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Research Article

A Different Approach to Global Supplier Risk: A Finance Based Model

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ABSTRACT

Increased competition with globalization has led multinational companies and suppliers to find cost-effective solutions to ensure competitive advantage. This tendency causes enterprises to shift their production to partially lower-cost markets. However, this approach ignores unpredictable and hidden costs and risks, especially in supply. Therefore, "The Strategy of Best Cost Country Sourcing" has begun to gain importance. The aim of this study is to propose a model for the determination of the risks in the selection of suppliers under the "Best Cost Country Sourcing Strategy". With the model, firm specific financial risks, national specific financial risks and global risks affecting Small and Medium Size Enterprices (SMEs) in 11 European Union countries were analyzed with the fuzzy logic method between 2006-2016.

Keywords: Global Sourcing, Supplier Risk, Supplier Selection, Country Risk, Supplier Financial Risk

Küresel Tedarikçi Riskine Farklı Bir Yaklaşım: Finans Temelli Bir Model Önerisi

ÖZ

Küreselleşmeyle birlikte artan rekabet, çok uluslu şirketleri ve tedarikçilerini rekabet avantajı sağlayabilmeleri amacıyla, özellikle maliyet etkin çözümler bulmaya yönlendirmiştir. Bu yönelim, işletmelerin üretimlerini kısmi olarak daha düşük maliyetli pazarlara kaydırmalarına neden olmuştur. Ancak bu yaklaşım, özellikle tedarikte öngörülemeyen ve gömülü maliyetleri ve riskleri göz ardı etmektedir Bu nedenle "En İyi Ülkeden Tedarik Stratejisi" gittikçe önem kazanmaya başlamıştır. Bu çalışmanın amacı, "En İyi Ülkeden Tedarik Stratejisi" kapsamında tedarikçilerin seçiminde risklerinin belirlenmesine yönelik bir model önerisi sunmaktır. Oluşturulan model ile 11 Avrupa Birliği ülkesinde yerleşik KOBİ'leri etkileyen ülkeye ve firmalara özgü mali riskler ve küresel riskler 2006-2016 yılları arasında bulanık mantık yöntemi ile analize tabi tutulmuştur.

Anahtar Kelimeler: Küresel Tedarik, Tedarikçi Riski, Tedarikçi Seçimi, Ülke Riski. Tedarikçi Mali Riski

1. Introduction

Since the 1990s, globalization of companies has accelerated with the liberalization of economy and international trade, new communication technologies and cheap transportation (Lund-Thomsen and Lindgreen, 2014). Slightly shifting production to low-cost countries such as Asia, Latin America and Eastern Europe has led to gain comparative cost advantages for multinational companies as well as SMEs in Europe, Japan and North America. By this way, they have increased their profitability by achieving competitive advantage in the market (Awasthi, 2015). In addition to this, Holweg et al. (2011) claim that there are different factors such as net price, quality, service and flexibility beyond the costs to determine the decision of global sourcing. Many studies in the literature explain why businesses need global sourcing and how they conduct this process. Levy (1995) and Nassimbeni claim that global sourcing has positive effects on companies in respect of accessing lower prices and technical expertise, but also they indicate the supply chain risks as a nefative impact. Monczka and Giunipero (1984) compiled a list for the rationale behind the global sourcing. The list consists of lower prices, availability of foreign products, improved quality of foreign products, increasing worldwide competiton, improved delivery of foreign products. Monczka and Trent (1991) explain the reasons for global sourcing as cost reduction, quality, delivery and reliability improvements, satisfying offset requirements, increase the number of available sources, technology, introduction of competition to the local supply base, recating to the offshore sourcing practices of competitors. According to Nassimbeni (2006), low cost materials and components, global competition, advanced technology, reduction of commercial barriers, low taxes, presence of plants in foreign countries, opportunity for new foreign market are the motivations for global sourcing. Christoper et al. (2011) state that the supply of products in the global market has shown an increasing trend in relation to economic development. Monczkar et al. (2005) define the concept of global sourcing as proactively integrating and coordinating global procurement, engineering, production, design, technology and suppliers. The main motivations for global sourcing are cost reduction, market access, technological requirements, proximity to customers, taxes and subsidies. The global sourcing has been more preferable and widespread with the low cost, technology and high quality products. Companies can choose suppliers from all over the world, and developing countries are more competitive because of low labor and operating costs. The selection of global supplier is more risky and challenging than choosing local suppliers because of the different risk factors that need to be considered. The low cost criterion does not always give accurate and effective solutions in the selection of global suppliers. According to Sawik (2011), when the buyer takes into account the different risks associated with the supplier, he/she would prefer to cooperate with a higher cost but more reliable supplier rather than a low cost but risky supplier. In addition, the risk of choosing a global supplier is not only caused by the supplier itself, but also from economic and political uncertainties in the supplier's country and even from global risks. In the last decade following the Global Financial Crisis, world commodity and capital flows are looking for their old days; The populist and protectionist policies that are spreading rapidly in the EU and the US are stressing in all countries and businesses. Also, stability in some of the central countries and in other developing countries still remains important to the phenomenon of globalization.

