Cultural Characteristics and the Entrepreneurial Intentions of University Students

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SUMMARY

The goals of the paper are to analyse the relationship between the cultural dimensions and to investigate the entrepreneurial intentions and activity of university students in 21 selected OECD countries. The analysis was conducted using the GUESSS database, which also includes three cultural dimensions of the GLOBE project. We found that there is a positive correlation between the entrepreneurial intentions of students and In-Group Collectivism. Uncertainty Avoidance does not have a direct effect on entrepreneurial activity of intentions; however, it correlates positively with perceived behavioural control, which has been proved to have a significant effect on entrepreneurial intentions.
Keywords: Cultural dimensions, entrepreneurial activity, entrepreneurial intentions, GLOBE, GUESSS, OECD
Journal of Economic Literature (JEL) codes: D70, L26, M14, N30, P17, Z10
DOI: http://dx.doi.org/10.18096/TMP.2017.02.01

INTRODUCTION

The connection between the practical domain of entrepreneurship and the theoretical models of economic growth was explained by Schumpeter with a creative and very convincing argument in his work first published in 1911 (Schumpeter 1934). Even though Schumpeter's idea is more than 100 years old, it is more popular than ever. The postman delivers our letters; his company is based on the customer's demand for communication. But if all companies that specialised in facilitating the communication of their customers had been content with playing only the postman's role, we would not be living in an era of communication revolution. While preparing this paper, the authors have exchanged several e-mail, Skype and Messenger messages; these services, however, were not brought to life by the needs of the authors, or anybody else, for that matter. They were created by companies, and then they spread because these firms convinced customers to use them instead of the good old mail system.

Innovations created by competing firms provide cheaper and better quality products to customers – this latter process is described as economic growth by macroeconomics. Taking a very simplified approach, one can conclude that the entrepreneur is a key agent who has a fundamental influence on market competition and economic growth. Just as the quantity of labour or physical resources affect the value of income produced, so does the entrepreneurial activity in a process that combines the traditional factors of production. The simplified approach should be stressed here, as opinions on the role of the entrepreneur in economic theory are rather mixed. Neoclassical economics, on the one extreme, does not even discuss the role of the entrepreneur (Baumol, 1968), while Knight (1921) and – following in his footsteps – Kirzner (1974) see the entrepreneur as the real producer of goods (with everybody else only providing resources for the process).

If we accept the view of those streams of economics that see the entrepreneur as a key resource (empirical evidence shows that entrepreneurial activity has an effect on economic growth, see van Stel et al. 2005), naturally the need arises to analyse the factors that influence the intensity and quality of entrepreneurial activity. The range of possible factors is very large. Mazzarol identifies the following nine components of the so-called entrepreneurial ecosystem: government policy, regulatory framework and infrastructure, funding and finance, culture, mentors, advisors and support system, universities, education and training, human capital and workforce, and local and global markets (Mazzarol, 2014, p. 9). This paper focuses on the role of culture and looks for an answer to the following question: to what extent do cultural differences detected among the young people of

the developed countries influence their entrepreneurial activity and intention?

LITERATURE REVIEW

Developed countries differ from each other both in terms of entrepreneurial activity (e.g. Ács et al. 2016), and in terms of cultural values (e.g. Hofstede 2001). It seems logical to assume that the two phenomena are related to each other.

Cultural Dimensions

Hofstede is one of the pioneers of cultural differences research. He distinguishes the following five national cultural dimensions (Hofstede 2001):
1. Power distance: the degree to which the less powerful members of a society accept and expect that power is distributed unequally.
2. Individualism or collectivism: the degree to which the identity of the members of the society is defined in terms of the individual or a certain group.
3. Masculinity: the degree to which gender roles are separated from each other, and whether the society is based on material rewards for success or is consensus-oriented.
4. Uncertainty avoidance: the degree to which the members of the society feel threatened and uncomfortable with unexpected and unforeseen events.
5. Long-term or short term-orientation: the degree to which the society prefers a future-oriented, innovative, pragmatic approach to one focusing on traditions.

In 1994 the GLOBE (Global Leadership & Organizational Behavior Effectiveness) project was started, partially based on Hofstede's work (House et al. 2004). GLOBE works with nine cultural dimensions (Bakacsi 2012), some of which are similar to Hofstede's, others of which can be interpreted as expansions of the original Hofstede dimensions (Hofstede himself added a sixth dimension, Indulgence, to his system):
1. Power distance: the degree to which members of an organization or society expect and agree that power should be stratified and concentrated at higher levels of an organization or government.
2. Uncertainty avoidance: the extent to which members of an organization or society strive to avoid uncertainty by relying on established social norms, rituals, and bureaucratic practices.
3. Institutional collectivism: is the degree to which organizational and societal institutional practices encourage and reward collective distribution of resources and collective action.
4. In-group collectivism: is the degree to which individuals express pride, loyalty, and cohesiveness in their organizations or families (GLOBE's Institutional and In-group collectivism are an expansion on and go

beyond of Hofstede's individualism-collectivism dimension).
5. Gender egalitarianism: the degree to which an organization or a society minimizes gender role differences while promoting gender equality.
6. Assertiveness: the degree to which individuals in organizations or society are assertive, confrontational, and aggressive in social relationships.
7. Performance orientation: the degree to which an organization or society encourages and rewards group members for performance improvement and excellence.
8. Humane orientation: the degree to which individuals in organizations or society encourages and rewards individuals for being fair, altruistic, friendly, generous, caring, and kind to others. (GLOBE's Gender egalitarianism, Assertiveness, Performance orientation, and Humane orientation are an expansion of and go way beyond of Hofstede's Masculinity/Femininity concept)
9. Future orientation: the degree to which individuals in organizations or societies engage in future oriented behaviours such as planning, investing in the future, and delaying individual or collective gratification (very similar to Hofstede's Long-term orientation) (House et al 2004, p 12).

These dimensions, whether Hofstede's or GLOBE's, should have an effect on entrepreneurial activity. Hayton et al. (2002), for instance, predict that entrepreneurial activity should be more common and popular in societies where people prefer risk taking and making autonomous decisions to conformity, group interest and traditions – in other words the society is characterised by Individualism, low Power distance and Uncertainty avoidance, and Masculinity.

Empirical studies usually confirm these assumptions; however, the relationships are typically found to be quite weak, and sometimes the direction of the relationship is the opposite of what we expect. Shane (1993) reported on a study that analysed the relationship between Hofstede's cultural dimensions and innovativeness in 33 countries. The relationships that he found showed that there is a positive correlation in case of Individualism and a negative one in case of Uncertainty avoidance and Power distance (high Power distance was found to be coupled with lower innovativeness). Davidsson and Wiklund (1997) measured the cultural values of individuals living in six regions of Sweden, and these values were compared to the number of new businesses registered in those regions. Davidsson (1995) did a similar study before that, when he compared the number of new businesses registered with a so-called entrepreneurial values index, an index comprised of several cultural values. Both studies found a weak but statistically significant correlation with such values as achievement motivation, locus of control, perceived risk, and change orientation.

Several studies have checked the relationship between national culture and the values of the entrepreneurs.

Mitchell et al. (2000) surveyed entrepreneurs and non-entrepreneurs in seven countries and concluded that Individualism and Power distance have a statistically significant association with the decision to start a business. Mueller and Thomas (2000) surveyed university students in nine countries, and again, they found that the entrepreneurial orientation is strongest in countries where Individualism is strong and Uncertainty avoidance is low. McGrath et al. (1992) conducted their survey among entrepreneurs and non-entrepreneurs in nine countries. They concluded that irrespective of their nationality, entrepreneurs are characterised with high Power distance, Individualism, and Masculinity, and with low Uncertainty avoidance.

Zhao et al. (2012) analysed the entrepreneurial activity of 42 countries using the cultural dimensions of the GLOBE project. In the study they controlled for the development level of the countries (using the GDP per capita data), and tested four indicators of entrepreneurial activity originally taken from the GEM project: early-stage entrepreneurship, established entrepreneurship, high-growth entrepreneurship, and high-innovation entrepreneurship. They found that Power distance, In-group collectivism, and Humane orientation help early-stage and established entrepreneurship in the low- and mid-income countries. In high-income countries, however, a high value of these characteristics lowers the value of the same indicators. They also manage to prove in their analysis that Uncertainty avoidance, Performance orientation, and Future orientation help high-growth and high-innovation entrepreneurship, especially in high-income countries. It is worth noting that, contrary to the studies mentioned above, Zhao et al. assume that there is a positive association between Uncertainty avoidance and both high-growth and high-innovation entrepreneurship. They argue that laying down clear rules fosters the efficient and structured operation of firms (Germany and Japan are mentioned as examples). Another argument is that highly structured firms may push more risk-tolerant and adventurous employees towards starting their own businesses. Their hypotheses were based on these arguments, but the study did not manage to find a statistically significant connection between Uncertainty avoidance and entrepreneurial activity.

Baliaeva et al. (2015) tested the relationship between Hofstede's dimensions and the entrepreneurial intentions of students on the GUESSS database (the very same database we use in this paper). They showed that the entrepreneurial intentions of the students are stronger in more individualistic societies and weaker in societies characterised with high Uncertainty avoidance.

