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Article

Analysis of Innovation Activities of Slovak Small and Medium-Sized Family Businesses

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Abstract: Family businesses began to emerge in Slovakia after the change of social establishment in 1989, and since then they represent a significant group of business entities with a significant contribution to the economy, and have significant growth potential. Innovations have become a driving force for the future opportunities of these companies. Based on empirical research, this paper aims to identify the innovation activities of small and medium-sized family businesses in Slovakia and to determine their impact on the company's economic results. We can state that out of small and medium-sized family businesses included in the survey, 76.5% have implemented innovations in the last five years. We use statistical tests to verify the research hypotheses. We can state that there is a statistically significant relationship between the size of the company and the number of types of introduced innovations, as well as between the generation running the company and the number of types of introduced innovations. Second-generation family businesses can, therefore, be considered more innovative than first-generation family businesses. We investigate the impact of the COVID-19 coronavirus pandemic on innovation activities in these companies. It is interesting that in 30.6% of family businesses the COVID-19 coronavirus pandemic positively affected their innovation activities.

Keywords: family businesses; innovations; COVID-19 coronavirus pandemic

1. Introduction

In economically developed countries, family businesses are a significant part of business entities, which make a considerable contribution to the creation of the country's gross domestic product and creation of job opportunities. They play an important social role in creating jobs not only in economically developed regions of the country but also in disadvantaged ones. (Lusnakova et al. 2019). In Europe, they represent the oldest form of business, which currently makes up the majority of its businesses.

In the Slovak Republic, family businesses represent a new developing form of business, which was reintroduced in the country after 1989 (Strazovska et al. 2019; Rafajova and Pafco 2017) and is associated with the onset of a market economy. Their creation was conditioned by the gradual disintegration of state-owned enterprises, which resulted in problems with ensuring work and income for former employees. Family businesses should help the stability and economic independence of families. In recent years, the Slovak governments have adopted several economic and political instruments supporting small and medium-sized enterprises; however, none of them focused exclusively on family businesses. Despite several initiatives of political movements, the legal definition of family businesses is still not part of the Slovak legislation (Strazovska 2015).

Despite the absence of a legal definition of the term “family business”, it is possible to rely on the characteristics of economic theorists in our country as well as abroad. Collective of authors Vilcekova et al. (2018) proposed a legal definition of family businesses as “a set of tangible, intangible

and personal components of the business of unmarried co-ownership of spouses or in the joint ownership of individual persons related in a direct or indirect way." In scientific studies, authors use the definition of the European Commission to identify family businesses, "the majority of decision-making rights are in the possession of the natural person(s) who established the firm, or in the possession of the natural person(s) who has/have acquired the share capital of the firm, or in the possession of their spouses, parents, child, or children's direct heirs. The majority of decision-making rights are indirect or direct. At least one representative of the family or kin is formally involved in the governance of the firm. Listed companies meet the definition of family enterprise if the person who established or acquired the firm (share capital) or their families or descendants possess 25 percent of the decision-making rights mandated by their share capital" (Marques et al. 2020; Strazovska et al. 2019; Rau et al. 2019; Moresova et al. 2017; European Commission 2009).

In family businesses, therefore, work and family life blend, creating a specific business culture. Entrepreneurs are trying to provide a livelihood for the family and leave the company to their successors in the future (Moresova et al. 2018). The motivation of employees of family businesses is, therefore, different from the motivation of employees in non-family businesses and public and local state administration (Vlasekova 2019). The focus of family business is often on the family interest, which is created by involving several family members in the business. Such a stronger family unit gives a better precondition for the transfer of experience from generation to generation. The personal factor is not only a source of stability but also a source of creation of tradition, which forms a strong basis for the continuity of the company and its future prosperity. The overlap between family and business can also lead to problems if the relationships between family members are not sincere. Conflicts can be transferred from business to family life, but also vice versa. These private disputes can affect the operation of the company and can also result in its bankruptcy. Therefore, it is appropriate to define the basic formal rules between individual family members before starting a business. The specifics of family business also reflect in the resolution of conflicts in labor relations, which are resolved in the family circle without the need to establish a labor compliance department as in non-family businesses (Kiselyova 2020).

Even though one of the main characteristics of the family business is the transfer of ownership to descendants, research by author Korenkova (2016) showed that 81% of university students from business families do not plan to take over the family business. The author Arz (2019) observed the transfer of main family values into business in his case study of a German second-generation family business. The author identified the following main family values: preservation—a strong commitment of the family to the company and a long-term intention to keep the ownership of the company in the family; altruism—the act of family members in the best interests of other family members and long-term non-family employees.

The study of the author Mura (2017) showed further differences between family and non-family businesses operating in the Slovak Republic in their approach to business. For family businesses, the characteristics of acceptance of members, emotional bond, internal orientation, customer orientation, and work-life balance were proved to be important. On the contrary, in the case of non-family businesses, external orientation, and customer orientation were identified as important characteristics. Differences between family and non-family businesses also reflect in financing decisions. Although the loan is one of the most frequently used external sources of financing for family businesses, compared to non-family businesses, they show lower leverage, and the zero-leverage company tends to occur more often among family businesses. The authors Michiels and Molly (2017) explain this phenomenon by the stronger aversion of family businesses to financial risks. A comparison of large publicly traded companies in the United States has shown that family businesses are less market-oriented than non-family businesses (Zachary et al. 2011). Not all companies disclose information about the family character of the company and act as a non-family business externally. The authors Kolodko et al. (2017) stated that Polish entrepreneurs often regard family involvement in the business to be unprofessional and unethical, as the qualification is traditionally regarded to be more important than family relationships.

Increasing the competitiveness of economies, economic growth, and employment growth, which are currently the main goals of the Member States of the European Union, cannot be achieved without innovation and increasing innovation performance. Innovation and creativity are also one of the domains contributing to corporate social responsibility (Popescu et al. 2019). The level and intensity of innovation activity in individual companies does not only depend on the interest and ability of the company to engage in innovation but is also influenced by external factors. These include, for example, a sufficient number of skilled workers and a favorable business environment in the country, which would make it possible to introduce and use innovations to a greater extent in small and medium-sized enterprises as well.

According to the latest edition of the IMD World Competitiveness Ranking (Institute for Management Development 2020), published annually by the Institute for Management Development in Switzerland, Slovakia is the 57th most competitive economy among the 63 countries evaluated. Compared to 2019, this means a drop of four positions and the worst position within the Central European region. The low share of innovative companies in the Slovak Republic is a consequence of the lack of comprehensive concepts of support for research, development, and innovations (Fila 2017). A significant difference in the innovation activities of small and medium-sized enterprises is also noticeable when comparing the original Member States of the European Union and its new members, which joined after 2004. These are below the European Union average in terms of innovation activities (Maros and Rybansky 2019). Every company aims to achieve sustainable growth, so its management must know the internal and external factors that affect the company's growth. The study by Marques et al. (2020) structured and analyzed determinants of family business growth using a fuzzy cognitive mapping technique and system dynamic approach. The study also verified the impact of an increase in family business innovation and entrepreneurial spirit on the decision criteria aggregated into Business Strategies and Managerial cluster. The authors observed a positive impact on the creation of new business areas and ventures based on new technologies. The author Mura (2019) focused his research on the internationalization of Slovak family businesses and identified the most important motives for their internationalization: saturated domestic market, fierce competition on the domestic market, and the success of other companies in the same sector. In the Slovak Republic, the Slovak Investment and Trade Development Agency assists small and medium-sized enterprises with internationalization (Vojtech et al. 2019).

