

ORIGINAL PAPER

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## An empirical analysis of factors affecting sharing economy growth

**JEL Classification:** O30; L260

**Keywords:** *sharing economy; peer-to-peer; information and communication technology; multicriteria evaluation*

### Abstract

**Research background:** There are widely recognized benefits of sharing economy for entrepreneurs and consumers. The European Commission emphasizes the importance of European countries being open to new opportunities that sharing economy brings. In order to promote the development of sharing economy, it is important to understand what factors contribute to its development.

**Purpose of the article:** The presented paper aims to identify the main factors relevant for the growth of sharing economy and to determine whether there are factors which are more significant for the development of the sharing economy than others. Based on reviewed literature, the Authors compiled a set of indicators and employed them for research purposes. The selected indicators were assigned into four main groups: technological, political and regulatory environment, economic and social-cultural environment.

**Methods:** The authors used two multicriteria methods (SAW and APH), which were applied to the set of indicators and modeled five different situations by attributing significance to the indicators. The Authors have applied this set of indicators for assessing the following selected countries: Lithuania, Latvia, Estonia and the United Kingdom. The data covers the years 2011–2015.

**Findings & Value added:** The results of the research show that technological readiness and social-cultural environment are significant for the development of sharing economy. For further research the Authors recommend the creation of a composite Sharing Economy Index (SHEI).

## Introduction

Due to the increasing pace of development of sharing economy digital platforms and its impact on various fields of our life and work, sharing economy has become the subject of scientific discussion and an issue for policy makers. A European agenda for the collaborative economy describes the collaborative/sharing economy as a new business model where activities are facilitated by collaborative platforms and highlights that goods are not ‘sold’ via digital platforms, but rather allow for ‘temporary access’ to goods (European Commission, 2016). Even though there is no common term of the phenomenon “sharing economy,” this new socio-economic model can be described as follows: “Sharing economy could be defined as multi-sided digital platforms that create an open market for services and products and act as the intermediary between users and service providers” (Grybaitė & Stankevičienė, 2016, p. 11).

Sharing economy encompasses three groups of participants: service providers; users of these services and digital platforms, which act as an intermediary and facilitate transactions between service providers and users. The prosumer can participate in the both sides of the market, i.e. to produce and to use the services (Rifkin, 2011; Formica, 2015). According to Vaughan and Daverio (2016, p. 3) study, finances generated by sharing economy generated revenues of nearly 4bn euros in Europe in 2015 and facilitated around 28bn euros of transactions. Moreover, a study developed by Juniper Research (2017) suggests that sharing economy will reach 40.2bn dollars in 2022.

The aim of this article is to examine the main forces that affect the development of sharing economy. For research purpose, the Authors have applied multicriteria methods — SAW (Simple Additive Weighting) and AHP (Analytic Hierarchy Process). The multicriteria methods allow to aggregate values of indicators and receive the value of one integral indicator which calculated for selected countries would allow the comparison between countries. The first part of paper presents a literature review on the main forces which determine the growth of sharing economy. The second section describes the indicators which the Authors use for calculation, and introduces multicriteria evaluations methods. The third part discusses the obtained results.

## Literature review

To analyze and assess the most important factors influencing the development of sharing economy, literature covering the topic has been reviewed. The literature analysis reveals that the main factors influencing the development of sharing economy might be attributed to these main groups: technological, political-legal, economic and social. Various researchers, e.g. Molenaar (2015), Dervojeda *et al.* (2013, p. 13), Hamari *et al.* (2016, p. 2048–2050), Daunorienè *et al.* (2015, pp. 838–839), Demailly and Novel (2014, p. 18), Selloni (2017, p. 16), define technological progress or the latest technologies as the stimulus for the growth of sharing economy. The latest technologies have also been described as ‘disruptive technologies’ which are crucial to the emergence of sharing economy. Baller *et al.* (2016) emphasize the ITC’s ability to improve access to services and enhance connectivity. Huckle *et al.* (2016, pp. 462–464) refer to the benefits of Internet of Things (IoT) and blockchain technology to the sharing economy. According Huckle *et al.* (2016, pp. 462–464) Internet of Things and blockchain opens opportunities for creating peer-to-peer secure automatic payment mechanisms and foreign exchange platforms. The latest technologies provide impetus to spread sharing economy by facilitating peer to peer business models (CIO review, 2016). As Sundararajan (2016) emphasizes, wireless broadband, mass market smartphones and digitalized social networks are crucial elements of the sharing economy. According to Owyang (2013), the main technological drivers are social networking technologies, mobile technologies and payment systems. According to Baller *et al.* (2016), the internet is one of the world’s most important general-purpose technologies and its impact on entire economies is huge.