Caution needs to be applied when evaluating the results of the empirical literature. Although there seems to be a connection, it is quite weak. It seems obvious that the national culture also has an effect on political and economic institutions, and those also influence the entrepreneurial activity. When attitudes related to the intention of starting a business are tested, a possible problem can arise from the fact that cultural characteristics are reflected in the survey answers (Hayton et al. 2002).

Entrepreneurial Activity and Entrepreneurial Intentions

Although both entrepreneurial activity and entrepreneurial intentions have been measured, a distinction needs to be made between the two, since often even the strongest intentions do not lead to action. But action without serious intentions is also very unlikely. Research on the possible determinants of entrepreneurial intentions is abundant. Some of the works stress the importance of education and especially the importance of learning by doing (Lackéus 2015; Valerio et al. 2014).

Among the important individual characteristics, the most important were found to be the willingness to take risk, the desire to be independent (Meager et al. 2003), and innovative thinking. Several studies address the issue of the social environment's role in the process of entrepreneurship. Autio and Wennberg (2010) argue that the norms and attitudes of the community have a fundamental influence on the behaviour of the entrepreneurs. National culture, as the previous subchapter depicted, also matters. It can affect individual characteristics (Thurik & Dejardin 2012; Thomas & Mueller 2000), but its direct effect on entrepreneurial statistics was also tested (Zhao et al. 2012; Shane et al. 1991). The regulatory framework and the financing system also matter.

Ajzen's theory of planned behaviour (1991) is a complex model that evaluates the effect of various factors detected at different levels (individual, communities, institutions). His model was tested on the GUESSS database in previous studies (Farkas & Gubik 2013; Gubik, 2016), but they did not check the relationship between the model's components and the cultural dimensions.
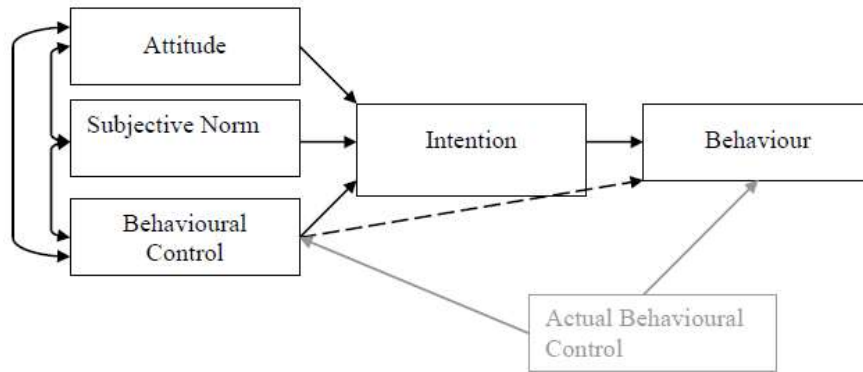
Source: Ajzen 2006

Figure 1. Factors shaping entrepreneurial intentions

The attitude towards starting a new business is the first component of the model. The more positive the individual's attitude is, the stronger the intention to start a new business. Subjective norms (the support of the social environment) also have a positive effect on the intention to start a new business. The more you think that your immediate environment likes the idea of you starting a new business, the more inclined you are to start it. Behavioural control, the third component, has a dual effect. On the one hand, the more you feel that you are in control of things, the more attractive the idea of starting a business becomes. On the other hand, self-efficacy also boosts the intention of starting a business. The more you feel that you have the skills and knowledge to run a business, the more comfortable you are with the idea of starting a business.

DATA AND METHODS

We used the GUESSS (Global University Entrepreneurial Spirit Students' Survey) database in our analysis. GUESSS was started in 2003 by the University of St. Gallen, and it surveys the entrepreneurial intentions and entrepreneurial activity of university students. It is being used in more and more countries: in 2013 it reached 109,000 students in 759 universities of 34 countries.

In our calculations we included those OECD members where the number of respondents was above 300. The distribution of respondents is shown in Table 1.

Table 1
Distribution of GUESSS respondents in selected countries

Country	Frequency	Percent
Australia	301	0.41
Austria	3,323	4.57
Belgium	368	0.51
Netherlands	8,141	11.19
France	555	0.76
Germany	10,567	14.53
Greece	391	0.54
Italy	7516	10.33
Poland	11,108	15.27
Portugal	303	0.42
Spain	9,924	13.64
Switzerland	6,032	8.29
Canada	335	0.46
United Kingdom	519	0.71
Japan	780	1.07
Hungary	8,500	11.68
Denmark	855	1.18
Slovenia	804	1.11
Estonia	1,231	1.69
Finland	597	0.82
Mexico	600	0.82
Total	72,750	100.00

Source: Own work

Comparative data on the cultural dimensions are available from the GLOBE project. They are, however, aggregated, and they include answers from the total population (aged between 18 and 64). GUESSS, on the other hand, only surveys students enrolled in an institute of higher education, and it gives access to disaggregated data. For this reason we chose to test only those cultural dimension that were surveyed by GUESSS (and not use the values from GLOBE), even though a quick test showed that there is no association between the age of the GUESSS respondents and their cultural values (suggesting that the cultural values of different age groups within a country are identical or very similar). Our choice meant that we could only test those dimensions that were integrated into the GUESSS survey, namely: In-group collectivism, Power distance, and Uncertainty avoidance. The questions used to measure these dimensions were the following.

In-Group Collectivism (IGC)
- In my society, children take pride in the individual accomplishments of their parents. (1-7 Likert scale, 1=strongly disagree, 7=strongly agree).
- In my society, parents take pride in the individual accomplishments of their children. (1-7 Likert scale, 1=strongly disagree, 7=strongly agree).
- In my society, aging parents generally live at home with their children. (1-7 Likert scale, 1=strongly disagree, 7=strongly agree).
- In my society, children generally live at home with their parents until they get married. (1-7 Likert scale, 1=strongly disagree, 7=strongly agree)

Power Distance (PD)
- In my society, rank and position in the hierarchy have special privileges. (1-7 Likert scale, 1=strongly disagree, 7=strongly agree).
- In my society, a person's influence is based primarily on…

  …ability and contribution to society

  …authority of one's position (Semantic differential scale, 1=first answer, 7=second answer)
- In my society, followers are expected to…

  …obey leaders without question

  …question leaders when in disagreement (Semantic differential scale, 1=first answer, 7=second answer)
- In my society, power is…

  …concentrated at the top

  …shared throughout society (Semantic differential scale, 1=first answer, 7=second answer)

Uncertainty Avoidance (UA)
- In my society, orderliness and consistency are stressed, even at the expense of experimentation and innovation. (1-7 Likert scale, 1=strongly disagree, 7=strongly agree).
- In my society, most people lead highly structured lives with few unexpected events. (1-7 Likert scale, 1=strongly disagree, 7=strongly agree).
- In my society, societal requirements and instructions are spelled out in detail so citizens know what they are expected to do. (1-7 Likert scale, 1=strongly disagree, 7=strongly agree)
- My society has rules or laws to cover…

  …almost all situations

  …very few situations (Semantic differential scale, 1=first answer, 7=second answer)

To measure entrepreneurial activity and entrepreneurial intentions the following questions were used:

- Are you currently trying to start your own business / to become self-employed? (yes/no)
- Are you already running your own business / are you already self-employed? (yes/no)

To measure the elements of the theory of planned behaviour we calculated the mean values of the following variables (1-7 Likert scale, 1=strongly disagree, 7=strongly agree)

Entrepreneurial intention
- I am ready to do anything to be an entrepreneur.
- My professional goal is to become an entrepreneur.
- I will make every effort to start and run my own firm.
- I am determined to create a firm in the future.
- I have very seriously thought of starting a firm.
- I have the strong intention to start a firm someday.

Attitudes
- Being an entrepreneur implies more advantages than disadvantages to me.
- A career as entrepreneur is attractive for me.
- If I had the opportunity and resources, I would become an entrepreneur.
- Being an entrepreneur would entail great satisfaction for me.
- Among various options, I would rather become an entrepreneur.

Perceived behavioural control
- I am usually able to protect my personal interests.
- When I make plans, I am almost certain to make them work.
- I can pretty much determine what will happen in my life.

Subjective norms
- If you were to pursue a career as an entrepreneur, how would people in your environment react? (Your close family/Your friends/Your fellow students).

