THE ASSESSMENT OF INDICATORS FOR A SUSTAINABLE E-BUSINESS GROWTH IN FOREIGN MARKET

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Abstract. Electronic business is a rapidly growing form of business in recent years. There are many studies conducted exploring various business models. However, there is a lack of research how using the electronic business can help to achieve the sustainable growth in foreign markets and what indicators may help to rank the potential foreign markets. The purpose of the research is to assess e-business model for a sustainable growth based on weighted business model component evaluations. The indicators of electronic business model development to foreign market are investigated and compared using TOPSIS and SAW methods. The most important factors for development in foreign markets are determined. The research methods used: scientific literature comparison, qualitative content analysis, statistical data analysis, and analytical decision-making method. The indicator evaluation model is proposed in order to encourage sustainable growth in foreign markets.

Keywords: e-business model, sustainable growth, foreign market, information and communication technology, development model, analytical hierarchy method, digital economy

Introduction

European Commission strategy states that "e-business aims to open up digital opportunities for people and business and enhance Europe's position as a world leader in the digital economy". Based on this strategy, electronic business helps to achieve a sustainable growth not only in local but also in foreign markets and empowers even small countries such as Lithuania to participate in a global market. However, according to Eurostat, in average only 12 to 34% of companies in the EU are using e-business technologies (Eurostat, 2016). Some scientific articles and business case studies argue that that e-business use and performance are influenced by specific socio-economical characteristics (Popa et al, 2018) and most of the investigation on e-business adoption/use has focused on high e-business intensity countries (Kongaut & Bohlin, 2015).

Electronic business serves as a tool to achieve a sustainable growth using less resource than a traditional business development requires- saving time, logistic costs, and facilitate communication to participate in a global market place. It may be involved in all business processes, starting with the purchasing, supply, customer service and for the internal business processes such as corporate partnerships or stakeholder's cooperation (Pilinkiene et al. 2013, Gasparėnienė et al. 2016, Schaltegger et al. 2016).

In order to gain a competitiveness and achieve a sustainable growth when approaching a foreign market, businesses have to evaluate which countries are the most convenient for a e-business development.

The electronic business itself requires some components and infrastructure to be successfully applied. As it will be analyzed further in the article, there are 6 large sections of indicators defined by the World Bank economists and based on this data, there could be potential for e-business growth in foreign markets evaluated using careful research of indicators.

Problem is the choice of balance of weighted components to achieve a sustainable growth of e-business in foreign markets.

Object. Sustainable e-business growth model indicators for foreign markets.

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The goal of this article is to assess the indicators influencing an e-business growth to foreign countries using multicriteria decision methods.

In order to achieve the goal, the following tasks must be conducted:

1. To analyze e-business and e-business development model concepts
2. To identify and evaluate e-business infrastructure indicators
3. To develop a conceptual e-business development model.

The methods of the research are scientific literature comparison, qualitative content analysis, data analysis, expert evaluation and analytical decision-making methods.

The limitations of the research are: limited number of countries; a sustainable growth is considered as a stable consistent business growth.

1. Electronic business growth concept

One of the first definitions to describe E-business was created in 1997 by IBM, stating that "e-business is the transformation of key business processes through the use of internet technologies" Chaffey, D. (2011). Electronic business refers to the use of information and communication technology to support a business strategy.