Goudin (2016), Dervojeda *et al.* (2013) stress the impact of financial and economic crisis on the emergence of the sharing economy. The severe consequences of economic crisis can be seen in the rise of unemployment and the decline of consumers’ purchasing power. The price of consumer goods is increasing at a faster pace than income. This leads to changes in consumers’ buying behavior. People are striving to find ways to save money or earn extra money. That is why peer-to-peer business models attract consumers who are willing to take advantage of sharing economy opportunities. Besides, Dervojeda *et al.* (2013) emphasize the investment into sharing economy business as one of the factors influencing development of sharing economy’s platforms.

Owyang (2013) emphasizes such social factors relevant to the growth of sharing economy as population density, sustainability mindset, lifestyle trends among youth, altruistic mindset and an independent lifestyle. Fur-

thermore, trust factors, culture, development of a sharing mentality, entrepreneurial spirit and aspiration are also important (Debarshi, 2015). Botsman (2015) highlights the trust factor in sharing economy, claiming that trust between strangers is very critical. People share idle assets with others and interact with each other in a way that was impossible before. Social networks (*e.g.* Facebook) provide the required security check on people thereby facilitate trust building between strangers (Trivett & Staf, 2013). Hence, people's participation in social networks is important factor for sharing economy.

Government regulation and laws can stimulate the development of sharing economy or impede its development. A reliable legal system, political stability, protected property rights, the ease to start and operate a business are all factors that can be named as important for businesses and for the participants of sharing economy. As states Ohlhausen (2015) “misguided government regulation can be the barrier to innovation that never falls”. Vitkovic (2016) acknowledges the need of “effective regulatory framework for the sharing economy”.

## **Research methodology**

Based on the literature review, the main factors affecting sharing economy development can be assigned into four main groups: technological, political and regulatory environment, economic and social-cultural environment. The Authors composed a set of indicators which reflect the main factors determining the sharing economy growth. The set of indicators (Table 1) is intended to provide information for policy makers on important factors that need to be considered for effective development of sharing economy.

The Authors have applied a set of indicators for assessing the Baltic countries (Lithuania, Latvia and Estonia) comparing to the United Kingdom, which PWC (2016) named as “a sharing economy hub”. According to PWC (2016), the United Kingdom shows the fastest sharing economy growth in Europe. The Authors raise the following question — is there any aspect (technological, the political and regulatory, economic or social-cultural) which is more significant for the development of sharing economy than others? For this purpose, the Authors modeled five different situations, attributing significance to the various groups of indicators included in the set. In order to determine if the applied methods for calculation impacted on the results, the Authors have used two multicriteria evaluation methods.

*Multicriteria evaluation methods*

A range of multicriteria methods such as SAW (Simple Additive Weighting), AHP (Analytic Hierarchy Process), TOPSIS (Technique for Order Preference by Similarity to an Ideal Solution), PROMETHEE (Preference Ranking Organization Method for Enrichment Evaluation), COPRAS (Complex proportional assessment), ARAS (Additive Ratio Assessment) and others are widely used in scientific research (Balcerzak, 2017; Balcerzak & Pietrzak, 2017a, 2017b; Wang *et al.*, 2009; Stankevičienė & Menciaitė, 2012; Zavadskas *et al.*, 2010; Nugaras & Ginevičius, 2015; Tvaronavičienė *et al.*, 2008; Tvaronavičienė & Grybaitė, 2012; Guerrero-Baena *et al.*, 2015; Latinopoulos & Kechagia, 2015; Podvezko, 2009; Wierzbicka, 2018; Pietrzak & Ziemkiewicz, 2018a, 2018b).

For research purposes the Authors of this paper employ two widely known and used multicriteria methods: SAW and AHP. The Simple Additive Weighting (SAW) method integrates the values and weights of criteria into a single estimating value.

The value of the SAW method  $S$  criterion is calculated according to the formula:

$$S = \sum_{i=1}^m w_i r_i \tag{1}$$

where:

$r_i$  – value of the  $i$ -th criterion of the evaluation variant (object);

$w_i$  – weigh (significance) of  $i$ -criterion;

$m$  – number of elements ( $i = 1, \dots, m$ ).

Sum of significances is equal 1.

For maximizing criteria, the value  $\tilde{r}_i$  is calculated according to the formula:

$$\tilde{r}_i = \frac{r_i}{\max r_i} \tag{2}$$

where:

$\min r_i$  and  $\max r_i$  – the smallest and largest values of  $i$ -criterion.

As converting minimizing criteria to maximizing evaluation criteria will be done using the following formula (Ginevičius & Podvezko, 2008, p. 74):

$$\tilde{r}_i = \frac{\min r_i}{r_i} \tag{3}$$

The AHP will be used for determining the significance of the objects being evaluated (Podvezko, 2009), AHP operates with the matrix (m is the number of alternatives, and n is the number of indicators) (Saaty, 1987). Each  $a_{ij}$  element must be normalized to satisfy the condition:

$$\sum_{j=1}^n a_{ij} = 1 \quad (4)$$

Applying AHP method, the best alternative is the one that best suits this condition:

$$S_{AHP} = \max_j \sum_{i=1}^n a_{ij} w_j, \quad j = 1, 2, 3, \dots, m. \quad (5)$$

The Authors of this paper modeled five different situations attributing significance to the indicators included in the set of indicators.

