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

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A B S T R A C T
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.

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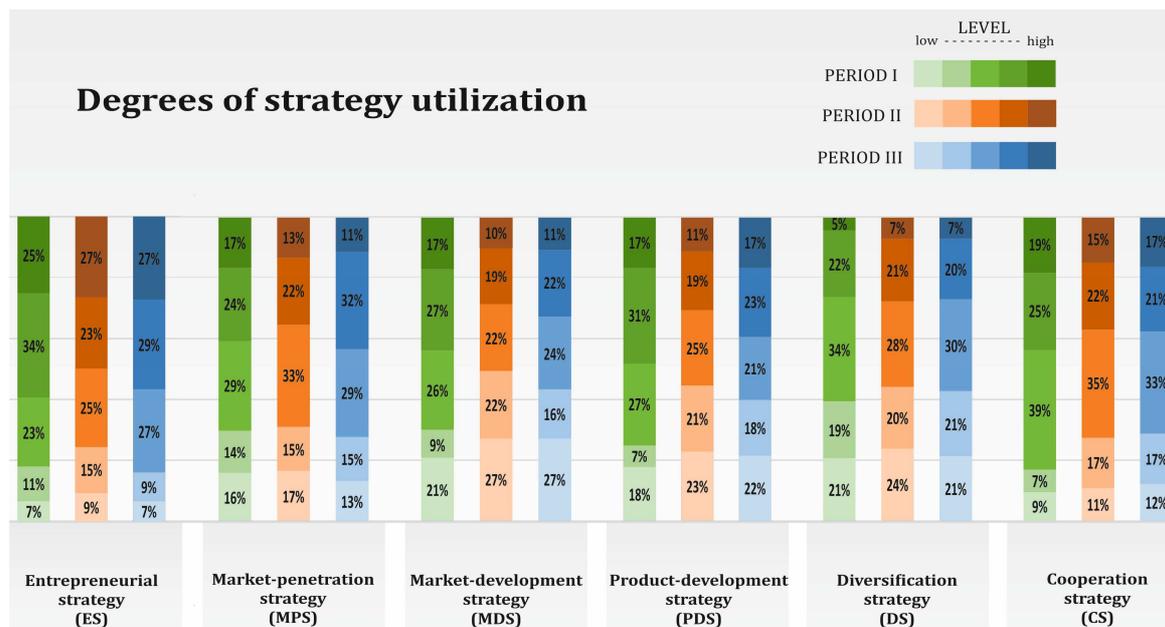
Figure 1. Cumulative frequency distribution of degree of utilising examined strategies during the three periods
Source: own elaboration based on survey results.

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:

$$FP = f(ES, MPS, MDS, PDS, DS, CS) \hspace{2cm} \text{(Model I)}$$

$$\sim FP = g(ES, MPS, MDS, PDS, DS, CS) \hspace{2cm} \text{(Model II)}$$

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

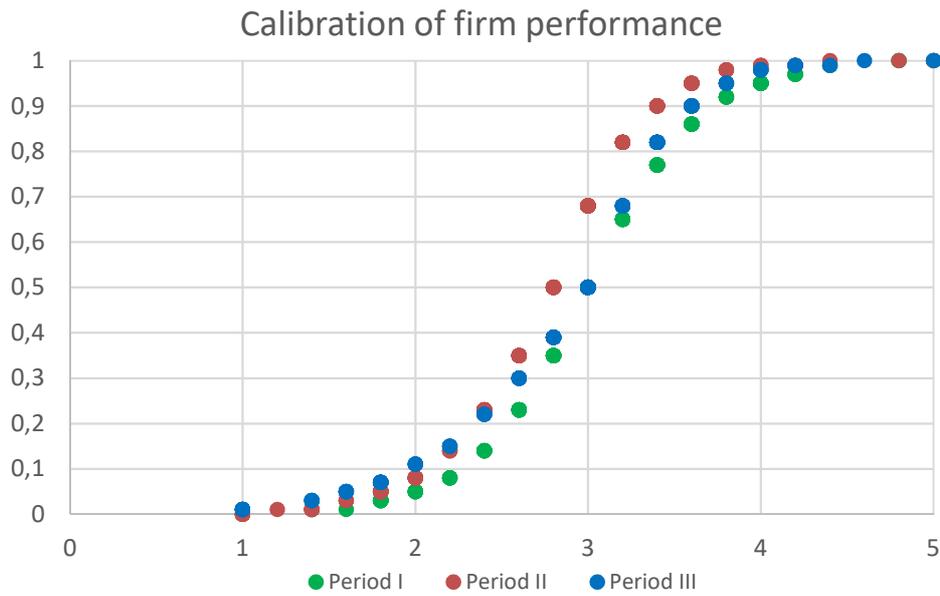| Variable	Period I	Period II	Period III
non-membership point	2.00	1.80	1.60
cross-over point	3.00	2.80	3.00
full membership point	4.00	3.60	3.80

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):

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

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 co-operation 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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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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