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.038	0.046	0.014	0.043	0.027	0.076	0.027	0.094	0.030	0.089	0.026	0.092
F2	0.069	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.033	0.024	0.020	0.025	0.038	0.054	0.038	0.054	0.042	0.063	0.036	0.053
F3	0.049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.017	0.028	0.019	0.054	0.027	0.054	0.028	0.059	0.034	0.070	0.040
F4	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.012	0.013	0.039	0.013	0.076	0.038	0.076	0.020	0.084	0.029	0.082	0.029
F5	0.098	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.020	0.020	0.081	0.076	0.084	0.025	0.098	0.109
F6	0.069	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.032	0.025	0.051	0.038	0.059	0.030	0.056	0.047
F7	0.049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.063	0.052	0.038	0.027	0.042	0.067	0.038	0.036
F8	0.035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.080	0.098	0.024	0.054	0.030	0.093	0.022	0.022
F9	0.098	0.000	0.000	0.000	0.107	0.097	0.034	0.097	0.021	0.089	0.025	0.108	0.000	0.000	0.000	0.000	0.060	0.028	0.018	0.056
F10	0.069	0.000	0.000	0.000	0.061	0.069	0.049	0.069	0.036	0.072	0.042	0.051	0.000	0.000	0.000	0.000	0.041	0.056	0.027	0.039
F11	0.049	0.000	0.000	0.000	0.047	0.049	0.069	0.049	0.068	0.035	0.063	0.036	0.000	0.000	0.000	0.000	0.024	0.020	0.043	0.028
F12	0.035	0.000	0.000	0.000	0.034	0.034	0.097	0.034	0.096	0.026	0.092	0.026	0.000	0.000	0.000	0.000	0.018	0.039	0.056	0.020
F13	0.098	0.000	0.000	0.000	0.013	0.018	0.022	0.061	0.060	0.057	0.013	0.011	0.012	0.052	0.013	0.053	0.000	0.000	0.000	0.000
F14	0.035	0.000	0.000	0.000	0.034	0.022	0.031	0.043	0.034	0.041	0.025	0.027	0.025	0.042	0.018	0.030	0.000	0.000	0.000	0.000
F15	0.049	0.000	0.000	0.000	0.047	0.044	0.043	0.031	0.026	0.022	0.039	0.041	0.035	0.016	0.038	0.023	0.000	0.000	0.000	0.000
F16	0.069	0.000	0.000	0.000	0.063	0.073	0.061	0.022	0.019	0.019	0.061	0.059	0.050	0.011	0.054	0.016	0.000	0.000	0.000	0.000
Limiting supermatrix																				
F17	0.138	0.000	0.000	0.000	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138	0.138
F18	0.110	0.000	0.000	0.000	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110	0.110
F19	0.083	0.000	0.000	0.000	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083	0.083
F20	0.085	0.000	0.000	0.000	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085	0.085
F1	0.048	0.000	0.000	0.000	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048	0.048
F2	0.037	0.000	0.000	0.000	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037	0.037
F3	0.032	0.000	0.000	0.000	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032	0.032
F4	0.033	0.000	0.000	0.000	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033	0.033
F5	0.044	0.000	0.000	0.000	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044	0.044
F6	0.031	0.000	0.000	0.000	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031
F7	0.029	0.000	0.000	0.000	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
F8	0.029	0.000	0.000	0.000	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029	0.029
F9	0.055	0.000	0.000	0.000	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055
F10	0.043	0.000	0.000	0.000	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043	0.043
F11	0.035	0.000	0.000	0.000	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035	0.035
F12	0.034	0.000	0.000	0.000	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034	0.034
F13	0.038	0.000	0.000	0.000	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038	0.038
F14	0.026	0.000	0.000	0.000	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026
F15	0.031	0.000	0.000	0.000	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031	0.031
F16	0.039	0.000	0.000	0.000	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.039	0.039

Source : own study.

Authors

Barnabas Nuhu Yakubu's share is 20%, Aidin Salamzadeh's share is 20%, Parisa Bouzari's share is 20%, Pejman Ebrahimi's share is 20% and Maria Fekete-Farkas's share is 20%

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Conflict of Interest

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Marketing determinants of innovation ambidexterity in small and medium-sized manufacturers

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ABSTRACT

Objective: The study aimed to identify the marketing determinants of SMEs' innovation ambidexterity and explore this phenomenon in the firms from a post-transition Polish market. Specifically, market-sensing capability, entrepreneurial marketing orientation, and marketing strategies were considered the possible determinants of innovation ambidexterity. The comparative character of the study enabled examining if these relationships have changed comparing 2019 to the time of pandemic crisis in 2021.

Research Design & Methods: The study includes a sample of 240 Polish manufacturing SMEs contacted with the CATI/CAWI method in May 2019 and 219 firms selected and surveyed according to the same method between January-February 2021. The results were obtained with factor analysis and logistic regression.

Findings: Innovation ambidexterity was related to market sensing, opportunity focus, proactive orientation, and adaptation strategy applied by manufacturing SMEs in the B2B markets. However, during the pandemic crisis, the different determinants replaced those identified during the less turbulent time.

Implications & Recommendations: Entrepreneurial marketing accompanies innovation ambidexterity. Including employees in the sensing process and concentrating on market opportunities are especially stimulating for exploratory and exploitative innovations. The significant influence of firm size and high-tech industry on ambidexterity points to the role of SMEs' strategic agility in a turbulent environment.

Contribution & Value Added: The study explored in detail the marketing determinants of an important SME capability: innovation ambidexterity. Comparing data from the span of two years enabled taking into account the pandemic crisis. In addition, the study verified the measurement tool for analyzing SME ambidexterity.

Article type:	research article
Keywords:	ambidextrous innovation; determinants; entrepreneurial marketing; SME; comparative study
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INTRODUCTION

Small and medium-sized manufacturers (SMEs) constitute essential part of economies worldwide, and especially in post-transition and emerging markets, they contribute significantly to economic growth. In Poland, the SMEs create 49.1% of GDP, and in 2021, the post-pandemic recovery period, the Polish GDP grew by 5.7% (GUS, 2022).This growth resulted mainly from the increase in manufacturing and exports (*Europe and Central Asia Economic Update, Fall 2021: Competition and Firm Recovery Post COVID-19*, 2021; Frączyk, 2021). However, Polish SMEs have problems introducing organizational or marketing innovations (ZPP, 2021). New or substantially improved products or processes were introduced by only 11.2% of small Polish firms and 34.3% of medium-sized SMEs in the 2017-2019 period (PARP, 2021).

The SMEs' management and marketing capabilities (Kaleka & Morgan, 2019; Cui *et al.*, 2014; Lin & Si, 2019) are still understudied. Among them, especially learning and informal market sensing are the characteristic attributes of small and medium-sized enterprises which make them succeed against the competition (Bruneel *et al.*, 2010; Pellegrino & McNaughton, 2015). Such firms develop specialized marketing capabilities helping them to maintain customer intensity, including cooperation in preparing innovations for the foreign markets (Kowalik *et al.*, 2020). They display an ambidextrous attitude towards innovations, which can be the critical input for performance enhancement (Martin *et al.*, 2017), all the more critical at turbulent times. Innovation ambidexterity includes companies' engagement in perfecting the 'old' tried-out product offering (exploitative innovations) and looking for completely new solutions (exploratory innovations). According to the literature, ambidexterity concerning innovations is the organizational capability to manage both radical exploratory innovation and exploitative incremental innovation simultaneously (Kang & Hwang, 2019).

As O'Reilly & Tushman (2004) suggest, firms need to balance exploration and exploitation to achieve superior performance. In this way, they can exploit the existing competencies and explore new opportunities with equal dexterity (Gibson & Birkinshaw, 2004). Numerous studies have provided evidence of the significant role of ambidexterity for firm performance (Ahmadi *et al.*, 2020; Jansen *et al.*, 2006; Yan *et al.*, 2021). Although this is an important capability, it has not been examined in post-transition market SMEs, and especially the determinants of innovation ambidexterity in SMEs are still not adequately explored (Chang & Hughes, 2012; Clercq *et al.*, 2014). The earlier studies deal mainly with the antecedents of ambidexterity of strategic management in organizations (Raisch & Birkinshaw, 2008). Among them, the centralization of decision-making, the role of formal procedures (Jansen *et al.*, 2006), internal rivalry and knowledge accessibility (Clercq *et al.*, 2014) were found. Ambidexterity antecedents including the human resources management (Cao *et al.*, 2009; Junni *et al.*, 2015) were also broadly explored. Nevertheless, the studies on innovation ambidexterity antecedents in SMEs are scarce (Yan *et al.*, 2021; Lin & McDonough, 2011; Martin *et al.,* 2017), which makes it an important research gap.

Managers of SMEs from post-transition markets are very flexible in adjusting their offering to market changes; it has been proven that the exporting firms from Central and Eastern Europe base their success on the corporate flexibility and high quality of products (Caputo *et al.*, 2016; Danik & Kowalik, 2015). Moreover, studies provide evidence supporting the existence of developed capabilities of learning and market sensing and the application of diverse knowledge sources by such SMEs during the consequent stages of their growth (Ciszewska-Mlinarič *et al.*, 2020; Głodowska *et al.*, 2019; Kowalik *et al.*, 2021; Maciejewski & Wach, 2019). They apply an entrepreneurial approach to marketing, displaying high proactiveness and opportunity focus in their relations with the market (Kowalik *et al.*, 2017). Additionally, the marketing strategies of such firms are idiosyncratic and adjusted to the dynamic environment (Baranowska-Prokop & Sikora, 2014). Therefore, considering the role of marketing for such firms (Govindarajan *et al.*, 2011; Hagen *et al.*, 2019), we aim at finding out how its elements, including the market-sensing capability, firm orientation, and strategies, may influence innovation ambidexterity. Moreover, we want to examine if these relationships have changed from 2019 to the time of pandemic crisis in 2021.

We decided to analyse the relations among marketing and innovation ambidexterity in two samples of SMEs selected according to the same criteria before and during the pandemic crisis in a post-transition Polish market. This Central-European context offered the possibility to verify the existing concepts and uncover new relationships between them in a new setting, which may fill an essential gap in the literature on entrepreneurship.

The study is structured as follows. Firstly, the literature background concerning the small firms' new product development capabilities and ambidexterity determinants will be provided. Next, we will describe the methodology, including sample characteristics. Further, we will present the analysis of hypotheses concerning the relationships between variables and a discussion of the study outcomes with available literature. Finally, we will provide the implications for future studies.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Small Firms' Capability of New Product development

According to the resource-based view (Hughes *et al.*, 2010; Kozlenkova *et al.*, 2014), the capability of innovation introduction belongs to the subset of resources whose purpose is to improve the productivity of the other resources in the firm. In light of the dynamic capabilities view, closely connected with the resource-based view (Al-Aali & Teece, 2014), new product development is a higher-order capability that enables reconfiguring other resources in an organization. Especially in an export context, this capability is likely to be further necessitated due to the dynamic nature of the environment (Efrat *et al.*, 2018). Those exporters who can display new ways of thinking and operating are more likely to derive lasting competitive advantages. In the words of Boso *et al.*, (2013, p. 62), 'from a resource-based perspective, innovativeness is valuable and idiosyncratic to firms, an intangible asset that may provide businesses with a competitive advantage by being too costly for rival firms to replicate.' Innovation capability is based on knowledge and enables firms to respond to the market by exploiting knowledge in the form of different innovation outputs associated with developing new products or variants of existing ones (Monferrer *et al.*, 2021). To conduct, coordinate, and balance the conflicting modes of exploitative and exploratory innovation and learning, firms need an organizational capability of ambidexterity (Cantarello *et al.*, 2012; Nosella *et al.*, 2012). Referring to innovations' introduction, one can talk about innovation ambidexterity (Cabeza-Pullés *et al.*, 2020). Jansen *et al.* define it as the ability to simultaneously pursue exploratory and exploitative innovation (Jansen *et al.*, 2005). The combined ambidexterity in new product development means that high numbers of both exploratory and exploitative innovations are introduced and valued by the organization (Mehrabi *et al.*, 2019). In response to the market needs or internal company goals of ambidextrous firms, the existing products are improved (exploitative innovations), but an exploration of new product ideas also takes place. Exploratory innovation can be measured by the extent to which the firm departs from existing knowledge and skills or existing customers, markets, and products (Benner & Tushman, 2003) by commercializing products and services entirely new to its market. On the contrary, as Benner and Tushman claim, exploitative innovation is expressed by how firms build on existing knowledge and skills or existing customers, markets, and products, by adding minor adaptations to existing products.

Ambidexterity is considered to be a dynamic capability, which an organization can exhibit at different levels (Carter, 2015). First-order ambidexterity considers shifting the ratio of exploitation and exploration to support new strategies (O'Reilly & Tushman, 2008). Second-order ambidexterity involves dynamically shifting the dominant logic to adapt top management thinking, behaviour, and processes to manage the organizational system (Carter, 2015). In our study, we concentrate on the first-order dynamic capability of innovation ambidexterity. The capability view suggests that the effective deployment of such valuable and idiosyncratic capabilities leads to the competitive advantage and superior performance in the target markets (Kaleka & Morgan, 2019; Zhou *et al.*, 2010). The literature suggests synergistic effects of exploration and exploitation, and hence there is a need for firms to manage the balance between them (Raisch & Birkinshaw, 2008). As some studies show, combining both exploration and exploitation at high levels is more important than maintaining these dimensions at a balance, *i.e.*, equally pursuing exploration and innovation but on moderate levels (Junni *et al.*, 2013).

In an extensive review of studies, Jansen *et al.* (2006) show that organizational ambidexterity is important for better performance, particularly in nonmanufacturing industries, and this relationship is moderated by contextual factors. Martin *et al.* (2017) have demonstrated that ambidextrous innovation moderates the relationship between international venture marketing capabilities and the companies' positional advantage. It has also been proved empirically that capabilities of exploration and exploitation in new product development contribute jointly to the improved performance of multinational firms from emerging markets (Wu & Chen, 2020). Moreover, exploration and exploitation in new product development have been shown to impact the rate of international entrepreneurship (Lin & Si, 2019). The literature, however, provides limited evidence on the SMEs' ambidextrous innovation antecedents (Chang & Hughes, 2012). So far, there have been mostly studies of its consequences. In addition, as studies show,

SMEs' marketing is essential to their success (Hagen *et al.*, 2019), so it is worth discussing what marketing factors may influence innovation ambidexterity, as it may lead to favourable outcomes.

Determinants of Ambidexterity

Based on an extensive literature review, Turner *et al.* (2013, p. 326) defined that ambidexterity is the capability to both use and refine the existing knowledge (exploitation) while also creating new knowledge to overcome knowledge deficiencies or absences identified within the execution of the work. As studies show, ambidexterity of strategic management in organizations has various internal antecedents and influencing factors in the environment (Raisch & Birkinshaw, 2008). Among the studied determinants, Clercq *et al.* (2014) point to internal rivalry and knowledge accessibility. Within the external determinants Raisch and Birkinshaw (2008) mention the moderating role of environmental dynamism in the relationship between exploratory innovations and financial performance, while Clercq *et al.* (2014) mention external competitive rivalry. Moreover Cao *et al.* (2009) and Junni *et al.* (2015) explored the role of human resources management and organizational factors in developing ambidexterity and built an integrated model of these factors based on a literature review.

Few studies have focused on the specific innovation ambidexterity antecedents. Jansen *et al.* (2006) include among them the centralization of decision making in companies, and the role of rules and formal procedures. Lin & McDonough (2011) examined the impact of leadership style and organizational culture on innovation ambidexterity. Its antecedents were also explored by Yan *et al.* (2021), who examined the effects of investment in infrastructure on the ambidexterity-performance relationship, and the influence of investments on both exploration and exploitation strategies. The marketing determinants of ambidextrous innovation in SME-exporters were analysed by Martin *et al.* (2017) and Kauppila (2010) who found that organizational culture centred on customers promotes ambidexterity.

The small number of studies regarding the marketing determinants of innovation ambidexterity is surprising, because the essential supply-side marketing capabilities include information gathering and its use to guide the development of new products or improvement of existing ones (Kaleka, 2011). Moreover, the ability to understand the target market with associated institutional factors and effectively transfer the developed knowledge home to inform, enrich, or transform the product development process constitutes the basis of market orientation (Jaworski *et al.*, 2000; Kaleka & Morgan, 2019).

The capability of market sensing is defined as a firm's propensity to actively and purposefully monitor the customers, competition, technology, and general environment (Miocevic & Morgan, 2018), but also by the concrete 'routines' needed for acquiring valuable knowledge about and from the foreign markets (Salojärvi *et al.*, 2015; p. 7).

