The Business Environment in Slovakia from the Point of View of the Death of Enterprises

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Abstract **– Creating favorable conditions in the business sphere is one of the main priorities of the European Union, while each member country implements the objectives of the EU strategy in its national strategic documents. The goal of this paper is modeling respectively quantifying the effect of the death of business entities in Slovakia in 2019 and 2020 from selected factors using logistic regression. We decided to find out which of the selected factors (legal form of the enterprise; size group according to the average registered number of employees; region; economic activity performed by the enterprise) most influenced the death of enterprises in the period before and during the pandemic, which will allow us to determine the most and the least threatened categories of enterprises. The analysis was based on the business demography database, while the processing itself was carried out using the statistical tool SAS Enterprise Guide 7.1.**

The results of the analysis during the COVID-19 pandemic showed a significant impact of the factor legal form of the enterprise - mainly in the group of enterprises owned by natural persons, then a statistically significant impact of the factor size group of enterprise with an average registered number of employees 0-1 and finally a significant impact of the factor economic activity of the enterprise, mainly in the field of services. The smallest but statistically significant effect was manifested in the region factor, while the region in the east of Slovakia can be considered the most threatened from the point of view of the demise of enterprises. An interesting fact is that the influence of individual categories of factors on the closure of a enterprises in the case of micro-enterprises with one employee is very similar to the situation throughout Slovakia.

Keywords **– Business demography, death of enterprise, logistic regression, small and medium-sized enterprises.**

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1. Introduction

The operation of every enterprise is influenced by various factors that arise from its surroundings – the business environment. The influence of this environment can have both positive and negative effects on enterprises. The main task of the Europe 2020 strategy was precisely the creation of suitable conditions for doing business in the countries of the European Union (EU). This strategy was defined by the European Commission as a framework for the development of the European Union until 2020. The essence of the strategy was the coordination of economic policies and employment policies to ensure growth and employment [1].

In 2021, the European Commission published an Action Plan for the implementation of the European Pillar of Social Rights, which focuses on further concrete steps in three key areas: increasing the number and quality of jobs, skills and equality, social protection, and inclusion. In line with the UN Sustainable Development Goals, it also proposes the EU's main goals until 2030, where one of the main goals is to achieve employment of at least 78% of the population between the ages of 20 and 64 [2].

The task of each EU member country is to implement the goals of the EU strategy in its national strategic documents and to support business mainly in the group of small and medium-sized enterprises (SMEs), with the aim of creating conditions for innovation, growth and competitiveness of enterprises, and ensuring sustainable growth of the European economy [3].

Recently, we witnessed how the pandemic of COVID-19 significantly influenced not only the health status of the population, but also the business environment, thus causing many problems for many business entities. Several anti-pandemic precautions were taken to prevent the extension of the virus, which forced many enterprises to close their operations. This led to the limitation of their income and many of them even found themselves under the threat of extinction [4].

Since enterprises are the carriers of new jobs and their activity contributes to economic growth, they are also given a lot of attention in this paper. Considerable emphasis is placed on the evaluation of the impact of the size of the enterprise, broken down by the number of employees, on the death of enterprise. Small and medium-sized enterprises have a significant position in the size categories of enterprises, which is confirmed by the fact that they make up to 99% of all EU enterprises, provide two thirds of employments in the private sector and contribute more than half to the total added value created by enterprises in the EU. The study will also concentrate on this size group of enterprises because they are enterprises that are on the one hand very innovative and on the other hand very vulnerable [5], [6], [7].

The key goal of this paper is to quantify and verify the statistically significant impact of chosen factors on the death of enterprises in Slovakia using logistic regression in 2019 (before the pandemic) and 2020 (during the pandemic). An additional goal is to describe what impact the pandemic of COVID-19 had on the death of enterprises in Slovakia, while in accordance with the goal of the Europe 2030 strategy, we will pay more attention to the impact of the factor of the size group of enterprises based on employment. Several authors argue about the effect of the COVID-19 crisis on SMEs in comparison to large enterprises [8], [9].

The starting source of data will be the business demography database, which provides key information on the population of enterprises and their activity. Changes in the population of enterprises are often also referred to in the context of the database as changes due to "demographic" events – the birth and death of enterprises. Indicators that are part of the business demography can provide an important outlook into the state of the business environment in the country and enable the government to take adequate measures to improve it.