The innovation activities of companies are currently receiving close attention from academic researchers. Innovation is an integral part of economic growth and is an important factor in business success and competitiveness (Vitezic and Vitezic 2015). Innovations can save employees' time and effort, improve the customer experience, shorten delivery times, differentiate the company from the competition, and turn disadvantages into advantages (Haddad et al. 2020). There are visible differences in the approach of large and small and medium-sized enterprises to innovation. Large companies cooperate to a greater extent with other companies in their group, professional training centers, and/or technical assistance centers in innovation activities. On the other hand, small and medium-sized enterprises cooperate to a greater extent with their clients/customers (Cristo-Andrade and Franco 2020). The study by Stanislawski (2020) showed that the rate of use, and thus the importance of open innovations for the company increases with the size of the company. The study also showed that the use of the open innovation concept increases with the increasing territorial market scope of companies.

Collective of authors Beynon et al. (2020) examined the relationship between small and medium-sized enterprises' strategies and their intention to drive future innovations. The results showed that business strategies focused on the internal environment, which the company can directly control, increase confidence in planning future innovations. An important part of the innovation activities of small and medium-sized enterprises is the implementation of business model innovation practices, which has a positive impact on necessary strategic and architectural changes in the business model, which will positively affect company's innovation and overall performance (Gatautis et al. 2019). The innovation potential and competitiveness of small and medium-sized enterprises increases

with the increasing level of the controlling management of the company, especially with a focus on the future results of the company (Pisar and Bilkova 2019). At present, companies are trying to achieve the goals of sustainable entrepreneurship and sustainable development, which are closely linked to ecological innovations, new values creation, and business transformation (Soltysik et al. 2019). A study of micro-enterprises' innovation activities by Henley and Son (2020) showed that innovation did not increase company's productivity outcomes but increased company's exports, and thus their positive effect was reflected in the internationalization strategy of companies. The innovation activities of small and medium-sized enterprises also focus on the area of IT solutions and the strategic use of big data. Their use enables small and medium-sized enterprises to generate new knowledge for the business organization, new business plan and/or new product, new customer pool, new decision-making rules, and new marketing materials. Successful small and medium-sized enterprises need to exploit big data using knowledge management systems (Wang and Wang 2020).

Although family businesses are often described as conservative, devoted to their traditions, and reluctant to innovate, we find family businesses among the most innovative businesses. The innovation potential of family businesses can be increased by finding a match between the company's attitude to innovation and the family system dimension, i.e., family goal diversity and family cohesion (Rondi et al. 2019). Family owners can better understand the value and risks associated with research and development projects than minority shareholders, due to their information advantage. They see the company in a long-term horizon as an asset to be passed on to their descendants. They do not see it as a wealth to be consumed during their lives. This longer time horizon also allows family owners to tolerate an increased deficit to encourage company's management to participate in research and development (R&D) investment strategies (Asensio-Lopez et al. 2019). Research by authors Peracek et al. (2020) identified the following innovation factors within the family businesses: product quality and services, customer relationship management, customer requirements, proactive approaches in marketing, and employee qualification.

The antecedents and effects of technological innovation are different in family and non-family businesses; therefore, technological innovation in family businesses is a relevant and promising research area (De Massis et al. 2013). Business strategies, level of control, investment horizons, social goals, and risk aversion differs for different types of owner structure (Thomsen and Pedersen 2000).

Maintaining and strengthening the traditions of family businesses can be achieved by establishing innovations. Family businesses not only increase their competitiveness through appropriately chosen innovative strategies but can also help maintain their anchored traditions (Erdogan et al. 2020). The authors Diaz-Moriana et al. (2020) identified three groups of motives for innovation in family businesses: conserving motives that reflect the importance of family traditions and reputations, persisting motives for long-term sustainability with a willingness to wait for a long-term return on investment, and legacy-building motives to continue the legacy that the previous generation had built while developing this legacy and ensuring its transfer to the next generation. Family businesses are more cautious in innovation activities due to risk aversion and reluctance to share leadership and control. However, their innovation potential is higher compared to non-family businesses, due to their long term horizons, long tenures, intimate knowledge of the business, and close network ties. In the innovation process, family businesses change their management strategies according to the current innovation cycle (Dieleman 2019). The management of family businesses, formed by family members, pursues the long-term goals of growth and sustainability of the company and is therefore willing to invest in innovations with a long return. External managers, on the other hand, pursue short-term goals and therefore prefer investments with a quick return (Schmid et al. 2014). The negative impact of risk aversion of family businesses on their innovation activities can be reduced in the case of demand-pull and technology-push innovation impulses. The authors Migliori et al. (2020) showed that the willingness to invest in innovation increases if the innovation impulse is based on market demand.

The process of generational change in the management structures of family businesses also changes the approach of companies to innovation. Companies that are run by the third and next-generations

have fewer innovation activities compared to companies run by the first-generation. This effect is reduced in the case of management with a high degree of psychological ownership (Rau et al. 2019). The study by Cirillo et al. (2019) showed that with the increase in family ownership of companies, the intensity of investment in research and development decreases. The study also showed that the presence of institutional shareholders in the form of private equity reduces this negative effect. Collective of authors Frank et al. (2019) identified eleven principles for successful family business innovation: innovate in manageable steps starting from a solid basis; observe the environment and yourself for innovation inspiration; use your values for your vision in the innovation process; consider quality in your innovation and use it to set yourself apart from others; take the unknown path, but stay authentic; invest in trusting relationships that enrich and facilitate innovation; regard innovation as a key task of the business family, and create the necessary freedom for it; communicate the importance of innovation internally and externally; combine innovation with sustainability in a way that fits your unique competencies; evaluate innovation projects with immediate feedback from multiple sources; learn through openness and creativity as well as structures and processes. Family businesses that are run by family members use management control systems to a lesser extent, which has a negative impact on the extent of technological innovation of companies, which negatively reflects in business results (Ruiz-Palomo et al. 2019).

Based on the above, we can say that innovations have the potential to become a driving force for future family business opportunities. The paper aims to identify the innovation activities of family businesses in the Slovak Republic and to determine their impact on the economic results of the company based on an empirical survey. We also pay attention to barriers to innovation activities in family businesses and the impact of the current COVID-19 coronavirus pandemic on innovation activities in small and medium-sized family businesses in the Slovak Republic. Based on the answers from the questionnaire survey, we test hypotheses about the impact of selected factors on innovation activities.