The market sensing concept proposed in previous studies involves both the assessment of the current environment and forecasting the future stage of the market (Day, 1994). Day identifies the following types of market sensing: (1) sensing activities, (2) interpreting sensed information, and (3) evaluating activities, related to monitoring and assessment (Ardyan, 2016; Day, 2002). Therefore, the sensing process must be concentrated not only on gathering information, but also on drawing the insights from this information by the staff who uses them in everyday decisions.

Thus, market sensing belongs to the higher-order dynamic capabilities of firms that should accompany flexibility in new product development, understood as the propensity to both explore the new knowledge and make adaptations in the old, functioning concepts (Salojärvi *et al.*, 2015). A study of Spanish firms (Monferrer *et al.*, 2021) supported the hypothesis that firms which can absorb the outside knowledge are also superior in introducing innovations. A similar relationship was found by (Cabeza-Pullés *et al.*, 2020) who showed that knowledge absorption impacted innovation ambidexterity. Moreover, based on the comprehensive dataset from the Community Innovation Survey, Santos *et al.* (2021) found that companies which promote knowledge creation, innovate significantly more. In a large study of SMEs from leather and furniture industry, Ardyan (2016) showed that their market-sensing capability had a significant effect on their product innovativeness' success. Therefore, the capabilities of sensing may be the antecedents of ambidexterity in innovation, and it is worth exploring the following hypothesis:

H1: Market sensing is positively related to innovation ambidexterity.

There have also been studies examining the influence of strategic company orientations on innovativeness. Among them Hult *et al.* (2004) and Zortea-Johnston *et al.* (2012) observed an effect of entrepreneurial orientation (EO) and marketing orientation (MO) on innovativeness. Bhattacharya *et al.* (2019) have recently studied the influence of combined EO and MO on innovation performance. Zortea-Johnston *et al.* (2012) found that an EO offers a more balanced approach than an MO, because it promotes both market-driving and market-driven innovation. According to Zortea-Johnston *et al.* (2012, p. 157), 'entrepreneurially oriented firms actively search for and pursue new opportunities, focus on long-term R&D, empower employees to contribute to the innovative process of the firm, acquire new resources, and expand into new markets to grow.' Moreover, this study shows that an MO does not lead to market-driving innovations and does affect market-driven innovations but to a lesser extent than an EO. In the quoted study, the effect of an EO on market-driven innovations was significantly more pronounced than the impact of an MO. However, we argue that both these orientations (EO and MO) may increase innovation capabilities if a firm displays them simultaneously. The EO and MO form the theoretical foundation of entrepreneurial marketing (EM) (Whalen *et al.*, 2016). Consistent with the resource-advantage theory (Mayasari *et al.,* 2009), marketing can facilitate the ability of firms to create new resources and enhance the productivity of current resources through leveraging and championing innovation in the form of unique combinations of resources. Studies show that entrepreneurially oriented firms or individuals can explore new and creative ideas that may help them change the market dynamics and anticipate future demands ahead of competitors (Hakala, 2011). Lin and MacDonough (2011) found that entrepreneurial culture of an organization is crucial to exhibit innovation ambidexterity. Atuahene-Gima and Ko (2001) show that the firms with a combination of entrepreneurial and market orientations have a better new product performance than others. However, the nature of the relation of entrepreneurial marketing with the exploration/exploitation capabilities is still unknown. Entrepreneurial marketing's characteristic features include proactive orientation (P); opportunity focus (OP); customer orientation (CO); low-risk marketing (RM) and value creation (VC) (Fiore *et al.*, 2013). Entrepreneurial orientation encourages learning, as the characteristic proactiveness and opportunity focus are connected with gathering new knowledge (Nasution *et al.*, 2011). On the one hand, proactiveness as a particular characteristic of entrepreneurs, seems to particularly contribute to exploratory, radical innovations, because the new knowledge can be included in the new value offerings for the customers. On the other hand, customer responsiveness, an element of MO, can stimulate exploitative innovation when replying to the changing customer needs. Value creation, a typical feature of entrepreneurial marketing (Morris *et al.,* 2002), should contribute to exploratory and exploitative innovations. As studies show, value creation could be concentrated on both augmenting the existing products and service offerings, as well as providing new solutions according to client demand (Shanmugathas, 2022). In addition, the opportunity focus, characteristic for entrepreneurial marketing, helps in locating market niches, which present the possibility for new product launches, thus stimulating various innovation types. Finally, a characteristic feature of EM, low-risk marketing, includes pursuing low cost and low-risk marketing activities. As Chang and Hughes (2012) have shown, the risk-taking tolerance of managers favours innovation ambidexterity. Thus, we expect low-risk marketing to be negatively related to innovation ambidexterity. Summing up, it is reasonable to expect the following relationships concerning the EM dimensions:

H2a: Entrepreneurial marketing dimensions of proactive orientation, opportunity focus, customer orientation and value creation are positively related to innovation ambidexterity.

H2b: Entrepreneurial marketing dimension of low-risk marketing is negatively related to innovation ambidexterity.

Firms engaged in entrepreneurial marketing develop specific strategies stemming from their characteristic proactiveness and customer orientation. Mort *et al.* (2012) outline four basic EM strategies, including opportunity creation, customer intimacy-based innovative products, resource enhancement, and legitimacy. Hallbäck and Gabrielsson (2013) describe product adaptation and

innovation introduction as the entrepreneurial marketing strategies that help born global firms to develop abroad. Kumar and Yakhlef (2011) mention customer relationship quality management, customer-relationship proactiveness, and customer-focused innovativeness as the EM strategies leading to competitive sustenance and growth of born-global firms. Whalen *et al.* (2016) propose that in entrepreneurial marketing, the co-creation with customers becomes the essential strategy of the firm. This type of strategy was also mentioned by Yang (2018) who adds accelerating customer value and international expansion based on regional market leadership, value innovation, marketing co-creation, and low-cost marketing as typical international EM strategies.

Therefore, adaptation to customer needs, including introducing constant changes in products tailored to the expectations of their recipients, seems to be the EM strategy promoting innovation. According to a study of 234 Scottish SMEs (Chang & Hughes, 2012) the more top managers' leadership is characterized by risk-taking tolerance and adaptability, the higher the ambidexterity of such firms. Adaptation involves both incremental changes and radical ones, which incorporate new technologies or patented solutions demanded by the clients. Therefore, promoting adaptation in products and processes might also help create the capability to carry out ambidextrous innovation.

Entrepreneurial approach includes adaptation of the products and services to client needs and the differentiation of the offering compared to the competition (Gabrielsson *et al.*, 2012). The literature treats the focus on the appearing new product opportunities as the crucial factor enabling the growth of young entrepreneurs (Whalen & Akaka, 2016). Making the offering standing out from the competing products requires continuous innovations as well. Furthermore, the constant perfecting of existing offering may contribute to quality differentiation. Thus, it is reasonable to expect firms which engage in differentiation of product offering to adopt an ambidextrous attitude towards innovations. Therefore, we propose to verify the following hypotheses (Figure 1):

H3a: Adaptation strategy application is positively related to innovation ambidexterity.

H3b: Differentiation strategy application is positively related to innovation ambidexterity.

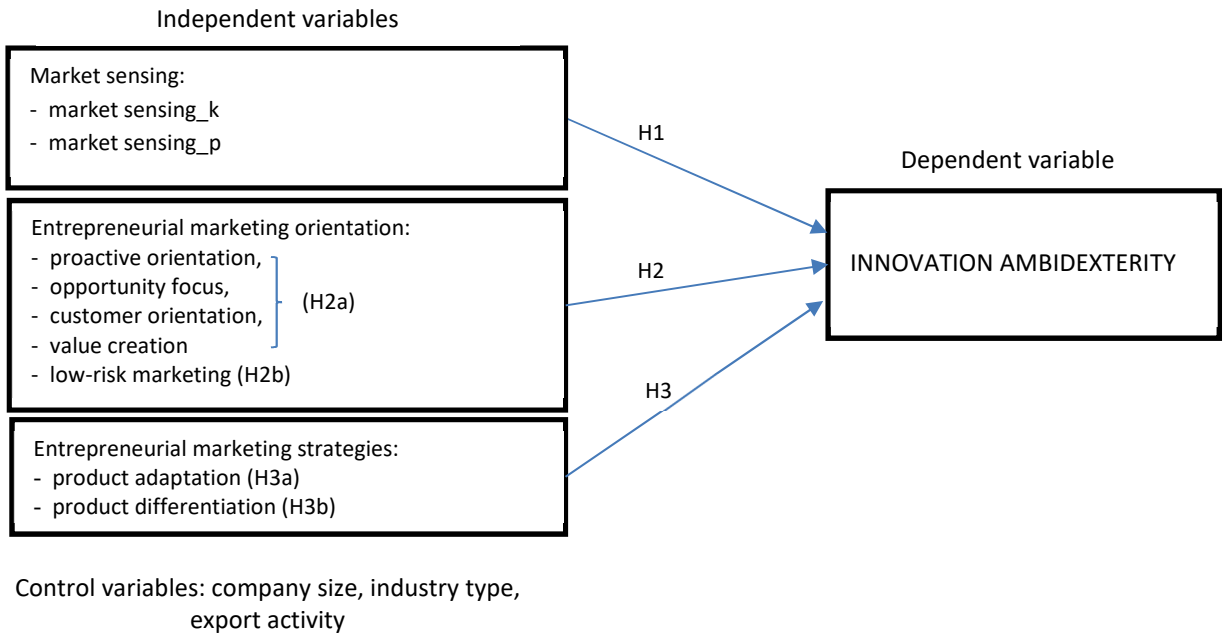

Figure 1. Conceptual model summary
Source: own elaboration.

RESEARCH METHODOLOGY

Sample and Data Gathering

The data for the first part of the study were collected in May 2019 using the mixed-mode method, *i.e.*, 207 interviews were obtained with the CATI and 33 – with CAWI technique. The studied population was drawn from a Bisnode database comprising 2969 Polish manufacturing SMEs, of which the final sample fulfilled the following criteria: manufacturing firms with 10-249 employees, established after 2003 and not being a result of a merger or takeover, never being a subsidiary of a foreign company. One hundred twenty companies were strongly internationalized, having at least 25% export share in total sales; the other 120 companies were active mainly locally (further referred to as non-exporters). The respondents were primarily sales/export/marketing directors or firm owners.

Almost 67% of the sample were small companies with 10-49 employees (Table 1). Most of the companies under study (c.a. 59%) did not reach the yearly turnover of 2 million Eur; 29% of the companies declared the total sales value between 2 and 10 million Eur and 12% – of 10-50 million Eur. In the sample, 44.2% of the companies served both the B2B and B2C markets; 25.4% operated exclusively on the B2B market, and 30.5% served B2C clients only. Later, we eliminated the firms that did not serve B2B clients from the analysis, to make the sample from 2019 comparable with the second one.

Table 1. Sample composition

Company characteristics		2019 (n=167)	2021 (n=219)
B2B	B2B	36.5%	67.6%
	B2B2C	63.5%	32.4%
Size	small (10-49 employees)	66.5%	62.1%
	large (50-249 employees)	33.5%	37.9%
Hitech	No	73.1%	78.5%
	Yes	26.9%	21.5%
Exporters	No	52.1%	50.2%
	Yes	47.9%	49.8%

Note: 'B2B' denotes firms serving only businesses; 'B2B2C' denotes firms serving both businesses and individual customers.
Source: own study.

In 2021, we surveyed 219 Polish SMEs with a CATI/CAWI mixed-mode method as a second subsample. They had similar characteristics as those surveyed in 2019 – namely, they belonged to the manufacturing industry, they had to be established not earlier than 1995 (80% of them were established in 2004 or later), not as a result of a merger of other firms, not as a branch of a foreign-based company, with a foreign ownership share of 0-45% (172 firms had less than 30% of foreign capital share). All firms had to serve B2B clients. The population meeting the above criteria in the purchased Bisnode database was 1395, of which 807 firms were drawn by a randomized algorithm, giving each of the firms an equal chance to participate in the study. Out of this group, 211 firms refused to participate, 46 stopped answering the questionnaire without finishing, 228 firms agreed to participate, but at times beyond the study, 75 did not meet the other selection criteria.

Measurements

To find out about the actual innovation-introducing activities, a screening question was asked (Appendix 5) (*Oslo Manual 2018*, 2019). Later, only the companies who answered this question positively were analyzed concerning innovation ambidexterity.

Exploratory innovation relates to the generation of new products, an extension of product range, penetration into new technology fields, and opening new markets. Exploitative innovation involves improving existing product quality, production flexibility, and reduced production cost. Using the translated ambidextrous innovation scale proposed by Martin *et al.* (2017) and He and Wong (2004), we checked the respondents' perception of the importance of these innovation types for their firms. In-

novation ambidexterity was a second-order construct consisting of two first-order reflective constructs, *i.e.*, INN1 – exploitative innovations and INN2 – exploratory innovations (Appendix 5).

The innovation ambidexterity scale was evaluated using factor analysis, applying the principal component extraction method and Promax rotation. It led to identifying two dimensions of innovativeness: exploitative innovations (INN1) and exploratory innovations (INN2), which explained 73% of the variation of the data in the sample (Table 2). In 2019, these dimensions retained the descriptors present in the original model (Martin *et al.*, 2017). The reliability level of both subscales was satisfactory (Cronbach's ά of INN1=0.852; INN2=0.830). Communalities showed that the two-dimensional solution reflected well all items' variances.

Table 2. Innovation ambidexterity: results of factor analysis (Pattern Matrix)[a]

Item name	Scale component		Communalities
	INN1	INN2	
INN1_1 [perfecting the quality of current products]	0.823	–	0.721
INN1_2 [improving production flexibility]	0.953	–	0.817
INN1_3 [lowering production costs]	0.898	–	0.720
INN2_1 [introducing new product generations]	–	0.917	0.775
INN2_2 [extending the product range]	–	0.966	0.806
INN2_3 [entering the new markets]	0.420	0.481	0.610
INN2_4 [penetration into new technology/manufacturing fields]	0.430	0.514	0.671

Note: scale items adapted from Martin *et al.* (2017). Extraction method: Principal Component analysis. Rotation method: Promax with Kaiser normalization. a. Rotation converged in three iterations. Sample n=240 firms (2019).
Source: own study.

As mentioned, we assumed that firms displayed innovation ambidexterity if they showed high levels of both exploitation (INN_1) and exploration (INN_2) (Junni *et al.*, 2013) (Mehrabi *et al.,* 2019). To select such firms in both years, we used the median level of summary exploration construct and the median level of summary exploitation construct as a cut-off value. Only the firms that scored equal to or higher than the cut-off value on both these dimensions were assigned as ambidextrous.

Among the independent variables, the entrepreneurial marketing orientation (EMO), was measured with a multidimensional construct, adapted from the study of Fiore *et al.* (2013). Entrepreneurial marketing orientation, which encompasses the features of both entrepreneurial and market orientations, has been conceptualized in a few recent studies. The basic conceptualization holds that EMO is based on entrepreneurial, market, innovation, and customer orientations (Jones & Rowley, 2011). More recently, based on a vast quantitative study, EMO has been conceptualized as including entrepreneurial orientation, and customer orientation, but also market driving, and resource-leveraging (Eggers *et al.*, 2020). The scale elaborated by Fiore *et al.* (2013) has the advantage of undergoing validation procedures and included the dimensions important for our study's viewpoint (Kowalik & Pleśniak, 2020). The applied EMO construct consisted of the following first-order reflective constructs: proactive orientation, opportunity focus, customer orientation, value creation, and low-risk marketing. Each construct comprised variables based on questionnaire items using seven-point Likert scales (Appendix 2). The reliability and validity of EMO dimensions were assessed based on F-L criteria (Fornell & Larcker, 1981) (Table 3).

As can be seen in Table 3, the constructs making up the EMO model presented satisfactory reliability and validity levels in 2019 (Nunnally & Bernstein, 2008). The measurement model showed an acceptable fit ($\chi 2$; 140.975; df 55; p<0.000) NFI =0.939; TLI =0.946; CFI =0. 962, RMSEA = 0.081; 90% CI for RMSEA [0.065; 0.097]). However, in 2021, the CO and VC dimensions could not be reflected in the same way as in 2019 due to a limited item set. Therefore, we used a construct which comprised item 1. from the original CO construct and items 1. and 2. from the original Value Creation construct. The average levels of items making up the EMO scale are shown in Appendix 3. We entered the EM dimensions in the regression model as separate variables because it was not possible to replicate the summary EMO construct in both analysed years. In addition, the hypothesized relations between Low-risk marketing and INN had an opposite direction compared to the remaining EMO dimensions.