In the first situation, all aspects were considered to be equally important and, therefore, all indicators reflecting technological readiness, political-regulatory, economic and social-cultural dimensions received equal significance.

In the second situation, technological readiness is emphasized, therefore higher significance is attributed to indicators of technological readiness. Technological readiness indicators are given the largest weight, while other indicators are given a minimum weight.

In the third situation, political-regulatory aspects are emphasized, therefore political-regulatory indicators received the highest significance, while the other indicators received a minimum weight.

In the fourth situation, the highest significance was accorded to economic indicators and other indicators received a minimum weight.

The fifth situation, social-cultural aspects were considered the most important, therefore social-cultural indicators received the highest weight.

The authors calculated the total aggregated index for each country (Lithuania, Latvia, Estonia and the United Kingdom) for the selected period (2011–2015). The aggregated index allows to rank the selected countries (Figure 1 and Figure 2). Dynamics of aggregated assessment of selected countries during the period 2011–2015 presented in Figure 3–12.

## **Results**

In the first modeled situation the Authors assumed that technological, economic, social-cultural and political-regulatory aspects were important for development of sharing economy, hence equal significance is attributed to

all indicators. Figure 1 and Figure 2 shows the aggregated assessment of Lithuania, Latvia, Estonia and the United Kingdom during the year 2011–2015. The application of the SAW and AHP methods provide the following results: the computed index for the period 2011–2015 is highest for the United Kingdom and puts that country into first place. A comparison of the Baltic states reveals that computed index for Estonia is higher compared to Lithuania and Latvia. Taking into consideration that all aspects (technological, economic, social-cultural and political — regulatory) are equally significant, the computed index for selected countries allows us to put countries in the following order: the United Kingdom in the first place, Estonia — in the second, Lithuania — the third, and Latvia into fourth place.

It should be noted that the Lithuanian and Latvian results are rather similar, and that the calculated index for Lithuania is 0.214397 and for Latvia is 0.210069 (AHP method). Rather similar results are also obtained by using the SAW method. The calculated index for Lithuania is 0.6802 and for Latvia — 0.6687 (see Table 2). The dynamics of aggregated assessment of selected countries during the period 2011–2015 display rather similar results (Figure 3 and Figure 4). However, it should be noted that for the 2015 year the calculated index for Estonia grew significantly, and was the highest compared to the year 2011–2014, while the index calculated for the United Kingdom fell and was the lowest compared to the previous years (Table 2).

In the second situation, the highest significance is attributed to the technological indicators. The application of the SAW and AHP methods shows similar results: the computed index for the period 2011–2015 allows us to put countries in the same order as we have seen previously in the first calculation: the United Kingdom, Estonia, Lithuania and Latvia (Figure 1 and Figure 2). The dynamics of aggregated assessment of the selected countries shows that in the year 2014 the countries regrouped (Figure 5 and Figure 6). Lithuania was in the first place among the Baltic countries in the year 2011–2013, but in the 2014 Estonia's indicators increased considerably, and Estonia surpassed Lithuania and Latvia. However, the difference between the calculated values of indicators in Lithuania and Latvia was minor.

In the third situation, the highest significance was assigned to political-regulatory indicators. As shown in Figure 1 and Figure 2, application of multicriteria methods provides us with the similar results, the position of countries remains the same, as in the first and second calculation, i.e. the United Kingdom in the first place, following by Estonia, Lithuania and Latvia. The dynamics of aggregated assessment of selected countries during the period 2011–2015 provides similar results and the ranking of countries remains the same (Figure 7 and Figure 8).

In the fourth situation, the highest significance was accorded to economic indicators. Applying the SAW and AHP methods, similar results as in the third situation were obtained. However, compared with the first three modeled situations, there are no significant fluctuations in the fourth situation (Figure 9 and Figure 10).

In the fifth mathematically modeled situation, the social-cultural aspects were considered the most important and hence, the highest significance was attributed to the social-cultural indicators, while the remaining groups of indicators were considered less important and received the lowest weight. Applying multicriteria methods produced different results compared to other mathematically modelled situations.

Aggregated indexes computed for selected countries for averaged period 2011–2015 allowed us to draw the following conclusions. When the highest significance was attributed to social-cultural aspects, Lithuania ranked the last compared with United Kingdom, Estonia and Latvia (Figure 11 and Figure 12).

Moreover, the results obtained by applying the SAW and AHP methods showed that the aggregated index computed for Lithuania declined in 2015. Meanwhile, the results for Estonia and Latvia are quite the opposite, their indexes tended to growth. It should be noted that despite their differences, the selected multicriteria methods for research provided us with rather similar results and had no impact on ranking of countries.

## **Conclusions**

Based on the review of scientific literature, authors of the paper produced the set of indicators which reflect the main factors of external environment important for the development of sharing economy.