E-business models were studied and researched for more than 20 years, and the review of various scientific databases, reviews, scholar journals shows that the interest in business models is still actual (Fig. 1). Various scientific literature databases count from 600 (Scopus), 5217 (ScienceDirect) to 142000 (Google Scholar) tags with articles, researches and citations on "electronic business model" keywords.
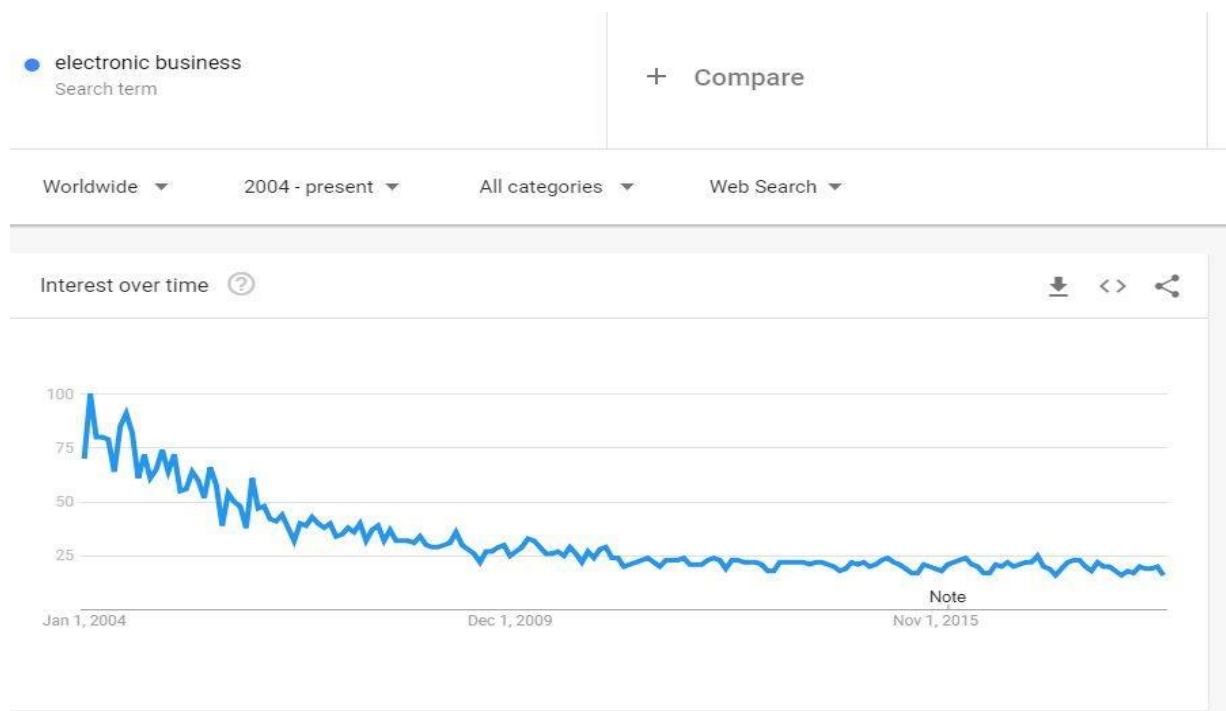

Figure 1. Number of Google searches researching the electronic business model 2004-2018. Created by author based on Google trend data.

The sustainable growth in this research is understood as a sustainable business value creation (growth) and a long-time business perspective (Geisdoefer et al, 2018).

A sustainable business model is a business model that creates competitive advantage through superior customer value and contributes to the sustainable development of the company and society (Lüdeke-Freund, F. 2010)

Business models refer to the logic of the company – how it operates and creates and captures value for stakeholders in a competitive marketplace - strategy is the plan to create a unique and valuable position involving a distinctive set of activities (Casadesus-Masanell R., & Ricart J.E. 2011).

Business concept should at least include a coherent understanding of the strategy, structure and the ability to utilize technological solutions to create value, which are 3 very significant attributes (Nielsen, C., Lund, M. 2014).

The different business-model streams are not only useful to describe a business model's current state but also serve as frameworks for describing and developing its future states (Ritter, T., Lettl C. 2018).

Table 1. E-business concepts. Completed by authors.

