

## Inga Jansone, Irina Voronova

Riga Technical University, Faculty of Engineering Economics and Management, Institute of Production and Entrepreneurship, Kalnciema str. 6, LV 1007 Riga, Latvia  
email: inga.jansone\_1@rtu.lv, irina.voronova@rtu.lv

### **Risks Matrixes – Risks Assessment Tools of Small and Medium-Sized Enterprises**

#### **Abstract**

The enterprises need to assess the risk dynamic of financial instability and this risk impact on small and medium-sized enterprises' development, because it is important for enterprises to extend commercial activity and to open a new structural subdivision. The authors have researched types of risks, their identification, classification and assessment possibilities in activities of small and medium-sized enterprises. The authors have used the own created algorithm of identification, classification and assessment of enterprises' risks.

The goal of the research is to study the economic and financial risks impact on small and medium-sized enterprises' development in Latvia. The authors have carried out the questionnaire of representative small and medium-sized enterprises about the economic and financial risks impact on enterprises' development in Latvia. The authors have created classification of Latvian services sectors economic and financial risks in the period from 2011 to 2012. Those risks have been included in questionnaire.

The risks matrix is a quantitative assessment tool of risks. The authors have created Latvian service sector economic and financial risks matrix. The authors have arranged risks by their size of possible losses for enterprises. For each type of risk has been assessed its probability of realization.

The authors have created Latvian accommodations (hotel) and food services technological process risks map. Several parts of the risk map (segments) make it possible to assess each type of the risk separately in its segment. Risk matrix can use to choose enterprise's strategy of risk management. Enterprise's strategy of risk management is developed by analysing zones of risk level.

#### **Key Words**

*classification of risks, risks assessment, risks matrixes, questionnaire of small and medium-sized enterprises*

**JEL Classification: G32**

### **Introduction**

Micro, small and medium-sized enterprises in accordance with European Commission Regulation No 364/2004 characterizes maximum staff number and annual turnover (or annual balance sheet total). A medium-sized enterprise is defined as an enterprise which employs fewer than 250 persons and whose annual turnover does not exceed EUR 50 million or whose annual balance-sheet total does not exceed EUR 43 million.

In Latvia it is important for small and medium-sized enterprises to create an efficient economic activity in both – economic growth and economic slowdown. Enterprises have to assess marketing activities to attract new and retain existing clients, as well as to create marketing activities that increase client's loyalty to enterprise's brand. Decreasing income, enterprise should reconsider expenditures in order to improve financial stability of enterprise. Because of reduction in client's solvency, small and medium-sized enterprises in Latvia regularly have to make the profit and loss account, so that they operatively keep up with ratio of incomes and expenditures. Evaluating these aspects, enterprises can develop a business strategy to effectively perform their economic activities. Establishing business strategy enterprises need to classify economic and financial risks as well as assessing their impact of enterprise's development.

Assessing the risks in small and medium-sized enterprises it is appropriate to use risk matrixes and risk maps. Using the risk matrixes employees of the company can assess each risk possible losses and its probability of realization. Several parts of the risk map (segments) make it possible to assess each type of the risk separately in its segment. Assessing the zones of the risk levels small and medium-sized enterprises can create their own risk management strategies.

## **1. Previous research**

One of the world's leading insurance broker and risk management consulting organization Aon Corporation has issued a Global Political Risk map for 2011 [2]. The risk in each country was ranked as Low, Medium-Low, Medium, Medium-High, High or Very High. Latvia is in group of countries which risk level is ranked as Medium. The major risks are the risk of monetary and the risk of reduction in client's solvency.

Henschel T. have studied German small and medium-sized enterprises' risk management problems, and carried out questionnaire for enterprises about it. Level of risk management is different in enterprises. In first variant there is risk identification and their documentation. In second variant staff of enterprise additionally are forming risk classification and risk assessment. In third variant enterprises do above mentioned two methods and additionally perform risk management systems. According to questionnaire results if you perform risk management system than size of enterprise is uppermost factor. The bigger enterprise, the detailed and completed is risk management system. According to questionnaire of German small and medium-sized enterprises results budget planning mainly was made in time period from two to three years. The most of small and medium-sized enterprises risk identification and assessment was doing once in a three months [3].