Since the input variable characterizing the death of the enterprise is not continuous but categorical – binary, we will use the logistic regression method to model the dependence, while the modeling itself will be carried out in the SAS enterprise guide software.

2. Input Business Demography Database

The main data source for the creation of the business demography database is the commercial register, the social insurance company and the tax office. This database presents a list of enterprises operating in Slovakia, which tracks data on whether the enterprise is active in a given year, whether it was established or closed in the monitored period, as well as data such as the legal form of the enterprise, region of operation, economic activity of the enterprise, number of employees, sales in euros, etc. Business data is tracked with an 18-month lag, so 2019 and 2020 provide the most up-to-date data currently available [10], [11].

The European Commission defines an enterprise as an entity that carries out an economic activity, regardless of its legal form. For this reason, according to the EC, enterprises can include self-employed persons and family enterprises that carry out artisanal or other activities, commercial companies, partnerships or associations that regularly carry out economic activity [3].

As the dependent variable that we decided to model in this paper, we chose the binary variable dead enterprises. According to the business demography methodology, these are economic entities that have actually disappeared or were not active in the previous two years. At the same time, it is true that no representative was found for these enterprises, which means the breakdown of production factors with the limitation that no other enterprises are involved in this breakdown. According to this methodology, we distinguish three types of death, namely [10], [11]:

- *estimated death* – we calculate them by comparing the number of active enterprises in time t and estimated active enterprises in time t+1,
- *preliminary death* – this is a refinement of the estimated data based on the actual number of active enterprises at time t+1,
- *definitive death* – these are final data that can only be reached when there is a database of active enterprises at time t+1 and t+2.

Subsequently, we selected variables (factors) from the business demography database, whose influence on the dependent variable we decided to verify and also quantify. We will consider the size of the enterprise as one of the most important factors, which determines the state of its employment.

This criterion is usually supplemented by two other financial criteria, namely the annual turnover or the total annual balance sheet amount of the enterprise. Since the mentioned financial criterion in the business demography database for the monitored years is missing in almost 57% of enterprises, we decided to use only the criterion of the average number of employees when dividing enterprises by size.

The number of registered active business subjects in Slovakia in 2019 was 570,224 enterprises, while in 2020, 6,888 more enterprises were registered (Table 1). Of this, small and medium-sized enterprises accounted for approximately 99.9% in both monitored years. The largest share (96.89% in 2019 and 97.22% in 2020) was represented by micro-enterprises that, according to the established European Commission classification (European Commission recommendation No. 2003/361/EC), employ from 0 to 9 employees. Small businesses (from 10-49 employees) accounted for 2.49% (year 2019) and 2.22% (year 2020); medium-sized enterprises employing more than 49 employees (max. 250) accounted for approximately 0.5% of the total number of active enterprises. Compared to large enterprises, small and medium-sized enterprises make up the largest part of the Slovak business market (Tables 1 and 2). For a better comparison of the effect of the size of the enterprises on the death of the enterprise itself, we then considered a more detailed structure of micro-enterprises.

Table 1. Frequency table of active enterprises by size in Slovakia in 2019

Enterprises by size	Frequency	Percent	Cumulative Frequency	Cumulative Percent
micro1	463 876	81.35	463 876	81.35
micro2	75 803	13.29	539 679	94.64
micro3	12 849	2.25	552 528	96.89
small	14 227	2.49	566 755	99.38
medium	2 805	0.50	569 560	99.88
large	664	0.12	570 224	100.00

Source: Statistical office of the Slovak Republic, own processing in SAS EG

Table 2. Frequency table of active enterprises by size in Slovakia in 2020

Enterprises by size	Frequency	Percent	Cumulative Frequency	Cumulative Percent
micro1	481 912	83.50	481 912	83.50
micro2	67 384	11.68	549 296	95.18
micro3	11 740	2.04	561 036	97.22
small	12 826	2.22	573 862	99.44
medium	2 610	0.45	576 472	99.89
large	640	0.11	577 112	100.00

Source: Statistical office of the Slovak Republic, own processing in SAS EG

When transforming the average number of employees, we created a categorical variable that we called SIZE. It is a variable containing the following categories of enterprises:

- Micro1 - average registered number of employees 0-1 (in persons),
- Micro2 - average registered number of employees 2-5 (in persons),
- Micro3 - average registered number of employees 6-9 (in persons),
- Small - average registered number of employees 10-49 (in persons),
- Medium - average registered number of employees 50-249 (in persons),
- Large - average registered number of employees 250+ (in persons).