The study aims to develop a model that measure the financial soundness of suppliers in selected countries by taking into account the financial risks of the country where the supplier is located and the financial risk factors specific to the firms and global risks. The developed model has been tested by fuzzy logic method which is highly effective in uncertainty and risk analysis.

In the model that is based on the best cost country supply consists of three main parts that evaluate the country risk as firm specific financial risk, national financial risk and global risk. Firstly, firm specific financial risk factors used in the study are analyzed by financial performance ratios related to supply chain performance in the financial statements of the supplier enterprises. Secondly, national financial risk factors are the variables indicating the macroeconomic risks of the supplier's country. Finally, global risk factors are based on the "Global Risk Report", which is announced annually by the "World Economic Forum". According to the report, 29 risks that should be taken into consideration in doing business globally are considered as the starting point of global risk indicators in the thesis. In the global risk analysis section, the probability and impact values of these risks are taken as basis.

The study distinguishes from studies that take into account macroeconomic and political risk characteristics of countries which are frequently used in the selection of supplier countries, by taking into account global risk factors and risk factors specific to the company.

The study consists of literature, data and methodology, findings, and finally the conclusion section, after the introduction.

2. Literature Review

The studies on the selection of supplier countries in the literature consist of studies on the total cost of ownership (TCO), low cost country sourcing and the best cost country sourcing. These are the main approaches in the literature for procurement. TCO and Low cost country sourcing are the approaches that are based on the cost savings.

TCO is an expression used to describe all costs associated with the acquisition, use and purchase of a good or service (Ellram and Siferd, 1993). TCO takes into account the costs of doing business with a supplier in general, rather than simply looking at the purchase price. Ellram (1993) allocates the TCO as pre-transaction costs, transaction costs and post-transaction costs. Alard and others (2009) designed a specific TCO concept that focuses not only on the supplier risk assessment but also on country risk assessment. They have shown that suppliers can obtain certain products more effectively from which countries. Meldrum (2000) states that all business transactions involve a risk. When commercial transactions go beyond international borders, they contain additional risks that are not available in domestic transactions. These additional risks, referred to as country risks, typically include the risks arising from various national differences in the economic and financial structure, policy, socio-political institutions, geography. Country risk analysis seeks to determine the potential of these risks to reduce the expected return on a cross-border investment.

Low-cost country supply is the use of global resources that focus on lower production costs and countries that have culturally and / or geographically important distance to the buyer (Kusaba, 2011). Low production cost consists of low raw material cost and labor cost (Dev, 2017). Due to the rise in commodity prices in most sectors, global sourcing strategy is considered to be a more proactive way for companies to have more competitive advantages. Lockström (2006) also showed that low-cost country sourcing is at the core of the phenomenon of globalization, and that low-cost countries use economies of scale, benefit from comparative advantages and take advantage of internal competitiveness, a way for foreign companies to increase their competitiveness. Some of the studies on low cost country sourcing is concerned with the strategic dimension of global supply. Hätönen and Eriksson (2009) and Javalgi et al. (2009) discuss the strategic aspects of global supply in developing countries, while Hanna and Jackson (2015) demonstrate the strategic and operational impacts of global sourcing.