Kirova M. had studied graphical presentation of risk assessment in management decision making process [9]. Korombela A. had studied risk management problems of Polish small and medium-sized enterprises and carried out questionnaire about it. Representatives of small and medium-sized enterprises (there was fully completed 101 inquiry form) arranged risk by their importance. The most important risks were F5 –

The risk of financial instability, E7 – The risk of increasing competition and E1 – The risk of legislative changes [11].

Komkova J. had researched risk management major problems in Latvian non-financial companies. The most of enterprises doesn't have insight about the need of the risk management implementation. The practical risk management implementation is not possible without relevant risk models adaptation to Latvian economic situation. There is a lack of experience in implementation and adaptation of risk management [10]. Zimecs A. and Ketners K. had studied business solution methodologies and their impact on risk management and carried out survey of risk management developments. As shown by the survey results, the entrepreneurs, who use the risk management elements in their daily activities, mainly manage risks by using information of business results [16].

## **2. Questionnaire for small and medium-sized enterprises**

The authors have researched economic activity of services sector enterprises in Latvia in the period from 2005 to 2011. From 2005 to 2008 total turnover indices of Latvian services sector enterprises have increased. The highest value was researched at the first quarter of 2008. From the second quarter of 2008 sector has started to decline, reaching lowest rates in 2009. From 2010 total turnover indices again started to increase.

Latvian service sector SWOT analysis is a component of the sector's risks identification and classification. By defining the opportunities and threats of the external environment and the strengths and weaknesses of internal environment, the authors have identified the risks [14]. External environment's opportunity is to increase turnover of Latvian services sector, if the country stimulates the economic growth, as well as external environment's opportunity is to choose qualified staff. Latvian services sector external environment's threat is the risk of insufficiency of credit resources, which may lead to decrease of current assets. Latvian services sector internal environment's strength is a possibility to offer assortment of qualified services, because level of staff skills has been improved. Latvian services sector internal environment's weakness is deadlines of service extended, because the risk of debtors are increased.

Based on the above mentioned the authors have created classification of Latvian services sector's economic and financial risks in the period from 2011 to 2012 (Tab.1). The authors have carried out the questionnaire for representative of small and medium-sized enterprises about the economic and financial risks impact on enterprises' development in Latvia. Those risks have been included in questionnaire.

The authors have prepared questionnaire about enterprise's activity and economic and financial risk assessment to predict possible amount of losses. The authors have carried out questionnaire where representatives of small and medium-sized enterprises gave information about economical and financial risk impact on enterprise's development in 2012. The authors sent inquiry forms to representatives of small and medium-sized enterprises and received fully completed inquiry forms from 35 representatives of small and medium-sized enterprises. 23 enterprises works in service sector (65.7 % of all

representatives who sent back fully completed inquiry form), 7 enterprises work in industry sector and 5 enterprises work in civil engineering sector.

Representatives of questionnaire had assessed economical and financial risks to predict possible amount of losses (value 5 mean maximum losses). Average results of questionnaire are showed in table (Tab.1). From enterprises which participated in questionnaire there were medium-sized enterprises (48.6%), small enterprises (40.0%) and micro enterprises (11.4%).

Results of questionnaire show that small and medium-sized enterprises mainly do budget planning for period of time till three years. Budget planning does Financial Department manager in majority of small and medium-sized enterprises. Also economical and financial risks identification and assessment does Financial Department manager in majority of small and medium-sized enterprises.