Table 3. Reliability and validity assessment of the EMO scale

Construct	2019		2021	
	AVE	CR	AVE	CR
Proactive orientation (P)	0.777	0.913	0.811	0.928
Opportunity focus (OP)	0.692	0.818	0.780	0.914
Customer Orientation (CO)	0.669	0.858	0.311	0.566
Value Creation (VC)	0.907	0.951	n.a.	n.a.
Low-risk marketing (RM)	0.555	0.789	0.599	0.740
Discriminant validity	max|r_{ij}| = 0.827, maxMSV = 0.684, ASV = 0.433		max|r_{ij}| = 0.887, maxMSV = 0.674, ASV = 0.314	

Note: CR – Composite reliability, AVE – Average variance extracted, max|rij| - maximum inter-construct correlation, MSV - maximum shared variance, ASV-average shared variance.
Source: own study.

The other independent variables were:

- Market sensing – measured with two statements based on (Sinkula *et al.*, 1997) and (Salojärvi *et al.*, 2015)(Appendix 5). To keep the number of categories small for the purpose of logistic regression analysis, both variables were dichotomized. Answers from one to four were recoded into zero (*no*), and five to seven into one (*yes*).
- Entrepreneurial marketing strategies, *i.e.*, product adaptation and product differentiation – assessed with the statements using semantic scales derived from (Baranowska-Prokop & Sikora, 2014) (Appendix 5). To keep the number of categories small for the purpose of logistic regression analysis, the two variables expressing entrepreneurial marketing strategies were dichotomized. Answers from one to two were recoded into zero (not using the strategy), and from three to five into one (yes).

Moreover, there were three control variables: company size (small from 10 up to 49 employees; medium 50-249 employees); technology level, measured using the classification of Eurostat (2018), which led to dividing the sample into two groups of SMEs (low-tech/high-tech); and export activity (yes/no).

RESULTS AND DISCUSSION

Innovation Ambidexterity Level

The innovativeness level in the sample of 2021 was lower than in 2019, which might have been due to the pandemic crisis. In 2019, 67% of firms confirmed they introduced innovations of any type, while in 2021, only 28% of firms did. In both years, the most popular innovations concerned the products (80.1% of all innovating firms in 2019 and 45.9% in 2021) and processes (63.6% in 2019 and 34.4% in 2021).

As for the innovation ambidexterity, descriptive statistics related to this construct's components are shown in Appendix 1. The statistics showed a considerable negative asymmetry in 2019; that is, most respondents chose values of statements above the mean level, and there was a tendency to agree with them. The kurtosis value was the highest for three statements (INN1_1, INN2_2, INN2_3). Thus, in 2019, respondents paid much attention to perfecting the new product quality, broadening the product range, and entering new markets. In 2021, levels of innovation ambidexterity measures were lower than in 2019. The differences were significant for six out of seven items, as assessed based on the Mann-Whitney U test (Appendix 1). The asymmetry was positive but not strong. That is, respondents tended to somewhat disagree with the statements. Compared to 2019, 'lowering of production costs' and 'extending the product range' were the activities that showed the most considerable decrease of mean levels.

The distributions of firms displaying innovation ambidexterity (high levels of both exploitation and exploration) in both years are included in Table 4.

Table 4. The distributions of firms displaying innovation ambidexterity in 2019 and in 2021

Dimension		2019 (n=116)		total	2021 (n=61)		total
		exploreQ2			exploreQ2		
		no	yes		no	yes	
exploitQ2	no	31.9%	17.2%	49,1%	19.7%	21.3%	41.0%
	yes	17.2%	**33.7%**	50,9%	14.8%	**44.3%**	59.0%
total		49.1%	50.9%	100%	34.4%	65.6%	100.0%

Note: exploitQ2 – number of firms with values of exploitation on or above the median; explorQ2 – number of firms with values of exploration on or above the median.
Source: own study.

As table 4 shows, in 2019, there were 33.7% firms displaying combined ambidexterity, and in 2021 there were 44.3% such firms among those introducing innovations. However, the proportion of ambidextrous firms in 2019 and in 2021 was not significantly different for the two samples as assessed based on a z-test for proportions (Z=1.391, p=0.164).

Determinants of ambidexterity

We used a logistic regression method to analyze the data because the dependent variable, *i.e.* innovation ambidexterity, was dichotomous. The correlation analysis was conducted before running the regression models (Appendix 4). As it showed, in 2019, there was a significant correlation of innovation types with all entrepreneurial marketing dimensions. The EMO dimensions were more strongly correlated with exploratory innovations than with the exploitative ones. However, in 2021 there was a significant correlation of proactive orientation with exploration only, indicating that the more entrepreneurial firms were in their marketing activity, the more they perceived exploratory innovations as necessary.

Next, a logistic regression model including the innovation ambidexterity indicator as a dependent variable and the earlier-described independent variables was prepared. In 2019 (Table 5), the regression analysis evidenced a significant relationship of innovation ambidexterity with:

- market sensing (sensing_p), p=0.030; Exp (B) =3.331;
- opportunity focus, p=0.000; Exp (B)= 3.361;
- proactive orientation (Model 1), p=0.061; Exp (B)=0.299;
- adaptation strategy, p=0.060; Exp (B)=2.703.

The assessment of the estimated models was based on a goodness-of-fit test and pseudo-R-squared measures, *i.e.*, Cox and Snell R Square and Nagelkerke R Square. The models showed an acceptable level of fit, and Hosmer and Lemeshow's test showed no reason to reject any of them.

The analogous model was built for the 2021 sample (Table 5). It showed the following predictors of innovation ambidexterity:

- belonging to a high-tech industry, p=0.017; Exp (B)=3.367
- being a medium company, p=0.029; Exp(B)=0.340 which means that for small firms Exp(B)=1/0.340 = 2.94.

DISCUSSION

The study aimed to find out the determinants of innovation ambidexterity within the SMEs' marketing and to explore this phenomenon in the firms from a post-transition Polish market. We also intended to examine if the relationships between the studied variables have changed during the time from 2019 to the pandemic crisis. Ambidexterity in innovations is an important phenomenon representing the willingness of firms to both improve the existing offering, and to explore the new ideas and market opportunities. Balance and coordination of exploration and exploitation enable firms to avoid the risk of relying on only one type of these activities (Wu &Chen, 2020). As we have proved, the innovation ambidexterity construct which had been previously applied in firms from the mature economies (Martin *et al.* 2017) was reliable and valid when used in SMEs from the Polish post-transformation market.

Table 5. Determinants of ambidexterity in 2019 and 2021 (logistic regression model)

Dependent variable: innovation ambidexterity	**2019[a]**		**2021[b]**		**Hypothesis**
	B	**Exp(B)**	**B**	**Exp(B)**	
Model 1 (all variables entered)					
Market sensing_k	1.691	5.424	-0.218	0.804	H1
Market sensing_p	0.856	2.354	-0.265	0.768	
Proactive orientation (P)	-1.208 *	**0.299**	-0.269	0.764	H2a
Opportunity focus (OP)	2.127 **	**8.391**	-0.410	0.664	
Customer Orientation (CO)	0.020	1.021	-0.339	0.713	
Value Creation (VC)	0.076	1.079	n.a.	n.a.	
Low-risk marketing (RM)	0.424	1.528	-0.427	0.652	H2b
Adaptation strategy	0.858	2.358	0.236	1.266	H3a
Differentiation strategy	-0.093	0.911	-0.532	0.587	H3b
Export activity (EXP)	-0.760	0.468	1.082	2.950	Controls
Technology level (Hitech)	0.497	1.644	1.135 **	3.112	
Company size (medium)	0.600	1.823	-0.760	0.468	
Constant	-4.086 **	0.017	-0.600	0.549	
No_innovating	n.a.	n.a.	-3.040 **	0.048	
Model 2 (backward stepwise logistic regression)					
Market sensing_p	**1.203 ** **	**3.331**			H1
Opportunity focus (OP)	**1.212 ** **	**3.361**			H2
Adaptation strategy	**0.994 ***	**2.703**			H3a
Technology level (Hitech)			**1.214 ** **	**3.367**	Controls
Company size (medium)			**-1.078 ** **	**0.340**	
Constant	**-2.591 ** **	**0.075**	-0.030	0.971	
No_innovating			**-3.054 ** **	**0.047**	
Model fit	**Model 1**	**Model 2**	**Model 1**	**Model 2**	
-2 Log-likelihood	103.386	113.271	131.908	135.686	
Cox & Snell R Square	0.299	0.233	0.242	0.228	
Nagelkerke R Square	0.411	0.320	0.413	0.390	
Hosmer and Lemeshow Test sig.	7.208(8) 0.514	9.009(8) 0.342	7.652(8) 0.468	0.128(4) 0.998	

Note: a. Variables entered on step 1: EMO dimensions: P, OP, VC, CO, RM; market sensing: sensing_k, sensing_p; entrepreneurial marketing strategies: adaptation strategy, differentiation strategy; control variables: export activity, technology level, company size. b. Variables entered on step 1: P, OP, CO, RM, sensing_k, sensing_p, adaptation strategy, differentiation strategy, export activity, technology level, company size, No_innovating. No_innovating – indicates no innovation introduced in 2021. As the reference group was the innovating one, EXP(B) for No_innovating shows the odds ratio of ambidexterity of non-innovating relative to innovating firms; **significant at 0.05 level, *significant at 0.1 level.Source: own study.

Furthermore, among the innovators in the studied two groups of Polish SMEs, a considerable part could be called ambidextrous. They put above-average emphasis on exploitation and exploration (33% of studied firms in 2019 and 44% in 2021). Despite a much lower number of innovations introduced during the crisis, still considerable numbers of firms were ambidextrous. They most strongly agreed to statements concerning entering the new markets and perfecting the quality of current products in 2021. Breaking of the foreign market distribution chains in the pandemic (particularly those stemming from Asia), leading to Polish firms replacing foreign value chain members quickly, was probably conducive to ambidexterity in innovations (Wedziuk, 2020). Those firms who were able to succeed before the changes in the turbulent environment might have retained the dynamic capability of ambidexterity, which made them resistant to shocks.

As some earlier studies suggest, the economic crisis can be accompanied by an increase in exploration activities (Alcalde-Heras *et al.*, 2019), and the turbulence in the environment stimulates innovation orientation (Niazi *et al.*, 2019). Despite that, the share of ambidextrous firms in our sample did not change significantly despite the crisis. On the one hand, we showed that innovation ambidexterity

was still important for firms during the market turbulences, but on the other, there was no support for radical (exploratory) innovations gaining relative importance. It might have been connected with the early phase of the crisis (January 2021) when there was the need for studied SMEs to maintain customer responsiveness (flexible supply, continuous customer support), instead of offering new products. Eggers and Kraus (2011) who studied the behaviour of SMEs from Silicon Valley during the economic crisis showed that the surveyed firms concentrated on customer responsiveness and not innovativeness at that time. Thus, also in the studied Polish firms, customer orientation might have dominated their activity, which did not allow for high levels of innovativeness.

Referring to the proposed hypotheses, our study has shown on samples of the post-transition market firms that the determinants of ambidexterity could be found within their marketing. Market sensing, opportunity focus, and product adaptation strategy stimulated innovation ambidexterity in the more stable pre-crisis period. Our study found that market sensing is directly related to ambidexterity, thus supporting hypothesis 1. Market sensing helps the SMEs 'generate valuable knowledge that is essential in initial stages of value creation' (Miocevic & Morgan, 2018). As the regression analysis confirmed, including employees in discussing the effects of market trends and new products increased the odds of being ambidextrous by over 2.3 times in 2019. Thus, by generating knowledge about the opportunities, market sensing enabled these firms to become more willing to introduce exploratory and exploitative innovations. As Alcalde-Heras *et al.* (2019) also indicated, the market-sensing capabilities accompanied ambidexterity in Spanish firms. This is explained by the fact that market sensing is an absorptive capability (Miocevic & Morgan, 2018), which collaborates with customer responsiveness in implementing the gathered knowledge and stimulates innovation. Similar results were obtained by Kyriakopoulos & Moorman (2004) who showed that firms' market orientation, involving gathering data on customers, enabled an effective combination of marketing exploitation and exploration strategies. Market sensing served as a dynamic market-linking capability, which allowed the ambidextrous new product development processes to improve new product financial performance. Unfortunately, our study did not support these findings in 2021, at crisis time. It may be due to the selection effect. In the times of the crisis, only highly innovative companies managed to introduce both exploratory and exploitative innovations, and the number of ambidextrous companies was small as well. As a result, the variance among them was too small to find the relationship with market-sensing significant.

Concerning hypotheses 2a and 2b and the connection between entrepreneurial marketing and innovation ambidexterity, we obtained mixed results concerning different EMO dimensions. The regression analysis supported the existence of the most robust relationship between opportunity focus and ambidexterity. Being focused on opportunities increased the odds of introducing both types of innovations by over 2.3 times. Such a result is in-line with the significant relationship between market-sensing and innovation ambidexterity. Some authors claim that opportunity recognition depends on market sensing (Andersson & Evers, 2015). In our sample focusing on opportunities and 'reacting to them quickly, regardless of the budgetary constraints' led to ambidextrous innovations. This finding supports other studies concerning the role of informal information gathering for SME's marketing (Schwens & Kabst, 2011).

What's surprising, in 2019, the regression model showed a negative relation of proactive orientation with innovation ambidexterity. There were lower odds for the proactively-oriented firms to be ambidextrous. The explanation may be that they were so concentrated on exploratory innovations that the exploitative innovations' level was too low to be classified as 'ambidextrous.' Proactiveness enables internationalized SMEs to develop technologically advanced products ahead of the competition and is connected with faster adoption of the new technologies (Brouthers *et al.,* 2015; Jin & Cho, 2018). It is supported by the positive correlation of proactive orientation with exploratory innovations in our study both in 2019 and 2021 (Appendix 4). In 2019, all the entrepreneurial marketing dimensions were significantly more strongly correlated with exploration than with exploitation. Thus, we demonstrated that entrepreneurial marketing accompanies introducing radical innovations (Hage & Meeus, 2006) and thus, hypothesis 2a was partially supported.

As for hypothesis 2b, low-risk marketing did not influence innovation ambidexterity in our study. This result indicates that low-cost, step-by-step promotional activities of studied SMEs have no connection with their innovation efforts. Many smaller firms in Poland, especially in the B2B markets, still prioritize the superior quality of products, developed in contact with clients, and treat promotion as an insignificant element of their activities. Constant customer communication and co-production may enable information transfer without emphasizing the formal promotional efforts (Gilmore, 2011).

As the study showed, at the time of crisis, entrepreneurial marketing dimensions were not related to innovation ambidexterity. An explanation for this result might stem from the nature of entrepreneurial orientation. It accompanies innovation development (Sanz Valle *et al.*, 2020), but during a crisis, the environment factors may change the actual innovation-introducing activities of entrepreneurs while their attitudes remain unchanged (Bagozzi, 1981).

Finally, Hypothesis 3a was supported in 2019, when engaging in the adaptation of products to the market needs increased the odds of being ambidextrous by over 1.7 times. Such a mix of the earlier-mentioned opportunity focus, with an adaptation strategy, means that the SMEs which were alert to opportunities could offer rapid developments in their existing products and explore new ideas at that time. This can indicate following the Kirznerian approach to exploring market opportunities in a relatively stable environment (Sadiku-Dushi *et al.*, 2019). The studied firms were all active primarily on B2B markets, so this finding also confirms a vital role of customer focus in the industrial marketing relationships.

Hypothesis 3b considering the second examined marketing strategy was not supported, as the differentiation of products did not increase the odds of becoming ambidextrous in 2019, nor 2021. One possible explanation can be that the studied SMEs engaged more strongly in price differentiation, than in quality differentiation. They concentrated on making the products accessible at lower prices than the competitors, which made the differentiation strategy unrelated to innovation ambidexterity.

In fact, during the crisis, in 2021, following any of the entrepreneurial marketing strategies did not increase the odds of being ambidextrous. This result is difficult to explain, but some earlier studies shed light on it. For example, an analysis by Mehrabi *et al.* (2019) reveals that entrepreneurship has reverse relationships with ambidexterity and performance under different environmental conditions. Mehrabi *et al.* explain the interaction of the firm's strategic posture and environmental context with the contingency theory regarding the choice between exploration and exploitation strategies in different environments (Smith & Lewis, 2011). Thus, assuming the adaptation strategy in a turbulent environment may lead to lower levels of exploration and exploitation than at peaceful times. The reason might be that the firms which focus on adapting their offering in stable environments withdraw from new product exploration at the turbulent time, and concentrate only on exploitation, as they are unwilling to take the additional risk and cost of new products development.

