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The current state of the application of risk management in the transport sector

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Abstract

The SMEs are considered to be the most flexible, the most effective and the most progressive part of the economy both in the developed countries and in Slovakia. The SMEs are very sensitive to the changes in the entrepreneurial environment and therefore it is important for them to know the risks that threaten their business activities. Several studies worldwide say that a reliable risk management ensures fewer negative surprises, a higher financial stability of the company and provides opportunities for achieving profits.
The aim of this paper is assessment the perceived key business risks of SMEs in Slovakia in transport sector based on own empirical research carried out in 2017. Its task was to detect the state of the risk management in the enterprises too. The overall results of the empirical research point to the need and importance of addressing the assessment of key risks and their resources in SMEs in Slovakia. The role of the paper is, through a relevant study, to highlight the need to apply risk management in the SMEs and to bring closer the results of the research in Slovakia to world trends.

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Keywords: small and medium enterprises, environment, risk assessment, transport sector

1. Introduction

Nowadays, managers and owners of small and medium sized enterprises (SME) in transport sector are faced with the responsibility to take decision to ensure stability, prosperity of enterprise and competitiveness, too. Every decision making obtain risk and is provided in risk condition (Agarwal et al., 2016). Managers and owners of SMEs are beginning to realize the need of risk management and its importance in current global conditions, too. Based on surveys Global trends 2025 (2017), The American Institute of CPAs (2017), CGMA (2017), Enterprise risk management initiative (2017) which was realized, it is possible to say, that risk management is one of the most perceived field of management. Managers and owners of SMEs perceived lack of risk management process in their enterprises. Risk management can increasing value, performance and competitive in enterprises, too.

Global business environment brings rapid changes into enterprises environments and enterprises are aware of the need of risk management in their business and importance of its, too. According to several authors Kozubikova et al., (2017), Gates et al., (2012), Fraser et al., (2016), Klučka et al., (2016) and Belás et al., (2018) is global trend in risk management based on an early risk identification, improvement level of organizational culture, risk assessment and positive attitude to risk management.

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Foreign studies Enterprise risk management initiative (2017), The American Institute of CPAs (2017), CGMA (2017) highlight shortcoming in risk management application in the world. The key findings from the studies are:

- insufficiently risk management models,
- lack of support in an enterprise,
- insufficiently implemented risk management system,
- lack of training,
- less delegating responsibility for risk control,
- not providing discussion about risks.

According to authors Titko et al., (2016), Nedeliakova et al., (2016), Leitner et al., (2015) the application of risk management is unsystematic in many enterprises in transport sector. If we compare those enterprises with manufacturing enterprises, we find out, that risk management in transport sector has many reserves. The risk management application encounters problems with content definition, risk responsibility, missing criteria, i.e. risk tolerance, insufficient focus on identifying source causes of risk, etc. The financial crisis in 2008-2009 raised interest in risk management in businesses. It strengthened the role of managing the risks of financial managers, but not far from that in the European countries.

According to authors Kormancova (2013) and Hudakova et al., (2016). managers in most cases believe that all problems will be resolved in time and without bigger losses until they occur. Risk management in small and medium-sized enterprises in the Slovak Republic in limited to manage market and investment risks, while other risks are neglected (Hudakova et al., 2018), Based on surveys, which were realized in 2013, 2017 in enterprises environment is need to raise awareness, evaluation and increase the knowledge of SMEs owners and managers.

2. Methods and data

The main aim of this contribution (based on the empirical research) is assess dependence between:

- level of education managers and owners of SMEs and create discussion conditions about key risks in enterprise,
- level of education managers and owners of SMEs and risk mitigations used for risk minimalize,
- Level of education managers and owners of SMEs, methods, and techniques, which are used in risk management process.

Based of aims of these contributions is possible to create 3 hypothesis:

- The highest achieved education of managers and owners of SMEs depends on creating space for discussion of key risks in enterprises.
- The highest achieved education of managers and owners of SMEs depends on used risk mitigations for risk minimalize.
- The highest achieved education of managers and owners of SMEs depends on methods and techniques, which are used in risk management process.

In order to meet the objective stated the empirical research methods (questionnaires, interviews with competent persons of SMEs), statistical methods, i.e., the analysis of dependence by the Chi-Square Test of Independence, Pearsons correlation coefficient and Tschuper´s correlation coefficient.