Other selected factors whose impact on the death of enterprises we decided to quantify using logistic regression are as follows:

- The legal form of the enterprise with categories created by merging organization codes according to codebook of organizations into groups[1]:
  - SP - enterprises owned by natural persons: codes 101, 102, 105, 106, 107, 108, 109, 110, 422,
  - LL - joint-stock companies, limited liability companies, and also foreign legal entities with headquarters outside the Slovak Republic: codes 112, 121, 421,
  - PA - an association of persons who operate a business under a common name can take the form of a limited partnership and all other legal forms (except 103,104).

[1] Statistical Office of the Slovak Republic – code of dial 0056

- Section of the classification of economic activities SK NACE rev.2.[2], in which the company is located, while individual items are marked with the alphabetic character B to S:
  B - mining and quarrying, C - manufacturing, D – electricity, gas, steam and air conditioning supply, E - water supply, sewerage, waste management, F - construction, G - wholesale and retail trade, repair of motor vehicles and motorcycles, H - transport and storage, I - accommodation and food service activities, J - information and communication, K - financial and insurance activities, L – real estate activities, M - professional, scientific and technical activities, N - administrative and support service activities, P - education, Q - health and social assistance, R - arts, entertainment and recreation, S - other service activities.

- Enterprise belonging to a territorial unit according to NUTS 3[3], which is formed by a combination of the two-digit alphabetic code of SK and the three-digit numerical code of the region:
  SK010 Bratislava region, SK021 Trnava region, SK022 Trenčín region, SK023 Nitra region, SK031 Žilina region, SK032 Banská Bystrica region, SK041 Prešov region, SK042 Košice region.

3. Methodology

Logistic regression is a prediction model for categorized variables. A categorical variable figure as a dependent variable, and variables of a continuous or categorical character can be used as explanatory variables. It is about modeling the conditional probability of one variation of a categorical dependent variable depending on other variables. Logistic regression is very similar to linear regression. It is also like linear regression based on statistical distribution and belongs to the robust tools for creating models. The main difference, however, is that the dependent variable is not continuous, but discrete, or categorical. In order to use regression, the dependent variable is transformed into a continuous value that is the probability function of the events occurring. Logistic regression is a special case of the generalized linear model [12], [13].

In this paper, we will consider a case with a dependent variable with an alternative distribution, where the logit binding function is most often used, which transforms the parameter π_i into the logarithm of the odds [14], [15]:

$$g(\pi_i) = \ln\frac{\pi_i}{1-\pi_i} = \eta_i = \beta_0 + \sum_{j=1}^{k}\beta_j x_{ij} = \sum_{j=0}^{k}\beta_j x_{ij} \quad (1)$$

We thus obtain the equation of the logistic regression model, which expresses the relationship between the logit π_i and the function of the observed values of the independent variables $\eta_i = \beta_0 + \sum_{j=1}^{k}\beta_j x_{ij}$. The logit function transforms the set of values of the parameter π_i, which is formed by the interval $[0;1]$, into the values of the logarithm of the odds $\ln\frac{\pi_i}{1-\pi_i}$, which are from the interval $(-\infty;+\infty)$.

The unconditional maximum likelihood method is used in the SAS EG statistical system to estimate the parameters β_j of the logistic regression model. This method is preferred by statisticians when the number of model parameters is relatively low to the range of data.

After estimating the parameters of the logistic model using the maximum likelihood method, testing the significance of the model as a whole and also testing the significance of individual parameters follows. In logistic regression, the estimated value of the *L* statistic and the standard errors of the estimates of individual parameters are used. The likelihood ratio test is based on the *L* statistic, and the Wald test is based on standard errors [16].

In addition to estimates of model parameters, it is appropriate to add point estimates of odds ratios and their confidence intervals to interpret the logistic model. The odds for a binary modeled dependent variable is the ratio of the probability that the observed event occurs *(Y=1)* and the probability that the observed event does not occur *(Y=0)*. It can be expressed as:

$$\frac{\pi_i}{1-\pi_i} = \exp(\eta_i) = \exp\left(\beta_0 + \sum_{j=1}^{k}\beta_j x_{ij}\right) \quad (2)$$

When interpreting the parameters of the logistic regression model, the odds ratio (referred to as *OR*) is used:

$$OR = \frac{odds_1}{odds_2} \quad (3)$$

while *odds1* is the odds for the first compared case, *odds2* is the odds for the second case compared to it.