Finally, according to the current study, being a small company and operating in a high-tech industry increased the odds of innovation ambidexterity at the times of crisis. The explanation for this may come from the greater agility and flexibility of the smaller firms than the medium-sized ones, which is especially useful during the crisis (Hagen *et al.,* 2019). This finding is also supported by a study covering 2 150 Spanish firms from 2009 to 2013 during the previous economic crisis. The authors found that smaller firms were more ambidextrous than larger ones (Alcalde-Heras *et al.*, 2019). Thus, our findings add up on theory concerning the organizational determinants of innovation ambidexterity (Junni *et al.*, 2015).

CONCLUSIONS

The study explored in detail the marketing determinants of an important SME capability which is ambidextrous innovation. By comparing data from two years, it enabled taking into account the pandemic crisis and showed that at that time, the identified relationships between variables lost their significance while the new organizational determinants of Innovation ambidexterity appeared. In addition, the study adapted and verified the ambidexterity measurement tool to the post-transition Polish market.

As a result of the study, three hypotheses concerning the marketing determinants of innovation ambidexterity in manufacturing SMEs have been supported in 2019 (Figure 2). To be specific, such elements of entrepreneurial marketing as systematic market sensing (H1), focus on market opportunities (H2a),

and product adaptation (H3a) are the determinants that make the small and medium-sized firms likely to strongly engage both in exploitation and exploration of new products. However, an evident change was noticed when comparing the pre-crisis and in-crisis determinants of innovation ambidexterity.

Thus, we may draw a conclusion that there were other determinants of this capability at crisis time, or the influence of the environment turbulence made the discovered relationships insignificant. This suggestion is supported by the earlier studies, which evidenced the environment's role as a determinant of ambidexterity (Jansen *et al.*, 2006; De Clercq *et al.*, 2014).

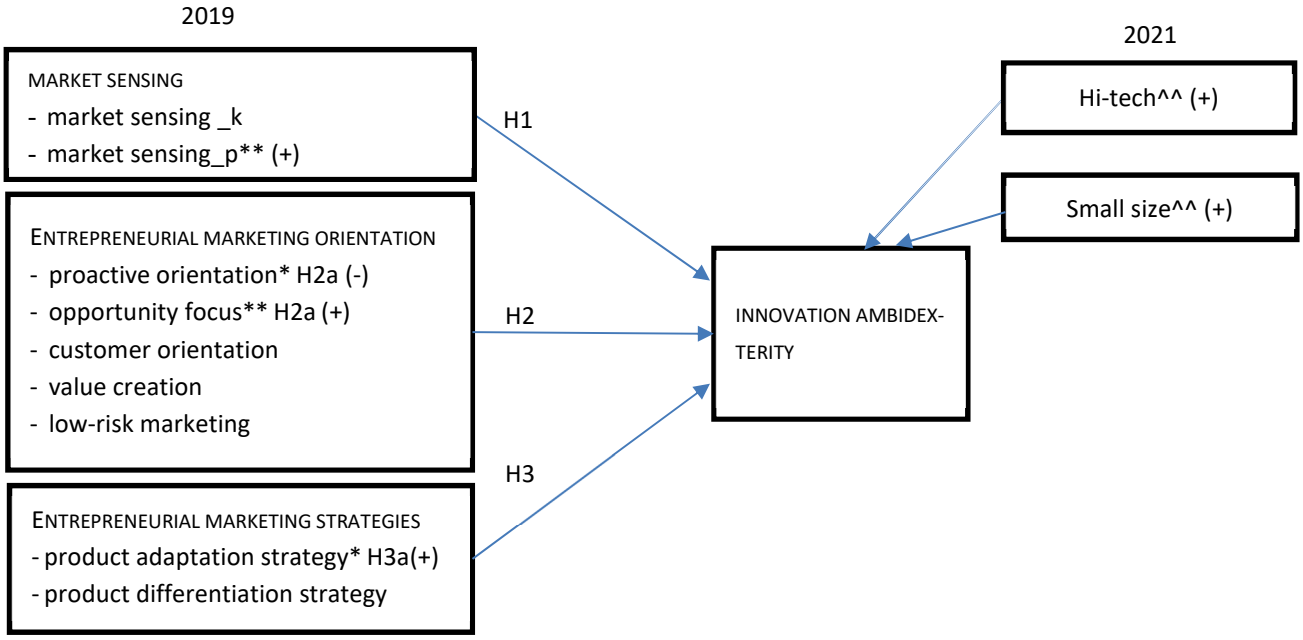

Figure 2. Verification of hypotheses
Note: **significant relationships in 2019, ^^significant relationships in 2021.
Source: own elaboration.

Furthermore, our study showed that innovation ambidexterity is a phenomenon characteristic for considerable numbers of the Polish manufacturing SMEs. Thus, the practical implications, directed at SME managers, relate to:

1. The role of market sensing and mainly of including employees in the sensing process in inducing ambidexterity.
2. The need to pursue entrepreneurial marketing, including an adaptation strategy, because it enhances the dynamic capability of innovation ambidexterity.
3. The importance of size and industry type for ambidexterity, as it becomes easier for smaller firms with more advanced technologies to maintain this capability at challenging times.

Another, more general implication of this study concerns the role of innovation ambidexterity in dynamic markets. As Sundqvist *et al.* (2012) showed, the Schumpeterian approach to entrepreneurship should be emphasized at crisis times. According to their study, risk-taking and innovativeness (contrary to competitive aggressiveness and autonomy) have stronger positive relationships with profits when markets are more dynamic. Therefore, both exporters and locally active firms should invest in the development of both exploratory and exploitative innovation capabilities when market turbulence increases. Our findings concerning the relative popularity of innovation ambidexterity in 2021 support such a recommendation.

The limitation of the study is that the findings apply mainly to SMEs from post-transition markets and the CEE region. Moreover, it has included mainly companies from low- and medium-tech industry branches. Therefore, it is worth extending the study among the other markets, with a different business environment and managers' characteristics, to confirm the applicability of measurement tools

and make the study's implications more universal. Furthermore, it would be worth exploring the influence of the particular external factors, such as different types of environmental turbulence, on the ambidexterity of SME. Finally, as innovation ambidexterity is the important capability of SME, more qualitative research on its development is needed. It should include the recently recommended expanded concept of 'multidexterity' (Robbins *et al.*, 2021), as it is appropriate for dynamic environment.

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Appendix:

Appendix 1. Descriptive statistics: innovation ambidexterity

Item	2019				2021				Mann-Whitney test
	Mean	Std. Deviation	Skewness	Kurtosis	Mean	Std. Deviation	Skewness	Kurtosis	
INN 1_1 [perfecting the quality of current products]	**6.15**	1.176	-1.548	2.222	**5.0**	0.967	0.552	-0.134	-2.058*
INN 1_2 [improving production flexibility]	**5.94**	1.310	-1.272	1.290	**4.57**	1.022	0.809	0.301	-3.664*
INN 1_3[lowering production costs]	**5.85**	1.394	-1.102	0.376	**4.39**	1.170	0.166	-0.964	-7.198*
INN 2_1 [introducing new product generations]	**5.70**	1.337	-1.100	1.303	**4.76**	1.044	0.465	-0.370	-0.224
INN 2_2 [extending the product range]	**5.86**	1.375	-1.500	2.334	**4.37**	0.921	0.229	-0.438	-5.901*
INN 2_3 [entering the new markets]	**5.81**	1.417	-1.432	1.837	**5.31**	0.762	0.111	-0.339	-2.705*
INN 2_4 [penetration into new technology/manufacturing fields]	**5.50**	1.596	-0.984	0.429	**4.37**	1.047	0.483	-0.424	-2.829*

Note: the standardized statistics are presented, *significant at 0.05 (Asymp. Sig.,2-tailed).
Source: own study.

Appendix 2. Correlation of EMO dimensions with innovation types

Dependent variables	Pearson correlation			
	2019 (n=176)		2021 (n=219)	
	exploration	exploitation	exploration	exploitation
P	0.267**	0.170*	0.132*	0.050
OP	0.308**	0.210**	0.021	-0.059
CO	0.365**	0.270**	0.063	-0.001
VC	0.287**	0.245**	n.a.	n.a.
RM	0.130*	0.062	-0.046	0.028

Note: **Correlation is significant at the 0.01 level (1-tailed), *Correlation is significant at the 0.05 level. EMO dimensions: P-proactive orientation, OP-opportunity focus, CO-customer orientation, VC-value creation, RM- low-risk marketing. In 2019 exploration and exploitation were measured only in firms introducing innovations (n=176).
Source: own study.

Appendix 3. Entrepreneurial marketing orientation: scale items

Dimensions	Scale items
Proactive Orientation (P)	- We continually engage in changing the way products/services are marketed by our business (P_1). - Our business is frequently one of the first among competitors to alter its marketing methods (P_2). - We consistently improve the approach to marketing our business (P_3).
Opportunity Focus (OP)	- We pursue untapped market opportunities regardless of budgetary or staff constraints (OP_1). - When new market opportunities arise, our business very quickly acts on them (OP_2). - Our business excels at identifying marketing opportunities (OP_3).
Customer orientation (CO)	- Our business' marketing efforts reflect knowledge of what our customers really want from our products/service (CO_1). - We spend considerable resources trying to learn more about our customers. ** - Communicating with customers is a great way to identify innovation opportunities (CO_2).* - Innovation is the key to achieving a competitive advantage in our business (CO_3).*
Value Creation (VC)	- We expect that every employee will create more value for customers (VC_1) *(item in CO construct in 2021).* - In our business, employees contribute ideas to create value for customers (VC_2) *(item in CO construct in 2021).*
Low-risk marketing (RM)	- When we decide to pursue a new marketing direction, we do so in stages rather than all at once to reduce the risk involved (RM_1). - Our marketing efforts tend to have a low level of risk for our business (RM_2). - Our business typically incurs low costs in connection with new marketing activities (RM_3).

Note: the responses were provided on 7-point Likert-type scales, starting from '1' – 'I entirely disagree' – to '7' – 'I entirely agree with the statement;' *Items used only in 2019; **Item deleted from the CO construct due to low correlation with other items.
Source: Own elaboration of Fiore *et al.*, 2013.

Appendix 4. Descriptive statistics of the EMO scale items (full samples)

EMO dimension	Mean	Std. dev.	Skewness	Kurtosis	Mean	Std.dev	Skewness	Kurtosis
	n=240; 2019				n=219; 2021			
P_1	4.27	1.746	-0.220	-0.692	4.79	0.999	-0.273	-0.589
P_2	3.85	1.688	-0.078	-0.809	3.79	1.169	0.738	0.103
P_3	4.14	1.701	-0.234	-0.736	4.64	1.154	0.096	-0.979
OP_1	3.97	1.617	-0.252	-0.828	4.14	1.033	0.091	-0.488
OP_2	4.41	1.595	-0.415	-0.420	4.86	1.085	0.002	-0.093
OP_3	4.31	1.505	-0.544	-0.348	4.68	1.000	-0.396	-0.428
CO_1	4.75	1.527	-0.646	-0.007	5.59	0.775	-0.092	0.271
CO_2	5.04	1.710	-0.763	-0.182	n.a.	n.a.	n.a.	n.a.
CO_3	4.75	1.707	-0.492	-0.518				
VC_1	4.45	1.730	-0.499	-0.580	4.60	1.041	-0.129	-0.574
VC_2	4.43	1.720	-0.511	-0.566	4.25	1.029	0.051	-0.704
RM_1	4.70	1.595	-0.667	-0.059	4.87	0.879	-0.565	0.885
RM_2	4.61	1.591	-0.702	-0.050	4.50	1.155	-0.409	-0.745
RM_3	4.50	1.571	-0.566	-0.281	3.85	1.251	0.450	-1.046

Note: EMO (entrepreneurial marketing orientation) dimensions: P-proactive orientation, OP-opportunity focus, CO-customer orientation, VC-value creation, RM- low-risk marketing.
Source: own study.

Appendix 5. Questionnaire items used in this study

Innovation activity (filtering question):
Please tell if your company introduces innovations concerning new product development, introducing new manufacturing processes/technologies, or marketing innovations?
Yes – coded as 'innovating'
No – 'no-innovating'

'INN_1' exploitative innovations:
In our company:
'INN1_1' *improving existing product quality*
'INN1_2' *improving production flexibility*
'INN1_3' *reducing production cost*
is: '1' *not important* to '7' - *very important*.

'INN_2' – exploratory innovations:
In our company:
'INN2_1' *introducing new generations of products*
'INN2_2' *extending the product range*
'INN2_3' *entering new markets*
'INN2_4' *entering new technology (manufacturing) fields*
is: '1' *not important* to '7' - *very important*.

Market sensing:
'sensing_k' *We quickly analyse and interpret changes taking place in market demand*
'sensing_p' *Our employees regularly discuss the effect of market trends and new products on our activities*

Product adaptation strategy:
Does the company offer any products standardized or adapted to the needs of customers on the foreign markets? (from '*1' - 'whole product range standardized*' to *'5' – 'whole product range adapted to the client needs*')

Product differentiation strategy:
To what degree do the company's products differ from the products offered by the closest competitors? (from '1' – '*whole product range similar to competitive products*' to '5' – '*whole product range different from the competitive products*').

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The contribution share of authors is equal and amounted to 50% for each of them. Izabela Kowalik – conceptualisation, literature writing, discussion of results, conclusions, implications; Agnieszka Pleśniak – conceptualisation, methodology, specification and estimation of models, results presentation.

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Conflict of Interest

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The two-mode network approach to digital skills and tasks among technology park employees

Anna Ujwary-Gil, Bianka Godlewska-Dzioboń

ABSTRACT

Objective: The article predicts how the performance of tasks understood as tasks shared between a dyad can be predicted based on the perceptual difference of behaviors in terms of the digital skills of technology park employees (social actors). Here, employees serve park tenants mainly from the creative, game, IT and multimedia industries, and broadly understood audiovisuals.

Research Design & Methods: The questionnaire previously validated by other authors was used to measure employees' digital skills and two non-parametric network statistics tests based on data permutation were conducted: the quadratic assignment procedure (QAP) and the multiple regression quadratic assignment procedure (MRQAP), which are good at error autocorrelation.

Findings: The results show that there is a relationship between selected digital skills and tasks shared among employees; digital skills influence behavior patterns, thus increasing or decreasing tasks shared in the workplace; moreover, dyad embedded in an intra-organizational social network is more appropriate for anticipating inherently relational tasks sharing between employees in a knowledge-intensive organization.

Implications & Recommendations: The findings contribute to the literature on digital skills and shared tasks from a dyadic and organizational perspective by deepening the understanding of the relationship between a pair of employees. Organizations should apply digital skills training to influence interpersonal relationships and thus the effectiveness of task performance and business processes. It seems necessary to develop and implement policy's assumptions about increasing the digital skill level of its employees.

Contribution & Value Added: The article shows digital skills (information management, information evaluation, communication sharing, communication building, communication networking, collaboration, critical thinking, creativity, problem solving) in connection with the tasks performed in the workplace in terms of dyads and two-mode networks (actors and digital skills; actors and tasks performed). In this perspective, the perceptual differences of behaviors in digital skills are considered, which from the network perspective have not yet been explored by other researchers.

Article type:	research article
Keywords:	digital skills; dyad; two-mode network; tasks; social networks; social network analysis, QAP, MRQAP
JEL codes:	M20, J24, L84

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INTRODUCTION

Modern work in service organizations requires not only technical skills focused on the operation of information systems or information and communication technologies (ICT) (Van Deursen & Van Dijk, 2014) but also digital skills and acceptance of new technology. Our research portrays the adopted level of analysis (dyad) and two-mode networks to digital skills and tasks in a specific context: the informal

organizational network. The way work is actually done tends to have more to do with informal networks, as an organization's formal structure only partially reflects how tasks are performed. This assumption inspired us to find out the differences and similarities in the networks of relationships oriented towards digital skills and employee tasks. We have adopted the two-mode network approach (cf. Ujwary-Gil, 2019), which is a fertile research perspective in social and behavioral sciences based on the relational approach to work and employees who perform tasks in the workplace or use resources (skills) creating a structure of relationships characterized by certain regularities. The network research in the organizational context concerns social ties, such as friendship (Hunter *et al*., 2020), sharing information and knowledge (Che Ibrahim *et al*., 2019; Jenke & Pretzsch, 2021; Steffen *et al*., 2017; Kanska *et al*., 2021; Darmawan *et al*., 2021) or trust (Li *et al*., 2020; Yao *et al*., 2019), and less known mapping of a science and technology policy network (*e.g.* Kalantari *et al*., 2021).