RESULTS

Figure 2 shows the entrepreneurial activity and intentions of the students in the selected 21 OECD countries. The differences are visible in the case of both existing and nascent businesses. In this paper we show the extent to which these differences can be explained with cultural differences. First we focus on the entrepreneurial activity (students who had already started businesses), then we analyse the entrepreneurial intentions and the career plans of the students.
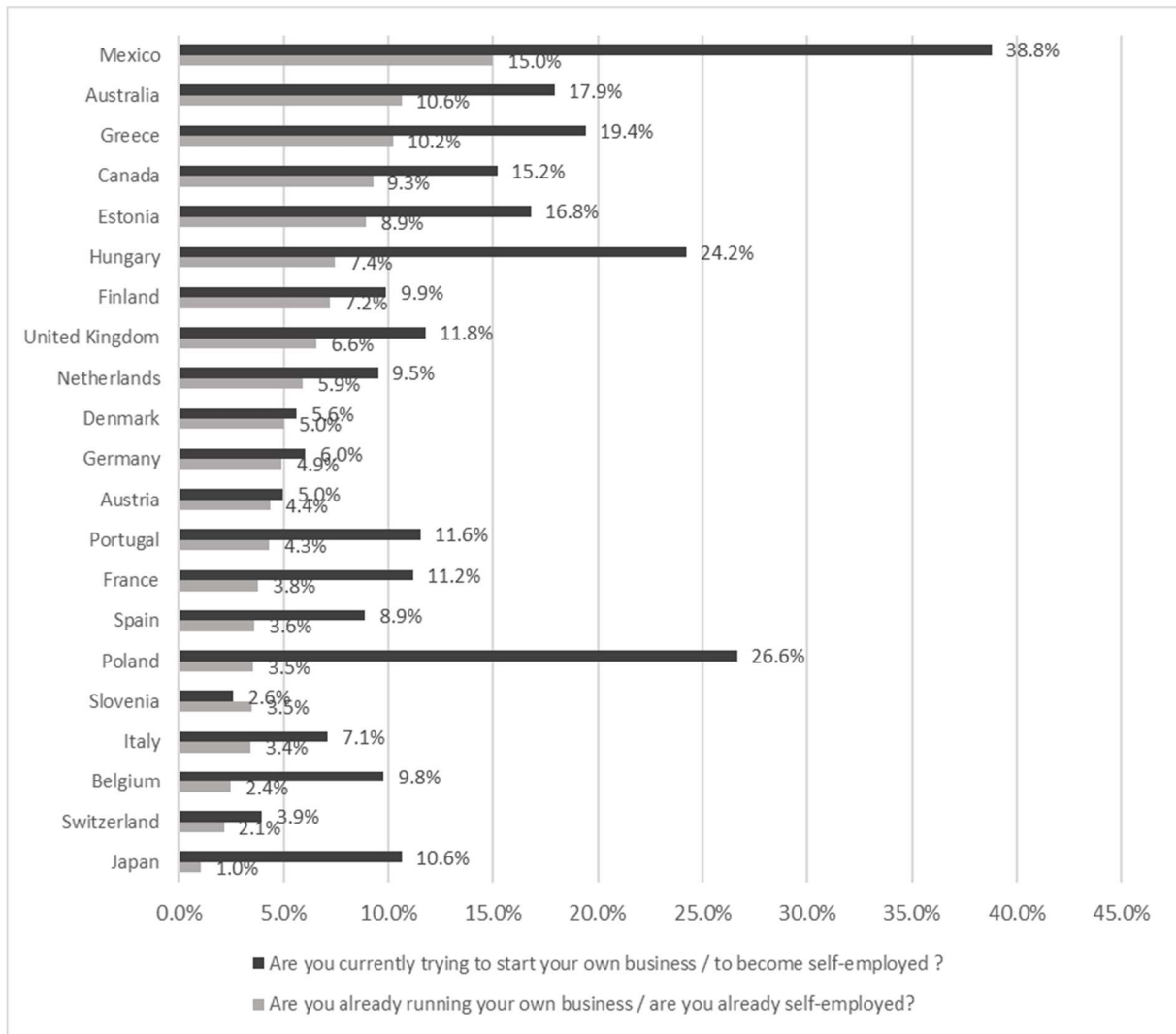
Source: Own calculation, N=72,750.

*Figure 2. The entrepreneurial activity and intentions of students*

The paper breaks down the results at an individual and at a country level. In the first case the individual is the unit of the analysis. We test the relationship between the answers given by individuals to the cultural variables and to the entrepreneurial variables. With this approach we can show the connection among the entrepreneurial activity, entrepreneurial intentions, career plans, and cultural values of every respondent. In the second case the countries are the unit of analysis. An arithmetic mean is calculated for every country and every variable, using the individual scores of all respondents belonging to the country. This way we can detect the typical differences among countries in terms of entrepreneurship and cultural characteristics. The stochastic relationships among country-level data are also analysed in the paper.

Entrepreneurial Activity and Cultural Dimensions

We start the analysis by checking whether differences in entrepreneurial activity can be attributed to cultural differences.

Individual data

There are no significant differences on the individual level. Entrepreneur and non-entrepreneur students are not significantly different in how they see and evaluate the culture of their societies, at least not in the case of the three measured dimensions. The entrepreneurial activity is mostly determined by the family background and the demographical variables (gender, age) (Gubik, 2015; Farkas & Gubik, 2016); these, however, are not discussed in this paper.
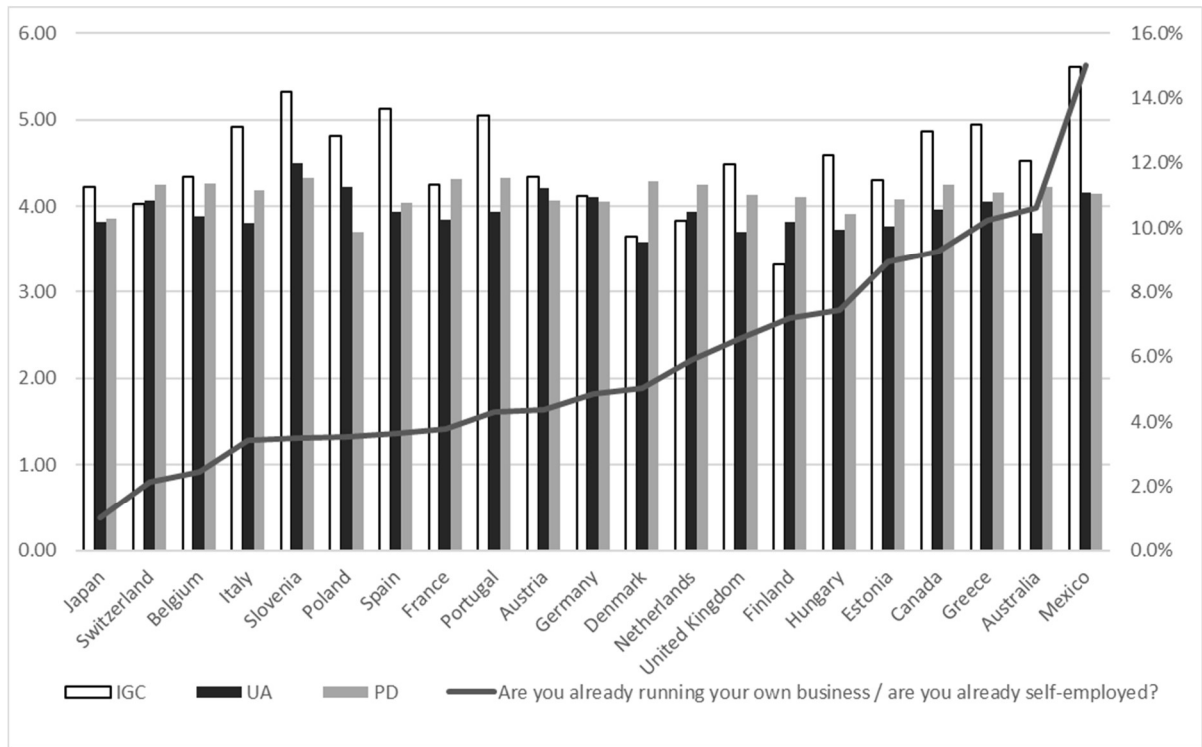
Source: Own calculation, N=72,750.

Figure 3. Values of cultural dimensions and the ratio of students running a business (individual level)
IGC: In-group collectivism; PD: Power distance; UA: Uncertainty avoidance

Aggregated data

Figure 3 suggests that the three cultural dimensions we were able to measure using the GUESSS data do not directly influence the entrepreneurial activity. Only in case of In-group collectivism were we able to detect a statistically significant association (Pearson's R=0.455; p=0.038). If we go beyond the GLOBE dimensions, the two GUESSS factors that had a significant relationship with the entrepreneurial activity were differences in risk related to entrepreneurship (Pearson's R=0.555; p=0.009) and national differences in the willingness to take risks (Pearson's R=0.486; p=0.025).

Entrepreneurial Intentions and Cultural Dimensions

Individual data

A distinctive pattern can be identified for entrepreneurial intentions. In-group collectivism is positively associated with entrepreneurial intentions, as well as with all three components of the Ajzen model (attitudes, behavioural control, and subjective norms). Pearson's R has a value between 0.124 and 0.241,

suggesting a weak relationship. A similarly weak but positive association was found in case of Uncertainty avoidance (with the exception of subjective norms, where the relationship is not statistically significant). The highest Pearson's R we found here was 0.133 (p=0.000), for behavioural control. Power distance did not have a significant effect on the individual differences in entrepreneurial intentions.

Our results show that respondents (irrespective of their nationality) rated the In-group collectivism and the Uncertainty avoidance of their society more highly if their entrepreneurial intentions were higher.

Aggregated data

An average can be calculated for the components of Ajzen's model of planned behaviour. We can find out, for example, whether the attitude to start a new business is lower or higher in one country compared to the others. This takes us away from the original goal and use of Ajzen's model, but by calculating the national averages for the components, we can test whether they are correlated in any way with the national values of the cultural dimensions. We found no similar analysis in the literature. The results of the calculations are shown in Table 2.