When the explanatory variable is categorical, odds ratios estimate the relative difference in the impact of each non-reference level compared to the reference level. The last step is the evaluation of the quality of the model, which can be carried out by several tests [14].

[2] https://ec.europa.eu/eurostat/web/nace
[3] https://ec.europa.eu/eurostat/web/nuts/background

4. Quantification of the Impact of Selected Factors on the Death of Enterprises in Slovakia

In this part of the paper, we focused on modeling or quantifying the dependence of the death of enterprises in Slovakia in 2019 and 2020 on selected factors, namely: legal form of the enterprise, region, and economic activity performed by the enterprise, and size group according to the average registered number of employees. We decided to find out which of the selected factors most influenced the death of enterprises in the period before and during the pandemic, which will allow us to determine the most and least threatened categories of enterprises according to individual factors.

When modeling the dependence of the death of enterprises in Slovakia, we used a dependent, binary variable that has 2 variations:

- 1 – the enterprise has ceased to exist,
- 0 – the enterprise did not case to exist.

An interesting fact is that, despite the restrictions on the activities of business entities due to the pandemic of Covid-19, the number of dead enterprises in 2020 compared to 2019 decreased by 17.94%, there were 10,527 less dead enterprises in absolute terms compared to 58,684 death in 2019. To a large extent, it could also be caused by the support measures adopted, the use of which was conditional on the maintaining of business activity. The drawing of these contributions could, for a time, also help economic entities whose activity would have ceased to exit under normal circumstances. It is important to warn that the data on enterprise´s death is currently estimated for 2020 and preliminary for 2019, which will be updated with respect to the definition of final data.

The following were used as reference categories of individual categorical variables:

- Small – size group of enterprises,
- Section C – manufacturing,
- SP legal form of the enterprise – enterprises owned by natural persons,
- SK010 region – Bratislava region.

Three tests were used to verify the significance of the model of the dependence of enterprise´s death on selected factors in Slovakia for both monitored years, while in all three tests the *p*-value is smaller than usual significance level used (0.05), therefore we can reject the hypothesis that all model parameters are null. However, the test result does not exclude the possibility of a zero value of one of the model parameters.

Table 3. Significance test of the model of the dependence of enterprise´s death on selected factors in the Slovak Republic for the year 2019

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	15471.8832	30	<.0001
Score	13584.8592	30	<.0001
Wald	12173.4291	30	<.0001

Source: Statistical office of the Slovak Republic, own processing in SAS EG

Table 4. Significance test of the model of the dependence of enterprise's death on selected factors in the Slovak Republic for the year 2020

Testing Global Null Hypothesis: BETA=0			
Test	**Chi-Square**	**DF**	**Pr > ChiSq**
Likelihood Ratio	29536.5299	30	<.0001
Score	23944.5592	30	<.0001
Wald	17580.5691	30	<.0001

Source: Statistical office of the Slovak Republic, own processing in SAS EG

Subsequently, we verified all parameters entering the model that appear to be statistically significant (Tables 5 and 6), while the influence of individual variables (factors) was ranked according to the size of the *chi*-square statistic. In both monitored years, the death of enterprise was most influenced by the legal form of the enterprise, followed by the size category of the enterprise according to the average registered number of employees, then the economic activity of the enterprise according to SK NACE, and finally the region in which the enterprise was located.

Table 5. Significance test of the parameters of the model of the dependence of enterprise´s death on selected factors in the Slovak Republic in 2019

Type 3 Analysis of Effects			
Effect	**DF**	**Wald Chi-Square**	**Pr > ChiSq**
FORM	2	3970.4800	<.0001
SIZE	5	3543.6629	<.0001
SK NACE	16	1981.7578	<.0001
NUTS3	7	208.3501	<.0001

Source: Statistical office of the Slovak Republic, own processing in SAS EG

Table 6. Significance test of the parameters of the model of the dependence of enterprise´s death on selected factors in the Slovak Republic in 2020

Type 3 Analysis of Effects			
Effect	**DF**	**Wald Chi-Square**	**Pr > ChiSq**
FORM	2	10489.5041	<.0001
SIZE	5	2626.6550	<.0001
SK NACE	16	1667.3048	<.0001
NUTS3	7	252.0186	<.0001

Source: Statistical office of the Slovak Republic, own processing in SAS EG

In the next step, the focus is on estimating the parameters for individual categories of factors of the logistic regression model using the unconditional maximum likelihood method. The results of the estimated parameters for the individual categories of the model as well as the test of their significance using the *chi*-square statistic and also the Wald test are provided in Tables 7 and 8. Point and interval estimates of odds ratio for both observed years, which we will use for interpretation, are contained in Tables 9 and 10. We will focus only on statistically significant parameter estimates for individual variations of selected factors (not highlighted). All interpretations of the parameters are presented under ceteris paribus condition, and we will not repeat this fact for each individual interpretation.