Author, year	Definition
Suchánek, P. (2008)	E-business presents all enterprise activities that are supported of information systems and information and communication technologies (ICT).
Chaffey, D. (2011)	E-business is a digital business as reflects the current usage in industry and research on the impact of digital technologies on business.
Kumari, S. (2015)	Electronic commerce focuses on the use of ICT (Information and Communication Technology) to enable the external activities and relationships of the business or e-business refers to business with the help of internet network
Čyras, G., & Sabaitytė, J. (2015)	IT-based development should be followed by rightly identified characteristics of electronic, mobile business and participants in this area, analysed strategy aspects and identified the role and importance of business model in this context.

Despite the large number of scientific articles and researches, electronic business model definition seems inconsistent. The simplified business model definition can be summarized as a strategy and structure to create profit, which correlates with the definition that "e-business refers to interactive business operations in the Internet, when the systems of intranet, extranet and the Internet are employed to link the staff, co-owners, suppliers and consumers, and employment of these systems contribute to creation of value added as the primary purpose of business" (Gasparėnienė et al. 2016).

Summarizing the definitions provided in Table 1 it could be stated that e-business model is using technology to improve the business processes and to improve the relationships between all participants of these processes. The improvement can be achieved by using a software for the internal processes such as human resources, accounting/financial and administration systems, as well as external processes such as sales and marketing, supply control and management and customer relationship development. The internet reduces the initial time and cost of, for example, identifying international network opportunities through international market visits to trade fairs or home country government export support offices in foreign locations (Mathiews el al. 2015).

Scientific researches suggest different key components for the successful e-business development, such as: legal, sectoral, market, technological, company- related, consumer-related (Gasparienė et al. 2016); technological, economical, social, political, legal, ideological (Paliulis et al. 2007); organizational, technological, and environmental (Ramayah et al. 2019).

In this article, authors will concentrate on the technological component for a sustainable e-business growth. We presume that the other components are relatively equal as the assessment is made for EU countries, or require an additional in-depth research in terms of market or social or sectoral environments.

There is an indirect link between Internet capabilities and international performance (Mathiews et al. 2015). There are suggested prioritizing e-business development recommendations by Hanafizadeh, P. et al. (2010). By the author, e-infrastructure is one of the most important components in e-business model. The experts from world trade organizations agree on that statement. The World Bank expresses that ICT infrastructure which is accessible and reliable must form the foundation of any ICT development strategy (World Bank, 2012). There is a potential risk of too small market if the infrastructure is not well developed. Therefore, the majority of national e-strategies encourage e-business development focusing on developing a country's ICT infrastructure, in particular, on broadening access.

In order to determine the most attractive foreign country for the e-business development we need to rank selected countries by suggested criteria. These criteria are chosen by the above cited recommendations and developed by the United Nations Conference on Trade and Development.

2. Selection of indicators

As described earlier, according to the Word Bank research and experts' evaluations, there are 6 indicator groups reflecting e-commerce development readiness by country. These indicators also implement a sustainable business growth:

1. Access to Financing
2. E-commerce readiness assessment and strategy formulation
3. E-commerce skills development
4. ICT infrastructure and services
5. Payment solutions
6. Trade logistics and trade facilitation

3. Methodology

The research is aiming to evaluate foreign countries for the sustainable business development. In order to achieve this goal, the research is conducted in the following steps. Scientific literature is reviewed in order to identify business model definitions and using comparison the model definition which is closest to ICT use identified. Based on database information, statistical data on key factors is chosen to be applied in multicriteria decision making models. In order to avoid the large number of similar indexes there were done some corrections, i.e. some indexes not considered (like percent of population without postal services which is 0 value in all analyzed countries), or was taken one index from 3 similar.

According to Yen (2002), there is no best method for multiple criteria decision problems. In some cases, the outcomes gathered by different MCDMs are the same, in some cases they differ. However, in situations where the decision ranking of all alternatives is necessary, the author states that it is important to consider that different methods produce different results for the same problem.