Another studies reveal the impact of low-cost country sourcing on the supply chain process and performance. These studies address different factors related to low-cost countries. These factors include the adequacy of employees (Kusaba et al., 2001), low-wage country sourcing (Ruamsook et al., 2009; Vos et al., 2016), management structure and resource zone distance (Schneider et al., 2013) logistics performance (Ruamsook et al., 2009; Kumar et al., 2010), total cost of ownership (Weber et al., 2010) and supply chain performance (Schneider et al., 2013).

Since the best-cost country supply is a new concept in the literature, it has not been defined yet. According to Dev (2017), the best cost country supply strategy does not consider only low material cost and low labor cost, but also long-term sustainability, environmental supply chain, logistics cost, suppliers' integration, selective demands and preferences for different products, as well as the macroeconomic characteristics of a country and new factors such as demography.

The starting point of the best country sourcing is not low material cost and low labor cost. Low production costs are an advantage for ideal best country supply. However, the best country sourcing also evaluates long-term risk factors such as political, macroeconomic, socio-demographic, environmental risk factors and sustainability.

Generally, there are three approaches to model risk and uncertainty for supplier selection Hamdi et al., 2018). The first approach employs fuzzy sets theory to incorporate inherent uncertainty to the decision model (Azadnia et al., 2015; Govindan et al., 2013a; Paul, 2015; Vahidi et al., 2018). Combined models of fuzzy multi-criteria decision making (MCDM) benefiting from the advantages and capabilities of different methods are very common in the supplier selection literature (Azadnia et al., 2015; Govindan et al., 2013a; Ju and Wang, 2013). Second most common modeling approach is scenario-based modeling, which welcomes randomness and utilizes stochastic problem parameters (Scottet al., 2015; Xanthopoulos et al., 2012; Vahidi et al., 2018). Finally, the third approach is using quantitative risk measures including the value at risk (VaR) and conditional value at risk (CVaR) (Fang et al., 2015;Sawik, 2013, 2014). Fuzzy logic is used as a method in the study.

3. Data and Methodology

The model presented by the study analyzes supplier country risk with three main categories. The model presented by the study analyzes the supplier country risk with three main classifications as the firm specific risk, national financial risk and global risk.

The firm specific financial risk consist of the EBITDA over interest on financial debt, Return on Equity, Return on Assets, Inventories/Net turnover, Trade receivables/Net turnover, Trade Payables/ Net turnover, Operating working capital/ Net turnover ratios while Real GDP Growth (%), Annual Inflation Rate (%), Current Account as a Percentage of GDP, Foreign Debt as a Percentage of GDP, Current Account as a Percentage of Exports of Goods and Services, Net International Liquidity as Months of Import Cover, Exchange Rate Stability are indicators of national financial risk. The data used in the firm-specific financial risk analysis was obtained from the Banque de France database for 11 EU countries. Global risk factors are based on the Global Risk Report, which is announced from 2006 annually by the World Economic Forum (WEF). While national and firms specific financial risks indicate the risks that are present, the WEF Global Risk Report, which includes future global risks, is used to increase the explanatory power of the model. Because, WEF global risks are a projection for next 10 years. According to the report, there are 29 risks in five main categories, economic, geopolitical, environmental, social and technological, which need to be taken into account in doing business globally. The first five risks that should be taken into account in global business are considered as the starting point of global risk indicators in the paper. These risks include unemployment and underemployment, financial crises, failures of national governments, shocks in energy prices and social events. In the global risk analysis section, the probability and impact values of these risks are taken as basis. firm specific financial risk, national financial risk and global risk factors are analyzed on the basis of fuzzy logic method by considering 11 European countries including Austria, Spain, France, Germany, Czech Republic, Poland, Portugal, Slovenia, Italy, Denmark and Belgium, where the manufacturing sector balance sheets can be reached. Due to the correct output results in uncertain environment, fuzzy logic method was preferred in the analysis. The vast majority of studies in the literature on fuzzy logic are made in MATLAB fuzzy logic toolbox. In this study, MATLAB program was used in the analysis of risk factors by fuzzy logic method. In the fuzzy logic method, certain input values are defined in the program and the output results are obtained according to the appropriate rules.

The steps of method followed in the study is summarized below.