Table 7. Estimates of parameters of logistic models of enterprise´s death in 2019

2019			
Analysis of Maximum Likelihood Estimates			
Parameter		**Estimate**	**Pr > ChiSq**
Intercept		-1.9229	<.0001
FORM	**LL**	-0.7348	<.0001
FORM	**PA**	-0.0902	0.1726
SIZE	**micro2**	-1.0113	<.0001
SIZE	**micro3**	-1.3522	<.0001
SIZE	**small**	-1.3669	<.0001
SIZE	**medium**	-1.3343	<.0001
SIZE	**large**	-1.8015	<.0001
SK NACE	**B**	0.2708	0.2917
SK NACE	**D**	-0.5026	0.0373
SK NACE	**E**	0.2877	0.0016
SK NACE	**F**	0.0868	<.0001
SK NACE	**G**	0.1396	<.0001
SK NACE	**H**	0.6503	<.0001
SK NACE	**I**	0.4111	<.0001
SK NACE	**J**	-0.0224	0.3748
SK NACE	**K**	0.6520	<.0001
SK NACE	**L**	-0.0299	0.4013
SK NACE	**M**	0.0127	0.4642
SK NACE	**N**	0.3201	<.0001
SK NACE	**P**	0.0759	0.0460
SK NACE	**Q**	0.1205	0.0069
SK NACE	**R**	0.1678	<.0001
SK NACE	**S**	-0.0552	0.0295
NUTS3	**SK021**	-0.0688	<.0001
NUTS3	**SK022**	-0.0851	<.0001
NUTS3	**SK023**	0.0281	0.0795
NUTS3	**SK031**	-0.1524	<.0001
NUTS3	**SK032**	0.0408	0.0184
NUTS3	**SK041**	-0.0585	0.0003
NUTS3	**SK042**	0.0403	0.0184

Source: Statistical office of the Slovak Republic, own processing in SAS EG

Table 8. Estimates of parameters of logistic models of enterprise´s death in 2020

2020			
Analysis of Maximum Likelihood Estimates			
Parameter		**Estimate**	**Pr > ChiSq**
Intercept		-2.1541	<.0001
FORM	**LL**	-1.7500	<.0001
FORM	**PA**	-1.2801	<.0001
SIZE	**micro2**	-1.4921	<.0001
SIZE	**micro3**	-1.9480	<.0001
SIZE	**small**	-1.7067	<.0001
SIZE	**medium**	-1.9876	<.0001
SIZE	**large**	-9.8913	0.7668
SKNACE	**B**	0.0819	0.7964
SKNACE	**D**	0.4885	0.0422
SKNACE	**E**	0.2049	0.0794
SKNACE	**F**	0.1302	<.0001
SKNACE	**G**	0.2124	<.0001
SKNACE	**H**	0.4743	<.0001
SKNACE	**I**	0.3605	<.0001
SKNACE	**J**	0.1490	<.0001
SKNACE	**K**	0.8740	<.0001
SKNACE	**L**	0.1854	<.0001
SKNACE	**M**	0.1500	<.0001
SKNACE	**N**	0.4152	<.0001
SKNACE	**P**	0.2278	<.0001
SKNACE	**Q**	0.3704	<.0001
SKNACE	**R**	0.1587	0.0006
SKNACE	**S**	-0.0557	0.0418
NUTS3	**SK021**	0.0257	0.1913
NUTS3	**SK022**	0.0210	0.2944
NUTS3	**SK023**	0.1434	<.0001
NUTS3	**SK031**	-0.0089	0.6231
NUTS3	**SK032**	0.1791	<.0001
NUTS3	**SK041**	0.0621	0.0005
NUTS3	**SK042**	0.2033	<.0001