2. Materials and Methods

The paper aims to identify innovation activities, their impact on the company's economic results, and the impact of the COVID-19 coronavirus pandemic on innovation activities in small and medium-sized family businesses in the Slovak Republic. The methodology of the paper consists of four stages. In the first stage of the solution, it is necessary to carry out literature research on domestic and foreign authors based on the analysis of secondary sources. At this stage, we use methods of scientific work such as summarization, synthesis of knowledge, and methods of analogy and deduction. The second stage focuses on the analysis of primary sources obtained by the implementation of empirical research by the questionnaire survey. The questionnaire focuses on the investigation of the innovation activities of family businesses in Slovakia. We evaluate the data from the questionnaire survey descriptively, numerically, and graphically. In the third stage, we verify the hypotheses concerning innovation activities using mathematical-statistical methods, analysis, and comparisons. In the final stage, we define the theoretical and practical benefits of the survey by analogy, deduction, and summarization of knowledge.

2.1. Questionnaire Survey

The starting point for gaining knowledge about innovation activities that affect Slovak family businesses is the implementation of an empirical survey. As there is no uniform definition of the family business in the world and neither Slovak legislation defines the concept of a family business, we use the definition of family business recommended by the European Commission (2009). As listed companies are not involved in the survey, a company is considered as a family business if at least one family member is in the company governance, or family members have the majority of decision-making rights.

The questionnaire was sent to 700 randomly selected small and medium-sized enterprises operating in the Slovak Republic. Questionnaires were sent electronically via e-mail. The return rate of the questionnaire was 31%, as 217 of the questionnaires were returned. Only 45.2% of enterprises

actively involved in the survey met the condition of the definition of small and medium-sized family businesses. The questionnaire is structured into two parts, as follows:

First part—8 questions: identification and basic characteristics of family businesses; and

Second part—19 questions: innovation activities, their impact on the company's economic results, and the impact of the COVID-19 coronavirus pandemic on innovation activities.

The questions in the first part are focused on identifying family businesses among small and medium-sized enterprises that operate in Slovakia. We ask in which region of the Slovak Republic the company operates, what is the number of employees, when has been the company founded, what is its legal form, in which industry the company operates, and what was its annual gross sales in 2019. We use the answers to the questions on the number of employees and the amount of annual gross sales in 2019 to identify whether the company belongs to the category of small and medium-sized enterprises. Table 1 shows the limit values of these indicators, according to the [European Commission \(2006\)](#).

Table 1. Limit values for determining the category of enterprises.

Category of Enterprise	Number of Employees	Annual Gross Sales
Medium	<250	≤EUR 50,000,000
Small	<50	≤EUR 10,000,000
Micro	<10	≤EUR 2,000,000

The addressed companies answer the question of whether they meet the definition of a family business according to the [European Commission \(2009\)](#). The following questions ask how many family members work in the company, which family generation holds a top management position in the company, and what is the type of business ownership (ownership and management are in the family; ownership is in the family, and management consists of family members and employees; or ownership is in the family, and management consists of employees).

In the second part of the questionnaire survey, we pay attention to the issue of innovation activities of the companies. The questionnaire examines the company's attitude to innovation, the types of innovations introduced in the last five years (2015–2019), who developed the introduced innovations, the amount of innovation costs in relation to annual gross sales, the amount of innovation benefits (cost savings and increase in gross sales) in relation to annual gross sales. The categories of innovation activities are selected, according to [OECD \(2005\)](#): product innovations, process innovations, organizational innovations, and marketing innovations. In the questionnaire, we identify two levels of product and technology innovation: the introduction of a new product/technology and a significant improvement of an existing product/technology. We consider organizational innovation to be the implementation of new organizational methods within the business practices, workplace, or external relations of the company. We understand marketing innovations as the implementation of significant changes in the design or packaging of a product, its placement, promotion, or pricing. The questionnaire examines how companies obtained funding for innovation activities, and what barriers companies faced in their innovation activities. We ask the companies how the current COVID-19 coronavirus pandemic affected their innovation activities. Given the future planned innovation activities of family businesses, we ask whether the companies plan to cooperate with secondary schools and/or universities.

2.2. Formulation and Testing of Research Hypotheses

Based on the answers from the questionnaire survey, we analyze the innovation activities of small and medium-sized family businesses with an emphasis on the analysis of factors influencing innovation activities and their benefits for the company. The size of the company is chosen as one of these factors. The authors [Cristo-Andrade and Franco \(2020\)](#) observed the impact of company size on cooperation in the implementation of innovations. The study by [Stanislawski \(2020\)](#) showed a positive relationship between the size of the company and the level of use of open innovations. Therefore, in the

research sample of small and medium-sized family businesses, we analyze the relationship between the size of the company and the types of company's innovation activities. The types of examined innovation activities are product innovations, process innovations, organizational innovations, and marketing innovations. We verify the assumed relationship by testing hypothesis H1.

Hypothesis 1 (H1). *There is no statistical dependence between the size of the company and the number of types of introduced innovations.*

Next, we examine whether there is a dependence between the number of types of introduced innovations and the generation that works in the management of the family business. A study (Rau et al. 2019) of German family businesses showed that there is an apparent decline in the innovation activities of third and next-generations family businesses compared to first-generation businesses. We test the hypothesis H2 to verify this dependence for Slovak small and medium-sized family businesses.

Hypothesis 2 (H2). *There is no statistical dependence between the generation running the company and the number of types of introduced innovations.*

In the next part, we examine the impact of innovations on the company's economic results. Businesses are introducing innovations to increase business success and competitiveness (Vitezic and Vitezic 2015). For the observed companies, we determine the amount of costs incurred for innovation activities expressed as a ratio of annual gross sales. At the same time, we determine the level of economic results after the introduction of innovations. The monitored factors are the percentage increase in annual gross sales and the decrease in costs expressed as a ratio of annual gross sales. To verify the dependence, we test hypotheses H3 and H4.

Hypothesis 3 (H3). *There is no statistical dependence between the amount of costs incurred for innovations and the increase in annual gross sales.*

Hypothesis 4 (H4). *There is no statistical dependence between the amount of costs incurred for innovations and the amount of cost savings.*

Businesses are currently facing the challenges of the ongoing COVID-19 coronavirus pandemic. This pandemic has affected the economies of all countries and its effects cannot be predicted with certainty. We are therefore interested in its impact on ongoing and planned innovation activities of the observed Slovak family businesses. We assume that there is a statistical dependence between the size of the company and the impact of the COVID-19 coronavirus pandemic on the company's innovation activities. The addressed companies answer the question in the questionnaire: "Had the COVID-19 coronavirus pandemic impact on your innovation activities?" Entrepreneurs could choose from the answers: yes, in a positive way (we want to start innovating); yes, in a negative way (we had to stop innovating); no, it did not affect us. We verify the assumed dependence by testing hypothesis H5.