For research purpose two multicriteria evaluation methods — SAW and APH were applied. The Authors found that despite the differences in multicriteria evaluation methods, they had no impact on the obtained results, i.e. the ranking of countries did not change. However, the significance attributed to different groups of indicators were relevant, as they affected the countries' ranking. When highest significance was attributed to the social-cultural indicators and the remaining groups of indicators received the lowest significance, the ranking the countries changed. Furthermore, even though aggregated index for the selected period 2011–2015 year had no effect on countries ranking, the dynamics of aggregated assessment of the selected countries showed that countries regrouped in the year 2014. Lithuania among the Baltic countries was in the first place in the year 2011–



2013, but in the 2014–2015 Estonia was in the first place among the Baltic countries.

Modeling five situations by attributing significance to particular group of indicators (technological, economic, political and regulatory and social-cultural) implies that technological readiness and social-cultural environment are significant for the development of sharing economy as they contribute to the ability and incentive to participate in sharing economy.

It should be noted that research has some limitations, since a limited number of countries were investigated. Also, the choice of the set of indicators was subjective, and because of the limited availability of statistical data.

For further research the authors recommend to create a composite Sharing Economy Index (SHEI), which would be useful in benchmarking countries' performance. Moreover, composite Sharing Economy Index (SHEI) would be easier to interpret since it shows a comprehensive view on a phenomenon that cannot be captured by only one single indicator.

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## Annex

**Table 1.** Set of selected indicators

Technological readiness	Political and regulatory		Social-cultural	Economic environment
Availability of computers (percentage of households)	Rule of law index		Population density (persons per km <sup>2</sup> )	GDP per capita, PPP (current international \$)
Level of internet access (percentage of households)	Regulatory index	quality	Cultural and Social Norms index	Consumer price index
Mobile internet access (percentage of individuals)	Government effectiveness index		Entrepreneurial Intention index	R&D expenditure (% of GDP)
Mobile-cellular subscriptions per 100 inhabitants	Property rights index		Motivational index	Total unemployment rate (percentage of the total population)
Fixed broadband subscriptions (per 100 people)	Business index	freedom	Individuals using the internet for participating in social networks% of individuals	Government expenditure on education, total (% of GDP)
Individuals using the Internet (% of population)	Investment index	freedom	Individuals using the internet for selling goods or services % of individuals	Labour costs (wages and salaries total)
Fixed-broadband sub-basket prices % of GNI	Tax burden index		Gross enrolment ratio, secondary, both sexes (%)	Productivity (GDP per hour worked (constant 1990US\$ at PPP)
Mobile-cellular sub-basket prices % of GNI				

Source: composed by authors based on The Heritage Foundation, The World bank group, OECD, Eurostat, The Global Entrepreneurship Monitor.

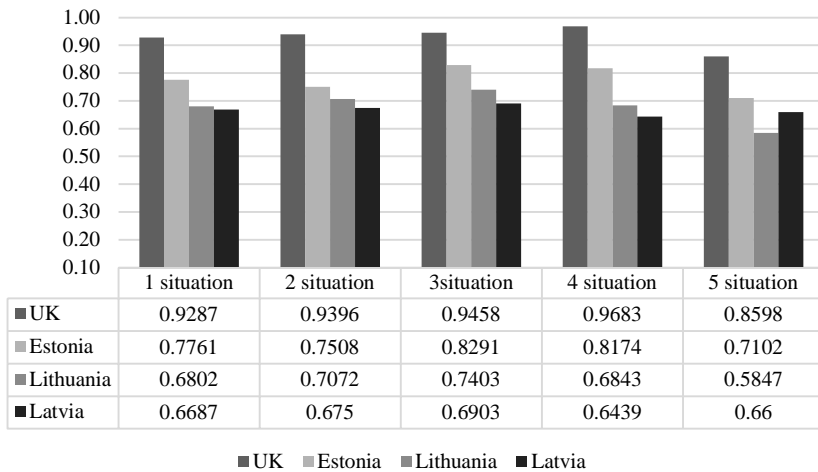
**Table 2.** Calculated indexes

		SAW method				
	Country	2011	2012	2013	2014	2015
1 Situation	Lithuania	0.652236	0.674486	0.693381	0.672538	0.683831
	Latvia	0.648601	0.665696	0.666513	0.663721	0.677974
	Estonia	0.755527	0.762498	0.770363	0.759334	0.820247
	UK	0.926737	0.923535	0.928168	0.946877	0.918360
2 Situation	Lithuania	0.717146	0.714745	0.733812	0.658711	0.710979
	Latvia	0.653344	0.692983	0.673431	0.654883	0.700192
	Estonia	0.697600	0.701922	0.711846	0.791747	0.851050
	UK	0.941319	0.936099	0.924664	0.979200	0.916980