In our research, we used the concept of digital skills, which has a practical dimension (Kurczewska *et al*., 2020; van Laar *et al*., 2020) related to professional work and tasks performed. Contrary to Chaker's (2020) study, we focused on soft digital skills rather than hard digital skills. Though digital skills also mean the use of ICT for work, study and active participation in society, creating a complex socio-digital system (Ujwary-Gil & Potoczek, 2020). In the literature, the terms 'digital skills' and 'digital competences' are often used interchangeably. According to van Laar *et al*. (2020), digital skills are the ability to communicate using information and communication technologies; information management and evaluation; communication sharing, building, and networking; collaboration; critical thinking; creativity, and problem solving in digital space. They refer to skills relevant in a digitalized work interaction (van Laar *et al*., 2017).

To understand better the existing relationships between digital skills perceived in this way and the shared tasks understood as work performed within the organization between employees, we used a social network analysis approach to look at our research area through the prism of a network of relationships and interdependencies. The (two-mode) network is a relationship between two sets of nodes (*e.g.* actor and digital skill; actor and task). There is little research that highlights the individual digital skills of employees and their impact on the work they do. A few examples include the valuable studies of van Laar *et al*. (2020, 2019, 2018). However, their research does not concern the dyadic view of digital skills and relational work. Most of the studies look at measuring digital skills, but not in relation to the tasks performed in organizations. Therefore, our understanding of what digital skills actually influence workplace tasks is limited. Reducing this research gap would allow for more effective organization of business processes in the organization. According to our knowledge, non-parametric tests of social network analysis were used for the first time to investigate the relationships existing (or not) between digital skills and tasks shared of employees, in which the subject of analysis was a dyad (a pair of actors), and work was interdependent and relational (Androniceanu *et al*., 2022). It is important to emphasize that formal structures and processes organize the task environment over which networks are layered. Hence, the organization is a system of activities (tasks). Still, more detailed insights let us understand that there is a structure in time and space that organizes them and matches individuals to tasks.

Thus, the objective of our research was a social network analysis of digital skills in relation to the tasks shared in the workplace. In this perspective, we considered the perceptual difference of behavior in digital skills. We measured employees' digital skills based on the previously validated questionnaire by van Laar *et al*. (2018). In this research, we argued that the digital skills used and the tasks performed by employees could be observed through network behavior patterns using non-parametric tests of social network analysis. We studied networks that connect employees through digital skills and tasks. Actors' behaviors were seen as interrelated between employees, not separated. To test our hypotheses, we replaced the two-mode matrices of actor x digital skill (ADS_{ij}) and actor x task (AT_{ij}) with one-mode networks of actor x actor (AA_{ij}), which list digital skills and related tasks through dyadic actors.

The article is organized as follows: after the introduction section, we will present a literature review and hypothesis development; then the methodology section, which is divided into data and sample, methods, measures; respectively, the results and discussion section. The article will end

with conclusions, including implications for theory and practice, limitations, and directions for further research.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

The pandemic lasting continuously since 2020 has forced employees to work remotely, in which multidimensional digital skills play a unique role in the performance of tasks (Florek-Paszkowska *et al.*, 2021; Gajdzik *et al.*, 2021; Skvarciany & Jurevičienė, 2021; Androniceanu, 2020). It has the most significant evidence in e-business development (Roshchyk *et al*., 2022), possibilities for remote work (Raišienė *et al*., 2021), implementation of AI tools in the consumer space (Sułkowski & Kaczorowska-Spychalska, 2021). It significantly influenced the processes of production of goods and services, their groundbreaking changes and potential political, social, and economic consequences (Rymarczyk, 2020). Enterprises dynamise the development of relational skills of IT-based enterprises, which affects their access to knowledge, supports innovation, and creates a competitive advantage (Benazzouz, 2019; Nuryakin, 2021). Digital skills and digital competences are essential in today's life and are even the basis of social exclusion or inequality (Ragnedda *et al*., 2020; Tewathia *et al*., 2020). In professional life, digital skills and digital competences are today a determinant of success in performing tasks at the individual level (Mazurchenko & Maršíková, 2019), innovation (Shakina *et al.*, 2021) and competitive advantage (Benešová & Hušek, 2019; Capestro & Kinkel, 2020) at the organizational level, and in macro terms – the level of digitization of society (Sá *et al.*, 2021) or smart cities (Komninos *et al.*, 2021).

The essence of the task (activity) in our research was the work performed within the organization. The action's dynamics was reflected in the constant interpenetration, emergence, and loss of relationships between people. The tasks were always analyzed within particular organizational and environmental contexts (Delibasic, 2022; Mitrovic, 2016). The tasks had a wide scope and relate to the necessary organizational action; they had a humanistic and intentional overtone. In each activity, a person used the skills at his/her disposal to perform a task. Digital skills empirically investigated by van Laar *et al*. (2020, 2018), such as information management and evaluation; communication sharing, building, networking; collaboration, critical thinking, creativity, problem solving, which were the subject of our considerations, are necessary for the implementation of tasks in organizations that provide knowledge-based services. They have a universal dimension, so their application is not limited to specific industries or types of activity, although they must consider the organizational context (Vieru, 2015).

Digital information management skills concern the ability to search, select, evaluate (usefulness, credibility, up-to-date), organize and store information for professional purposes (Hwang *et al.*, 2015). Work is based on information retrieval systems to gather information necessary for problem solving and decision making, and requires the ability to save and organize files properly, and the consistent naming of digital files (Russell-Rose *et al*., 2018). The need for information is a result of the information and knowledge gap; hence, in order to minimize this gap, the employee turns to other employees for help when they share tasks or look for answers online. The use of ICT leads to better recognition of the skills and competences necessary for social inclusion through reciprocity and interaction; thus digital skills, are a predictor of ties and cooperation in the scope of performed tasks (Riemer *et al*., 2009). Employees' use of digital skills can increase or decrease the potential for task integration in their workplace. We suggested that assessing digital skills differences between a pair of actors may be a good indicator of tasks shared in a workplace. Bearing the above in mind, we hypothesized:

H1: Differences between employees' digital skills in information management **(H1a)** and information evaluation **(H1b)** will be negatively associated with the tasks shared by the dyad.

Today, communication using ICT has become commonplace in the workplace. Digital communication skills are the ability to interact with each other to achieve career goals. However, employees, especially specialists who want to create a positive image of an expert or a given organization, take care of the possibility of sharing knowledge and experience based on a critical selection of places for

publishing and establishing and maintaining contacts (Van Deursen *et al.*, 2014). Communication influences social interactions and relationships (Hwang *et al*., 2015). Employees perceive communication as essential for their daily routines and so undertake online content sharing activities, including posting news, articles, blogs, and even starting online discussions on topics related to professional work (Lewin & McNicol, 2015). We put forward a hypothesis:

H2: Differences between employees' digital skills in communication building **(H2a)**, communication sharing **(H2b)**, and communication networking **(H2c)** will be negatively associated with the tasks shared by the dyad.

Organizations are relational in nature, which means that employees with complementary competences constantly contact each other and share tasks, experiences, and information via online media (Makkar *et al.*, 2020). Collaborative digital skills are assigned to employees on the basis of their specialized knowledge and skills required to complete tasks and support others in their work *(*Pitafi *et al*., 2018). The complexity of tasks requires the collaboration of employees whose knowledge and skills are complementary, making it necessary to understand their own tasks and colleagues' tasks. We put forward a hypothesis:

H3: Differences between employees' digital skills in collaboration will be negatively associated with the tasks shared by the dyad.

Critical thinking skills allow one to understand the relationships between facts or concepts and recognize mistakes in reasoning and action. The digital approach in critical thinking focuses on defining problems, collecting data, opinions, and arguments from various, usually online, sources. In addition, digital critical thinking skills allow to evaluate the data in terms of their reliability and objectivity, on the basis of which employees perform their tasks more effectively (Oberländer *et al*., 2020). By thinking critically, the employee evaluates, synthesizes, and interprets relevant information related to the task situation (Tripathy, 2020). We put forward a hypothesis:

H4: Differences between employees' digital skills in critical thinking will be negatively associated with the tasks shared by the dyad.

The creative potential of employees is supported by online platforms allowing them to participate in the performance and sharing of online tasks (Pitafi *et al.*, 2018; Sun *et al.*, 2020). Employees can use information and communication technology to be original in their work and be creative in their tasks. Creative digital skills are related to the ability to use ICT in bisociative linking of distant associations (content, ideas) in order to create new configurations used to carry out tasks (Carter *et al.*, 2020). Increasingly common online platforms enabling participation and task sharing contribute significantly to the creation of new products and/or services (Falco & Kleinhans, 2019). In this sense, creativity is related not only to novelty, but also to the utility value of the proposed solutions. In the digital context, it is challenging to study the features of creative thinking ignoring social factors like support or sharing tasks, thus, we hypothesize:

H5: Differences between employees' digital skills in creative thinking will be negatively associated with the tasks shared by the dyad.

Employees with digital problem-solving skills are able to define a problem situation to which they correctly assign a problem-solving strategy. In conjunction with creative and critical thinking skills, ICT helps to find many solutions, effectively implement knowledge into tasks, and solve professional problems (van Laar *et al*., 2020). Information and communication technologies enable quick and relatively unlimited access to knowledge and information that employees are more or less able to use to solve problems (Attaran *et al*., 2019). Problem-solving skills help employees acquire and apply the knowledge they need to solve complex problems at work (Mehrabi Boshrabadi & Hosseini, 2020). Employee social capital refers to integration within an organization and collaborative networks to perform tasks. According to Eshet (2012), in addition to using software or operating digital devices, digital skills emphasize socio-emotional skills to complete tasks and solve problems. We put forward a hypothesis:

H6: Differences between employees' digital skills in problem solving will be negatively associated with the tasks shared by the dyad.

RESEARCH METHODOLOGY

Data and Sample

Social network research often consists of identified populations, thus enabling data collection from all organization members (Borgatti *et al.*, 2018; Maciel & Chaves, 2017). Many network surveys cover very small organizations (or departments) with 22 (Maciel & Chaves, 2017) or 29 (Gibbons, 2004; Meyer, 1994) employees. However, in social network studies, the number of relationships that are being observed is the most important element – not the individuals (Maciejewski *et al.*, 2022). In our case, the main Technology Park Department, responsible for the entire organization's functioning, became the border of the network, within which the Administrative Department and the Management Office were separated. Based on the convenience strategy of purposeful case selection (Palinkas *et al.*, 2015), we chose one of Poland's largest technology parks for research, offering tenants various sophisticated digital technology services and the benefits of locating their activities in the Park. Network research is characterized by the purposefulness of selecting the network boundary so that it is possible to study the existing relations. In this case, the network's boundary was the population of the established Technology Park Department. The number of employees was N = 33 (three employees did not complete the survey, which gave us 92% of the surveyed population (*cf.* Meyer, 1994). We conducted the research from August 2020 to February 2021. As we needed a very high response rate, it was important to work closely with top management and gain their strong support for the research project. Of those who participated in the study, 39% were men, and 61% were women. The mean age was 37.85 (SD 8.14), and the mean number of years of professional experience (tenure) in the Park was 5.06 (SD 3.81). We identified a total of 16 positions (e.g., business development specialist, company development specialist, financial coordinator, director, manager of the company support and development team). Within one matrix, we created N = 1056 observations (N*(N-1)); in total N = 14784 observations for all 14 matrices that we correlated and regressed. The fundamental assumption of network research is the dependence of observations against each other (*e.g.* actors are interdependent due to the performed tasks).

Methods and Measures

Similarly to Tsai and Ghoshal (1998), the managing director was invited to the interview, because he was the person responsible for business process management based on which the selected tasks (T) were identified. The interview made it possible to develop the categories of typical tasks that were used as answer options (items) in the survey. We conducted a pilot study, which allowed for the simplification of the survey according to the glossary of proprietary terms of the Technology Park Department, and after reducing the complexity and time required for filling in, the final version was ready. We transcribed the interview and coded it using descriptive codes (Miles & Huberman, 1994). The data was collected through an online survey, in which we asked employees to evaluate their behavior related to digital skills and the tasks performed. In particular, we asked respondents to rate the frequency of behaviors related to their experiences with specific digital skills practices (45 items) on a five-point Likert scale (see Appendix) and to rate behavior related to the tasks performed (21 statements) also on a five-point Likert scale.

The quadratic assignment procedure (QAP) and multiple regression QAP (MRQAP) are the nonparametric significance tests for correlating one-mode and two-mode networks (after conversion to a one-mode network) and matrix-like network attributes. Many square matrices with the same dimensions can be correlated (*e.g.* actors for which the type of relation or attributes have been defined). (MR)QAP are usually based on Pearson's *r* correlation (the Pearson product-moment correlation coefficient), in which a point-biserial correlation coefficient is used for binary and continuous variables, and a phi-coefficient for binary only variables. Matrices with binary and value data (*e.g.* interval, ordinal) are allowed, indicating the relationship's strength. Correlating matrices of a different nature of data does not change the

interpretation of the correlation coefficients in which we control the effects due to the dependencies of the observations. MRQAP network method regresses many independent variables on dependent variables, allowing researchers to test the overall R^2. The observed matrices are then compared with the permutations of the random matrices for the p-value calculation, while the regression coefficients are computed using ordinary least squares (OLS). Next, the OLS regression is repeated with this new permuted matrix, resulting in different beta coefficients (see more Ujwary-Gil, 2022).

We divided our variables into: digital skills (independent variables), tasks performed (dependent variable), and employee attributes (control variables), which were created at the individual level and had to be transferred to the relational level. Before developing relational matrices (a dyad), we measured variables on an individual (actor-based) level. Consequently, the cells represented a kind of the ties between the employees and all variables were presented as matrices, in which the rows and columns represent actors, digital skills, and tasks (Raider & Krackhardt, 2017). The independent variables were the digital skills of employees (ADS_{ij}), which we did not consider in isolation from others but rather in relation to other employees' digital skills. Among other studies, social network research aimed at understanding how ties affect behaviors relies on behavioral similarity or differences (*e.g.* Meyer, 1994; Zagenczyk *et al.*, 2020). Similar to the studies by Zagenczyk *et al*. (2020), we measured the behavioral differences in the frequency of digital skills used by employees as the degree to which the digital skills used by the main employee were different from the frequency of digital skills use notified by each of his/her network connections. To assess differences, we began with measuring each employee's digital skills with a 45-question (items) and questionnaire created by van Laar *et al*. (2018). According to Cronbach's alpha, the level of reliability for all statements was 0.94. Employees answered all 45 items using a five-point Likert scale (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = (almost) always). We chose those items of the questionnaire that could best relate to the specificity of people's work in the main department responsible for the technology park's operation. We then grouped digital skills into nine areas (see Appendix and van Laar *et al*., 2018): information management (Cronbach's alpha (α) for the scale was 0.79); information evaluation (α = 0.68, after removing question 23); communication sharing (α = 0.80, after removing question 41); communication building (α = 0.82); communication networking (α = 0.88); collaboration (α = 0.87); critical thinking (α = 0.79); creativity (α = 0.83); problem solving (α = 0.88).

Then, each employee's responses by grouped digital skills were averaged to give an average score for the frequency of use of each digital skill, in which higher scores represented a higher frequency of digital skills activities. Then, analogously to the research of Meyer (1994), we evaluated the degree of difference, taking the absolute difference between the average score of a given *i* employee's digital skills and the average score of the *j* employee's digital skills. Finally, we used the results of the differences to create a matrix of difference, in which smaller (larger) numbers represented a greater (lesser) similarity between each pair of respondent's digital skills.

The dependent variable was created based on the measurement of the frequency of tasks performed by employees in the Technology Park Department, which resulted from the organizational context. Employees answered 21 statements (Cronbach's alpha = 0.84), how often they perform a given task (T1-T21) on the five-point Likert scale, where 0 = do not perform this task, 1 = once a year, 2 = once every few months, 3 = at least once a month, 4 = at least once a week, 5 = daily or almost daily. Examples of tasks are T1) Creating promotional content (website, articles, reports, dedicated graphics); T4) Monitoring the competition (analysis of the activities of similar entities in Poland and abroad); T7) Development of cooperation agreements; T12) Conducting regular interviews with clients on their condition and needs; T18) Accounting for clients (for development purposes, completing formalities, de minimis aid, and payments). The mean for the responses was 3.02 (SD 1.12), then we binarized the two-mode matrix of the actor x task (AT_{ij}) assuming the value of 1 wherever the respondents chose a response scale above 3.02, respectively 0 when the responses were below the mean (cf. Diez-Vial & Montoro-Sanchez, 2014). We received an assignment of the employee to a given task (strong relationships). Such a binarized matrix was the basis for the projection, *i.e.* the transformation of a two-mode matrix into a one-mode matrix, where at the intersection of rows and columns, we obtained the number of shared (the same) tasks by a pair of actors (dyad). The control variables were based on the homophily concept (Kossinets, 2006), which assumes that the similarity of the actors increases the

likelihood of a relationship. Similar to creating a relational matrix of digital skills, the result was a symmetric pseudo-network that was binary for gender identity and position, and valued for age and tenure. In particular, the gender identities and work positions were 1 if *i* and *j* were of the same position or gender, and 0 otherwise. The age and tenure difference (in years) variables were measured as the absolute age difference between *i* and *j*.