Hypothesis 5 (H5). *There is no statistical dependence between the size of the company and the impact of the COVID-19 coronavirus pandemic on the company's innovation activities.*

We perform the testing of research hypotheses using the MATLAB R2019b program. We test the research hypotheses H1 and H2 using the Kruskal–Wallis test, which is a nonparametric analogy of a one-sample analysis of variance (ANOVA), which does not assume a normal distribution of the residuals. It is an extension of the Wilcoxon rank sum test. In the Kruskal–Wallis test, we test the hypothesis $H_0 : F_1(x) = \dots = F_I(x)$ for all x , where $F_i, i = 1, \dots, I$, is a continuous distribution function of selection Y_{i1}, \dots, Y_{in_i} from some distribution. We test hypothesis H_0 against alternative H_1 , that is a

contradiction to H_0 . All variables Y_{ij} together form a combined sample with the range $n = n_1 + \dots + n_I$. The rank R_{ij} is assigned to every variable Y_{ij} . The sum of the ranks is $T_i = R_{i1} + \dots + R_{in_i}$ and the sum of all ranks is $T_1 + \dots + T_I = n(n+1)/2$. The test statistic Q is calculated as

$$Q = \frac{12}{n(n+1)} \sum_{i=1}^I \frac{T_i^2}{n_i} - 3(n+1) \quad (1)$$

The test statistic Q has an asymptotic χ^2 distribution with $(I-1)$ degrees of freedom under the hypothesis H_0 . Therefore, we reject the hypothesis H_0 at the α level of significance when the observed value of Q is greater than $\chi_{I-1}^2(\alpha)$ (Andel 2007).

To verify the research hypotheses H3 and H4 we calculate the Spearman's rank correlation coefficient and the Kendall's rank correlation coefficient for which we test hypotheses H_0 that these correlation coefficients are equal to 0. We calculate correlation coefficients between two variables from a two-dimensional continuous distribution $(X_1, Y_1)', \dots, (X_n, Y_n)'$. We determine the ranks R_1, \dots, R_n of the variables X_1, \dots, X_n , and the ranks Q_1, \dots, Q_n of the variables Y_1, \dots, Y_n . The Spearman's rank correlation coefficient r_s is calculated as

$$r_s = 1 - \frac{6}{n(n^2-1)} \sum_{i=1}^n (R_i - Q_i)^2 \quad (2)$$

We reject the hypothesis $H_0 : r_s = 0$ at the α level of significance when $|r_s| \geq r_s(\alpha)$, where $r_s(\alpha)$ is the tabulated critical value. The Kendall's rank correlation coefficient τ is calculated as

$$\tau = \frac{1}{n(n-1)} \sum_{i \neq j} \text{sign}(R_i - R_j) \text{sign}(Q_i - Q_j) \quad (3)$$

We reject the hypothesis $H_0 : \tau = 0$ at the α level of significance when the p -value calculated by MATLAB is less than α (Andel 2007).

We test the research hypotheses H5 using the χ^2 test of independence, which determines the relationship between two discrete variables with a finite number of possible values. The frequency distribution of the variables is presented in a contingency table. We test the hypothesis of independence $H_0 : p_{ij} = p_{i.}p_{.j}$, where $p_{ij} = P(Y = i, Z = j)$; $p_{i.} = \sum_j p_{ij}$; $p_{.j} = \sum_i p_{ij}$; $i = 1, \dots, r$; $j = 1, \dots, c$; Y is a discrete variable with values from the range $1, \dots, r$; and Z is a discrete variable with values from the range $1, \dots, c$. The test statistic is

$$\chi^2 = n \sum_{i=1}^r \sum_{j=1}^c \frac{n_{ij}^2}{n_{i.}n_{.j}} - n \quad (4)$$

where n_{ij} are empirical frequencies; $n_{i.} = \sum_j n_{ij}$; $n_{.j} = \sum_i n_{ij}$. We reject the hypothesis H_0 at the α level of significance when $\chi^2 \geq \chi_{(r-1)(c-1)}^2(\alpha)$, where $\chi_{(r-1)(c-1)}^2(\alpha)$ is the tabulated critical value (Andel 2007).

3. Results

In this section, we describe and interpret the results of the questionnaire survey aimed at identifying innovation activities of small and medium-sized family businesses in Slovakia. We discuss the validity of formulated and tested research hypotheses.

3.1. Questionnaire Survey

The survey addressed a total of 700 companies. The return rate of the questionnaire was 31%, as 217 of the questionnaires were returned. Based on the answers to the questions of whether the company meets the definition of a family business, how many employees does it have, and what

were its gross sales in 2019, 45.2% of companies were identified as small and medium-sized family businesses. Of this, 67.4% are small-sized family businesses with 10–49 employees, and with gross sales not exceeding EUR 10 million in 2019. The remaining 32.7% are medium-sized family businesses with 50–249 employees, and with gross sales not exceeding EUR 50 million in 2019. In terms of spatial structures, 29.6% of participating companies operate in the Bratislava Region, 9.2% in the Trnava Region, 11.2% in the Nitra Region, 14.3% in the Trenčín Region, 13.3% in the Žilina Region, 8.2% in the Banská Bystrica Region, 8.2% in the Prešov Region, and 6.1% in the Košice Region. The free business has existed in the Slovak Republic for less than 30 years. We therefore examined the year of the establishment of family businesses. More than half of the companies included in the survey (62.2%) have been operating in Slovakia for more than 15 years. One of the characteristic features of family businesses is the employment of several family members. Figure 1 shows the relative frequencies of the numbers of employed family members. Three–four family members most often work in the observed companies, which is stated by 63.3% of companies.

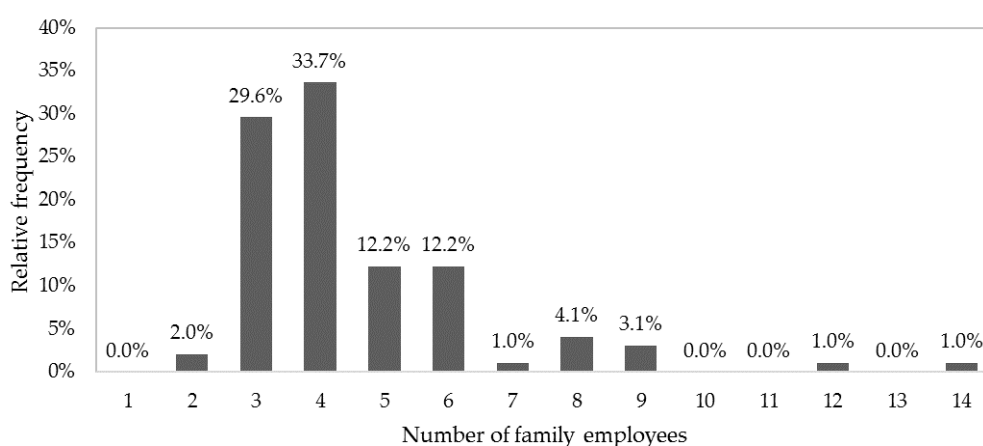


Figure 1. The relative frequencies of the numbers of employed family members.