1st Step: Determination of input variables and value ranges and transfer to the system

2nd Step: Fuzzyfication of data by assigning membership functions and degrees in accordance with the range of input variables.

3rd Step: Determination of membership degrees and value ranges belonging to risk

4th Step: To determine if / if rules are based on theoretical knowledge appropriate to the analysis groups, between input and output values

5th Step: Obtaining outputs by means of fuzzy inference system according to / if rules

In the context of the methodology followed, the risk levels of 11 European countries were determined as output, while firm specific financial risk, national financial risk and global risk factors were considered as inputs.

The inputs and value ranges used in each analysis group are given below;

Inputs used for firm specific financial risk factors;

- Ratio M1= EBITDA over interest on financial debt
- Ratio M2= Return on Equity
- Ratio M3= Return on Asset
- Ratio M4= Inventories/Net turnover
- Ratio M5= Trade receivables/Net turnover
- Ratio M6= Trade payables/Net turnover
- Ratio M7= Operating working capital/ Net turnover ratios
- Inputs used for national financial risk risk factor;
- Ratio Ma1= Real GDP Growth (%),
- Ratio Ma2= Current Account as a Percentage of GDP
- Ratio Ma3= Annual Inflation Rate (%),
- Ratio Ma4= Foreign Debt as a Percentage of GDP
- Ratio Ma5= Exchange Rate Stability
- Ratio Ma6= Net International Liquidity as Months of Import Cover
- Inputs used for global risk factor
- Ratio G1= Unemployment and underemployment
- Ratio G2= Financial crises
- Ratio G3= Failures of national governments
- Ratio G4= Shocks in energy prices
- Ratio G5= Social events

The minimum and maximum value ranges of each variable used as input are different from each other, so these value ranges need to be defined in the system.

The minimum and maximum value ranges of each variable used as input can be seen in Table 1.

Value Ranges for Input Variables of Firm Specific Financial Risk Analysis		Value Ranges for Input Variables of National Financial Risk Analysis		Value Ranges for Input Variables of Global Analysis	
Ratio M1	[363 3900]	Ratio Ma1	[-6 11]	Ratio G1	[43 2228]
Ratio M2	[-6 19]	Ratio Ma2	[-1 9]	Ratio G2	[36 168]
Ratio M3	[-1 10]	Ratio Ma3	[-1 7]	Ratio G3	[41 170]
Ratio M4	[12 22]	Ratio Ma4	[35 324]	Ratio G4	[11 93]
Ratio M5	[8 36]	Ratio Ma5	[-30 17]	Ratio G5	[47 192]
Ratio M6	[2 26]	Ratio Ma6	[0 7]		
Ratio M7	[10 40]				

Table 1. Value Ranges for Input Variables of Firm Specific Financial Risk, National Financial Risk and Global Analysis

One of the most critical points of the fuzzy logic method is the classical cluster and fuzzy set concepts. A group of objects, which can be tangible and / or intangible, is called a cluster. Object evaluation in the classical cluster concept is expressed as;

$$\mu_A(x) = \begin{cases} 1, If & x \in A \\ 0, If & x \notin A \end{cases}$$

In the concept of fuzzy sets, unlike the classical set concept, objects are evaluated according to their degree of being a member of the cluster. In this context, Zadeh (1965) describes the fuzzy cluster as a community of objects with a degree of uninterrupted membership. Accordingly, membership in fuzzy clusters is expressed as follows:

$$S = \left\{ \left\{ \left(x, \mu_S(x)\right) \middle| x \in S, \mu_S(x) \in [0,1] \right\} \right\}$$

Another feature of the fuzzy sets is that the membership degrees are expressed with different functions according to the characteristics of the elements. For example, if only one of the variables is the full of the cluster and the others are members of different membership degrees, the membership degree is expressed by the triangle membership function.

Triangle membership function;

$$\mu_S(x) = \begin{cases} 0 & x \le s_1 \\ \dfrac{x - s_1}{s_2 - s_1} & s_1 < x \le s_2 \\ \dfrac{s_3 - x}{s_3 - s_2} & s_2 < x \le s_3 \\ 0 & x \ge s_2 \end{cases}$$

If the triangle membership form is not sufficient to explain the variable, the crooked membership function can be used.