**Tab. 1 Classification of Latvian service sector economic and financial risks in the period from 2011 to 2012**

The economic risks	Ranged by losses	The financial risks	Ranged by losses
E5 - The risk of reduction in client's solvency	3.829	F1 - The risk of unpaid credit	3.371
E2 - The risk of increment of taxes	3.657	F3 - The risk of monetary	3.314
E7 - The risk of increasing competition	3.343	F2 - The risk of increment of interest	3.286
E6 - The risk of insufficiency of credit resources	3.343	F13 - The risk of reduction in profitability of own capital	3.257
E4 - The risk of damage to reputation	3.314	F12 - The risk of reduction in profitability of assets	3.257
E3 - The risk of financial instability of suppliers	3.314	F11 - The risk of liquidity	3.229
E1 - The risk of legislative changes	3.171	F5 - The risk of financial instability	3.171
The financial risks	Ranged by losses	F6 - The risk of insufficiency of own capital	3.057
F9 - The risk of debtors	3.571	F14 - The risk of insolvency (bankruptcy)	2.914
F8 - The risk of insufficiency of current assets	3.486	F10 - The risk of reduction in circulation of stocks	2.857
F4 - The risk of inflation	3.400	F7 - The risk of investment (the new project planning)	2.829

*Source: the authors have created*

Questionnaire participants' assessed economical risks which were ranged by possible amount of losses (value 5 mean maximum losses) (Tab. 1). The biggest losses were possible from impact of these risks – The risk of reduction in client's solvency (E5), The risk of increment of taxes (E2) and The risk of increasing competition (E7). Questionnaire participants' assessed financial risks which were ranged by possible amount of losses from them (Tab. 1). The biggest losses were possible from impact of these risks – The risk of debtors (F9), The risk of insufficiency of current assets (F8), The risk of inflation (F4), The risk of unpaid credit (F1) and The risk of monetary (F3).

### 3. Risks matrixes: the case of Latvian service sector

The authors have researched types of risks, their identification, classification and assessment possibilities in activities of small and medium-sized enterprises. The purpose of the first International risk management standard ISO 31000:2009 is to provide principles and generic guidelines on risk management. Risk is effect of uncertainty on objectives. Impact of risk could be negative (losses) or positive (profit). If we study negative impact of risks, than amount of risk characterizes possible amount of result (losses) and probability of realization. Process of risk assessment includes identification and classification of risk and risk analysis of quality and quantity [12]. To quantity assess individual risk level you have to use two values – possible amount of risk result (losses) and its probability of realisation. Risk level is multiplication of result of risk (losses) and its probability of realisation. Risk level can calculate by formula (1).

$$\text{risk level} = \text{result (losses)} \cdot \text{probability} . \quad (1)$$

For quantity assessment of risk it is possible to use risk matrixes which arrange risks by their possible amount of result (losses). According every type of risk its probability of realisation is assessed also [17]. The authors have created risk matrix where is showed different zones of risk level (Tab. 2).

**Tab. 2 Example risks matrix (Different zone of risk level)**

0,8 – 1,0	L	P	P	K	K
0,6 - 0,8	L	L	P	P	K
0,4 - 0,6	V	L	L	P	P
0,2 - 0,4	V	V	L	L	P
0,0 - 0,2	M	V	V	L	L
Probability of realization	Small risk	Medium risk	Big risk	Maximum acceptable risk	Critical risk
characteristics of the size of risk (losses)					

*Source: the authors have created*

Description of zones of risk level (Tab. 2):

- M – small risk level – small losses and probability of realization (0.0 – 0.2);
- V – medium risk level – small losses and probability of realization (0.2 – 0.6), medium losses and probability of realization (0.0 – 0.4), big losses and probability of realization (0.0 – 0.2);
- L – big risk level – small losses and (0.6 – 1.0), medium losses and (0.4 – 0.8), big losses and (0.2 – 0.6), maximum acceptable losses and (0.0 – 0.4), critical losses and (0.0 – 0.2);
- P – maximum acceptable risk level – medium losses and probability of realization (0.8 – 1.0), big losses and probability of realization (0.6 – 1.0), maximum acceptable

- losses and probability of realization (0.4 – 0.8), critical losses and probability of realization (0.2 – 0.6);
- K – critical risk level – maximum acceptable losses and probability of realization (0.8 – 1.0), critical losses and probability of realization (0.6 – 1.0).