Looking at the generations that are active in the family business is also interesting. The second-generation runs 46.9% of family businesses and the first-generation runs 53.1% of them. The third and next-generation is not yet actively involved in the management of the company among our respondents. The family members own and manage 58.2% of the addressed companies, 41.8% of companies are owned by the family members and the management consists of family members and non-family employees. None of the companies included in the survey are owned by family members and managed only by non-family employees. From the above, we can state that family business in Slovakia takes place mainly in the family circle.

The second part of the questionnaire investigate innovations, innovation activities, and their impact on the company's economic results. A company is considered to be implementing innovation activities if it has launched new, or significantly improved, products on the market, or introduced new, or significantly improved, processes within the company, or introduced organizational or marketing innovations. Of the small and medium-sized family businesses included in the survey, 76.5% of enterprises are actively implementing innovation activities. Figure 2 shows the relative frequencies of types of introduced innovations grouped by the size of the company, and Figure 3 shows the relative frequencies of types of introduced innovations grouped by the generation running the company. The most common types of innovations are product and process innovations. Product innovations are introduced by 74.7% of innovative companies, 73.3% of innovative companies introduce process innovations. They are followed by marketing innovations introduced by 60% of companies, and the least used are organizational innovations introduced by 48% of companies.

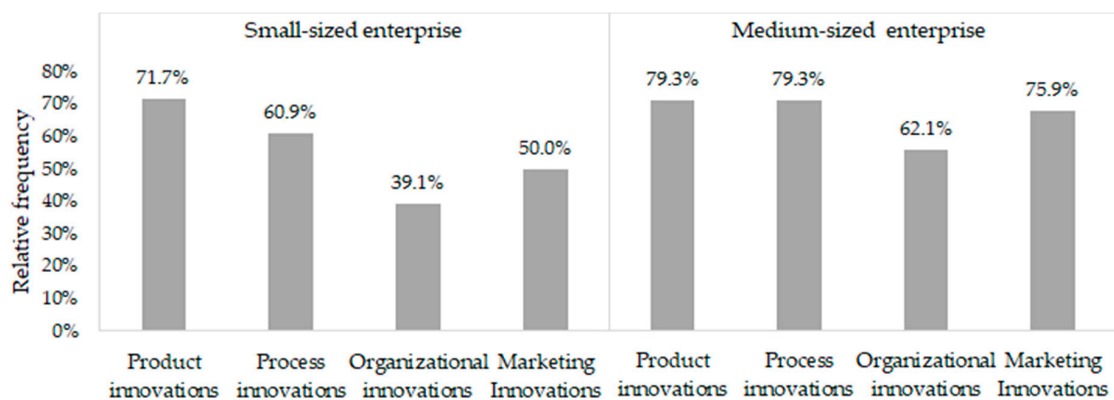


Figure 2. The relative frequencies of the number of types of introduced innovations grouped by the size of the company.

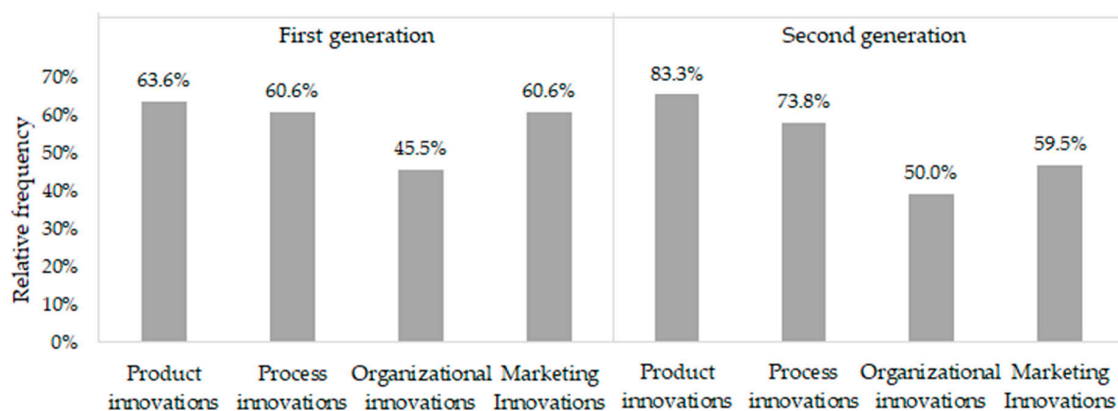


Figure 3. The relative frequencies of the number of types of introduced innovations grouped by the generation running the company.

Among the companies that successfully introduced product innovations, 45.5% of companies introduced a completely new product, 27.3% of companies significantly improved an existing product, and 27.3% of companies introduced a completely new product and also significantly improved an existing product. Among companies that successfully introduced technology innovations, 30.6% of companies introduced completely new technology, 67.4% of companies significantly improved existing technology, and 2% of companies introduced completely new technology and also significantly improved existing technology. In the questionnaire, we also examined cooperation in innovation activities. For this survey, innovation cooperation means active participation in joint research and development projects and other innovation projects with other companies or non-commercial institutions. Implemented innovations were developed independently by 50.7% of family businesses, 21.3% of family businesses cooperated on the development of innovations with other companies or institutions, 28% of family businesses developed innovations by modifying or changing products, services, or processes originally developed by another company or institution. Based on the answers, we can state that most of the Slovak small and medium-sized family businesses rely on their research and development in their innovation processes.

The next questionnaire questions concern the impact of innovation activities on the company's economic results for the last five years. An increase in annual gross sales, an increase in quality of production, costs savings, market expansion, an increase in profit, and an increase in export are chosen as important indicators of the impact of innovation activities. Figure 4 shows the companies' responses.

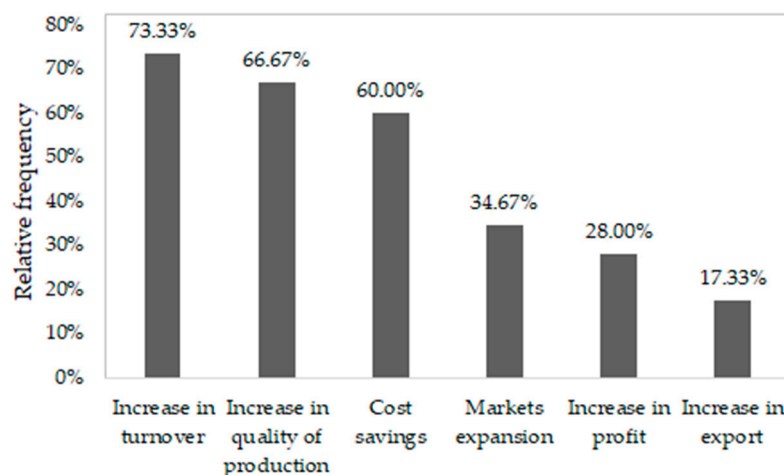


Figure 4. The impact of innovation activities on the economic results of family businesses.