TOPSIS and SAW methods are used in this research, as they allow to normalize the different measurements of indexes. Those two methods are relatively easy to use and the ability to calculate the unlimited number of criterions/alternatives. TOPSIS was developed by Hwang (Hwang and Yoon, 1981) and widely applied by other researchers. A matrix containing alternatives and the criteria, where usually, the criteria have different dimensions that complicate their comparison that is needed for determining their effectiveness, represents all multi-criteria problems. In order to avoid the difficulties caused by their different dimensions, a transformation (or normalization) of the criteria values is used (Zavackas E.K., et al 2006). SAW method, according to V. Podvezko (2011), is the oldest, most widely known and practically used method. The measure combines weight and criteria into one dimension.

The analysis using TOPSIS method helps to find the shortest distance from the ideal solution and the longest distance from the negative-ideal solution, in a geometrical sense. The method evaluates the decision matrix, which refers to n alternatives that are evaluated in terms of m criteria. The member ij denotes the performance measure of the jth alternative in terms of the ith criterion.

The first step of the procedure of every multiple criterion decision-making method is to calculate the normalized decision matrix. The indicators are given weights and the matrix is designed.

Calculating the normalized decision matrix:

$$n_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \tag{1}$$

Calculating the weighted normalized decision matrix:
$$v_{ij} = w_j n_{ij} \text{ for } i = 1, \dots, m; j = 1, \dots, n \tag{2}$$

w_j − the weight of the j-th criterion

Determining the positive ideal and negative ideal solutions.

$$V^+ = (v_1^+, v_2^+, \dots, v_n^+) = \left(\left(\max_i v_{ij} \middle| j \in I \right), \left(\min_i v_{ij} \middle| j \in J \right) \right) \tag{3}$$

$$V^- = (v_1^-, v_2^-, \dots, v_n^-) = \left(\left(\min_i v_{ij} \middle| j \in I \right), \left(\max_i v_{ij} \middle| j \in J \right) \right) \tag{4}$$

where I is associated with benefit criteria and J with the cost criteria, $i = 1, \ldots, m; j = 1, \ldots, n$.

Calculating the separation measures from the positive ideal solution and the negative ideal solution:

$$S_i^+ = \sqrt{\sum_{j=1}^{n}\left(v_{ij} - v_i^+\right)^2}, \ i = 1, 2, \ldots, m. \tag{5}$$

$$S_i^- = \sqrt{\sum_{j=1}^{n}\left(v_{ij} - v_i^-\right)^2}, \ i = 1, 2, \ldots, m.$$

Calculating the relative closeness to the positive ideal solution:

$$P_i = \frac{S_i^-}{S_i^- + S_i^+} \tag{6}$$

Ranking the preference order.

The other method chosen for the ranking is SAW method. According to V. Podvezko (2011), SAW (Simple Additive Weighting) is the oldest, most widely known and practically used method. It is quite simple to use and requires only a few measures. The only limitation of this method is that only positive numbers may be calculated, so in case of negative indicator value there is an additional step to transform it into positive. But it does not apply in our case, as all the indicators chosen have positive value. Formula (7) demonstrates how the measure combines weight and criteria into one dimension:

$$S_j = \sum_{i=1}^{m} w_i \, \bar{r}_{ij} \tag{7}$$

w_i − weight of the i-th criterion

$\bar{r}_{ij}$ − normalized i-th criterion's value for j-th object; $i = 1, \ldots, m; j = 1, \ldots, n$

m – the number of the criteria used

n – is the number of the objects (alternatives) compared.

$$\bar{r}_{ij} = \frac{\min_{j} r_{ij}}{r_{ij}} \tag{8}$$

r_{ij} − i-th criterion's value for j-th alternative

$\min_{j} r_{ij}$ − the smallest i-th criterion's value for all the alternatives compared

$\bar{r}_{ij}$ − denotes the converted values.

$$\bar{r}_{ij} = \frac{r_{ij}}{\max_{j} r_{ij}} \tag{9}$$

$\max_{j} r_{ij}$ − the largest i-th criterion's value of all alternatives

The largest value of the criterion Sj corresponds to the best alternative. The alternatives compared should be ranked in the decreasing order of the calculated values of the criterion Sj.