**Table 2.** Continued

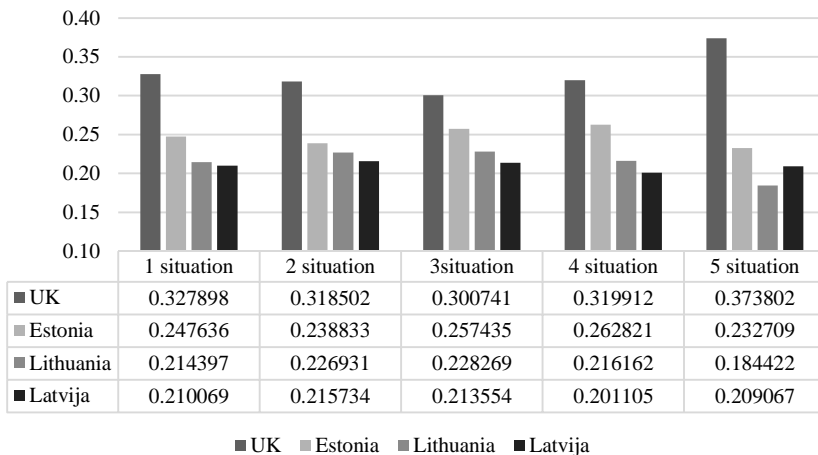
		SAW method				
	Country	2011	2012	2013	2014	2015
3 Situation	Lithuania	0.706666	0.727909	0.724593	0.771466	0.771587
	Latvia	0.671556	0.680377	0.685556	0.726857	0.708954
	Estonia	0.854701	0.812987	0.831665	0.794966	0.851718
	UK	0.943137	0.942909	0.944608	0.944091	0.953417
4 Situation	Lithuania	0.617866	0.629826	0.670111	0.656456	0.653911
	Latvia	0.587301	0.596098	0.628919	0.635548	0.621954
	Estonia	0.772877	0.799888	0.816144	0.782964	0.796052
	UK	0.957284	0.951187	0.980653	0.981923	0.970695
5 Situation	Lithuania	0.558094	0.619788	0.639269	0.605703	0.595065
	Latvia	0.681651	0.689524	0.677273	0.639084	0.677826
	Estonia	0.705407	0.744007	0.730318	0.663176	0.777777
	UK	0.863088	0.862124	0.863324	0.877603	0.832680
		AHP method				
	Country	2011	2012	2013	2014	2015
1 Situation	Lithuania	0.210124	0.214600	0.219640	0.214181	0.213819
	Latvia	0.209855	0.210838	0.208918	0.210471	0.211233
	Estonia	0.248015	0.246894	0.245570	0.244375	0.260724
	UK	0.332006	0.327668	0.325872	0.330973	0.314223
2 Situation	Lithuania	0.234171	0.228852	0.239998	0.209629	0.222007
	Latvia	0.213111	0.223129	0.216052	0.208793	0.217595
	Estonia	0.226087	0.224421	0.226833	0.252479	0.264417
	UK	0.326631	0.323598	0.317116	0.329098	0.295981
3 Situation	Lithuania	0.218276	0.227340	0.224726	0.238004	0.233163
	Latvia	0.207806	0.212305	0.212560	0.222711	0.212554
	Estonia	0.269556	0.256582	0.261012	0.241039	0.259095
	UK	0.304362	0.303773	0.301702	0.298247	0.295187
4 Situation	Lithuania	0.199702	0.201902	0.208587	0.206825	0.206390
	Latvia	0.189426	0.190542	0.194892	0.199041	0.195067
	Estonia	0.262396	0.266755	0.260097	0.252827	0.257294
	UK	0.348476	0.340801	0.336424	0.341307	0.341249
5 Situation	Lithuania	0.184919	0.198274	0.202324	0.202953	0.192550
	Latvia	0.228628	0.215637	0.211163	0.211625	0.218846
	Estonia	0.237185	0.243057	0.237041	0.230007	0.261532
	UK	0.349267	0.343032	0.349471	0.355415	0.327072

**Figure 1.** Aggregated assessment of selected countries during the period 2011–2015 (1-5 situations). SAW method



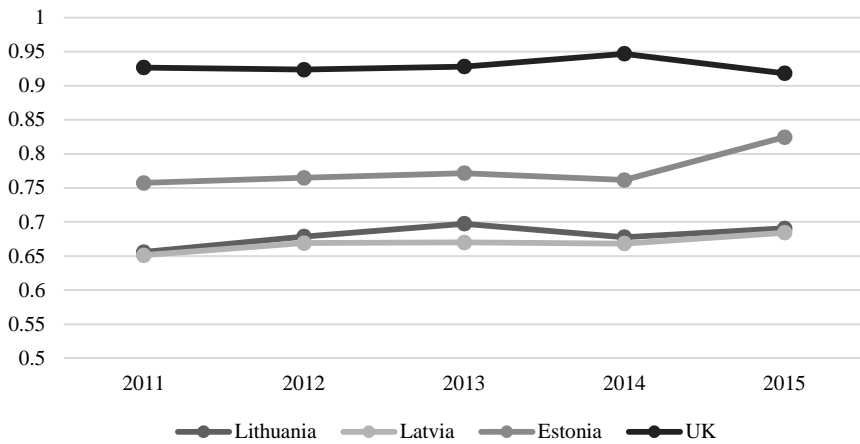
Source: computed by authors based on Eurostat, The World Bank, The Heritage Foundation, The Global Entrepreneurship Monitor, OECD.