Expenditure on innovation includes all expenditure relating to the scientific, technological, and commercial steps that lead to the introduction of the innovation. In terms of the size of the family business, it is interesting to examine whether small-sized enterprises invest a smaller rate of annual gross sales in their innovation activities compared to medium-sized enterprises. Most of the addressed small-sized family businesses (82.6%) invested in innovation activities less than 10% of annual gross sales. In the range of 11–20% of annual gross sales invested 15.2% of small-sized enterprises, and only 2.2% of small-sized enterprises invested 31–40% of gross sales in innovation activities. Almost 38% of medium-sized family businesses invested in innovation activities less than 10% of annual gross sales, 31% of medium-sized enterprises invested 11–20% of annual gross sales in innovation activities, and 31% of medium-sized enterprises invested 21–30% of annual gross sales. When examining the costs of innovation activities, it is also necessary to determine the origin of financial resources. The addressed innovative companies invest primarily their retained earnings in their innovation activities. Some companies use a combination of their retained earnings, debt capital, and EU and state grants, as shown in Figure 5.

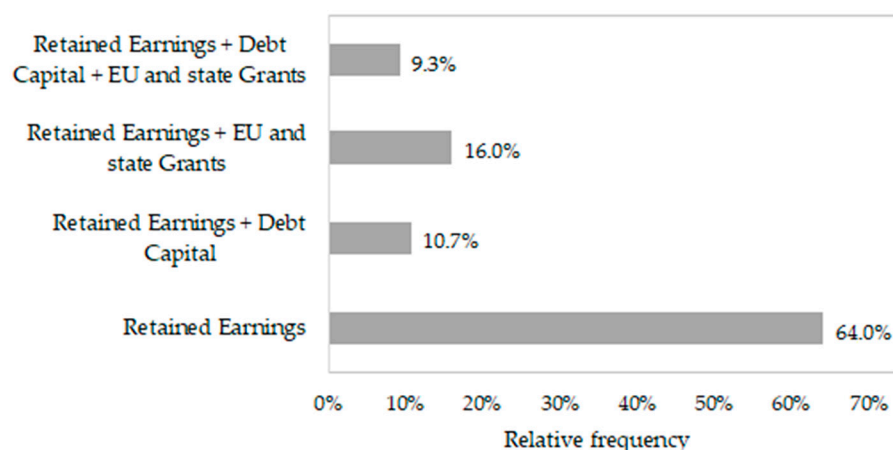


Figure 5. Family businesses' financial resources for innovation activities.

Family businesses have encountered several problems in obtaining funding from EU grants. Up to 56% of innovative companies did not try to obtain funding from this source. Of the companies applying for funding from EU grants, 57.6% were successful. Companies that did not apply for these resources listed large bureaucracy (47.6%), excessive complexity of the process (35.7%), and lack of information on existing calls (16.7%) as reasons. Companies also encountered other barriers limiting

their innovation activities. Entrepreneurs consider the lack of their financial resources (33.7%) and the lack of qualified employees (32.7%) as the most serious barriers. Other barriers are the difficulty of finding a partner for innovation (19.4%), markets dominated by established companies (18.4%), lack of financial resources outside the company (16.3%), too high innovation costs (15.3%), uncertain demand for innovated products or services (14.3%), lack of information on technologies (4.1%), and lack of information on markets (4.1%). Despite the mentioned barriers and COVID-19 coronavirus pandemic, 83.7% of the addressed Slovak family businesses state that continuous innovation activity is a part of their company's long-term strategy. Family businesses realize that technological advances are one of the global trends that will change the way we do business in the world. Digitization and technology innovations are considered the most significant innovation activities in the next period by 89.8% of family businesses. Product innovations are considered the most significant innovation activities in the next period by 38.8% of family businesses, organizational innovations by 22.5% of companies, and marketing innovations by 17.6% of companies.

The COVID-19 coronavirus pandemic has shaken the business environment, and many family businesses also face the question of how to survive and restart their business. In the questionnaire, we asked whether the COVID-19 coronavirus pandemic affected their innovation activities. The COVID-19 coronavirus pandemic positively affected innovation activities of 30.6% of family businesses (they want to start innovating) and negatively affected 21.4% of family businesses (they had to stop innovating). The COVID-19 coronavirus pandemic did not affect innovation activities of 48% of family businesses. In the next part, we will examine the statistical relationship between the size of the company and the impact of the COVID-19 coronavirus pandemic on the company's innovation activities.

As part of innovation activities, 9.2% of family businesses plan to cooperate with secondary schools, and 22.5% of companies plan to cooperate with universities. Surprisingly, 74.5% of companies do not plan to cooperate with schools.

3.2. Testing of Research Hypotheses

The next part of our research is the verification of formulated research hypotheses. We verified the statistical relationship between the size of family businesses and the number of types of introduced innovations by testing the hypothesis H1: There is no statistical dependence between the size of the company and the number of types of introduced innovations. Of the small-sized family businesses included in the survey, 69.7% of companies introduced at least one type of innovation, and of the medium-sized family businesses included in the survey, 90.6% of companies introduced at least one type of innovation. Figure 6 shows an interaction plot of the relative frequencies of the number of types of introduced innovation in small-sized family businesses and medium-sized family businesses. We use the Kruskal–Wallis test to verify the tested hypothesis. The test statistic is $Q = 16.49$ and at the $\alpha = 0.01$ level of significance is $p\text{-value} = 4.89 \times 10^{-5}$. Since $p\text{-value} < \alpha$ we reject the hypothesis H1 at the $\alpha = 0.01$ level of significance. We can state that there is a statistically significant relationship between the size of the company and the number of types of introduced innovations. It is clear from Figure 6 that medium-sized family businesses introduced more types of innovations and can, therefore, be considered more innovative than small-sized family businesses.

We verified the statistical relationship between the generation running the family business and the number of types of introduced innovations by testing the hypothesis H2: There is no statistical dependence between the generation running the company and the number of types of introduced innovations. Of the first-generation family businesses included in the survey, 63.5% of enterprises introduced at least one type of innovation, and of the second-generation family businesses included in the survey, 91.3% of enterprises introduced at least one type of innovation. Among the family businesses included in the survey, there are no enterprises managed by the third and next-generation, which can be explained by the reestablishment of a free enterprise economy system in the Slovak Republic after 1989. Figure 7 shows an interaction plot of the relative frequencies of the number of types

of introduced innovation in first-generation family businesses and second-generation family businesses. We use the Kruskal–Wallis test to verify the tested hypothesis. The test statistic is $Q = 12.66$ and at the $\alpha = 0.01$ level of significance is $p\text{-value} = 4.00 \times 10^{-4}$. Since $p\text{-value} < \alpha$ we reject the hypothesis H2 at the $\alpha = 0.01$ level of significance. We can state that there is a statistically significant relationship between the generation running the family business and the number of types of introduced innovations. It is clear from Figure 7 that second-generation family businesses introduced more types of innovations and can, therefore, be considered more innovative than first-generation family businesses.