Crooked membership function;

$$\mu_S(x) = \begin{cases} 0, & x < s_1 \\ \dfrac{x - s_1}{s_2 - s_1}, & s_1 \le x \le s_2 \\ 1, & s_2 \le x \le s_3 \\ \dfrac{x - s_4}{s_3 - s_4}, & s_3 \le x \le s_4 \\ 0, & x > s_4 \end{cases}$$

Membership ratings are based on subjective evaluation. Accordingly, the appropriate membership functions and value ranges of the inputs are shown in Table 2, Table 3 and Table 4 for three different analysis respectively.

Variable	Member Function	Value Range	Variable	Member Function	Value Range
Ratio M1			Ratio M5		
Low	Crooked	[-545 363 600 900]	Low	Crooked	[6 8 17 20]
Med.	Triangle	[629 929 1229]	Med.	Triangle	[17 20 23]
High	Crooked	[950 1300 3900 5174]	High	Crooked	[21 24 36 47]
Ratio M2			Ratio M6		
Low	Crooked	[-15 -6 2 5]	Low	Crooked	[2 4 11 13]
Med.	Triangle	[4 7 10]	Med.	Triangle	[11 14 17]
High	Crooked	[7 12 19 28]	High	Crooked	[14 16 26 33]
Ratio M3			Ratio M7		
Low	Crooked	[-13 -1 2 4]	Low	Crooked	[8 10 19 21]
Med.	Triangle	[3 5 7]	Med.	Triangle	[19 22 25]
High	Crooked	[5 7 10 13]	High	Crooked	[22 25 40 53]
Ratio M4					
Low	Crooked	[8 12 14 15]			
Med.	Triangle	[14 16 18]			
High	Crooked	[17 18 22 25]			

Table 2. Membership functions and value ranges for firm specific risk analysis.

Variable	Member Function	Value Range	Variable	Member Function	Value Range
Ratio Ma1			Ratio Ma4		
Low	Crooked	[-12 6 -1 1]	Low	Crooked	[-69 35 108 142]
Med.	Triangle	[0 1,5 3]	Med.	Triangle	[122 152 182]
High	Crooked	[1.89 4.23 11 17.1]	High	Crooked	[163 195 323 428]
Ratio Ma2			Ratio Ma5		
Low	Crooked	[-20.9 -13 -3.5 -0.5]	Low	Crooked	[-46 -30 -9 -1.2]
Med.	Triangle	[-2 -0.25 1.75]	Med.	Triangle	[-3 -1 2]
High	Crooked	[0.7 2.7 9 16.9]	High	Crooked	[0.02 7 19 34]
Ratio Ma3			Oran Ma6		
Low	Crooked	[-3.8 -1 0.3 1.17]	Düşük	Yamuk	[-2.5 0 1 1.8]
Med.	Triangle	[0 1.6 3.2]	Orta	Üçgen	[1.18 1.18 3.18]
High	Crooked	[1.9 2.9 7 9.6]	Yüksek	Yamuk	[2.5 4 7 8.6]

Table 3. Membership functions and value ranges for national specific risk analysis

Variable	Membership Function	Value Range	Variable	Membership Function	Value Range
Ratio G1			Ratio G4		
Low	Crooked	[-23 48 80 110]	Low	Crooked	[-18 11 35 53]
Med.	Triangle	[90 115 140]	Med.	Triangle	[35 55 75]
High	Crooked	[120 150 228 294]	High	Crooked	[58 72 93 123]
Ratio G2			Ratio G5		
Low	Crooked	[-7 39 76 95]	Low	Crooked	[-5 47 75 97]
Med.	Triangle	[78 98 118]	Med.	Triangle	[80 100 120]
High	Crooked	[105 118 168 214]	High	Crooked	[104 123 192 244]
Ratio G3					
Low	Crooked	[-5 41 89 109]			
Med.	Triangle	[93 113 133]			
High	Crooked	[118 134 170 218]			

Table 4. Membership functions and value ranges for global risk analysis

Membership functions and ratings defined for input variables should also be defined for supplier country risk as output variable. In the study, the results of the analysis are designed to be in a range of 0-100 in order to make the results more understandable and easier to interpret. Accordingly, as the output value approaches 0, the risk level will be low and the risk level will be higher as it approaches 100.