Source: Statistical office of the Slovak Republic, own processing in SAS EG

Table 9. Point and interval estimates of odds ratios of the logistic models of enterprise´s death from selected factors in 2019

2019			
Odds Ratio Estimates and Wald Confidence Intervals			
Effect	Estimate	95% Confidence Limits	
LL vs SP	0.480	0.469	0.491
PA vs SP	0.914	0.803	1.040
micro2 vs micro1	0.364	0.350	0.378
micro3 vs micro1	0.259	0.231	0.289
small vs micro1	0.255	0.228	0.285
medium vs micro1	0.263	0.204	0.340
large vs micro1	0.165	0.086	0.319
B vs C	1.311	0.792	2.169
D vs C	0.605	0.377	0.971
E vs C	1.333	1.115	1.594
F vs C	1.091	1.058	1.124
G vs C	1.150	1.114	1.187
H vs C	1.916	1.834	2.002
I vs C	1.508	1.431	1.590
J vs C	0.978	0.931	1.027
K vs C	1.919	1.827	2.016
L vs C	0.971	0.905	1.041
M vs C	1.013	0.979	1.048
N vs C	1.377	1.323	1.434
P vs C	1.079	1.001	1.162
Q vs C	1.128	1.034	1.231
R vs C	1.183	1.091	1.282
S vs C	0.946	0.900	0.995
SK021 vs SK010	0.933	0.902	0.966
SK022 vs SK010	0.918	0.887	0.951
SK023 vs SK010	1.029	0.997	1.061
SK031 vs SK010	0.859	0.832	0.886
SK032 vs SK010	1.042	1.007	1.078
SK041 vs SK010	0.943	0.914	0.973
SK042 vs SK010	1.041	1.007	1.077

Source: Statistical office of the Slovak Republic, own processing in SAS EG

Table 10. Point and interval estimates of odds ratios of the logistic models of enterprise´s death from selected factors in 2020

2020			
Odds Ratio Estimates and Wald Confidence Intervals			
Effect	Estimate	95% Confidence Limits	
LL vs SP	0.174	0.168	0.180
PA vs SP	0.278	0.221	0.350
micro2 vs micro1	0.225	0.211	0.240
micro3 vs micro1	0.143	0.115	0.177
small vs micro1	0.181	0.147	0.224
medium vs micro1	0.137	0.074	0.255
large vs micro1	<0.001	<0.001	>999.999
B vs C	1.085	0.583	2.022
D vs C	1.630	1.017	2.611
E vs C	1.227	0.976	1.543
F vs C	1.139	1.102	1.177
G vs C	1.237	1.194	1.281
H vs C	1.607	1.526	1.692
I vs C	1.434	1.349	1.525
J vs C	1.161	1.100	1.225
K vs C	2.396	2.278	2.521
L vs C	1.204	1.098	1.319
M vs C	1.162	1.119	1.206
N vs C	1.515	1.448	1.584
P vs C	1.256	1.158	1.362
Q vs C	1.448	1.304	1.608
R vs C	1.172	1.070	1.283
S vs C	0.946	0.896	0.998
SK021 vs SK010	1.026	0.987	1.066
SK022 vs SK010	1.021	0.982	1.062
SK023 vs SK010	1.154	1.114	1.196
SK031 vs SK010	0.991	0.957	1.027
SK032 vs SK010	1.196	1.151	1.243
SK041 vs SK010	1.064	1.027	1.102
SK042 vs SK010	1.225	1.180	1.272

Source: Statistical office of the Slovak Republic, own processing in SAS EG

The death of enterprises in Slovakia was most influenced by the variable legal form of the business entity. It turned out that in terms of legal form in 2019, only the LL legal form (112 limited liability companies, 121 joint-stock companies and 421 foreign legal entities with headquarters outside the Slovak Republic) had a statistically significant effect on the death of enterprises, whose odds of death was 2.08 times lower compared to enterprises of natural persons (Table 11). In 2020, the probability of the enterprise's death was once again highest among natural persons. In 2020, the odds of death of enterprise with the legal form of PA (association of persons who operate a business under a common name, with the form of e.g. limited partnership and all other legal forms) compared to the legal form o SP was 3.6 times lower, while in the case of enterprises with the legal form LL was up to 5.75 times lower.

In terms of the death of enterprises based on their legal form, in the monitored years, the group of enterprises SP can be considered the most endangered. On the contrary, the group of enterprises LL in both monitored years, which has the lowest probability of extinction among the other groups, is the least endangered.