Chi-Square Test of Independence define Chajdiak (1999) as a nonparametric statistical test to determine if two or more classifications of the samples are independent or not. A common question with regards to a contingency table is whether it has independence. By independence, we mean that the row and column variables are unassociated (i.e. knowing the value of a row variable will not help us predict the value of a column variable, and likewise, knowing the value of a column variable will not help us predict the value of a row variable).

Methodology of calculation Chi-Square Test is divided into 4 main steps. It is necessary to established null and alternative hypothesis – the null hypothesis is, that variables are independent, and alternative hypothesis that variables are related (dependent). Second step is determinated significate level α. The third step is calculate Chi-Square Test of Independence based formula (1) and last step is compare computed Chi-Square with critical value by statistic tables for established level of significance.

$$\aleph^2 = \sum_{i=1}^{m}\sum_{j=1}^{k}\frac{((a_i b_j)-(a_i b_j)_0)*(((a_i b_j)-(a_i b_j)_0)}{(a_i b_j)_0} \quad (1)$$

Pearson's correlation coefficient (r) is the mostly used nonparametric measure of association for two random variables, is calculated by formula (2) (Wang, 2012). Pearson correlation coefficient is dimensionless measure that determines a linear relation between two variables. Its value varies from-1, when there is a perfect negative linear relation, to+1, when there is a perfect positive linear relation. The closer this value to zero, the smaller is the degree of linear relation. From the Pearson correlation coefficient, many other statistics are calculated, such as partial correlation, direct and indirect effects between variables in track analysis, and canonical correlation (Hair et al., 2005).

Association is possible to investigate by Table 1 – the measures of association value and its interpretation.

Table 1. The measures of association value and its interpretation

Measure of association value	Degree of association
0,0	Perfect independence
(0,0-0,1)	Trivial association
<0,1-0,3)	Small association
<0,3-0,5)	Moderate association
<0,5-0,7)	Large association
<0,7-0,9)	Very large association
<0,9-1,0)	Nearly perfect association
1,0	Perfect association

Source: Cohen, 2016

$$r = \sqrt{\frac{\aleph^2}{n+\aleph^2}} \tag{2}$$

Tschuper´s coefficient (T) is one of the indexes, based them is possible to calculate degree of dependence between 2 qualitative characteristics. It is necessary to results compute into pivot table r x s. Tschuper´s coefficient (T) is calculated by formula (3) (Markechova 2011).

$$T = \frac{\aleph^2}{n * \sqrt{(m-1)*(k-1)}} \tag{3}$$

3. Results

In 2017 the authors of the paper realized an empirical research aimed at detecting the key entrepreneurial risks of the SMEs in Slovakia and the state of implementing the risk management process. 487 SMEs participated in this research. Out of 487 participants there were 64 % of the micro-companies, 24 % of the small-sized companies a 12 % of the medium-sized companies. From the point of view of the line of business the structure was as follows: 16 % industry; 24 % trade; 1 % agriculture; 12 % building industry; transport, information 6 %; 9 % accommodation, catering; 7 % business services; other types of services 22 %; other services 3 % (Hudakova et al., 2018) .

The addressed owners and managers of the SMEs in Slovakia were to determine maximally three risks out of seven ones they consider as the key risks in their business. Out of the total number of 487 addressed SMEs we determined the percentage of the identified key risks of the SMEs in Slovakia as follows: the most serious risks were the market risks – 26 %; the financial risks – 21 %; the economic risks – 19 %; the personal risks – 11 %; the operational risks – 9 %; the legal risks – 7 %; the security risks – 6 % and the other risks – 1 %. Fig. 2 presents the share of identified key risks of SMEs in Slovakia in 2017 (Hudakova et al., 2018).