**Figure 2.** Aggregated assessment of selected countries during the period 2011–2015 (1-5 situations). AHP method



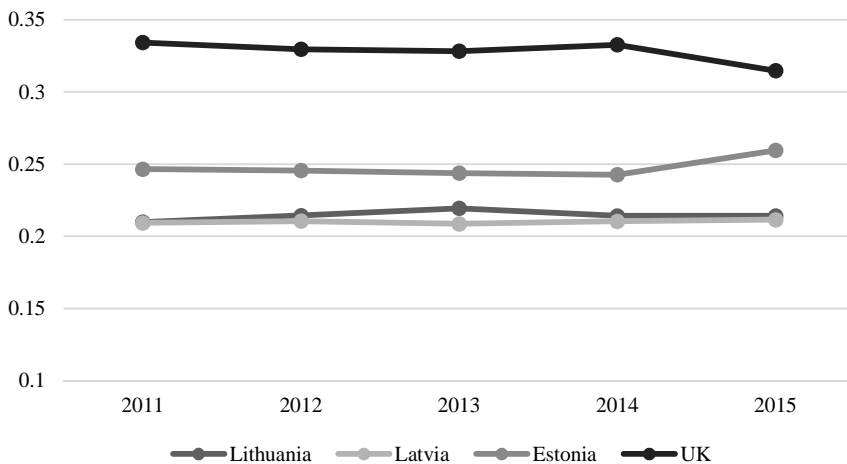
Source: computed by authors based on Eurostat, The World Bank, The Heritage Foundation, The Global Entrepreneurship Monitor, OECD.

**Figure 3.** Dynamics of aggregated assessment of selected countries during the period 2011–2015. SAW method (1 Situation)



Source: computed by authors based on Eurostat, The World Bank, The Heritage Foundation, The Global Entrepreneurship Monitor, OECD.

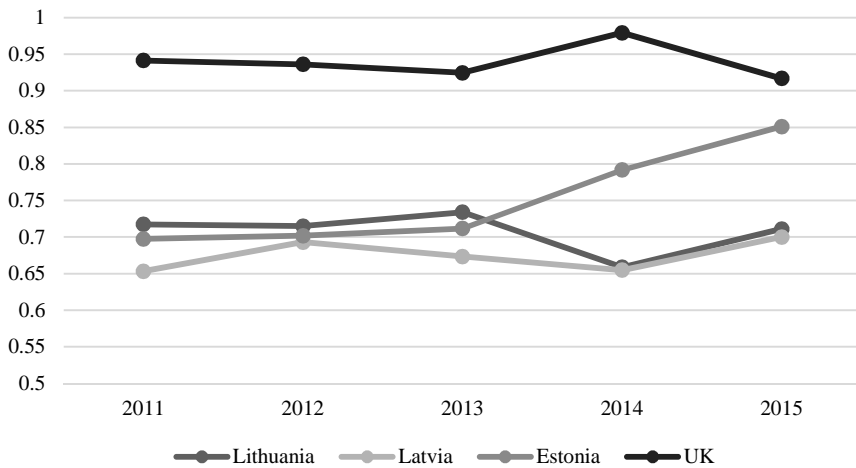
**Figure 4.** Dynamics of aggregated assessment of selected countries during the period 2011–2015. AHP method (1 Situation)



Source: computed by authors based on Eurostat, The World Bank, The Heritage Foundation, The Global Entrepreneurship Monitor, OECD.