Risk matrix can use to choose enterprise's strategy of risk management. Enterprise's strategy of risk management is developed by analysing zones of risk level [1]:

- In zone of small risk level, medium risk level, and big risk level for enterprise is recommended to create risk management system in order to decrease identified risks, their possible amount of losses and probability of realisation;
- In zone of big risk level and maximum acceptable risk level for enterprise is recommended to realise risk insurance;
- In zone of critical risk level for enterprise is recommended business interruption.

The authors have used their own created algorithm of enterprises' risks identification, classification and assessment [7].

- Important stages of above mentioned algorithm are:
- Make the SWOT analysis of services sector;
- Get to know with the surveys of the major risks in the world;
- Create the classification and description of specific services technological process risks;
- Classify and assess risks in order to create risks matrix;
- Assess risks by using the special coefficient method;
- Rank external and internal risks by their impact on sector enterprises' development.

The small and medium-sized enterprises can use the authors created algorithms of classification and assessment of the risks to produce their own risk management systems. Enterprises carrying out their sector SWOT analysis and preparing description of technological process risks can identify and classify specific sector's economic, financial and technological process risks. For risk quantity assessment small and medium-sized enterprises can use risk matrix, which arrange risks by their possible amount of losses. According to each type of risk it is possible to assess its probability of realisation.

The authors have created economic and financial risks matrix (Tab. 3) to quantity assess economic and financial risks of Latvian service sector enterprises. The authors have arranged risks by their size of possible losses for enterprises. For each type of risk has been assessed its probability of realization. The size (losses) of the risk are divided into – low risk, medium risk, high risk, maximum acceptable risk and critical risk. Most of the authors classified Latvian service sector sizes of economic and financial risks from medium till maximum acceptable. The probability of risks realization is from 0.2 till 0.6 (Tab. 3). The maximum acceptable economic risks (with the probability of risks realization is from 0.4 till 0.6) are the risk of increment of taxes (E2) and the risk of damage to reputation (E4). The maximum acceptable financial risks (with the

probability of risks realization is from 0.4 till 0.6) are the risk of unpaid credit (F1), the risk of monetary (F3), the risk of financial instability (F5) and the risk of debtors (F9).

**Tab. 3 Latvian service sector economic and financial risks matrix**

0,6 - 0,8					F7					
0,4 - 0,6			E3		E1 E6 F4 F12 F10		E4 F1 F3		E2 F5 F9	
0,2 - 0,4			F13		E7 F2 F6 F11		E5 F8		F14	
Scale $\alpha_i$	1	2	3	4	5	6	7	8	9	10
Probability of realization	Small risk		Medium risk		Big risk		Maximum acceptable risk		Critical risk	

Source: the authors have created

The maximum acceptable economic risks (with the probability of risks realization is from 0.2 till 0.4) is the risk of reduction in client's solvency (E5). The maximum acceptable financial risks (with the probability of risks realization is from 0.2 till 0.4) are the risk of insufficiency of current assets (F8) and the risk of insolvency (bankruptcy) (F14).

The authors have created classification of the accommodation (hotel) and food services technological process risks [7]. The authors for risk assessment have created first part of risk map (Tab. 4) where is showed accommodation (hotel) and food services technological process risks in separate segments. Accommodation (specific – hotel) services risks are marked with letter "V". Food services risks are marked with letter "D" [13].

**Tab. 4 Latvian accommodations (hotel) and food services technological process risks map**

										0,6 - 0,8
				V1 V4		V5 V2				0,4 - 0,6
V3		V7		V8		V6				0,2 - 0,4
										0,1 - 0,2
10	9	8	7	6	5	4	3	2	1	Scale $\alpha_i$
Critical risk		Maximum acceptable risk		Big risk		Medium risk		Small risk		Probability of realization
										0,1 - 0,2
				D6		D7 D3				0,2 - 0,4
		D2 D4		D5 D1						0,4 - 0,6
										0,6 - 0,8

Source: the authors have created

The critical technological process risk is the risk of security system (V3). The maximum acceptable technological process risks are the risk of client's payment (V7), the risk of HACCP (Hazard Analysis and Critical Control Point) system (D2) and the risk of employees' hygiene (D4). The big technological process risks are the risk of reservation (V1), the risk of ordering food services (V4), the risk of accounting (V8), the risk of choice of food assortment (D1), the risk of food preparation (D5) and the risk of food products storage (D6). The medium technological process risks are the risk of registration (V2), the risk of room service (V5), the risk of ordering additional (beauty, health, fitness) services (V6), the risk of acceptance of raw materials (D3), the risk of food products storage (D6) and the risk of client's service (D7).