Table 2
Relationship among the components of the theory of planned behavior
and the GLOBE dimensions (correlation matrix).

	1	2	3	4	5	6	7
1 Entrepreneurial intention	1						
2 Attitudes	.978** 0.000	1					
3 Perceived behaviour control	.551** 0.010	.498* 0.022	1				
4 Subjective norms	.715** 0.000	.679** 0.001	.777** 0.000	1			
5 In-Group Collectivism	.762** 0.000	.776** 0.000	0.369 0.099	.474* 0.030	1		
6 Uncertainty Avoidance	0.217 0.344	0.224 0.330	.486* 0.025	0.216 0.347	.472* 0.031	1	
7 Power Distance	-0.055 0.812	-0.080 0.731	0.052 0.822	0.343 0.128	-0.030 0.896	-0.050 0.830	1

Source: own calculation, N=21

Power distance, again, is not related to any of the model's components. The aggregated data confirm that the national differences in entrepreneurial intentions in the 21 countries analysed are not affected by the Power distance. Uncertainty avoidance does have some effect, however it is only significantly associated with the behavioural control. The relationship is positive, suggesting that the more important norms and rules are in reducing uncertainty in a country, the more confident the members of the society are in carrying out a given task.

In-group collectivism is positively correlated with attitudes, and subjective norms, as well as with entrepreneurial intentions. The strongest relationship was found for attitudes and entrepreneurial intentions (Pearson's R is above 0.7), but the relationship is moderately strong and statistically significant with subjective norms. In-group collectivism is a sign of a cohesive and loyal society (Bakacsi 2008), which also leads to higher entrepreneurial intentions, according to our analysis.

The positive relationship between In-group collectivism and entrepreneurial intentions contradicts many results found in the literature. In order to better understand our results, we checked the career plans of the students. We found the highest In-group collectivism values among students who planned to take over a family business (IGC score =4.97). A somewhat lower IGC score was found for students who planned to take over a business led by someone else (4.7), but even those students who planned to start their own business had a higher than average IGC score (4.61). In-group collectivism values varied for students aiming for a career as an employee, too: those who planned to work for smaller-sized enterprises had higher IGC scores (4.55), while career plans that are more impersonal (working in the public sector or for a large corporation) were paired with the lowest IGC scores.

CONCLUSION AND FURTHER RESEARCH

In our study we found the strongest relationship between In-group collectivism and entrepreneurial intentions. The effect of In-group collectivism was tested both with the use of GLOBE-like country averages and at the individual level. The association was positive in both cases. This result supports the line of research that suggests that belonging to a smaller, closed group strengthens entrepreneurial intentions. One of the explanations for this phenomenon is that people with high In-group collectivism values would rather plan their career at a smaller, friendly family business than at an impersonal large corporation. Some tests run on our database back this argument. Respondent with the highest In-group collectivism scores are those whose first career choice is to become an entrepreneur (with students planning to take over a family business having the highest scores of all). They are followed by those who plan to work for a small business, and after that come the ones who would like to work for a middle-sized company. Respondents with more impersonal career plans (working in the public sector or for a large company) have the lowest IGC score. The connection between career plans and In-group collectivism can be detected on the country level as well, which provides further support for our explanation.

Uncertainty avoidance was the other GLOBE dimension that was found to have a statistically significant effect on entrepreneurial intentions; namely, it is positively associated with Ajzen's behavioural control. The relationship is moderately strong on the country level, and weaker on the individual level. Once again, there is no agreement in the literature about the direction of the relationship. We found that high Uncertainty avoidance is positively correlated with high behavioural control. Given that behavioural control is a determinant of entrepreneurial intentions, Uncertainty avoidance indirectly influences entrepreneurial intentions as well, although no direct evidence of this was found in our analysis (no connection was found on the country level, and only a weak one on the individual level). Societies characterised with high Uncertainty avoidance have an institutional environment that makes socioeconomic relations more predictable, which apparently makes individuals feel more in control (and this is what behavioural control measures).

Although we based our study on the GLOBE dimensions, we could only test three of them, because these were the only ones addressed by questions in the GUESSS survey. Our results are also limited by the fact that only 28 OECD members took part in the GUESSS survey in 2013, and the number of respondents varies significantly among countries (as shown in Table 1). Since the number of respondents was below 300 in 7 OECD members, the tests were run on results from the other 21 countries.

The results would be more robust if more countries were tested, and if the distribution of respondents was more proportionate (primarily in terms of absolute numbers, and also in terms of per population ratios). The literature focuses on the three dimensions tested in this paper, but it also suggests that the involvement of other dimensions such as Future orientation or Performance orientation could strengthen our results. Promising results could be drawn from a cluster analysis (clustering countries according to their cultural characteristics), and from case studies that present the institutional background of countries with higher entrepreneurial activity.

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Factors Leading to Audit Expectation Gap: An Empirical Study in a Hungarian Context

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SUMMARY

The audit expectation gap has preoccupied the finance and accounting profession for a long time. A great number of studies have been performed on this issue and attempts have been made to provide an accurate definition of the audit expectation gap, model this concept and assess the possibilities of its narrowing. Therefore, this study is aimed at identifying the causes and the typical composition of the audit expectation gap in Hungary to enable us to find appropriate combinations of solutions for narrowing the expectation gap. The primary source of the empirical study was generated from a self-structured questionnaire, which was filled by groups involved in an audit were identified as possible target groups of the questionnaire survey.
Keywords: financial audit, audit expectation gap
Journal of Economic Literature (JEL) code: M420
DOI: http://dx.doi.org/10.18096/TMP.2017.02.02

INTRODUCTION, RESEARCH QUESTIONS

The audit expectation gap is a topic that has preoccupied the finance and accounting profession for decades. A great number of studies have focused on this issue and attempted to provide an accurate definition of the audit expectation gap, to model it and to assess ways to narrow the gap. Also, numerous studies investigate the existence of an audit expectation gap in several researched regions. The objectives of the empirical studies on the structure and nature of the audit expectation gap are to identify the existing and expected roles and responsibilities of auditors as well as the factors contributing to the existence of the audit expectation gap in a society.

Because economic, social and legal factors of a specific country have a considerable impact on research results, even distorting results, the findings of international studies on the audit expectation gap cannot directly be applied to a particular country without further investigation. Nor can they be applied in Hungary. Therefore, this study aims to identify the causes and the typical composition of the audit expectation gap in Hungary. This should allow us to find appropriate combinations of solutions for narrowing the expectation gap.

Also, through an analysis of the literature – Hungarian and in particular, international literature on audit expectation gap – my study aims at gaining a deep insight into the theoretical background of this empirical research in sufficient detail. I attempt to create a Hungarian model of the audit expectation gap and conduct an empirical analysis of important areas of this gap, which are closely related to expectations towards auditors and their performance. Such areas are:

➢ the information content of the audit report,
➢ usability of the audit report in decision-making processes and
➢ the perception of auditors' independence in Hungary.

PROCESS AND FINDINGS OF THE RESEARCH

I formulated eight hypotheses in the initial phase of the work based on research and identification of encountered problems.

After the presentation of national and international regulation of the audit, the concept, nature and structure of audit expectation gap, major studies on the topic and the results were presented in my dissertation.

After developing the theoretical background, the definition of empirical research methods, research design

and implementation has been demonstrated, then the practical empirical testing of hypotheses was conducted.

Based on the results of literature research and empirical survey I formulated my research findings, which hopefully are new and practically useful results for the stakeholders of audit.

In order to support the hypotheses about the audit expectation gap formulated in my study, it was critical to conduct a detailed analysis of the existing audit systems and the international and Hungarian national standards to enable me to identify any regulatory inconsistencies or overlaps hidden in legislation.

The aim and the scope of audit based on the legislative compliance obligations as well as the auditors' responsibilities and duties are clearly defined in the Hungarian legislation.

The detailed analyses of the relevant audit rules showed that the legislation on auditing has several overlapping topics. The overlaps occur in audit topics stipulated in various rules on auditing and in rules mostly with the same content or with a supplementing content, which makes it difficult for practitioners acting in good faith to interpret the regulatory requirements.

In addition, the analysis of the statement about the legislation on auditing – closely linked with this – and the standards set and continuously updated by professional organisations provide bases for drawing further conclusions. The key audit areas can be identified. The knowledge and the interpretation of these areas as well as the appropriate application of the audit results are fundamental for performing auditing activities.

In order to provide clarity in the interpretation of audit expectations, the following audit issues are to be addressed and appropriately communicated towards the groups interested in auditing:

➢ auditors' duties and tasks;
➢ auditors' assurance, reliability and relevance;
➢ auditors' responsibilities;
➢ auditors' independence, objectivity, neutrality and conflicts of interest;
➢ correct interpretation of the terminology, information content, up-to-datedness of audit reports and their usability in decision-making processes.

After reviewing the legislation and standards on auditing, my study focused on the literature and research findings related to the audit expectation gap. The definition given to the audit expectation gap by scientists has undergone considerable evolution over time. The concept of expectation asymmetry in audit was first formulated by Liggio (1974), who defined it as the difference between the levels of 'expected performance as envisioned by auditors and by users of financial statements'. In 1978, Liggio's definition was further extended by the Cohen Commission (CAR), which defined it as a gap that 'may exist between what the public expects or needs and what auditors can and should reasonably expect to accomplish' (Cohen Commission on Auditors Responsibilities 1978).