Table 11. The rate of decline in odds ratios of the "size" variable compared to the category in the monitored periods (in %)

SIZE	2019	SIZE	2020
micro2	↓ 174.73	micro2	↓ 344.44
micro3	↓ 286.10	micro3	↓ 599.30
small	↓ 292.16	small	↓ 452.49
medium	↓ 280.23	medium	↓ 629.93
large	↓ 506.06	large	-

Source: Own processing in MS Excel

From the point of view of enterprise size, the odds of the enterprise's death in all size groups according to the average registered number of employees was lower than in the micro1 group of enterprises, in both monitored periods (Table 8). In the category of micro2 enterprises with 2 to 5 employees, the odds of death was 174.73% lower in 2019 and 344.44% lower in 2020 than in the category of micro1 enterprises. There was a slightly bigger difference in the micro3 category of enterprises with 6 to 9 employees, where the odds of death was 286.1% lower in 2019 and 599.30% lower in 2020 than in enterprises with one employee. The biggest difference can be observed in the categories of medium-sized enterprises in comparison with micro1 enterprises, where the odds of death was lower in 2020 by 349.7 percentage points compared to the odds of death in 2019.

In both monitored years, the group of micro1 enterprises had the highest odds of death and can be considered the most risky. These are one-employee enterprises that often have limited financial resources and do not have a sufficient financial reserve to cover the unexpected expenses associated with staying in the market. This means that they can easily get into financial difficulties, which can lead to their death. In 2019, we can consider the category of large enterprises with more than 250 employees as the least threatened and statistically significant, whose odds of death is 6.06 times lower compared to micro1 enterprises. The least endangered group for 2020 is the group of --sized enterprises, whose odds of death was the lowest among the other categories of enterprises, up to 7.3 times lower compared to micro1 enterprises.

When interpreting the odds of death of enterprises according to economic activity, we chose as a reference category enterprises with manufacturing (section C), since this sector can be considered a focal sector of the Slovak economy. We see a negative, statistically significant estimated parameter for enterprises whose activity deals with section D in 2019, and enterprises whose activity falls into the section of other service activities (S) in both monitored years.

The situation in these sections of enterprises in 2019 can be considered the most favorable, as their odds of death was the lowest among other sections compared to manufacturing enterprises.

For all other categories, the parameter estimate is positive, and thus the odds of death of enterprises is higher than in section C. Despite the fact that in 2020, manufacturing was threatened by a lack of materials and components on the market, the death of enterprises in this sector was not so much threatened. The order of the industries together with the percentage expression of the increase/decrease in odds ratio compared to manufacturing is expressed in Table 12.

Table 12. Rates of increase/decrease in odds ratios of the "SKNACE" variable compared to the reference category in the monitored periods (in %)

SKNACE	2019	SKNACE	2020
K	↑ 91.90	K	↑ 139.60
H	↑ 91.60	D	↑ 63.00
I	↑ 50.80	H	↑ 60.70
N	↑ 37.70	N	↑ 51.50
E	↑ 33.30	Q	↑ 44.80
R	↑ 18.30	I	↑ 43.40
G	↑ 15.00	P	↑ 25.60
Q	↑ 12.80	G	↑ 23.70
F	↑ 9.10	E	↑ 22.70
P	↑ 7.90	L	↑ 20.40
S	↓ 5.71	R	↑ 17.20
D	↓ 65.29	M	↑ 16.20
B	-	J	↑ 16.10
J	-	F	↑ 13.90
L	-	S	↓ 5.71
M	-	B	-

Source: Own processing in MS Excel

In both monitored years, the highest odds of enterprise's death are in section K – financial and insurance activities. In 2020 by 139.6% and in 2019 by 91.9% higher than in a manufacturing enterprise. The reason may be complex and difficult to apply VAT rules, which lead to high administrative and regulatory costs or legal uncertainty. The order of other industries varies slightly in the monitored years.

If we want to compare the death of enterprises in individual periods, we can see that for most groups of enterprises according to economic activities (groups K, N, Q, P, G, M, F), odds of death of enterprises are higher compared to manufacturing enterprises in 2020. It follows that at the time of the COVID-19 crisis, the odds of death of enterprises in the mentioned sectors was higher (again compared to the manufacturing sector) than before the pandemic. The highest increase in the odds of death can be seen in enterprises whose economic activity falls into category D.