4. Findings

First of all, in the empirical part, firm specific financial risk analysis was performed using financial ratios related to the supply chain performance in the financial statements of the manufacturing sector. In the second stage of the analyzes, national financial risk of the countries was determined by using the variables included in the national financial risk indicators. In the last stage, the global risk analysis was performed by calculating the global risk compound index value consisting of the global risks, which are determined by the World Economic Forum and expected to be effective on the next 10 years, by multiplying the probability and impact values of the first five most effective risks.

The limitation of the study can be summarized as follows;

- The study was carried out with only SMEs.
- In this study, three main risk factors (company specific financial, national financial and global) to be considered in the selection of suppliers are discussed.
- The study was implemented on 11 European countries due to limited access to data on sector financial statements used in the analysis of company specific financial risk factors.
- In addition, among the 29 global risk factors of WEF, the first five risk factors are taking into consideration for the analysis of global risk.

In this context, the results of firm specific financial risk analysis are given in Table 5 below.

Country/Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Mean
Austria	34,36	40,71	38,78	39,30	37,52	38,70	37,39	37,80	38,06	38,18	20,38	36,47
Belgium	39,32	43,83	47,58	50,00	49,23	51,53	50,00	50,00	49,69	44,52	47,20	47,54
Czech	39,03	38,77	38,66	39,18	40,32	39,35	38,74	38,74	38,74	38,74	39,67	39,08
Germany	38,74	38,74	38,16	38,58	36,02	32,50	34,93	33,55	22,84	22,16	13,00	31,75
Denmark	38,74	38,74	38,74	37,89	35,68	38,74	38,74	38,74	38,74	38,74	38,74	38,38
Spain	39,10	38,78	46,67	50,00	50,00	50,00	50,00	50,00	46,91	39,34	38,90	45,43
France	41,36	42,99	47,26	46,75	39,04	38,87	41,36	40,81	40,16	44,43	42,62	42,33
Italy	59,98	60,96	55,05	61,67	59,51	58,50	60,80	56,54	55,25	41,76	39,55	55,42
Polond	36,47	28,74	34,04	37,08	40,74	38,22	35,96	34,55	33,94	32,34	35,17	35,20
Portugal	56,53	56,48	60,84	58,37	56,62	59,65	59,81	59,15	55,80	42,18	38,74	54,92
Slovakia	53,28	58,40	53,98	59,27	56,78	57,92	51,50	48,95	57,33	49,19	52,82	54,49

Table 5. Results of Firm Specific Financial Risk Analysis

According to firm specific financial risk analysis results, when the 11-year risk results of the countries subject to the analysis are averaged, it is seen that Portugal, Italy and Slovakia are above the 50 level as an average risk indicator. In this case, these countries are classified as risky according to the results of micro-analysis. However, Germany, Poland, Austria, Denmark and Czech are the first five countries with the lowest risk levels.

National financial risk analysis, which was applied as the second stage of the analysis, was carried out for the years 2006-2016 based on the economic and financial indicators of the countries.

Country/Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Mean
Spain	44,46	57,30	60,83	50,00	49,84	85,82	58,77	57,70	50,00	32,77	40,88	53,49
Portugal	79,38	58,55	68,29	63,32	42,16	87,00	63,93	87,00	50,81	39,88	50,00	62,76
Germany	27,68	50,36	60,96	50,00	14,04	36,55	43,00	58,43	49,74	42,28	49,69	43,88
Slovakia	40,88	45,16	40,31	50,00	14,60	59,08	50,00	57,32	16,34	13,34	14,50	36,50
Austria	45,24	61,66	86,98	62,78	42,29	84,26	50,00	81,97	51,41	35,46	50,00	59,28
Belgium	46,14	60,58	84,87	63,32	46,38	86,51	55,64	68,21	50,00	38,28	50,00	59,08
Çzech	42,39	46,32	46,56	50,00	46,89	56,58	63,94	50,00	36,42	13,00	41,09	44,83
Denmark	35,29	60,83	86,87	61,26	47,65	60,50	55,66	50,61	50,00	38,60	49,56	54,26
France	48,00	55,52	68,53	63,32	41,98	59,22	56,80	58,97	50,37	39,61	50,00	53,85
Italy	51,18	55,73	87,00	50,00	44,96	61,61	61,32	57,92	48,58	27,78	35,20	52,84
Poland	37,74	42,55	45,94	43,30	43,09	48,78	50,00	46,23	17,81	13,35	15,94	36,79