In order to validate and evaluate the results, the final rankings made by those methods are compared.

The world integrated trade solution (WITS) database gives a large number of analytical tools. As we are seeking to assess some European Union countries and evaluate their e-business infrastructure indicators, we created the

simplified indicator table. To make a comparison less complicated, one indicator as a criterion from each group was selected.

Table 2. Sections and indicators. Adjusted by authors from WITS database.

	Section Name	Given weights	Indicator Name
C1	Access to Financing	0,12	Proportion of loans requiring collateral (%)
C2	E-Commerce Readiness Assessment and Strategy Formulation	0,2	Country rank and value in the ITU ICT Development Index-Value
C3	E-Commerce Skills Development	0,22	Firms technology absorption
C4	ICT Infrastructure and Services	0,19	Internet users (per 100 people)
C5	Payment Solutions	0,07	Used an account to make a transaction through a mobile phone (% age 15+)
C6	Trade Logistics and Trade Facilitation	0,2	Burden of customs procedures

These indicators were developed jointly by UNCTAD and the World Bank, utilizing data from the International Telecommunications Union (ITU), UNCTAD, the U.N. Office on Drugs and Crime (UNODC), Universal Postal Union (UPU), World Economic Forum, and the World Bank (WITD, 2018).

Table 3. The values of indicators by country. (Source: World Integrated Trade Solution). The latest data is for year 2014.

Indicator Name	Bulgaria	Estonia	Germany	Lithuania	Sweden
Proportion of loans requiring collateral (%)	84,7	75,0	90,9	74,2	51,5
Country rank and value in the ITU ICT Development Index-Value	6,4	8,0	8,1	7,0	8,5
Firms technology absorption	4,4	5,4	5,7	5,4	6,0
Internet users (per 100 people)	56,7	88,4	87,6	71,4	90,6
Used an account to make a transaction through a mobile phone (% age 15+) [w2]	2,4	13,6	12,8	8,5	34,0
Burden of customs procedures	3,8	5,3	4,7	4,5	5,3

Countries are selected as peer countries to Lithuania, Sweden and Germany are added to the list of comparison as the more developed countries. Peer countries are suggested by analytical database tool and the number is minimized from 7 to 2.

Table 4. The results of the calculations. Designed by authors.

SAW Ranking		TOPSIS Ranking	
1	Sweden	1	Sweden
2	Germany	2	Estonia
3	Estonia	3	Germany
4	Lithuania	4	Lithuania

5	Bulgaria	5	Bulgaria

The results in country ranking using SAW method differ from results using TOPSIS method.

Still, the first and the last rankings are the same. Both applied methods suggest that Sweden has the best developed ICT readiness for e-business so the most sustainable e-business growth may be expected there. However, to validate the results, correlation with other indicators such as GDP may be considered.

Table 5. Countries ranked by GDP per capita, 2014. Adjusted by authors using Trading economics database.

GDP per capita per country, US dollars		
1	Sweden	53561,91
2	Germany	45022,57
3	Estonia	17453,37
4	Lithuania	14935,54
5	Bulgaria	7299,55

SAW method results and ranking by country GDP indicators results correlate and therefore SAW method may be preferred as more accurate for the indicator evaluation.

Conclusions

There are many electronic business development models, based on different conceptions. The assessment was conducted evaluating the e-infrastructure development as the main component for the sustainable e-business growth.

Different ADMM may result different rankings. To validate the results, further investigation on consistency or expert evaluation or correlation with GDP may be considered. Research shows that SAW method results correlate with the GDP per capita ranking.

According to the current research results, the most suitable country for sustainable e-business growth is Sweden.

As the research is based on limited number of countries, further investigation with more data is suggested in order to confirm or deny the assessment model effectiveness.

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