Risk map of four segments is created linking both first part and second part of risk map. In the centre of risk map is point which value is the smallest and probability of risk realisation is the smallest also. Risk map which consists of four segments shows values and probability of realisation of every type of risk (Latvian service sector economical, financial risks and accommodation (hotel) and food service technological process risks). Risk matrix and risk maps are one of the most common and easiest risk assessment tools. The authors recommend using risk matrix and risk maps in order to assess different types of risks. The authors recommend for small and medium-sized enterprises to use method of risk ranking assessing external and internal risks by their effect on enterprises' development [8]. Internal and external risks effect coefficient values show which of these two risks (internal or external) has bigger impact on sector enterprises' development. For small and medium-sized enterprise's is important to regularly assess the risk of insolvency (bankruptcy) (F14) in order to perform in time arrangements to increase financial stability of enterprise.

The authors recommended using Altmana E. Model (adapted for Latvia by RTU scientists Sorins R. and Voronova I.). Test results for trade service sector enterprises show that forecasting accuracy of the risk of insolvency (bankruptcy) (F14) is more than 80 % for both models (Atmana E. Model, Sorins R. and Voronova I. Model) [4]. Jansone I. and Voronova I. have studied financial stability problems of Latvian trade sector enterprises [5]. Voronova I. have studied financial risks and possibilities to assess them, as well as financial stability models which are adapted for other countries (for circumstances of individual country) [15]. The authors have classified and assessed trade service technological process risks [6], as well as accommodation (hotel) and food services technological process risks [7]. It is important for small and medium-sized enterprises to indentify and classify specific technological process risks. Enterprises can use risk matrix to quantity assess specific type of risk (Figure 2). In order to clearly show several types of risk in small and medium-sized enterprises it is recommended to use risk maps (Tab. 4). Different types of risk are show in several segments of risk map (as far as four segments).

## Conclusions

The small and medium-sized enterprises can use the authors created algorithms of classification and assessment of the risks to produce their own risk management



systems. Enterprises carrying out their sector SWOT analysis and preparing description of technological process risks can identify and classify specific sector's economic, financial and technological process risks.

For risk quantity assessment small and medium-sized enterprises can use risk matrix, which arrange risks by their possible amount of losses. According to each type of risk it is possible to assess its probability of realisation. Risk matrix can use to choose small and medium-sized enterprise's strategy of risk management. Enterprise's strategy of risk management is developed by analysing zones of risk level. Risk map which consists of four segments shows values and probability of realisation of every type of risk. Risk matrix and risk maps are one of the most common and easiest risk assessment tools. The authors have recommended small and medium-sized enterprises using risk matrix and risk maps in order to assess different types of risks.

Questionnaire participants' assessment economic risks had rated by possible amount of losses from them. The biggest losses is possible from impact of these risks – The risk of reduction in client's solvency (E5), The risk of increment of taxes (E2) and The risk of increasing competition (E7). Questionnaire participants' assessment financial risks had rated by possible amount of losses from them. The biggest losses is possible from impact of these risks – The risk of debtors (F9), The risk of insufficiency of current assets (F8), The risk of inflation (F4), The risk of unpaid credit (F1) and The risk of monetary (F3).