This fact could have been caused by the limitation of business activity during the COVID-19 pandemic and the subsequent reduction in demand for the supply of electricity or gas.

Favorable trend (a decrease in the probability of the enterprise's death) we observe in the sectors H - transport and storage, I - accommodation and food service activities, E - water supply, sewerage, waste management and R - arts, entertainment and recreation. The reason may be, for example, the already mentioned support measures, the use of which was conditional on maintaining the activity of business entities. For enterprises operating in the field of transport and storage (H), the reduction in the probability of the enterprise's closure can be attributed to the sharp increase in online shopping and thus the increased demand for warehouse and courier activities.

The most diverse can be considered the death of enterprises in individual size categories by region (Tab. 7). While in 2019 the influence of the region is significant in all categories, in 2020 mainly in the west of Slovakia (SK021-Trnava region, SK022 - Trenčín region, SK031- Žilina region) there were insignificant differences in the death of enterprises compared to Bratislava region (SK010). An interesting fact is that in 2020, for all statistically significant parameter estimates, there were higher odds of death in all regions of Slovakia compared to SK010 - Bratislava region. In 2019 - in the period before the pandemic, SK032-Banská Bystrica region was the most endangered in terms of closure (the odds of death was 1.042 times higher than in SK010), followed very closely by SK042-Košice region (the odds of death was 1.041 times higher than in SK010). On the contrary, the least endangered region in 2019 was SK031-Žilina region, in which the odds of the enterprise's death was 1.16 times lower than in SK010 region. The biggest change occurred in the monitored years in SK041-Prešov region, where in 2019 the odds of enterprise's death was 1.06 times lower than in SK010 region, while in 2020 this odds increased compared to SK010 region, also by 1.06 times.

By comparing the regions, we can conclude that the worst situation (the greatest probability of death of enterprises) was in Banská Bystrica region in 2019 and in Košice region in 2020.

5. Conclusion

The Slovak Republic is a small country with an even smaller market. Not only on the domestic market, but also abroad, it is often very difficult to remain among the competition yet it is not impossible.

This image can be created not only by focusing the economy on the production of commodities and services that have a high added value, but also by creating a suitable business environment.

The pandemic caused by the virus COVID-19 resulted in extensive economic damage in many countries of the world, including the Slovak Republic. The world economy measured by the GDP indicator decreased by 3.5% in 2020, even by 6.6% in EU countries. Even the Slovak Republic did not avoid a decline in performance (SBA, 2021a).

The main indicator declaring a decline in business activity, which was the research subject in this paper, is the number of dead enterprises. Despite the pandemic, which plagued entrepreneurs almost throughout 2020, the biggest paradox is the fact that the number of death enterprises in Slovakia in 2020 was lower than in 2019. In 2020, there were 48,157 dead enterprises, which is by 10,527 (by 17.94%) fewer enterprises than in 2019. The measures taken to support entrepreneurs during the pandemic contributed to the historically low number of dead enterprises in 2020. Based on the above, it can be concluded that during the two waves of the pandemic, there were fewer dead enterprises in Slovakia than in the pre-pandemic year of 2019.

The results of the analysis proved that the legal form of the company had the most significant impact on the death of enterprises during the COVID-19 pandemic. Enterprises of natural persons in private ownership had relatively flat hierarchical structures, which allowed for easier death of enterprise. In terms of size, these were usually enterprises with one employee or o micro-enterprises, whose resources, whether human or financial, are more limited compared to larger enterprises. Overall, small and medium-sized enterprises can be avowed less resistant, meaning that they did not return to business after the end of the crisis, or their return was slower and more difficult. It follows from the logistic models that in the case of the sectoral structure, the financial and insurance services sector was the most risky in terms of enterprise´s death in both years. Overall, it can be assessed that the decrease in business activity in 2020 compared to 2019 was most shown in the service sector. If we focus on the impact of the regional point of view during the pandemic of COVID-19, the interesting fact is that the least threatened region in 2020 was Bratislava (SK010), in which the capital of Slovakia is located, while the situation was approximately the same in the other three regions in the west of Slovakia. On the contrary, the most threatened region was Košice region (SK041) that is, from a geographical point of view, the east, and followed by the center of Slovakia.

However, when monitoring the odds of enterprise's death for the whole of Slovakia, it is possible to observe a similar structure of the influence of individual categories of factors as in the case of micro-enterprises with one employee.

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