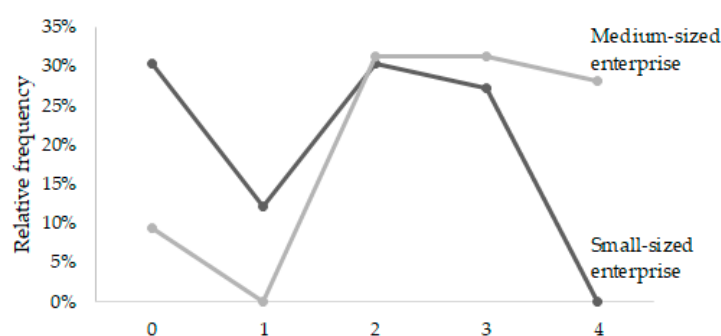


Figure 6. Interaction plot of the relative frequencies of the number of types of introduced innovation grouped by the size of the family business.

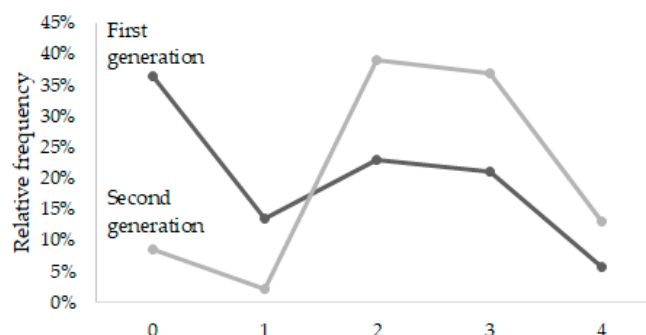


Figure 7. Interaction plot of the relative frequencies of the number of types of introduced innovation grouped by the generation running the family business.

We analyzed the innovation activities of the family business and its economic results by examining the relationship between the amount of costs incurred for innovation activities and the level of improvement of the company's economic results. An increase in annual gross sales and the amount of cost savings are selected from the company's economic results. The amount of costs incurred and the decrease in costs are expressed as a ratio of annual gross sales, the increase in gross sales is expressed as a percentage. We verified the statistical relationship between the amount of costs incurred for innovations and the increase in annual gross sales by testing the hypothesis H3: There is no statistical dependence between the amount of costs incurred for innovations and the increase in annual gross sales. We calculated the values of Spearman's rank correlation coefficient and Kendall's rank correlation coefficient. We tested the statistical significance of these coefficients at the $\alpha = 0.01$ level of significance. Table 2 shows the results of the correlation analysis.

The $p\text{-values}$ of the statistical significance testing of both Spearman's rank correlation coefficient and Kendall's rank correlation coefficient are less than α . For both correlation coefficients, we rejected the hypothesis H3 at the $\alpha = 0.01$ level of significance. We can state that although the values of both correlation coefficients are low, this measured relationship is statistically significant.

We verified the statistical relationship between the amount of costs incurred for innovations and the amount of cost savings by testing the hypothesis H4: There is no statistical dependence between

the amount of costs incurred for innovations and the amount of cost savings. We calculated the values of Spearman's rank correlation coefficient and Kendall's rank correlation coefficient. We tested the statistical significance of these coefficients at the $\alpha = 0.01$ level of significance. Table 3 shows the results of the correlation analysis.

Table 2. The values of the correlation coefficients between the amount of costs incurred for innovations and the increase in annual gross sales of a family business.

Correlation Coefficient	Value of the Correlation Coefficient	<i>p</i> -Value
Spearman	0.3631	0.0014
Kendall	0.3173	0.002

Table 3. The values of the correlation coefficients between the amount of costs incurred for innovations and the amount of cost savings of a family business.

Correlation Coefficient	Value of the Correlation Coefficient	<i>p</i> -Value
Spearman	0.3453	0.0024
Kendall	0.3233	0.0022

The *p*-values of the statistical significance testing of both Spearman's rank correlation coefficient and Kendall's rank correlation coefficient are less than α . For both correlation coefficients, we rejected the hypothesis H4 at the $\alpha = 0.01$ level of significance. We can state that although the values of both correlation coefficients are low, this measured relationship is statistically significant.

We verified the statistical relationship between the size of the family business and the impact of the COVID-19 coronavirus pandemic on the company's innovation activities by testing the hypothesis H5: There is no statistical dependence between the size of the company and the impact of the COVID-19 coronavirus pandemic on the company's innovation activities. Figure 8 shows an interaction plot of the relative frequencies of the impact of the COVID-19 coronavirus pandemic on the company's innovation activities in small-sized family businesses and medium-sized family businesses. Among the small-sized family businesses included in the survey, 36.4% reported a positive impact, 18.2% a negative impact, and 45.5% no impact of the COVID-19 coronavirus pandemic on their innovation activities. Among medium-sized family businesses, 18.8% reported a positive impact, 28.1% a negative impact, and 53.1% no impact of the COVID-19 coronavirus pandemic on their innovation activities. We use the χ^2 test of independence to verify the hypothesis H5. The test statistic is $\chi^2 = 3.44$ and at the $\alpha = 0.05$ level of significance is *p*-value = 0.1788. Since *p*-value > α we do not reject the hypothesis H5 at the $\alpha = 0.05$ level of significance. We can state that there is no statistically significant dependence between the size of the family business and the impact of the COVID-19 coronavirus pandemic on the company's innovation activities.

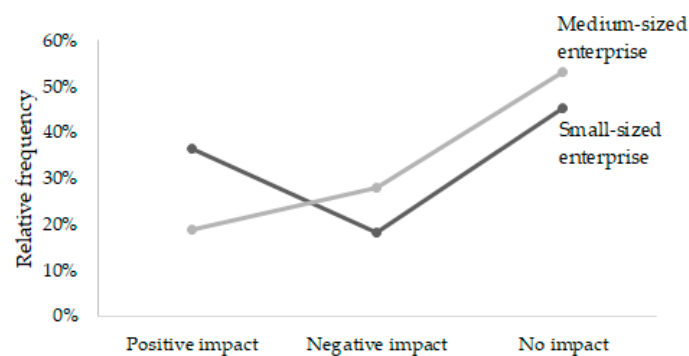


Figure 8. Interaction plot of the relative frequencies of the categories of the impact of the COVID-19 coronavirus pandemic on the company's innovation activities grouped by the size of the family business.