Porter considered Liggio's (1974) and CAR's (1978) definitions to be too narrow because they failed to realise that auditors might not accomplish the expected performance level (Liggio 1994), or the level they can or should reasonably expect to accomplish, as defined by CAR. Based on the empirical research, she preferred and suggested adopting the term 'audit expectation-performance gap' because of the recent criticism of auditors. She defined the gap as the difference between society's expectations of auditors and society's perceptions of auditors' performance. Porter distinguished two major components of the audit expectation-performance gap, as you can see below in the figure 1. First, the reasonableness gap, which is the difference between what the public expects of auditors to achieve and what they can reasonably be expected to accomplish. Second, the performance gap, which is the difference between what the public can reasonably expect auditors to accomplish and what auditors are perceived to achieve. The performance gap was further subdivided into deficiencies in standards (regulations), that is, the difference between what can reasonably be expected of auditors and auditors' existing duties and auditors' deficient performance, that is, the difference between the expected standard of performance of auditors' existing duties and auditors' perceived performance (Porter 1993).
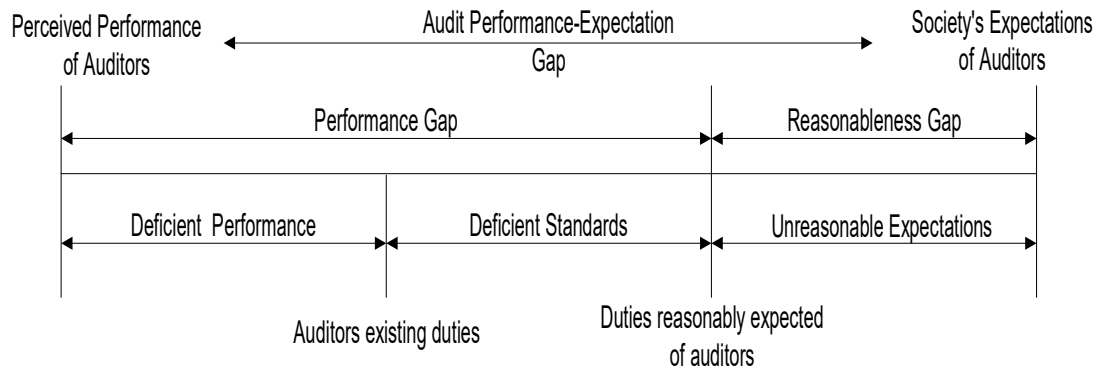
Source: Porter 1993, p. 2.

Figure 1. Structure of the audit performance-expectation gap

The definition of the audit expectation gap has undergone considerable evolution over time. However, Porter's definition is considered the basic definition and the research into the gap shifted from the definition towards the nature, structure and causes of the audit expectation gap and audit expectation-performance gap as well as towards identifying possibilities for narrowing the gap.

Based on a review of the research, Salehi (2007) summarised some components of the causes of the audit expectation gap as follows, showed in the figure 2.

As can be seen from the overview of the literature available on the audit expectation gap, researchers have already identified a number of causes for this gap while conducting research into this issue. Although valid general conclusions cannot be drawn from the obtained research results because of the economic, religious and regulatory differences and derogations in specific societies, some typical, common components can be identified.

Research results have confirmed the existence of the audit expectation gap in the United States of America, the United Kingdom, Australia, New Zealand, the South African Republic, Singapore, Denmark, Malaysia, Thailand, China, Egypt, Lebanon, Saudi Arabia, India, Iran, and the Netherlands. The map in figure 3 shows the countries where surveys on audit expectation gap have been conducted. (For a full list of the studies shown in the figure, see http://193.6.1.94:9080/JaDoX_Portlets/documents/document_23030_section_19090.pdf.)

Perceived performance ⟷ Gap ⟷ Society's expectation of auditors

Performance gap	Standard gap	Reasonableness gap		
Reasonable expectation of auditor performance	Reasonable expectation of standard	Unreasonable expectations		
		Over-expectation of audit performance	Over-expectation of standards	Miscommunication of users
Reasons for Audit Expectation Gap				
➢ Non-audit service practicing by auditors ➢ Self-interest and economic benefits of auditors ➢ Unqualified auditor ➢ Dependent auditor ➢ Miscommunication of auditors	➢ Lack of sufficient standards ➢ Existing insufficient standards regarding auditor responsibilities for detection of fraud and illegal acts	➢ Misunderstanding of users ➢ Over-expectations of users to auditor performances ➢ Misinterpretation of users ➢ Unawareness of users of audit responsibilities and limitations ➢ Users' over-expectations of standards		

Source: Salehi, 2007

Figure 2. Reasons for the audit expectation gap
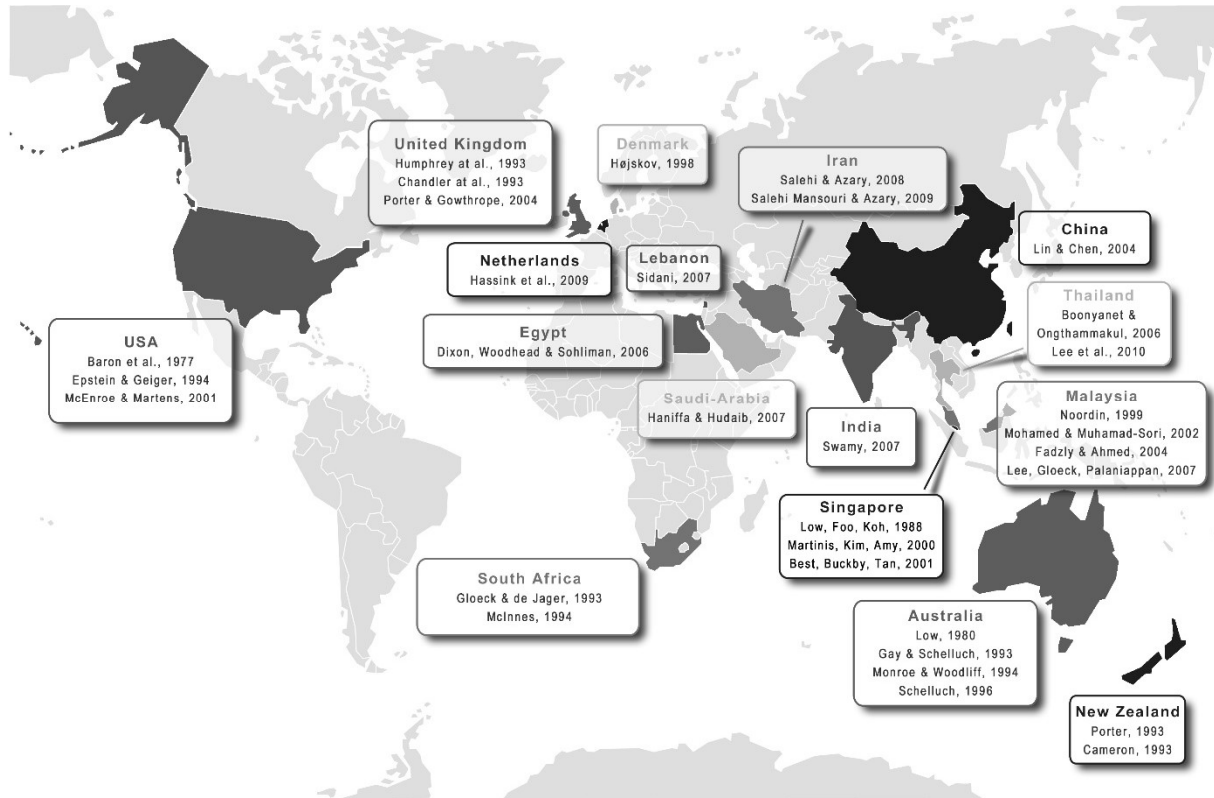
Source: author's own elaboration based on the reviewed literature

Figure 3. Studies confirming the existence of the audit expectation gap

The review of the prior literature reveals that after identifying the typical components of the audit expectation gap, the studies conducted recently in different economic and political environment and in various countries and societies have focused on the extent and composition of the gap. Since the studies have found evidence of the expectation gap in different countries, we can speak of a global audit expectation gap.

Most researchers agree that the audit expectation gap encompasses several issues. The greatest emphasis is laid on the auditors' role and responsibility (Porter 1993; Fadzly & Ahmad 2004; Dixon et al. 2006), nature and meaning of the message communicated by an audit report (Monroe & Woodliff 1994; Gay et al. 1998) and auditor's independence (Sweeney, 1997; Lin & Chen 2004; Alleyne et al. 2006).

Identifying components of the audit expectation gap is critical because problems arising from different components require different solutions. Possible tools to reduce the gap can be assigned only after the audit expectation gap and its components in a specific society have been identified.