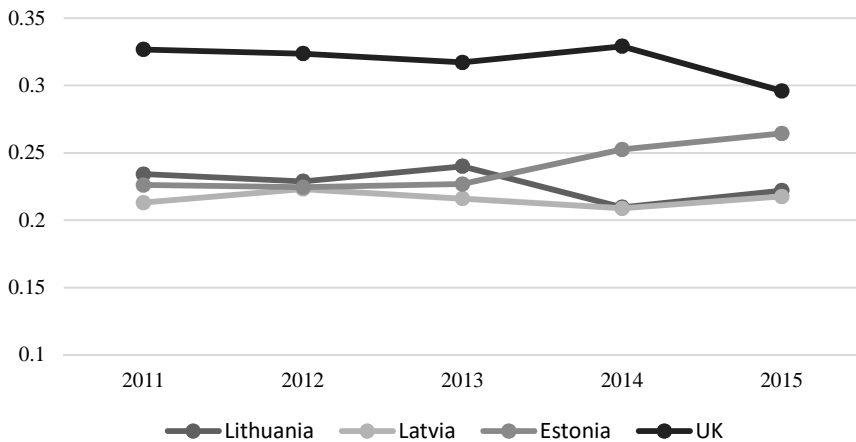


**Figure 5.** Dynamics of aggregated assessment of selected countries during the period 2011–2015. SAW (2 Situation)



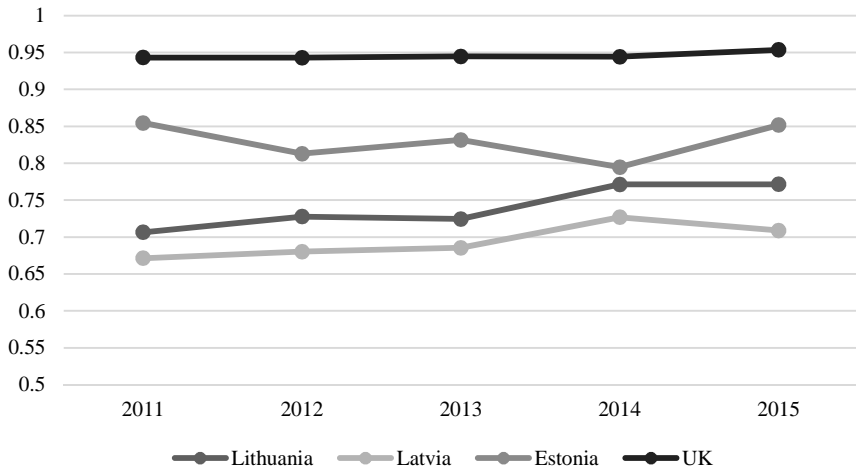
Source: computed by authors based on Eurostat, The World Bank, The Heritage Foundation, The Global Entrepreneurship Monitor, OECD.

**Figure 6.** Dynamics of aggregated assessment of selected countries during the period 2011–2015. AHP method (2 Situation)



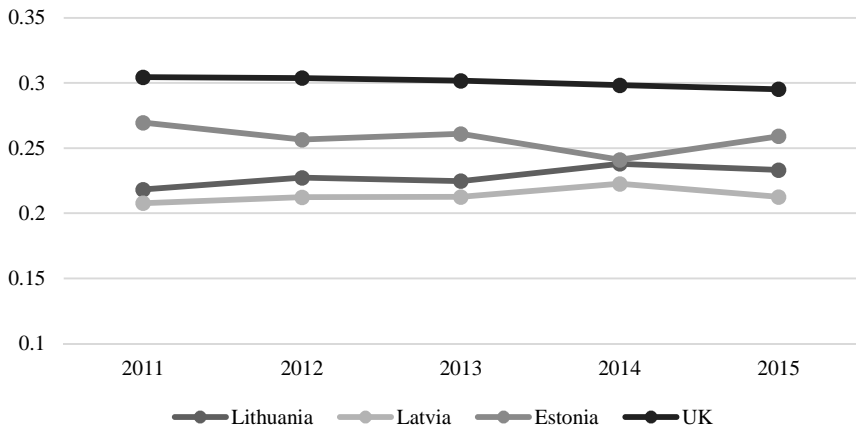
Source: computed by authors based on Eurostat, The World Bank, The Heritage Foundation, The Global Entrepreneurship Monitor, OECD.

**Figure 7.** Dynamics of aggregated assessment of selected countries during the period 2011–2015. SAW method (3 Situation)



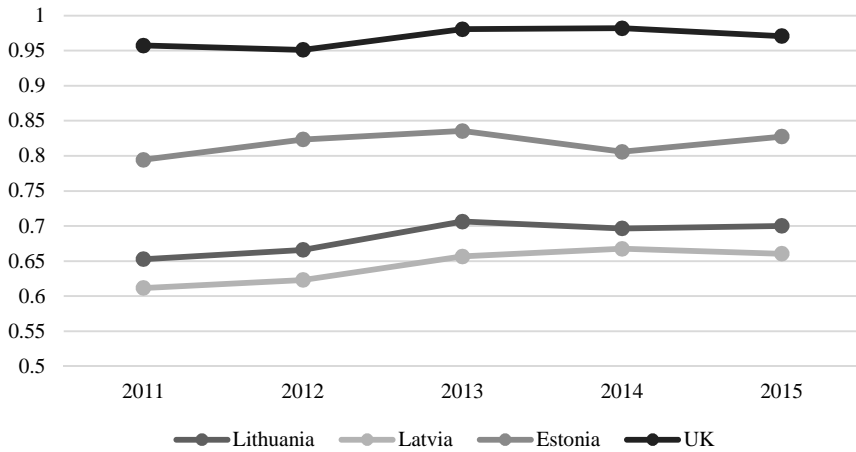
Source: computed by authors based on Eurostat, The World Bank, The Heritage Foundation, The Global Entrepreneurship Monitor, OECD.