4. Discussion

Based on the analysis of empirical data, we manage to obtain information about the innovation activities of Slovak family businesses, formulate, and test research hypotheses concerning their innovation activities. More than half of the family businesses included in the survey (62.2%) have been established more than 15 years ago. We can, therefore, state that they are established companies. The higher stability of companies is related, as [Arz \(2019\)](#) argued in his study, to the transfer of the main family values into business.

Three–four family members most often work in the surveyed family businesses, and 53.1% of family businesses are still run by the first-generation, 46.9% of family businesses are run by the second-generation. The third and next-generation is not yet actively involved in the management of the company among our respondents. The situation of family businesses in the world, for example in the USA or Germany, is different than in Slovakia. In Western countries, the fourth-generation exchange has already taken place in some family businesses ([Hudakova et al. 2015](#)). The trend of only owning a family business comes to the fore in the world. The number of family businesses planning to transfer ownership but not management to the next-generation has increased. The professionalization of family businesses is often reflected in the hiring of external managers. It is often the right decision, especially if the company reaches a certain critical dimension, which can be a difficult moment for the company. The situation is different in Slovakia. Family members own and manage 58.2% of the addressed companies, the remaining 41.8% of companies are owned by the family members, and the management consists of family members and non-family employees. None of the companies included in the survey is owned by family members and managed only by non-family employees. From the above, we can state that family business in Slovakia takes place mainly in the family circle. It may be because companies have not yet reached a critical dimension, or to the fact that small and medium-sized family businesses can hardly compete in the labor market for multinational corporations that offer career advancement and foreign experience.

Innovation activities are actively implemented by 76.5% of the surveyed small and medium-sized family businesses. We were pleasantly surprised by this, as several researches ([Fabova 2013](#); [Fila 2017](#)) recorded a low share of innovative companies in the Slovak Republic. The high percentage of innovative companies can be explained by the fact that the questions about innovation activities were more willing to be answered by innovative companies that successfully implemented such innovation activities and were, therefore, willing to share their attitudes to innovation and their results.

The most common types of innovations are product and process innovations. Based on the testing of research hypotheses, we can state that medium-sized family businesses introduce more types of innovations and can, therefore, be considered more innovative than small-sized family businesses. The process of generational change in the management structures of family businesses also changes the approach of companies to innovation. According to [Rau et al. \(2019\)](#), companies that are run by the third and next-generations show lesser innovation activities compared to companies run by the first-generation. Our research does not confirm this statement, and based on the test of the research hypothesis, we can state that second-generation family businesses introduce more types of innovation and can, therefore, be considered more innovative than first-generation family businesses.

Based on the answers to the questionnaire survey, we can state that most of the Slovak small and medium-sized family businesses rely on their research and development in their innovation processes. We recommend the state to create a suitable scientific-research base cooperating with companies and to support cooperation between the public and private sectors, which would help increase the country's innovation performance. Most of the addressed small-sized family businesses (82.6%) invested in innovation activities less than 10% of annual gross sales. On the contrary, 62.1% of medium-sized family businesses invested in innovation activities 11–30% of annual gross sales. We confirm the statistical dependence between the amount of costs incurred for innovations and the increase in the company's gross sales, and the statistical dependence between the amount of costs incurred for innovations and the decrease in the company's total costs.

The addressed innovative companies invest primary their retained earnings in their innovation activities. We can agree with the statement of the authors [Michiels and Molly \(2017\)](#) that family businesses show lower leverage compared to non-family businesses and the zero-leverage company tends to occur more often among family businesses. This phenomenon is explained by the stronger aversion of family businesses to financial risks. When obtaining funding from EU grants, companies faced mainly barriers in the form of large bureaucracy and excessive complexity of the process. For this reason, we recommend the government to simplify the process of obtaining funds from EU grants or to create an advisory service at the regional level. Family businesses also encountered other barriers limiting their innovation activities. Entrepreneurs consider the lack of their financial resources and the lack of qualified employees as the most serious barriers. The system of dual education and vocationally oriented study programs of universities could solve the problem with qualified employees. It is striking that up to 74.5% of the surveyed small and medium-sized family businesses do not plan to cooperate with schools. In further research, it would be interesting to find out what causes this lack of interest.

Despite the mentioned barriers and COVID-19 coronavirus pandemic, 83.7% of the addressed Slovak family businesses state that continuous innovation activity is a part of their company's long-term strategy. Family businesses realize that technological advances are one of the global trends that will change the way we do business in the world. Almost 90% of the surveyed family businesses consider digitization and technology innovation to be the most important innovation activities in the next period.

The COVID-19 coronavirus pandemic significantly suppressed domestic and foreign demand for Slovak goods and services and changed consumer behavior. Many family businesses face the question of how to survive, how to restart their business, how to adapt to the new norm, and how to prosper in the "post-coronavirus" world. Therefore, we are interested in whether the pandemic has affected the innovation activities of family businesses. Based on empirical data, we can state that companies are aware of the need to innovate, and in 30.6% of family businesses the COVID-19 coronavirus pandemic has positively affected their innovation activities. Based on the hypothesis testing, we can also state that there is no statistically significant dependence between the size of the family business and the impact of the COVID-19 coronavirus pandemic on the company's innovation activities.

Although the business sector and the associated required frequency of innovations can be significant factors influencing family businesses' innovation activities, the used questionnaire survey does not investigate the business sector of companies. We consider this fact to be a limitation of our research. In future research, it would therefore be appropriate to focus on examining the innovation activities of family businesses in the context of the business sector. In our future research, we also plan to pay attention to the relationship between innovation activities and corporate social responsibility of Slovak family businesses.

5. Conclusions

As there is no definition of family businesses in the Slovak legislation, their identification and analysis are difficult. In our research analyzing innovation activities of companies is involved 98 small and medium-sized enterprises operating in Slovakia. This comprehensive analysis is where we see the main contribution of our research to the existing literature.

Businesses are trying to maintain their market position, especially during the COVID-19 coronavirus pandemic. This situation also brings new challenges for Slovak small and medium-sized family businesses. Innovation is one of the tools for maintaining competitiveness and market position. Of the small and medium-sized family businesses involved in the survey, almost 77% are innovative companies. The most common types of innovation are product and process innovations. Based on the performed tests of research hypotheses, we can state that medium-sized family businesses introduce more types of innovations than small family businesses. In the process of generational change in the management structures of family businesses, the approach of companies to innovation is also changing. Second-generation family businesses are more innovative than first-generation family businesses. Most of the addressed companies rely on their research and development in their innovation processes

and primarily use their resources to finance them. There is also a proven dependence between the amount of costs incurred for innovations and the amount of benefits obtained, which are an increase in the company's gross sales and a decrease in the company's total costs. Companies face various barriers during innovation processes. The addressed companies consider the lack of their financial resources and the lack of qualified employees to be the most serious ones. Despite these barriers and the COVID-19 coronavirus pandemic, innovation activities are becoming an integral part of corporate strategies. Surprisingly, we do not prove the relationship between the size of the company and the impact of the pandemic on its innovation activities.

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