The figure 4 summarises possible tools that have been identified based on research results and can narrow some components of the audit expectation gap.
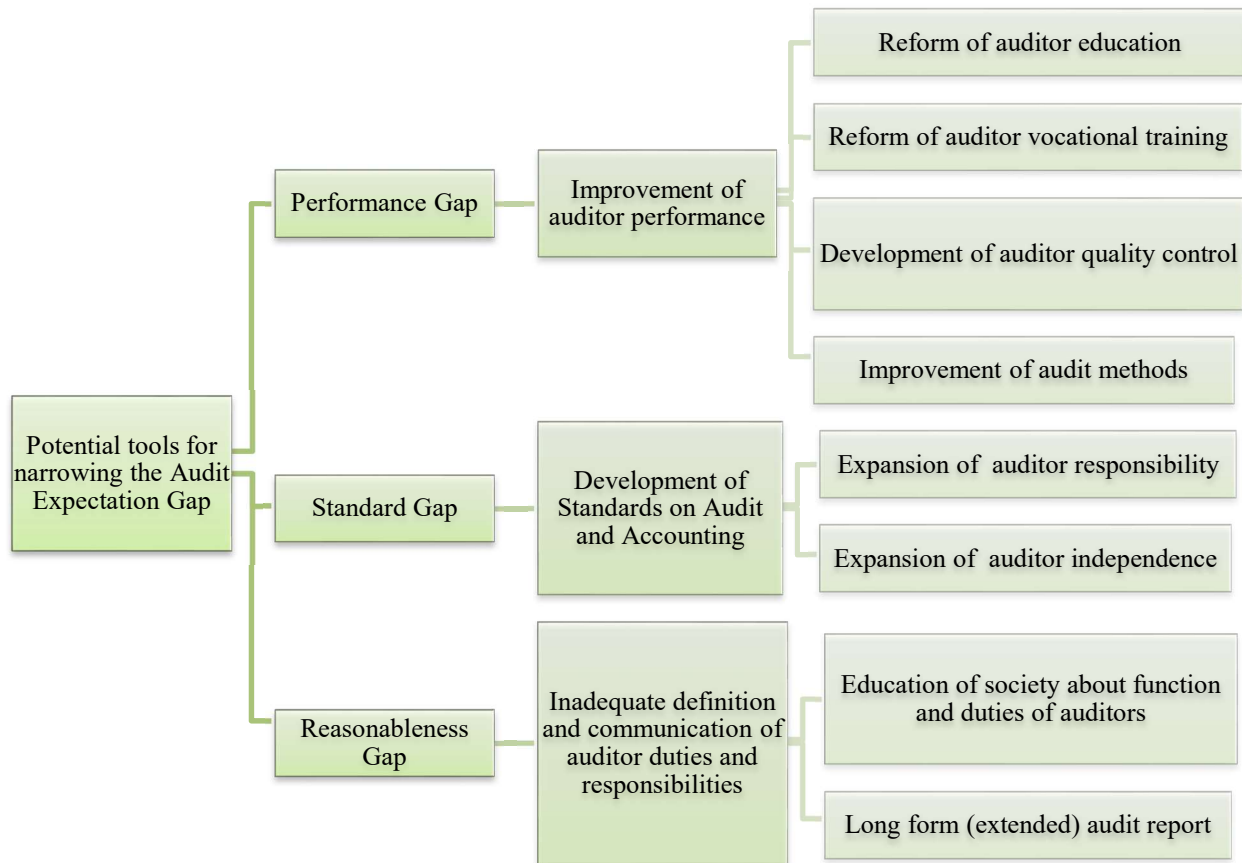
Source: author's own elaboration based on the reviewed literature

Figure 4. Potential tools for narrowing the audit expectation gap based on the results of former research studies

The hypotheses formulated based on the reviewed literature and the prior research findings of other studies on the audit expectation gap are considered supported and accepted as follows: Studies carried out on providing a definition, on modeling and on seeking the possibilities of narrowing the audit expectation gap are in the focus of attention in countries at different stages of economic development and with different audit regulatory systems.

The aim of the quantitative research conducted by primary research is to design a Hungarian model of the audit expectation gap, which focuses on the analyses of four coherent sets of questions, such as:

➢ Is there an audit expectation gap in Hungary in terms of the selected issues?
➢ What are the causes of evolution of the audit expectation gap?
➢ What are the structure and the composition of the audit expectation gap in Hungary?
➢ What are the possibilities for narrowing the audit expectation gap?

In order to support the answers for the questions, active players of economic life were invited to provide information on these issues. The primary source of this empirical study was generated from a well-structured questionnaire.

The reviewed literature revealed that while conducting analyses of the audit expectation gap, researchers surveyed a wide range of users of financial statements such as investors (Fadzly & Ahmad 2004), bankers (Best et al. 2001), financial directors (Haniffa & Hudaib 2007), senior managers (Alleyne & Howard 2005), investment analysts (Haniffa &Hudaib 2007; Humphrey et al. 1993), educators (Lin & Chen 2004), government officials (Haniffa & Hudaib 2007; Lin & Chen 2004), brokers (Fadzly & Ahmad 2004), credit managers (Haniffa & Hudaib 2007), judges (Lowe 1994) and jurors (Frank et al. 2001).

In the process of the research design, groups involved in an audit were identified as possible target groups of the questionnaire survey. Within the framework of this approach, and from the population of interest groups consisting of preparers, analysts and beneficiaries of financial statements, a sub-population was selected whose opinion seemed to be valuable and suitable for analysis.

The research hypotheses about the audit expectation gap were formulated after the available literature had been synthesised. The hypotheses were empirically tested by evaluating the findings of the collected survey responses, which reflected the opinion of the groups interested in auditing.

While evaluating the responses regarding the perception of the audit expectation gap, the study also seeks for evidence of the gap. If the responses reveal that there is an audit expectation gap in Hungary, the study has to focus on investigating the causes of its evolution and widening in the country. This is because the causes have to be directly mapped first. The respondents choose from the provided possible causes, which are checked later with the help of indirect means when the responses related to audit functions, usability and performance are evaluated.

The conducted analysis failed to fully support the initial hypotheses. However, the research findings enabled me to formulate the following hypothesis: the groups interested in financial statements show no significant difference in the perception of the existence of the audit expectation gap in Hungary. Each interest group attributes the audit expectation gap to corporate crises and to audit and report scandals, which results in new professional expectations and responsibilities of the auditing profession. However, they do not consider non-audit services provided by auditors to be a common cause. Also, the interest groups attribute the audit expectation gap to misunderstanding and ignorance of audit users about auditors' responsibilities and audit limitations as well as to unreasonable expectations of audit users about audit functions. There is a significant difference between the perceptions of different groups regarding the extent to which these factors contribute to the evolution of the audit expectation gap.

Among the many theories that look at the audit expectation gap discussed in in my thesis, Porter's model of 'audit performance-expectation gap' stands out for its comprehensiveness. My study attempts to validate its amended version in Hungary by a primary analysis. This is because the audit expectation gap can be the result of not only performance and reasonableness reasons, but also the result of false interpretation of specific audit terminology by groups with an interest in audits. This study assumes that this is closely linked with the conclusions drawn from audit results stipulated in the standards, which auditors comply with, however, the interest groups misinterpret their meaning.

In order to achieve the research objectives – namely identifying the causes of the audit expectation gap and typical components of its nature – an analysis of interest group opinions was conducted, which could prove the existence of performance, standard, reasonableness and improper interpretation gaps. This depended on whether the specific responsibility of the auditor was reasonably expected to exist, not reasonably expected to exist or improperly interpreted responsibility by the groups involved.