RESULTS AND DISCUSSION

For the presentation of the results, we used the ORA (Organizational Risk Analyzer) program, version ORA-PRO 3.0.9.9.87 (Altman *et al.*, 2020) and UCINET 6 (version for Windows, 6.717) (Borgatti *et al*., 2002), including two non-parametric tests: quadratic assignment procedure (QAP) and multiple regression quadratic assignment procedure (MRQAP). To use ORA-PRO and UCINET, we created a total of 14 matrices that included all the answers obtained in the study. To correlate and regress matrices, it is required to transform a two-mode matrix into a one-mode matrix. We transformed the two-mode matrix analogically to Jasny (2012) into the following one-mode projection of network A and its transposition AT in which rows (n) and columns (m) are replaced, creating a network $A_{ij} = A_{ji}^{T}$ for each pair of actors *ij*.

Our research unit is the dyadic relationship between two employees (cf. Tsai, 2001) who can be involved in several relationships in dyads. On the basis of the presented projection, the dependent variable was prepared as a matrix describing common tasks for each pair of employees. We used the QAP to obtain the estimation of the coefficients for the predictive models based on bivariate variables. Researchers (*e.g*. Krackhardt, 1988) recommend using QAP for dyadic data analysis in view of significance tests based on the permutation that is less prone to autocorrelation problems than, for instance, OLS regression models. QAP computes the Pearson correlation coefficients for two matrices by permuting multiple times (10000 in our case) the rows and columns of matrices, randomly assigning the results of the dependent variable to the result vector of each case for the independent variables. The number of possible permutations increases rapidly with the size of the network. The p-value of a statistic is the percentage of the number of times the observed correlations resulted from different matrix permutations. Table 1 shows the descriptive statistics: the means and standard deviations of the variables that make up the 14 matrices.

There was a low correlation between the independent variables, except for the digital skills in communication networking and dyadic digital skills in communication building ($r = 0.53$, $p < 0.001$), digital skills in creativity and digital skills in collaboration ($r = 0.42$, $p < 0.001$), digital skills in communication networking ($r = 0.37$, $p < 0.001$), digital skills in communication building ($r = 0.35$, $p < 0.001$). The correlation between digital skills in problem solving and the creativity ($r = 0.36$, $p < 0.001$), and collaboration ($r = 0.37$, $p < 0.01$) was at a similar level. We observed that the correlations covering the control variables were practically non-existent, except for the correlation between the dyadic age difference and the dyadic tasks shared ($r = -0.20$, $p < 0.05$) and the dyadic tenure difference and the dyadic age difference ($r = 0.34$, $p < 0.01$).

Another non-parametric test is the MRQAP, which similarly to QAP, is based on permutation and takes error autocorrelation into account (Borgatti *et al.,* 2018). MRQAP considers many independent variables, in our case, these were digital skills divided according to the approach of van Laar *et al*. (2018) into nine types (see Table 2), which enabled the use of regression analysis on matrices (each variable corresponds to one matrix). As part of MRQAP, we used the Double-Dekker Semi-Partialling Method (Dekker *et al.*, 2007). We computed multiple regressions for the respective cells from the dyadic tasks shared matrix, the dyadic digital skills differences matrices, and the control variable matrices (Borgatti *et al.* 2002). As to QAP, we repeated the permutations 10000 times as suggested by Borgatti *et al*. (2018) to estimate the standard error.

Table 2 shows the MRQAP results. We first regressed the dyadic tasks shared matrix on the control variables (Model 1), then on independent variables (Model 2), and all variables combined (Model 3).

Table 1. Results of descriptive statistics and QAP correlations

Variables	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Dyadic tasks shared	1.80	1.05	1.00												
2. Digital skills in information management	1.00	0.59	0.00	1.00											
3. Digital skills in information evaluation	0.94	0.46	-0.01	0.05	1.00										
4. Digital skills in communication sharing	1.29	0.72	-0.12+	0.14*	0.01	1.00									
5. Digital skills in communication building	1.18	0.66	0.01+	-0.06	-0.01	0.05	1.00								
6. Digital skills in communication networking	0.95	0.68	-0.04	0.10	0.07	0.11+	0.53***	1.00							
7. Digital skills in collaboration	0.65	0.49	-0.18+	-0.04	0.02	-0.05	0.21*	0.08	1.00						
8. Digital skills in critical thinking	0.66	0.42	0.22*	-0.17+	-0.12+	0.09	0.17+	0.02	-0.18+	1.00					
9. Digital skills in creativity	0.74	0.49	-0.18	0.00	0.12+	0.01	0.35***	0.37***	0.42***	-0.14	1.00				
10. Digital skills in problem solving	0.69	0.44	0.05	-0.02	0.01	-0.06	0.33***	0.25*	0.37**	0.17+	0.36***	1.00			
11. Gender	–	–	-0.05	0.06*	0.04	0.02	-0.02	0.03	0.07*	-0.07*	0.02	0.04	1.00		
12. Dyadic age difference	9.68	7.08	-0.20*	0.03	-0.01	-0.08+	-0.12*	-0.10	0.02	-0.05	-0.03	-0.13*	-0.01	1.00	
13. Dyadic tenure difference	4.86	3.17	-0.08	-0.06	-0.06	-0.05	-0.11*	-0.10+	0.08	-0.02	-0.02	0.10	-0.01	0.34**	1.00
14. Position	–	–	0.02	-0.02	-0.01	-0.02	0.01	-0.04	0.04	0.04	-0.06	0.07+	0.04	-0.03	0.03

N = 1056 relationships; Gender: male = 1, female = 0; Position: same position = 1, different = 0

*p < 0.05, **p < 0.01, ***p < 0.001, +p < 0.1

Source: own study.

Table 2. MRQAP results for dependent variable: 1. Dyadic tasks shared

Variables	Model 1	Model 2	Model 3
2. Digital skills in information management	–	0.02 (0.14)	0.04 (0.14)
3. Digital skills in information evaluation	–	-0.19+ (0.13)	-0.19+ (0.13)
4. Digital skills in communication sharing	–	-0.18* (0.11)	-0.20* (0.10)
5. Digital skills in communication building	–	0.11 (0.15)	0.09 (0.15)
6. Digital skills in communication networking	–	-0.03 (0.18)	-0.04 (0.17)
7. Digital skills in collaboration	–	-0.50* (0.28)	-0.45+ (0.28)
8. Digital skills in critical thinking	–	0.50* (0.26)	0.43* (0.25)
9. Digital skills in creativity	–	-0.55* (0.23)	-0.52* (0.22)
10. Digital skills in problem solving	–	0.32+ (0.25)	0.28 (0.24)
11. Gender	-0.12 (0.11)	–	-0.08 (0.10)
12. Dyadic age difference	-0.03* (0.02)	–	-0.03* (0.01)
13. Dyadic tenure difference	-0.01 (0.03)	–	-0.01 (0.03)
14. Position	0.05 (0.23)	–	-0.04 (0.20)
R^2	0.04*	0.12***	0.15***
Dyadic observations	1056	1056	1056
Permutations	10000	10000	10000

Unstandardized Coefficients; Standard Errors in Parentheses
*p < 0.05, **p < 0.01, ***p < 0.001, $^{+}$p < 0.10
Source: own study.

The coefficients in Table 2 are unstandardized regression coefficients. Model 1 introduces control variables that show little effect on the dyadic tasks shared; the percentage of variance included is 4% ($R^2 = 0.04$, $p < 0.05$). Model 2 includes independent variables and increases the explanatory power to 12% ($R^2 = 0.12$, $p < 0.001$). In Model 3, we added all the variables and the variance was 15% ($R^2 = 0.15$, $p < 0.01$). This suggests that 15% of the variance in the performed tasks can be explained based on relational factors. As expected, some digital skills were significantly associated with the dependent variable. Hypothesis H1 predicted that digital skills in information management (H1a) and information evaluation (H1b) between employees in the network would reduce the tasks shared. The digital skills in information evaluation were negatively and marginally significantly related to the tasks shared ($\beta = -0.19$, $p < 0.10$) but not the digital skills in information management ($\beta = 0.04$, $p > 0.05$). Overall, we found that the tasks shared had no impact on employees who have different approaches to digital information management. Regarding hypothesis H2, we expected that digital skills in communication such as communication building (H2a), communication sharing (H2b), and communication networking (H2c) between employees in the network would be negatively associated with the tasks shared.

We found partial support for this hypothesis, because the digital skills in communication sharing were negatively and significantly related to the tasks shared ($\beta = -0.20$, $p < 0.05$). We did not find support for the hypothesis H2a and H2c, because the digital skills in communication building ($\beta = 0.09$, $p > 0.05$) and the digital skills in communication networking ($\beta = -0.04$, $p > 0.05$) were not related to the tasks shared. We found no evidence supporting the assumption that employees adopt behaviors in these digital skills similar to those associated with task-sharing relationships. In hypothesis H3, we predicted that the digital skills in collaboration in the network would have a negative impact on the tasks shared. We found support for this hypothesis, because the digital skills in collaboration were negatively and marginally significantly related to the tasks shared ($\beta = -0.45$, $p < 0.10$). We predicted in hypothesis H4 that differences in the critical thinking between employees in the network would be negatively associated with the tasks shared. Overall, we found no support for this hypothesis, because the digital skills in critical thinking were positively and significantly related to the increase of tasks shared ($\beta = 0.43$, $p < 0.05$). Moreover, for our last hypothesis, H5, we predicted that the digital skills in creativity between employees in the network would have a negative impact on tasks shared ($\beta = -0.52$, $p < 0.05$). At the same time, we did not find support for

hypothesis H6, because the digital skills in problem solving ($\beta = 0.28$, $p > 0.05$) was not related to the tasks shared. If we consider the significance level, the research supported a total of three hypotheses (H2b, H4, and H5). Or, additionally, if we accept the marginal level of significance, then we can conditionally assume that the dyadic information evaluation digital skills negatively affects the tasks shared at a marginal significance level ($\beta = -0.19$, $p < 0.10$), and therefore H1b can be confirmed, and the digital skills in collaboration negatively affect the tasks shared, also at a marginal level of significance ($\beta = -0.45$, $p < 0.10$), which H3 may confirm.

The roots of organizing work from the dyadic perspective can be found in Barnard (1938), known as the progenitor of the dyadic theory of organizational behavior, who sees organizations as negotiated systems and cooperation as the essence of organizing. Barnard wrote about employees interacting with each other to achieve goals, what Graen and Scandura (1987) call dyadic organizing, and Weick (1979) calls organizing a process built on individual behaviors that are related between two or more people. Therefore, any behavior of one person is dependent on that of another person. Our two-mode networks, especially their projection, are characterized by symmetry (Breiger, 1974) which means that if actor A_{ij} is connected with actor A_{ji} by different/similar behavior, then A_{ji} is also associated with A_{ij}. It can be predicted that if two actors share digital skills or tasks, they are related to each other. Breiger (1974) and Feld (1981) point out that the ties and affiliations that take place in two-mode networks are related, and ties emerge from shared connections. Thus, when two employees share the same digital skills or perform the same tasks, it usually leads to the creation of social ties between the actors. As two people have different (similar) digital skills or tasks, the strength of their social ties will decrease (increase). Tie strength is a characteristic that either leads to more interaction between the two employees or an interaction that is more valued.

In addition to finding out whether social network analysis provides a new description of the digital skills activity of employees, our main expectations were related to the linkage patterns that reflect the performance of tasks through the lens of employees' digital skills. Digital skills shaped through practical action and experience indicate to what extent an individual is able to use digital skills to perform specific tasks assigned to a given work. The results for these hypotheses emphasize the significant impact of behavioral differences on the variability of the performed tasks. According to Umphress *et al*. (2003), negative signs in the correlation and regression tables have been inverted. Positive coefficient scores represent a greater similarity in digital skills, and negative scores represent a lesser similarity (differences) in employees' digital skills. As a result of a decrease in the similarity of digital skills, behavior on the employee side, and an increase in behavioral similarity in the digital skills of a co-worker, the digital skills similarity will decrease for the dyad. Our results show that selected digital skills contribute to the formation of patterns of behavior and interpersonal relations, thus increasing or decreasing the number of tasks shared in the workplace.

In their research on organizational behavior, Wagner *et al*. (1984) indicate that differences affect relationships between individuals and organizational cohesion. In other words, there is a strong argument that differences between nodes affect how networks are linked, or that differences can keep employees apart. Another line of research focuses on the reverse trend, called homophily, which indicates that similarity brings people closer together in networks. In our research, matrices described some kind of similarity or difference in behavior between employees that may have had something to do with the similarity in the way an organization performs tasks within its business processes. The opposite, the heterophily phenomenon is different employee relationships that tend to disappear as the network grows (Mehra *et al*., 1998). In our research, neither gender, tenure, nor the position held determined the dependent variable. The dyadic approach to intra-organizational relationships allowed us to understand how an individual's behavior becomes integrated with others through coordinated and interdependent tasks. In the informal approach to the organization, as mentioned in the introduction, unstructured tasks are not specified and cannot be analyzed and reduced to written standard procedures like standardized tasks (Graen & Scandura, 1987). A dyadic approach involving two employees and their interrelationships can reveal differences in the behavior of digital skills used to complete tasks, as is the case of our research.

CONCLUSIONS

In our research, we used social network analysis applied in a dyadic context to examine the relationship between digital skills and the tasks performed by technology park employees. We established the relational level on digital skills and performed tasks embedded in an intra-organizational social network that are relational in nature. Digital skills as a construct has been placed on the individual's properties that accumulate in the organization through social interactions and relations. Table 3 summarizes the evidence for the research hypotheses.

Table 3. Final results for the research hypothesis

Hypothesis		Beta (β)	p-value	Status
H1a	Digital skills in information management ---> task shared	0.04	0.40	Not confirmed
H1b	Digital skills in information evaluation ---> task shared	-0.19	0.08	Confirmed
H2a	Digital skills in communication building ---> task shared	0.09	0.29	Not confirmed
H2b	Digital skills in communication sharing ---> task shared	-0.20	0.03	Confirmed
H2c	Digital skills in communication networking ---> task shared	-0.04	0.39	Not confirmed
H3	Digital skills in collaboration ---> task shared	-0.45	0.06	Confirmed
H4	Digital skills in critical thinking ---> task shared	0.43	0.04	Not confirmed
H5	Digital skills in creativity ---> task shared	-0.52	0.01	Confirmed
H6	Digital skills in problem solving ---> task shared	0.28	0.12	Not confirmed

Source: own study.

The hypothetical relationship between dyadic digital skills, such as information management (H1a), communication building (H2a), communication networking (H2c), creative thinking (H5), and problem solving (H6) with the dependent variable, was not confirmed in our research. On the other hand, dyadic digital skills in information evaluation (H1b), communication sharing (H2b), collaboration (H3), and critical thinking (H4), may be alternative paths to understanding the tasks performed between employees in knowledge-intensive organizations. Our dyadic approach to digital skills was in line with the multiplexity concept of Zagenczyk *et al*. (2015), who considers relationships between the dyad as overlapping. This feature of the social network perspective implies that multiple ties can be considered simultaneously and that certain relationships should retain their separate features, predecessors, and consequences (see also Raider & Krackhardt, 2017).

The findings contribute to the literature on digital skills and tasks shared from a dyadic and organizational perspective by deepening the understanding of the relationship between a pair of employees (actors) in reference to the tasks performed. Our theoretical input is predicting the relationship between digital skills and the tasks performed as actor-based constructs transformed into relational constructs. It seems that the assumptions in Model 3 are better suited to predicting the dyadic tasks shared, which is inherently relational. Moreover, by adopting a social network perspective, we identified a new source of variation in digital skills by arguing that digital skills differ at the dyadic level of analysis. On the other hand, this is the first empirical study we know of that has shown a direct influence of digital skills on internal task performance practices. We introduced a new relational measure based on the dyadic approach for the various types of digital skills mentioned in the research and performed MRQAP on the basis of a previously validated questionnaire (see van Laar *et al*., 2018) on behaviors related to the digital skills of employees.