**Figure 8.** Dynamics of aggregated assessment of selected countries during the period 2011–2015. AHP method (3 Situation)



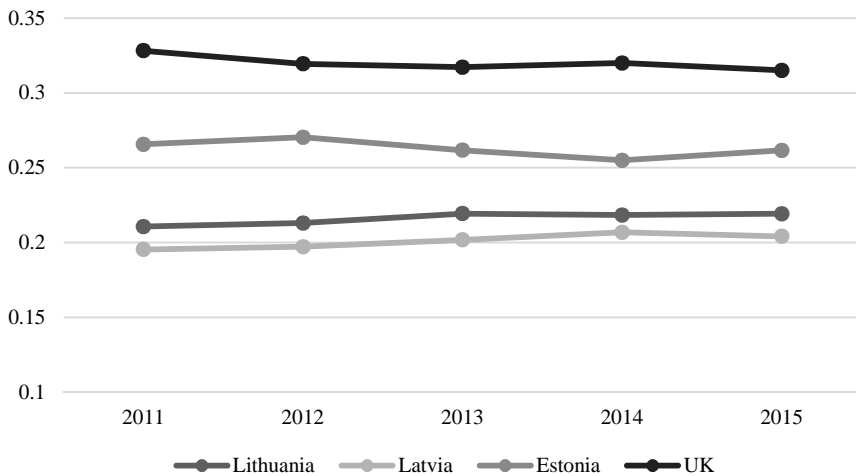
Source: computed by authors based on Eurostat, The World Bank, The Heritage Foundation, The Global Entrepreneurship Monitor, OECD.

**Figure 9.** Dynamics of aggregated assessment of selected countries during the period 2011–2015. SAW method (4 Situation)



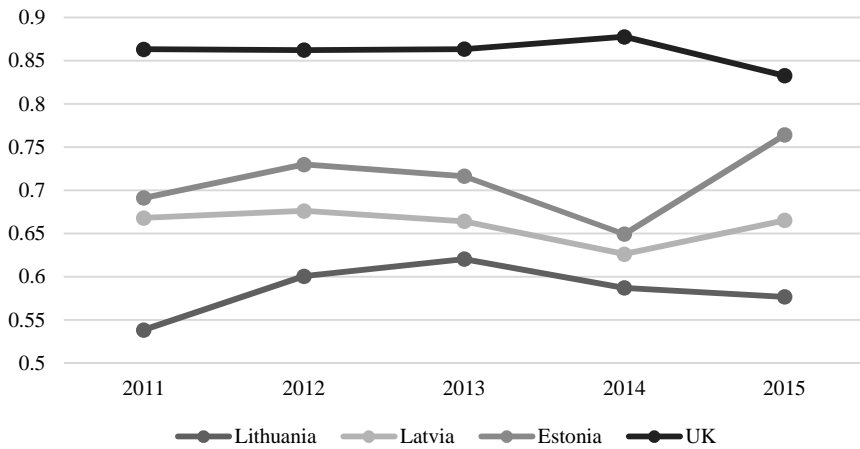
Source: computed by authors based on Eurostat, The World Bank, The Heritage Foundation, The Global Entrepreneurship Monitor, OECD.

**Figure 10.** Dynamics of aggregated assessment of selected countries during the period 2011–2015. AHP method (4 Situation)



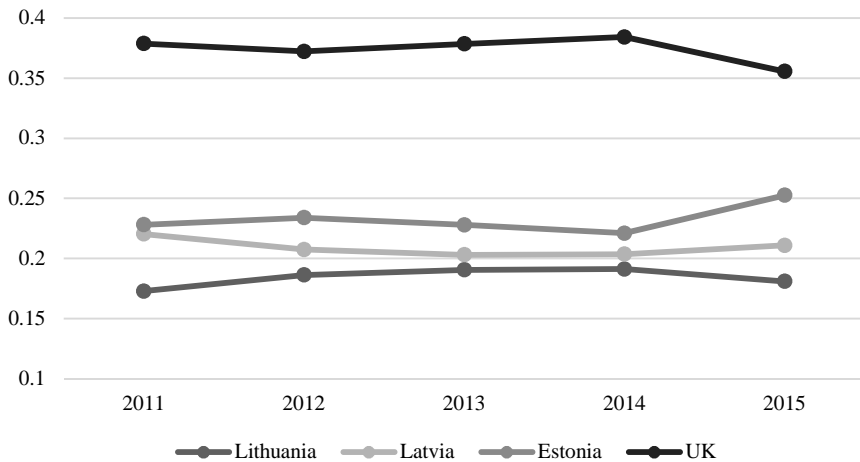
Source: computed by authors based on Eurostat, The World Bank, The Heritage Foundation, The Global Entrepreneurship Monitor, OECD.

**Figure 11.** Dynamics of aggregated assessment of selected countries during the period 2011–2015. SAW method (5 Situation)



Source: computed by authors based on Eurostat, The World Bank, The Heritage Foundation, The Global Entrepreneurship Monitor, OECD.

**Figure 12.** Dynamics of aggregated assessment of selected countries during the period 2011–2015. AHP method (5 Situation)



Source: computed by authors based on Eurostat, The World Bank, The Heritage Foundation, The Global Entrepreneurship Monitor, OECD.