Table 6. Results of National Specific Financial Risk Analysis

According to results are mentioned in Table 6, when the 11-year results are averaged, Slovakia, Poland, Germany, Czechia are the countries with the lowest risk. The results of the global risk analysis based on the first five global risk factors which are announced by World Economic Forum predicted for the next 10 years are presented in Table 7.

Country	2018/Risk
Austria	39,30
Belgium	50,68
Czech	38,09
Germany	37,61
Denmark	38,74
Spain	54,73
France	59,86
Italy	60,40
Poland	50,00
Portugal	59,92
Slovakia	43,58

Table 7. Results of Global Risk Analysis

According to the results of the global analysis risk in Table 7, Germany, Czech, Denmark, Austria, Slovakia, Poland are the lowest risk countries respectively.

5. Conclusion

The study aims to develop a model that measure the financial soundness of suppliers in selected countries by taking into account the financial risks of the country where the supplier is located and the financial risk factors specific to the firms and global risks. The developed model has been tested by fuzzy logic method which is highly effective in uncertainty and risk analysis.

The need to reduce the costs of enterprises has brought with them the demand to benefit from suppliers beyond their borders. “Global sourcing” is the answer to the question of how to meet this need. The aim of global sourcing is to take advantage of global advantages in the delivery of products and services. Countries should take

account of open and hidden costs and risks while shifting their production and / or supply chains partially to cost-effective developing countries. The model that is based on the best cost country supply consists of three main parts that evaluate the country risk as firm specific financial risk, national financial risk and global risk. Firstly, firm specific financial risk factors used in the study are analyzed by financial performance ratios related to supply chain performance in the financial statements of the supplier enterprises. Secondly, national financial risk factors are the variables indicating the macroeconomic risks of the supplier's country. Finally, global risk factors are based on the "Global Risk Report", which is announced annually by the "World Economic Forum". As a result of the analysis, Germany, Czech and Poland are the lowest risk countries. The results of the study were compared with Global Resilience Index 2018, which is widely used in supplier country risk analysis and presented by FM Global. The 2019 FM Global Resistance Index is the only index that allows you to compare risks in approximately 130 countries. This index can help to make more informed strategic choices about regions, operations, supplier selection and institutional endurance. This index consists of three main categories as economic risk quality and supply chain. Risk quality score represents the rank of the country according to its natural hazard risks and cyber-attacks while supply chain risks are based on control of corruption, quality of infrastructure, corporate governance, and supply chain visibility.

Global Resilience Index results are given in Table 8.

Country	Country Rank	Risk Quality Score	Supply Chain Score
Austria	6	83,7	92,6
Germany	5	95,5	91,1
Denmark	7	87,7	87,3
France	12	92,2	85,2
Belgium	16	93,8	82,9
Portugal	26	88,6	71,5
Spain	22	96,9	71,4
Czech	14	99,3	69,2
Italy	32	69,7	62,4
Poland	27	95,5	60,3
Slovakia	31	79,4	54,7

Table 8. Global Resilience Index

According to the Global Resilience Index, the three countries (Germany, Denmark and Austria), which are among the first countries in the risk ranking, are matched with the 3 countries in the top 5 are presented in the analysis results of our model. In addition, Germany, Czechia and Poland are considered as the least risky among the countries examined, and this result is compatible with European countries, with increasing investment attractiveness (Mc Kinsey&Company, 2015).

As a result of the study conducted by the Polish-German Chamber of Commerce and Industry with the participation of 300 foreign companies operating in Poland and 1700 investors in Europe, Poland is the second most preferred country by investors after Czech Republic. In addition, Poland and Czech are seen as a base for Asian investors such as South Korea and Japan, used to be included in the European market (Poland-in, 2018).

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