The process of defining the audit expectation gap in Hungary was modelled as follows:
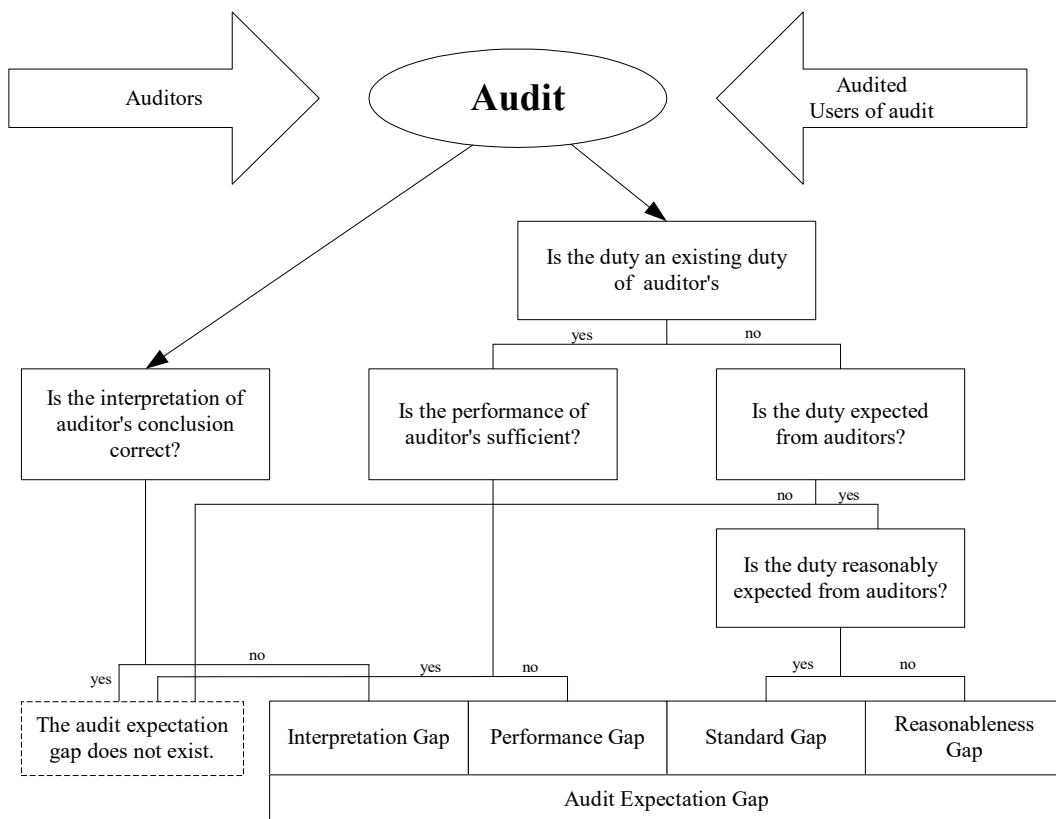
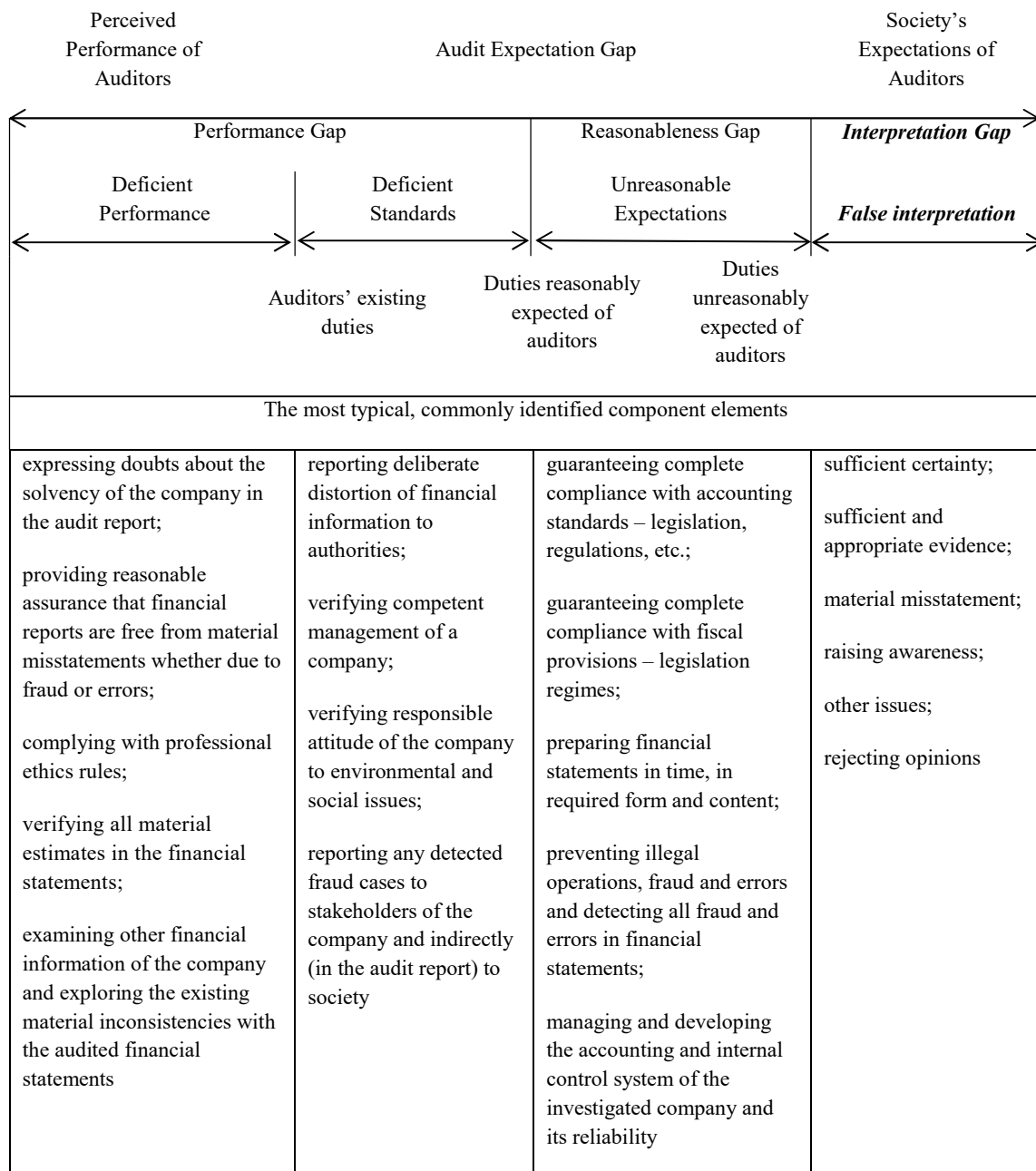Source: author's own elaboration based on Porter, 1993

Figure 5. Process of determining the audit expectation gap

Based on the analysis of responses, the specific factors that contribute to the existence of certain components of the audit expectation gap may be presented.

In the process of defining the audit expectation gap on the basis of the model illustrated in Figure 5 and evaluating the responses of the interest groups, a numerical criterion is to be established to enable us to clarify what position a specific group takes regarding the above-listed issues. The reviewed literature offers several solutions to establishing a numerical criterion. Whilst examining the audit expectation gap and identifying the position of the interest groups on this issue, Porter (1993) asserts that if 20% of respondents considered that a duty was reasonably expected and should be performed, it was relevant. Troberg &Viitanen (1999) in their studies suggested a higher rate of 25%, which 'constituted a qualified minority'. This study adopts Troberg &Viitanen's (1999) numerical criterion.

After a statistical evaluation of the responses to the questionnaire and further developing Porter's model of the structure of the audit expectation gap, this study modelled the audit expectation gap in the figure 6. The most typical factors characterising the component elements of the audit expectation gap and providing a basis for identifying the measures contributing to narrowing the gap in Hungary are illustrated in the model.

Perceived Performance of Auditors		Audit Expectation Gap		Society's Expectations of Auditors
Performance Gap		Reasonableness Gap		*Interpretation Gap*
Deficient Performance	Deficient Standards	Unreasonable Expectations		*False interpretation*
	Auditors' existing duties	Duties reasonably expected of auditors	Duties unreasonably expected of auditors	
The most typical, commonly identified component elements				
expressing doubts about the solvency of the company in the audit report; providing reasonable assurance that financial reports are free from material misstatements whether due to fraud or errors; complying with professional ethics rules; verifying all material estimates in the financial statements; examining other financial information of the company and exploring the existing material inconsistencies with the audited financial statements	reporting deliberate distortion of financial information to authorities; verifying competent management of a company; verifying responsible attitude of the company to environmental and social issues; reporting any detected fraud cases to stakeholders of the company and indirectly (in the audit report) to society	guaranteeing complete compliance with accounting standards – legislation, regulations, etc.; guaranteeing complete compliance with fiscal provisions – legislation regimes; preparing financial statements in time, in required form and content; preventing illegal operations, fraud and errors and detecting all fraud and errors in financial statements; managing and developing the accounting and internal control system of the investigated company and its reliability		sufficient certainty; sufficient and appropriate evidence; material misstatement; raising awareness; other issues; rejecting opinions

Source: author's own elaboration

Figure 6. Structure of audit expectation gap in Hungary
by the perception of audit interest parties

The conducted analyses support the hypotheses of my research study. Hence, the following conclusion can be drawn on the basis of the findings this research: In Hungary the audit expectation gap stems from the combination of the deficient performance of auditors, deficiencies in audit standards, unreasonable expectations and false interpretations of audit functions. Mapping these factors enables us to identify the possible tools required for narrowing the gap.

The auditors' existing and expected role in fraud prevention and detection is a characteristic element in the analysis of the audit expectation gap. Numerous studies conducted in various countries have revealed the perceived role of auditors in fraud and deficiency detection, as perceived by interest groups. (Humphrey et al. 1993; Epstein & Geiger 1994; Lowe 1994; Best et al. 2001; Frank et al., 2001; McEnroe & Martens 2001; Fadzly & Ahmad 2004; Lin & Chen 2004; Alleyne & Howard 2005; Dixon et al. 2006; Haniffa & Hudaib 2007, Sidani 2007).

In order to obtain a more comprehensive picture of the beliefs of interest groups and to support the formulated hypothesis, the responses to questions related to auditors' responsibilities for prevention of audit fraud and other illegal acts are evaluated. The findings reveal that audit users have the highest demand and auditors have the lowest demand for modification of the existing audit regulations and standards in terms of auditors' responsibilities for prevention of audit fraud and other illegal acts.

Whilst identifying the characteristic components of the audit expectation gap in Hungary, my study focuses on three factors related to prevention, detection and communication of detected audit fraud and expected responsibilities. The auditors' opinions reveal that they are unwilling to take responsibility for reporting their client fraud and publishing this in an audit report.