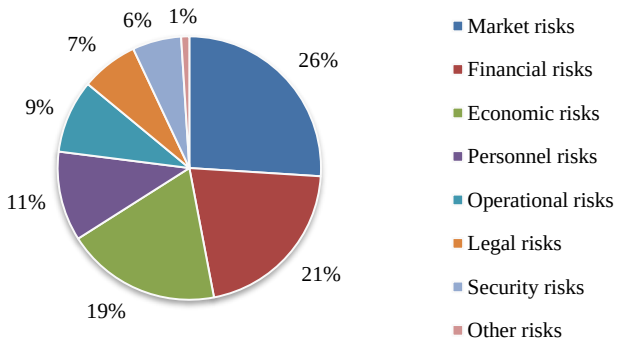

Fig. 1. Share of identified key risks of SMEs in Slovakia in 2017 (Hudakova et al., 2018)

It was established following null and alternative hypothesis for investigated dependences:

- For investigate hypothesis H_1 - The highest achieved education of managers and owners of SMEs depends on creating space for discussion of key risks in enterprises.
  - H_{01} - The highest achieved education of managers and owners of SMEs is independent on creating space for discussion of key risks in enterprises.
  - H_{11} - The highest achieved education of managers and owners of SMEs is independent on creating space for discussion of key risks in enterprises..

- For investigate hypothesis H_2 - The highest achieved education of managers and owners of SMEs depends on used risk mitigations for risk minimalize.
    - H_{02} - The highest achieved education of managers and owners of SMEs is in depend on used risk mitigations for risk minimalize.
    - H_{12} - The highest achieved education of managers and owners of SMEs is depend on used risk mitigations for risk minimalize.
- For investigate hypothesis H_3 - The highest achieved education of managers and owners of SMEs depends on methods and techniques, which are used in risk management process.
    - H_{03} - The highest achieved education of managers and owners of SMEs is independent on methods and techniques, which are used in risk management process.
    - H_{13} - The highest achieved education of managers and owners of SMEs is dependent on methods and techniques, which are used in risk management process.

Significance level (α) was established by authors experiences as α =0,05. Authors consider established significate level as suitable for fulfil main aim of this contribution.

Chi-Square was calculated based formula (1), it is necessary to create 3 calculate tables – table of empirical multiplicity, table of theoretical multiplicity and table of test criterion for each hypothesis.

Table 2. The Empirical multiplicity for hypothesis H_1

Education	Monthly	Quarterly	Half annually	Annually	Without discussion	Summary
University	46	29	20	21	54	170
Sixth-form college	42	19	26	44	126	257
Vocational college	9	3	10	3	33	58
Summary	97	51	56	68	213	485

Table 3. The Theoretical multiplicity for hypothesis H_1

Education	Monthly	Quarterly	Half annually	Annually	Without discussion	Summary
University	34,00	17,88	19,63	23,84	74,66	170,00
Sixth-form college	51,40	27,02	29,67	36,03	112,87	257,00
Vocational college	11,60	6,10	6,70	8,13	25,47	58,00
Summary	97,00	51,00	56,00	68,00	213,00	485,00

Table 4. The Test criterion for hypothesis H_1

Education	Monthly	Quarterly	Half annually	Annually	Without discussion	Summary
University	4,24	6,92	0,01	0,34	5,72	17,22
Sixth-form college	1,72	2,38	0,45	1,76	1,53	7,85
Vocational college	0,58	1,57	1,63	3,24	2,22	9,25
Summary	6,54	10,88	2,09	5,34	9,47	34,31

Based statistical tables for established level of significate and Df is value of Chi-square 15,51. Calculated value is 34,31, so we can say, that hypothesis H11 is confirmed, and highest achieved education of managers and owners of SMEs is independent on creating space for discussion of key risks in enterprises. It is necessary to calculate test force by Pearson´s and Tschuprov´s correlation coefficient by formulas (2) and (3). Pearson´s correlation coefficient was 0,26 and Tschuprov´s correlation coefficient was 0,026. Based on this results, we can say, that there is small association between highest achieved education of managers and owners of SMEs and creating space for discussion of key risks in enterprises.

Table 5. The Empirical multiplicity for hypothesis H_2

Education	Risk Avoid	Insurance	Extension of productivity	Risk transfer	Financial reserves	Summary
University	65	54	10	6	31	166
Sixth-form college	104	83	6	3	59	255
Vocational college	32	14	7	1	10	64
Summary	201	151	23	10	100	485

Table 6. The Theoretical multiplicity for hypothesis H_2

Education	Risk Avoid	Insurance	Extension of productivity	Risk transfer	Financial reserves	Summary
University	68,80	51,68	7,87	3,42	34,23	166,00
Sixth-form college	105,68	79,39	12,10	5,26	52,58	255,00