## References

- [1] ALEXANDER, C., MARSHALL, M. I. The Risk matrix: Illustrating the importance of risk management strategies. *Journal of Extension*, 2006, 44(2). ISSN 1077-5315.
- [2] AON's Political Risk Map for 2011 [online]. [cit. 2011-10-10]. Available from WWW: <<http://www.newsinsurances.co.uk/aon%E2%80%99s-political-risk-map-for-2011/0169473094>>
- [3] HENSCHER, T. Typology of Risk Management Practices: An Empirical Investigation into German SMEs, *Journal of International Business and Economic Affairs*, 2010, 9(3): 1 – 28. ISSN 1476-1297.
- [4] JANSONE, I., NESPORIS, V., VORONOVA, I. Impact of Financial and Economic Risks to Extension of Food Retail Industry of Latvia. *Scientific Journal of RTU: Economics and Business*, 2010, 20(1): 59 – 64. ISSN 1407-7337.
- [5] JANSONE, I., VORONOVA, I. Assessment Tools of Latvian Trade Sector Enterprises Financial Stability. In *Стратегия антикризисного управления экономическим развитием Российской Федерации*. Russia, Penza: 2010.
- [6] JANSONE, I., VORONOVA, I. Latvian Trade Sector External and Internal Risk Assessment, International Conference. In *The Current Issues in Management of Business and Society Development*. Latvia, Riga: 2011, pp. 53 – 54.
- [7] JANSONE, I., VORONOVA, I. External and Internal Risks Impact on Accommodation and Food Services Sector of Latvia. *Scientific Journal of RTU: Economics and Business*, 2012, 22(1): 80 – 87. ISSN 1407-7337.

- [8] JANSONE, I., VORONOVA, I. Risks Assessment of Accommodation and Food Services Sector: the Case of Latvia. In *The 7<sup>th</sup> International Scientific Conference Business and Management 2012*. Lithuania, Vilnius: 2012, pp. 1117 – 1124. ISSN 2029-4441.
- [9] KIROVA, M. Graphical presentation of risk assessment in management decision making process. In *The 7<sup>th</sup> International Scientific Conference Business and Management 2012*. Lithuania, Vilnius: 2012, pp. 386 – 391. ISSN 2029-4441.
- [10] KOMKOVA, J. *Risk management models for Latvian non-financial sector enterprises*. [Summary of Doctoral thesis]. RTU, Riga, 2008. 44 pgs.
- [11] KOROMBEL, A. Enterprise risk management in practice of Polish small businesses – own research results. In *The 7<sup>th</sup> International Scientific Conference Business and Management 2012*. Lithuania, Vilnius: 2012, pp. 1137 – 1143. ISSN 2029-4441.
- [12] Risk management — Principles and Guidelines (International Standard ISO31000) [online]. [cit. 2012-06-01]. Available from WWW: <[http://calmap.gisc.berkeley.edu/dwh doc link/Technical Background/RAM documents/ISO+31000-2009.pdf](http://calmap.gisc.berkeley.edu/dwh%20doc%20link/Technical%20Background/RAM%20documents/ISO+31000-2009.pdf)>
- [13] *Risk management 2010. Exxaro's top residual business risk map for 2010* [online]. [cit. 2012-06-0]. Available from WWW: <<http://www.exxaro.com/content/sustain/risk.asp#>>
- [14] VORONOVA, I. Methods of analysis and estimation of risks at the enterprises of non-financial sphere of Latvia. *Journal of Business Economics and Management. Transition Processes in Central and Eastern Europe*, 2008, 9(4): 319 – 326. ISSN 1611 – 1699.
- [15] VORONOVA, I. Financial Risks: Cases of Non-Financial Enterprises. In *Risk Management for the Future – Theory and Cases*. Croatia: InTech, 2012, pp. 435 – 466. ISBN 978-953-51-0571-8.
- [16] ZIMECS, A., KETNERS, K. Entrepreneurial Decision Substantiation Methodology and It Impact on Risk Management, *Scientific Journal of RTU: Economics and Business*, 2010, 20(1): 157 – 163. ISSN 1407-7337.
- [17] VINCENT, H. *The risk of using risk matrix in assessing safety risk* [online]. [cit. 2012-06-1]. Available from WWW: <[http://www.hkarms.org/web resources/20101116 Risk matrix HKIEb print.pdf](http://www.hkarms.org/web%20resources/20101116%20Risk%20matrix%20HKIEb%20print.pdf)>