Most importantly, our study predicted how specific digital skills influenced the dyadic approach to the tasks shared, based on empirical evidence obtained through MRQAP. So far, according to our knowledge, no research has been undertaken to investigate the dyadic digital skills differences of coworkers and their relationship with the dyadic tasks shared. Most of the publications concern the study of the social network's impact on many other phenomena (Kirschbaum, 2019). Our research approach can also be seen as an incentive to those who hope to address the complexities of management studies, as is the case with the studies by Kaše *et al.* (2009), especially since in the knowledge-intensive service industry in which technology parks operate, research in management literature rarely discusses

employees' individual digital skills. On the other hand, multilevel research enables an understanding of the organizational business processes occurring at different levels (multilevel) by combining actor-based and relational levels. The results suggest that digital skills are a potentially essential source of social impact analogous to research on organizational coordination (Meyer, 1994), or emotion crossover in organizational social networks (Zagenczyk *et al*. 2020). However, no previous research that we are aware of has explored the possibility that shared dyadic tasks were socially influenced through the prism of dyadic digital skills differences. Our research indicates that social impact studies can benefit from considering whether ties exist and how strong these ties are (measured by the frequency of behavior) and whether they are multiplexed. Van Laar *et al*. (2020, 2018) note that most organizations lack a description of the skills their staff needs, and organizations would benefit from defining a digital profile for performed work and job position. There is a pressing need to identify which digital skills employees need to learn in the workplace to develop effective impact assessments.

Managers should consider the digital skills development practices targeted at employees as training and improvement often translate into their relationships. As a result, interventions that involve an individual may have far-reaching effects over time on the social network in the organization and, therefore, on the tasks and work performed. Organizations should apply digital skills training to influence interpersonal relationships and thus the effective performance of tasks and business processes. It seems necessary to develop and implement any policy's assumptions about increasing the skill level of its employees. As Chaker (2020) points out, the digital divide is viewed as an inequality in the use of digital skills; hence, policy should cover lifelong learning alongside other adult learning programs.

Our research has some limitations. We tested the model in one of the technology park departments with a high level of services and specialist knowledge of employees; therefore, a statistical generalization is not possible, which does not rule out a theoretical generalization (see more a single case network study, *e.g.* Zagenczyk *et al*., 2020; Ujwary-Gil & Potoczek, 2020; Maciel & Chaves, 2017; Gibbons, 2004; Umphress *et al*., 2003; Tsai, 2001). The department employed people with diverse positions, whose duty was to coordinate the entire technology park's tasks and work. The model requires re-verification in a different technology park or organization and a different organizational context in which digital skills play an essential role. Our research model should have considered longitudinal studies and network dynamics in order to make inferences about the causality and directions of inference valid. As Umphress *et al*. (2003) point out, the cross-sectional data leaves the question of causation open.

Data analysis required the construction of a difference score-based matrix that served as independent and control variables. Edwards (1993) suggests that differential scores could pose problems on reliability or regression to the mean when using them both as independent and dependent variables, which is not the case in our research. After Raider and Krackhardt (2017), we can conclude that MRQAP is less prone to problems related to the application of differential results, as is the case with more conventional estimation techniques. Moreover, as Zagenczyk *et al*. (2015) point out (see also Gibbons, 2004), QAP uses permutation-based hypothesis tests, which exclude the possibility of calculating statistical power, degrees of freedom, and effect size. Significance levels of the correlations and beta values may differ because of a limited number of correlations in the network data. As a result, R^2 values are also usually smaller than in an OLS regression (still, our R^2 is bigger than in Zagenczyk's *et al.* 2020 studies), and the p-value seems to be more critical in QAP analysis. Hence, many researchers ignore the R^2 value when presenting network regression results (*e.g*. Diez-Vial & Montoro-Sanchez, 2014). The model's overall fit may not sufficiently explain other important predictors, such as organizational culture, working climate, and leadership style, which may influence employee's behavior.

As rightly pointed out by Tobback and Martens (2019), we can distinguish two main types of relational data: real and pseudo-network data. A real network assumes that two actors are connected because, for instance, they communicate directly with each other. A pseudo-network assumes that two actors are connected, because they share behaviors or activities, and the network is implicit. We rely on two-mode network data and use data in a relational way. We create an implicit or pseudo-social network in which two employees are connected if they perform the same tasks or use the same digital skills (cf. Ujwary-Gil, 2019). The transposition of a two-mode network into a one-mode network

assumes that this conversion necessarily entails data loss. Recent work, however, suggests that these fears have been exaggerated (Borgatti et *al*., 2018; Everett & Borgatti, 2013).

Future research on digital skills in organizational and network contexts can be more broadly linked to the type of tasks performed and resources used within specific business processes in creative, game, IT and multimedia industries, and broadly understood audiovisuals. This would allow an examination of whether the type of work performed and, thus, the identified business processes can be predicted on the basis of digital skills.

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Appendix:

Appendix: Questionnaire

Digital skill / Cronbach's alpha	Item	M	SD
Information management / 0.79	Do you save useful digital files directly to the right folder	4.09	0.91
	Are you consistent in the naming of digital files	4.00	1.00
	Do you organize digital files via a hierarchical folder structure	3.85	0.83
Information evaluation / 0.68	Do you check the reliability of a website	4.06	0.83
	Do you check the information found on a different website	3.85	0.80
	Do you check if the information found is up to date	4.30	0.68
Communication sharing / 0.80	Do you post new messages on the internet	2.82	0.95
	Do you post a blog/article on the internet	2.06	1.17
	Do you share information on the internet to start a discussion	3.09	0.98
Communication building / 0.82	Do you establish online contacts to collaborate with	3.79	0.78
	Do you find experts on the internet to start a project with	3.42	1.09
Communication networking / 0.88	Do you spend time and effort in online networking with people from your field	3.61	1.03
	Do you build online relationships with people from your field	3.58	1.03
	Does the internet help you approach new professional contacts	3.67	0.82
	Do you use your online network to increase brand awareness	3.18	1.10
	Do you start a conversation with other professionals via the internet	3.21	0.86
Collaboration / 0.87	Do you share important information with your team via the internet	4.00	0.97
	Do you use the internet to share information that supports the work of others	3.88	0.86
	Do you use the internet to share resources that help the team perform tasks	3.88	0.86
	Do you use the internet to provide each other with information that progresses work	4.52	0.67
	Does the internet help you get support from co-workers	4.42	0.66
	Do you communicate via the internet with co-workers from other disciplines	4.12	0.93
	Do you share work-related knowledge with each other via the internet	3.58	1.06
	Do you use the internet to give feedback to co-workers	4.09	0.58
	Does the internet help you carry out tasks according to the planning	3.55	0.94
	Do you use the internet to discuss your role and contributions with team members	3.79	0.78
	Does the internet help you use other professionals' expertise	4.33	0.89
Critical thinking / 0.79	Do you give proof or examples of arguments you give	3.82	0.68
	Do you ask questions to understand other people's viewpoint	4.15	0.62
	Do you consider various arguments to formulate your own point of view	3.97	0.73
	Do you connect viewpoints to give a new turn to the discussion	3.70	0.95
	Do you generate new input from a discussion	3.64	0.78
	Are you open for ideas that challenge some of your held beliefs	3.73	0.80
	Do you use the internet to justify your choices	3.09	0.98
Creativity / 0.83	Do you give a creative turn to existing processes using the internet	3.30	0.88
	Do you use the internet to generate innovative ideas for your field	3.64	0.82
	Do you show originality in your work using the internet	3.61	0.70
	Do you use the internet to execute your tasks creatively	3.79	0.78
	Do you follow trends on the internet to generate original ideas	3.76	0.79
	Do you use the internet to evaluate the usability of your ideas	3.33	0.92
Problem solving / 0.88	Does the internet help you find the best way to solve the problem	3.48	0.67
	Do you solve the problem using the internet	3.76	0.61
	Do you come up with solutions to the problem via the internet	3.88	0.65
	Are you confronted with a problem that you are sure you can solve using the internet	3.64	0.78
	Does the actual outcome you achieved via the internet match what you expected	3.39	0.56

The items were asked in Polish on a five-point Likert scale: 1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = (almost) always.
Cronbach's alpha; M (Mean); SD (Standard Devotion) were own calculations.
Source: Van Laar *et al.* (2018).

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The contribution share of authors is equal and amounted to 50% for each of them.

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The entrepreneurial motivation, Covid-19, and the new normal

Cristina Blanco González-Tejero, Klaus Ulrich, Agustín Carrilero

ABSTRACT

Objective: The main objective of the article is to show how the influence of Covid-19 affects entrepreneurial motivation through the variables of creativity, leadership, and communication, understood as information available and transferable within the environment.

Research Design & Methods: The study was performed by means of an email survey questionnaire conducted on 63 employees in Madrid (Spain). The propositions and the research model were tested with fuzzy-set qualitative comparative analysis (fsQCA).

Findings: The results illustrate that employees who aspire to become entrepreneurs evidence specific configurations in relation to the variables proposed before the Covid-19 pandemic. Nevertheless, these configurations in the new normal are only determinant for the absence of entrepreneurial decision.

Implications & Recommendations: Background affects the link between the variables of creativity, communication, leadership, and entrepreneurial motivation. Thus, the uncertainty derived from Covid-19 influences entrepreneurial development, and consequently, it is recommended to consider these aspects in government policies that encourage support to potential entrepreneurs.

Contribution & Value Added: Through a comprehensive assessment, this research contributes to the literature on entrepreneurship by addressing the gap related to entrepreneurial motivation and the impact of the new normal in the face of Covid-19.

Article type: research article

Keywords: entrepreneurship; Covid-19; entrepreneurial motivation; skills; competencies

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INTRODUCTION

Entrepreneurship is an extremely important issue in the twenty-first century (Soriano, 2010) and entrepreneurial motivation plays a decisive role in the development of entrepreneurship (Cervelló-Royo *et al.*, 2020). Entrepreneurs, opportunities, and entrepreneurial behaviours are key elements in entrepreneurship theory (Kusa *et al.*, 2021). The Covid-19 pandemic poses an unprecedented challenge in many respects (Belitski *et al.*, 2022), however, it takes on special relevance in economic development. Considering that the entrepreneurial individual's work is not guided by any manual, they must contemplate different perspectives and implications (Dobón & Soriano, 2008) to overcome the market dynamism that has led to the need for entrepreneurs to adapt, in order to achieve business sustainability. New aspects related to the entrepreneur role in society in crisis situations become relevant. Consequently, uncertainty has affected entrepreneurial development, so the study of the variables involved in entrepreneurial motivation before and during the pandemic situation takes on special relevance.

Over the years, many scholars have investigated entrepreneurial motivations (Liñán & Chen, 2009), thus providing insights into the perceived strengths and weaknesses in shaping personal attitudes towards entrepreneurship. To succeed in the global business environment, it is necessary to identify

opportunities, since entrepreneurship requires non-routine innovative activity to be developed, which involves the development of instincts, intuition and inspirations (Sharma, 2019). The aim of this research work is to show how the influence of Covid-19 affects entrepreneurial motivation. Ultimately, the skills and abilities to undertake a business should be considered (Fernández-Pérez *et al*., 2019). Hence, the goal of the research is the analysis of creativity, a variable highlighted in the research of Capella-Peris *et al*. (2020); Rueda Barrios *et al*. (2021); Biswas and Verma (2021); communication and relevance of information referred to by Capella-Peris *et al*. (2019) and Eliyana *et al*. (2020), and finally leadership considered in research by Biswas and Verma (2021) and Eliyana *et al*. (2020).

To respond to the analysed variables, the study of factors related to entrepreneurial motivation was carried out to explain the motivational effect of individuals in pursuing entrepreneurial career options. Different market shocks have been experienced over the years, directly hitting the economy and more specifically financial services (Piñeiro-Chousa *et al*., 2019a). In turn, the influence of Covid-19 on entrepreneurial motivation and drive was considered. For this purpose, the research has been developed through a survey sent to 100 employees and potential entrepreneurs in 2019 and in 2021. For the collection of information, the survey was sent via Microsoft Forms. The answers considered valid were filled out by 33 employees and potential entrepreneurs in 2019 (before the pandemic) and another 30 in 2021 (the new normal). The following research questions are posed:

RQ1: Does creative awareness act as an influential variable on entrepreneurial or intrapreneurial motivation before and/or during Covid-19?

RQ2: Does communication become relevant in the development of entrepreneurial or intrapreneurial motivation and influence entrepreneurial motivation before and/or during Covid-19?

RQ3: Is awareness of leadership ability significantly associated with the motivation to undertake or participate in an intrapreneurial initiative before and/or during Covid-19?

Consequently, in this research, entrepreneurial motivation will be considered as the starting point of entrepreneurial development (Elfving *et al*., 2009). These issues have been addressed through an exhaustive evaluation of the proposed variables using fuzzy-set qualitative comparative analysis (fsQCA).

The article is organized as follows. The following section presents the hypotheses that were considered in the light of the literature review. The study continues by describing the data set and the research method. Subsequently, results are presented and discussed, and finally the conclusions of the study are presented, the limitations of the research are highlighted, and new lines of research are outlined.

LITERATURE REVIEW

Entrepreneurship has been considered from different perspectives, referring to the entrepreneurial factor, function, initiative and behaviour, which has made it possible to consider the entrepreneurial 'spirit' (Cuervo & Ribeiro, 2007). Motivation represents the amount of effort a person will invest to achieve a specific goal (Lawler & Suttle, 1973), in this case, to launch a business initiative. In this way, goals and motivations act to connect entrepreneurial intentions with actual entrepreneurial behaviours (Vallerie, 2014).

Individual competencies, referring to knowledge, skills and abilities, are necessary for personal and business development and differentiation. In the entrepreneurial environment, Bos-Brouwers (2010) considers personal motivation while Jahanshahi *et al.* (2018) the individual's attitude as key elements. Likewise, Rindova *et al*. (2009) propose self-actualization and self-esteem as elements that enable development towards personal achievement, which significantly influences entrepreneurial behaviour. Williams *et al*. (2013) point out attributes such as flexibility, motivation, perseverance. and optimism as attributes that characterize entrepreneurs. Consequently, entrepreneurial motivation is considered to boost a series of behaviours developed by entrepreneurs in the idea management process (Baum & Locke, 2014).

From the cognitive perspective, entrepreneurial activity has been focused on the theory of planned behaviour linked to psychology (Ajzen, 1991), which allows entrepreneurial behaviour to be considered as highly intentional. The relationships between self-identity, commitments, motivations, and individual actions are analysed from different perspectives, considering their link with social psychology

(Metallo *et al*., 2021). Accordingly, entrepreneurial intentions are linked to the attitudes of the individual towards entrepreneurship, which enables factors that influence entrepreneurial motivations to be understood (Boyd & Vozikis, 1994). Therefore, entrepreneurial intentions play a crucial role in the individual's motivation to start a new business, as these intentions precede the action of starting a business idea and, consequently, help in the development of the entrepreneurial process and making decisions (Krueger *et al*., 2000). Entrepreneurial decision-making has been approached from different domains, such as gender, age, education or entrepreneurial confidence (Dvouletý & Orel, 2020). Moreover, other variables, such as gender, have long been a disputed issue in the entrepreneurial environment and influential in entrepreneurial orientation (Goktan & Gupta, 2015), so it becomes relevant to consider whether it has an influence on entrepreneurial motivation.

Due to the current situation that society is going through and the uncertainty it is facing, the entrepreneurial spirit is deemed. Hence, situational factors and context influence entrepreneurial intentions (Boyd & Vozikis, 1994; Morales-Gualdrón & Roig, 2005). The analysis considers entrepreneurial motivation to be the motivation existing in individuals that allows them to detect opportunities based on present needs, thus giving rise to entrepreneurial or intra-entrepreneurial actions. Consequently, researchers assume that particular motivations are needed: the commitment to implement the idea and the actual effort to start a new venture (McMullen & Shepherd, 2006).

The Covid-19 pandemic has dramatically changed society and disrupted current business practices, requiring new approaches that influence entrepreneurial thinking. Psychological responses to the Covid-19 pandemic have been explored by scholars such as Xie *et al.* (2020), because during this time, many people have received different information insights that have influenced their personal and professional decisions. As has become evident over the last two years, Covid-19 has had a global impact, affecting all countries regardless of their level of development. However, the extent of the pandemic in terms of economic impact and business sustainability has been altered depending on the set of government policies and measures proposed to mitigate it. Therefore, it is necessary to analyse the effect of Covid-19 on entrepreneurial intention by analysing the influence of different motivational antecedents. Consequently, the different entrepreneurial motivations are addressed, understood as variables that refer to the internal drives or desires that push the individual to become an entrepreneur. Thus, internal motivations are analysed, which are related to the desire for self-fulfilment or achievement (Sivarajah & Achchuthan, 2013) or gender issues, as proposed by Davidsson and Reynolds (2005). Similarly, researchers consider the relationship of entrepreneurial potential and its motivations in the context of the pandemic as there are not enough studies in this field at present.

Creativity

At the individual level, people need to be creative to solve problems encountered at work and in everyday life (Sternberg & Lubart, 1996). Thus, individual creativity is considered crucial and influential on factors such as personality, motivation, knowledge, and cognitive skills (Dimov, 2007).