Vocational college	26,52	19,93	3,04	1,32	13,10	64,00
Summary	201,00	151,00	23,00	10,00	100,00	485,00

Table 7. The Test criterion for hypothesis H_2

Education	Risk Avoid	Insurance	Extension of productivity	Risk transfer	Financial reserves	Summary
University	0,21	0,10	0,58	1,94	0,30	3,13
Sixth-form college	0,03	0,16	3,07	0,97	0,78	5,01
Vocational college	1,13	1,76	5,18	0,08	0,77	8,92
Summary	1,37	2,03	8,82	2,99	1,86	17,07

Based statistical tables for established level of significance and Df is value of Chi-square 15,51. Calculated value is 17,07, so we can say, that hypothesis H21 is confirmed, and The highest achieved education of managers and owners of SMEs is depend on used risk mitigations for risk minimalize. It is necessary to calculate test force by Pearson´s and Tschuprov´s correlation coefficient by formulas (2) and (3). Pearson´s correlation coefficient was 0,18 and Tschuprov´s correlation coefficient was 0,021. Based on this result, we can say, that there is small association between highest achieved education of managers and owners of SMEs and used risk mitigations for risk minimalize.

Table 8. The Empirical multiplicity for hypothesis H_2

Education	Audit	Methods and techniques for planning	Project management methods and techniques	Decision-making methods and techniques	Quality management methods and techniques	Do not use	Control of established goals	Summary
University	35	11	1	13	5	11	84	160
Sixth-form college	51	4	4	11	5	4	156	237
Vocational college	12	1	1	3	15	24	30	88
Summary	98	16	6	27	25	39	270	485

Table 9. The Theoretical multiplicity for hypothesis H_2

Education	Audit	Methods and techniques for planning	Project management methods and techniques	Decision-making methods and techniques	Quality management methods and techniques	Do not use	Control of established goals	Summary
University	32,33	5,28	1,98	8,91	8,25	1,32	89,07	160,00
Sixth-form college	47,89	7,82	2,93	13,19	12,22	1,95	131,94	237,00
Vocational college	17,78	2,90	1,09	4,90	4,53	0,73	48,99	88,00
Summary	98,00	16,00	6,00	27,00	25,00	4,00	270,00	485,00

Table 10. The Test criterion for hypothesis H_2

Education	Audit	Methods and techniques for planning	Project management methods and techniques	Decision-making methods and techniques	Quality management methods and techniques	Do not use	Control of established goals	Summary
University	0,22	6,20	0,48	1,88	1,28	1,32	0,29	11,95
Sixth-form college	0,20	1,86	0,39	0,36	4,26	0,00	4,39	23,37
Vocational college	1,88	1,25	0,01	0,74	24,14	2,24	7,36	78,08
Summary	2,30	9,31	0,88	2,98	29,68	3,56	12,04	113,40

Based statistical tables for established level of significate and Df is value of Chi-square 23,68. Calculated value is 113,4 , so we can say, that hypothesis H31 is confirmed, and The highest achieved education of managers and owners of SMEs is dependent on methods and techniques, which are used in risk management process. It is necessary to calculate test force by Pearson´s and Tschuprov´s correlation coefficient by formulas (2) and (3). Pearson´s correlation coefficient was 0,19 and Tschuprov´s correlation coefficient was 0,067. Based on this results, we can say, that there is small association between methods and techniques, which are used in risk management process.

4. Conclusion

The overall results of empirical research point to the significance and importance of education of SMEs in Slovakia. Managers and owners of SMEs emphasize the need for active and systematic work with risk and preparation for the traps of the current business environment. Based results it is necessary to improve education process of managers and owners of SMEs enterprises in Slovakia.

Results highlights importance on education, because of it is association between education and creating space for discussion of key risks in enterprises, used risk mitigations for risk minimalize, methods and techniques, which are used in risk management process. Managers and owners of SMEs perceive added value in risk management, but education must be suit for their needs. If managers have knowledge, they may use right methods and technique for running a business, they may minimalize risk, if they use right strategy, and they may run a discussion about key risks in their enterprise. Those factors are necessary to improve competitiveness of their enterprise, rise efficiently and value of enterprise. The authors' efforts are to create step-by-step actions to promote the application of the risk management process in enterprises in Slovakia so that managers can manage risks and progressively move towards global trends.

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