Creativity, as analysed by Chen *et al.* (2018), highlights the ability of organizational founders to produce goods that show some degree of novelty, originality, and uniqueness. Additionally, taking into account creativity as a variable object of study, Oldham and Cummings (1996) relate it to work, considering that it refers to the ability to develop ideas as a solution to the problems posed. Therefore, Chua *et al.* (2015) examine its relationship by understanding that the lack of valuation by the environment of personal initiative would negatively impact the generation and development of the idea. In turn, this leads to a lower perception of creative capacity, which originates a reduced use of creative development in organizations (Hormiga *et al*., 2013). Likewise, the positive relationship between creativity and business development through the capture of intangible value by applying creative, technological and innovation knowledge is related by Hearn (2020).

New entrepreneurial educational practices are required to contribute to the management of change due to the uncertainty caused by Covid-19 (Ratten & Jones, 2021). Creativity has been studied since educational stages as an influential variable in entrepreneurial development (Capella-Peris *et al.*, 2019; Rueda Barrios *et al.*, 2021). Meanwhile, Biswas and Verma (2021) argue that in entrepreneurial development, innovation is a personality trait, in which creativity plays a key role as it allows the cre-

ative development of innovative ideas. Hence, it is relevant to consider initiative and imagination in entrepreneurial development, as it gives way to new business opportunities (Cuervo & Ribeiro, 2007). To this end, it is of key importance to analyse the impact of the individual's creative awareness in response to the new social needs that have developed in the pandemic situation.

Proposition 1: Creative awareness acts as an influential variable in entrepreneurial or intrapreneurial motivation before and/or during Covid-19.

Leadership

The Covid-19 crisis makes leadership a valued quality for policymakers (Ratten, 2021). Leadership, creativity, entrepreneurial mindset, entrepreneurial culture, and strategic management of resources have been key factors for the creation of distinctive value in business organizations (Ireland *et al.*, 2003). Capella-Peris *et al.* (2019) analyse the ability to coordinate people and cope with different situations from higher education, with the aim of assessing entrepreneurial competencies. Consequently, from an early age, leadership acquires relevance as a factor in the decision about becoming entrepreneur.

The entrepreneur is considered a leader by authors such as Baron (2002). Hunt (2004) refers to the leader as the person who has the ability to influence others. On many occasions, this capacity appears naturally within social systems and leaders can influence the decisions and make people follow strategies. In addition, the motivation of the members of the organization, support and learning are also aspects that are influenced by leaders (Yukl, 2002). Thus, the leader is a key element in the organization generating visionary scenarios (Gupta *et al.*, 2004).

The capacity to lead has been linked with other traits such as creativity, which implies considering leaders as individuals with the ability to guide the team towards results through collaboration and creative decisions (Soriano & Martinez, 2007). Biswas and Verma (2021) analyse variables linked to the management as well as the handling of difficult problems and persuasion in business tasks.

Bearing in mind Covid-19 and the uncertainty it poses in business decisions and strategies, it becomes relevant to understand the influence of the leader's profile on business motivation and management.

Proposition 2: Leadership ability is significantly associated with the decision to undertake or participate in an intrapreneurial initiative before and/or during Covid-19.

Communication

Communication is a characteristic that allows individuals to generate understanding, give meaning, and provide identity to the different relationships in the environment, thus, interpersonal communication refers to the process of interaction in the environment involving individuals, and is represented through the behaviour of verbal and nonverbal messages (Baxter & Braithwaite, 2008). Within information management in the entrepreneurial environment, cooperation is another relevant factor to consider, since it enables coordination among participants and the improvement and implementation of coordination in the processes through which knowledge and skills/abilities are shared, facilitating communication (Del Mar Benavides-Espinosa & Ribeiro, 2014). Therefore, it becomes a characteristic of analysis in the entrepreneurial environment, as it influences the relationships that arise in that environment.

Capella-Peris *et al.* (2019) analyse the access to information required for entrepreneurship or the dialogue to solve problems. Aligned with the previous aforementioned research, Eliyana *et al.* (2020) consider the socialization between individuals relevant in entrepreneurship. Thus, it becomes relevant to consider communication as a variable, since communication theories can be an interesting asset for the study of entrepreneurial behaviour.

During the pandemic, information has evolved rapidly, making it relevant to consider the impact on business development and motivation. As Obrenovic *et al.* (2020) point out, the development of effective communication techniques during Covid-19 has led to improved performance and mental support among individuals.

Proposition 3: Awareness of the existence of communication and information becomes relevant in the development of entrepreneurial or intrapreneurial motivation and influences before and/or during Covid-19.

RESEARCH METHODOLOGY

Qualitative comparative analysis (QCA) is a research methodology based on the mathematical set theory. QCA analyses the influence of the combination of causal conditions on the outcome (De Crescenzo *et al*., 2021; Misangyi *et al*., 2017; Ribeiro-Navarrete *et al*., 2021b). Qualitative comparative studies have a configurational approach (Fainshmidt *et al*., 2020; Lassala *et al*., 2021; Ribeiro-Navarrete *et al*., 2021a), in that the relevance of the methodology relies more on the configuration/combination of conditions, more than the behaviour of an individual condition on the outcome. Therefore, the fuzzy-set qualitative comparative analysis (fsQCA) method has gained relevance nowadays, as it has been proven to be a highly valid alternative method or complementary to other methodological analyses (Piñeiro-Chousa *et al*., 2019b).

Sampling and data collection

Data comes from the 2019 annual survey of a group of 33 employees and potential entrepreneurs and the 2021 survey on 30 employees and potential entrepreneurs. Thus, the final sample included information from 63 Spanish potential entrepreneurs.

The strengths of motivational factors, perceived success factors and problems were measured using a five-point Likert scale. The statements analysed were:

a) I am frequently surprised with innovative ideas as a solution to the problems posed (CRT);
b) I understand that there is adequate information that favours communication (COM); and
c) I like to lead initiatives and teams (LEA).

In turn, two dichotomous variables were considered: the first, the decision to undertake in the next three years, or to be at the forefront of the development of, a business idea within the organization (potential entrepreneur); and the second, gender (male or female).

Table 1. Calibration data 2019

Calibration	CRT	COM	LEA
full membership (90th percentile)	5	5	5
crossover point (median)	4	4	4
full non-membership (10th percentile)	1.4	2	2.4

Source: own study.

Table 2. Calibration data 2021-2022

Calibration	CRT	COM	LEA
full membership (90th percentile)	5	3.9	5
crossover point (median)	3	2	3
full non-membership (10th percentile)	2	1	2

Source: own study.

During the calibration process (Tables 1 and 2), all the causal conditions were calibrated, except the crisp conditions (binomial conditions that only can adopt the values 0 or 1). In the calibration, all the fuzzy sets were converted into values ranged between 0 and 1 (Ragin, 2009; Ragin, 2008).

According to prior studies of Pappas and Woodside (2021), we set as thresholds different percentiles in order to determine the membership of the fuzzy set. In this sense, we fixed percentile 90 for full membership, percentile 10 for full non-membership and percentile 50 for the crossover point. In order to avoid difficulties in determining to what particular set a case belongs to, we followed Ragin's (2008) recommendations and we subtracted 0.01 from the membership scores for all the calibrated conditions below full membership (Miranda *et al*., 2018; Fiss, 2011).

The causal condition CRT, which represents the innovation ability to solve problems, was calibrated for the 2019 data with the thresholds 5, 3.99, 1.4, and for 2021: 5, 2.99, 2. The causal condition COM, which represents the belief that the existent information encourages communication, was calibrated with the following thresholds for the 2019 data: 5, 3.99, and 2, and for 2021: 3.9, 2, 1. LEA, that is a

causal condition which represents the preference to lead level of employees, was calibrated in 2019 with the thresholds 5, 3.9, and 2, and for the 2021 data: 5, 2.99, and 2.

Moreover, the causal condition GEN, which represents the gender, is considered as a binomial condition, in fsQCA terminology, a crisp condition that is not calibrated (Thiem, 2014). Value 1 represents male and 0 female. In the case of ENT, which represents that the aim of the employee is to become an entrepreneur, it is also a crisp condition, which adopts the value 1 in the case that the aim of the employee is to be an entrepreneur in the future, and value 0 if that is not the case.

RESULTS AND DISCUSSION

Analysis of Necessary Conditions

In fsQCA studies, we elaborated an analysis to determine which conditions could be considered necessary for the occurring of the expected outcome (Table 3). In social sciences, the phenomena overlap and reinforce one another (Gligor & Bozkurt, 2020), thus to study the joint influence of conditions this approach enhances the classic correlation models that study the net effect, based on the ceteris paribus principle of dependent variables on the independent variable (Oana *et al*., 2021; Skarmeas *et al*., 2014). Necessary conditions are those that are so important for the outcome that they cannot occur in its absence. In the elaboration of the necessity analysis, we focused on two main indicators, *i.e.* consistency and coverage. Consistency measures the ratio of cases that have both condition and the outcome among all that present the expected outcome. Coverage measures the proportion of cases in which the condition and the outcome appear, among all that show the condition. According to prior studies of Schneider and Wagemann (2012), conditions can be considered necessary if they reach consistency scores above 0.9.

Table 3. Necessary conditions

Causal conditions	PRESENCE OF THE OUTCOME IN 2019		ABSENCE OF THE OUTCOME IN 2021	
	Consistency	Coverage	Consistency	Coverage
GEN	0.667	0.6000	0.636	0.778
~GEN	0.333	0.462	0.364	0.803
CRT	0.715	0.817	0.396	0.543
~CRT	0.285	0.297	0.604	0.953
COM	0.607	0.657	0.499	0.671
~COM	0.392	0.431	0.500	0.809
LEA	0.593	0.748	0.507	0.700
~LEA	0.407	0.391	0.493	0.771

Source: own study.

As it can be concluded from this study, no condition can be considered as necessary, since they do not reach the 0.9 consistency score.

Analysis of Sufficient Conditions

In order to elaborate the sufficiency analysis, we constructed a truth table through the fsQCA 3.0 software in order to determine the conditions that lead to the presence (Table 4) or absence (Table 5) of the outcome (Park *et al*., 2020). In the analysis of sufficient conditions, we analysed four main indicators: the consistency of the solution, which explained how many cases are explained by the presented solution; the coverage of the solution, which analysed how many interest cases are covered by the solution; the raw coverage, which represented the proportion of interest cases explained by the configuration; and the unique coverage, which explained the ratio of cases with the expected outcome explained uniquely by one configuration.

Table 4. Sufficiency analysis for the presence of the outcome in 2019

Criteria	PRESENCE OF THE OUTCOME (ENT) IN 2019		
	1	2	3
GEN	●	•	
CRT	●	●	●
COM	●		•
LEA		●	●
Raw coverage	0.334	0.377	0.392
Unique coverage	0.070	0.113	0.128
Consistency	0.864	0.919	0.880
Solution coverage	0.575		
Consistency	0.876		

Source: own study.

Table 5. Sufficiency analysis for the absence of the outcome in 2021

Criteria	ABSENCE OF THE OUTCOME (ENT) IN 2021-2022	
	4	5
GEN		⚬
CRT	⚬	⚬
COM	◯	◯
LEA	⚬	
Raw coverage	0.334	0.377
Unique coverage	0.070	0.113
Consistency	0.864	0.919
Solution coverage	0.575	
Consistency	0.876	

Note: According to the Fiss (2011), the solutions provided should be considered from different perspectives, black circles denote the presence of the condition and white circles show the absence of the condition. In relation to the size, the large circles refer to the central condition which appears in both the parsimonious and the intermediate solution, and the small circles indicate the presence of the condition only in the intermediate solution.
Source: own study.

Presence of the Outcome

Configuration 1 showed that employees who have to aim to become entrepreneurs are usually males, who usually surprise themselves with innovative ideas to solve problems and believe that the existent information is enough and encourage communication. This configuration registered the raw coverage of 0.334, which meant that this configuration explains 33.4% of cases and had a consistency score of 0.864.

Configuration 2 suggested that employees with leadership capabilities, a creative mindset to solve problems and whose gender was male usually develop entrepreneurial goals for their future. This solution registered the highest consistency level (0.919) and had a raw coverage of 0.377.

Configuration 3 showed that in order to have entrepreneurial future goals, employees had to show innovative ideas in the solution setting processes, were likely to lead teams and projects, and believed they have enough information to communicate. Configuration 3 had a raw coverage of 0.392, which meant that it explained 39.2% of cases that gathered the expected output with a consistency level of 0.880.

Absence of the Outcome

Configuration 4 indicated that employees who believe they do not have enough information to encourage communication, who usually did not have innovative and creative ideas and did not like to lead teams or initiatives, did not want to become entrepreneurs in the future. This configuration had a consistency score of 0.864 and a raw coverage of 0.334.

Configuration 5 showed that employees who did not have entrepreneurial objectives did not believe that they have enough information to communicate, did not have innovative or creative ideas to solve problems, and were of female gender. Configuration 5 registered a consistency level of 0.919 and a raw coverage score of 0.377.

Discussion

The impact of the media during Covid-19 in the dissemination of information meant a change in the behaviour of individuals (Al-Omoush *et al*., 2020). Doanh *et al.* (2021) revealed that the fear and anxiety generated by Covid-19 have decreased entrepreneurial self-efficacy and the intention to create own business, therefore understanding its impact is relevant.

The variables proposed in the research are not necessary conditions for entrepreneurial motivation, neither in the pre-pandemic situation nor in the new normal, since no variable exceeded the consistency of 0.9. In this way, the analysis of the combination of conditions becomes relevant. Therefore, considering market shocks and high competitiveness, economic motives on their own do not clarify why entrepreneurs will make sustained efforts over time under high uncertainty and uncertain future revenues (Reynolds, 2012).

The results obtained for the new normal (year 2021) evidence an absence of the condition. Thus, uncertainty does not motivate employees to be entrepreneurial as the information in the market is not clear. The results obtained for 2019 show presence of the condition of being entrepreneurial when there are innovative ideas and good communication, considering that there is enough information in the market. In addition, it should be noted that creativity and leadership are influential variables in men to develop entrepreneurship. In this sense, other scholars, such as Reissová *et al.* (2020) also highlight the characteristic of creativity for the start of an entrepreneurial career. Therefore, it is worth considering that just as fear of failure and uncertainty act as personal barriers, awareness of individual knowledge and skills can be driving variables of entrepreneurial motivation.

CONCLUSIONS

The research examined how the variables of creativity, communication, and leadership influence the decision to become an entrepreneur in a pre-pandemic situation and in the current situation (new normal). Entrepreneurial motivation has been defined as being influenced by uncertainty and these variables do not represent the presence of potential entrepreneurs in the new normal, although they did before Covid-19. Therefore, in our analysis, we placed special emphasis on the relationship between competencies as determining and influential elements in the decision to become an entrepreneur. To arrive at the results, a sample of self-reported data collected through a survey from 63 employees was analysed, which allowed for an in-depth analysis.

Entrepreneurial motivation is essential for the development of entrepreneurship, so it is worth knowing which variables have a positive influence on this trend. By analysing the conditions related to entrepreneurial motivation, the study contributes to the debate on the influence of different variables on the start-up of a business initiative. The configurations leading to employee motivation were identified using the fsQCA. The results of this empirical study show the importance of certain variables related to creativity, communication and leadership and the relevance of context. The theory presented in this article helps to answer the research questions posed above.

Based on this research and as pointed out by other previously mentioned investigations (Hearn, 2020; Capella-Peris *et al*., 2019; Eliyana *et al*., 2020), the variables creativity, communication, and leadership were addressed and shown to acquire special relevance considering their impact on the economic environment, so as a result of different configurations they have the ability to link with entrepreneurial motivation. Moreover, the context should be borne in mind as a key factor as proposed by Boyd and Vozikis (1994) and Morales-Gualdrón and Roig (2005). Furthermore, it should be considered that people who identify new opportunities, have a proactive character, and are able to take risks find it attractive to become an entrepreneur (Żur *et al*., 2015).

Regarding possible directions for future research, our sample can be expanded by taking into account variables such as skills training, since entrepreneurship education and culture play an essential

role in the intention to become an entrepreneur (Wardana *et al.*, 2021). This research might be replicated considering a different timeline, with the aim to analyse whether elements such as vaccinations or new information disseminated contribute to entrepreneurial confidence and motivate entrepreneurship again. As Hassan *et al.* (2021) argue, the ability to take risks, creativity, and innovation act as characteristics that can be enhanced through empowerment. Therefore, it is suggested that empowerment be considered as a method of development and work on the variables proposed in the research. Moreover, it is relevant that these factors are considered by business leaders, employees, potential entrepreneurs, educators, and policymakers in order to support entrepreneurial development and consequently contribute to the economy.

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