Analyis results do not fully support the initial hypotheses. However, on the basis of the research findings the following hypothesis could be formulated: from the groups having an interest in audits, the audited and audit users expect greater responsibilities of auditors for fraud prevention and detection within an economic entity and for communication of the detected fraud.

Apart from the above considerations, the aim of the questionnaire survey was to conduct empirical analyses of other key aspects of auditing, which are closely related to expectations towards auditors and their expected performance, such as:

➢ legal content and usability of audit reports and
➢ perception of auditors' independence in Hungary.

Respondents were asked to judge the quality of the information in audit reports and the usefulness of auditors' opinions in making investment decisions.

The analysis shows that that the investigated factors are independent of each other. Belonging to a specific group is independent of perceptions about the usefulness of audit reports. On the other hand, the results clearly show that a significant majority of respondents with firm opinions in each group think that both the information in the audit reports and the rating of the audit clause have an impact on investment decisions and increase the reliability of audit data and information. However, neither of the previous is enough to support the investment decisions.

Based on the finding that the information contained in audit reports is insufficient to support investment decisions I aimed to determine the scope of information used for increasing usefulness of audit reports, according to perceptions of interest groups. Thus, the questionnaire included an item on whether the usefulness of audit reports in investment decisions could be increased by providing supplementary information in audit reports.

The conducted analysis shows that financial statements contain potential supplementary information. The overwhelming majority of interested groups believe that if this supplementary information were published in audit reports, the usability of audit reports in making investment decisions would considerably increase. However, also it is also important to take into consideration the risks of publishing supplementary information in audit reports. Information on audit procedures, determining the materiality threshold, significant accounting estimates and introducing the challenges experienced in the course of audit may also contribute to misinterpretation of audit reports without providing any extra benefits.

Based on the interested groups' opinion, the usefulness of audit reports can further be enhanced by improving its content value in the following way:

➢ auditors express their opinion about entity's ability to continue as a going concern;
➢ auditors declare that they have not received all the necessary information and explanation enabling them to form their opinion about the audited financial statement
➢ auditors use terminology that everybody can understand, because current audit reports fail to meet this need;
➢ auditors express their opinion about the efficiency and efficacy of accounting and other internal controls.

Auditor Independence

Independent audit is critical both from regulatory aspects and practical aspects. It has a dual character, since auditors need to form an objective and usable opinion about the financial statement prepared by entities that shortlisted and hired them. This study investigated different elements of the respondents' perception of audit independence. The respondents were asked to indicate what they meant by independent audit (they were allowed to choose as many elements as they wished).
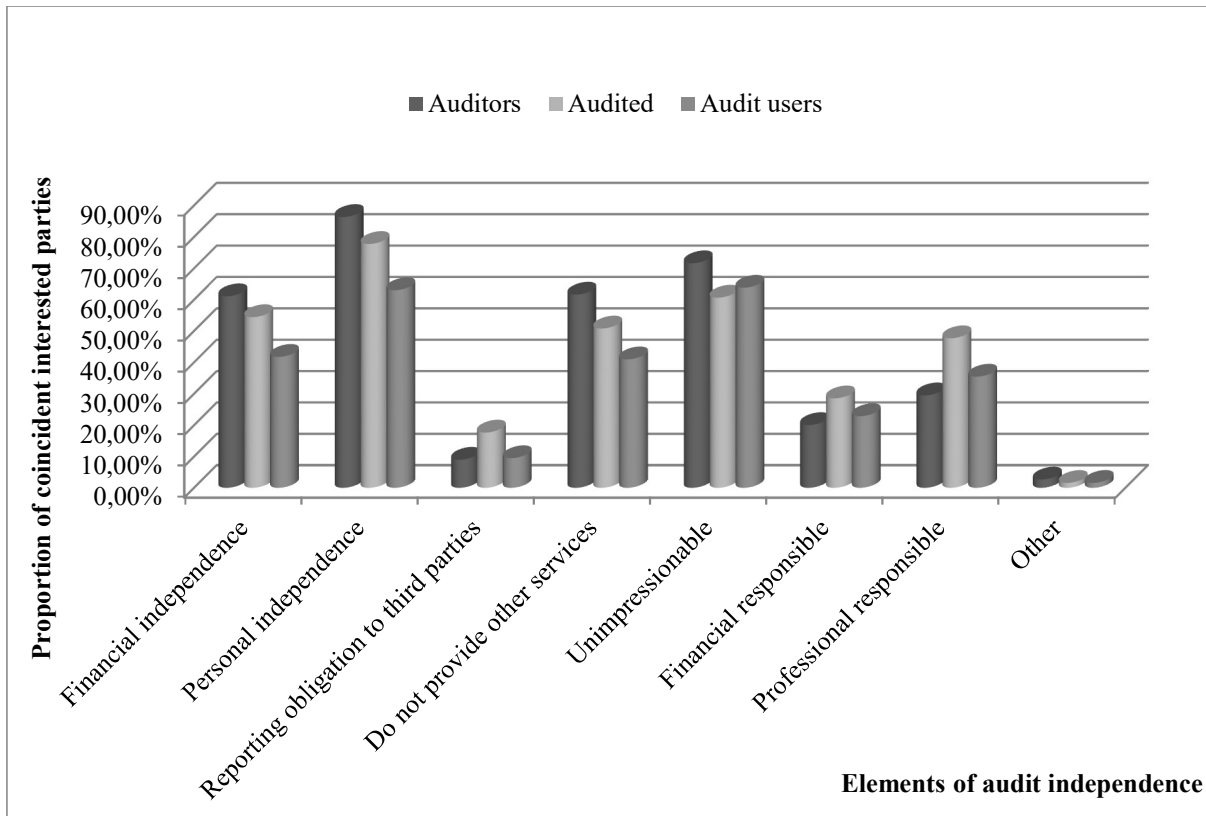
Source: author's own elaboration based on the questionnaire data processed by EvaSys Education Survey Automation Suite

Figure 7. Interpretation of audit independence by interest group

After clarifying the interpretation of auditor independence by the interest groups, the respondents expressed their opinions on whether auditors are able to express independent and credible opinions on financial statements of entities that selected and hired them. The evaluated responses show that a significant majority of respondents in each interest group agreed that auditors were able to form an independent opinion on financial statements of entities hiring them. Auditors' responses indicate that it was the auditors who gave the best appraisal of their independent work. The audit users were the least satisfied with the audit independence. This is interesting because they had the least information about the independence of auditees and auditors. Tthis could

undermine users' confidence in audit reports on financial statements or in other audit aspects.

After this, the respondents were requested to indicate how much of a threat the listed elements posed to auditor independence. The responses revealed that auditors naturally considered that the listed factors threaten their independence very little. The difference between the responses of interest groups in terms of threat was insignificant.

Figure 8 shows the percentage distribution of firm responses regarding elements threatening audit independence.
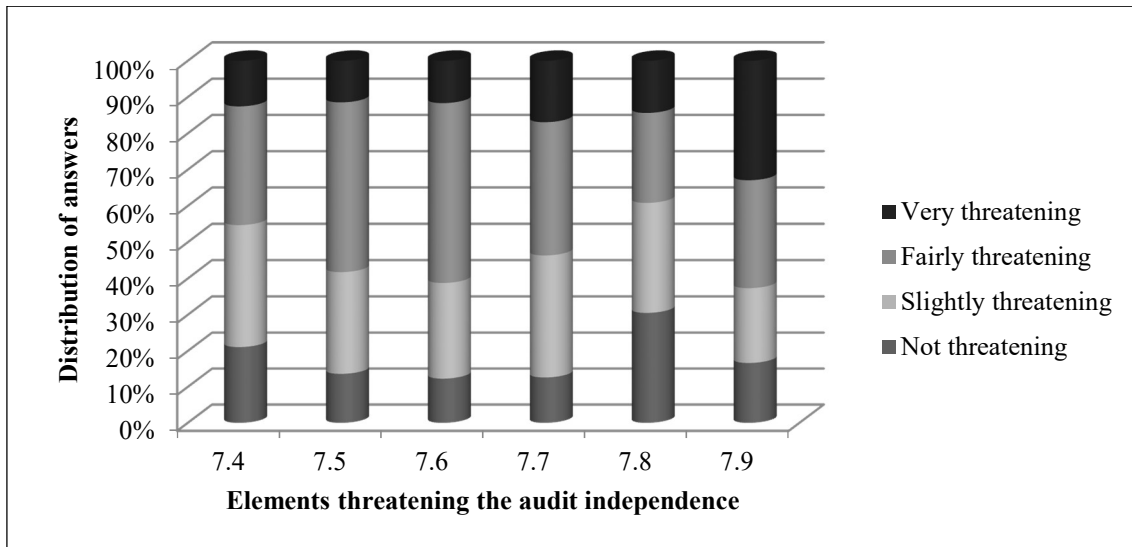
Source: author's own elaboration

Figure 8. Perception of factors threatening audit independence

A low percentage of respondents – less than one-fifth – felt that the listed factors do not threaten audit independence. Based on the responses, the extent of threat factors to audit independence may be determined. The overwhelming majority of respondents considered the provision of non-audit services – as accounting services and internal audit – to audit clients (item 7.9 in Fig. 8) to be the greatest threat to audit independence. Interest groups ranked audit fees item – within the total audit turnover – generated from specific stakeholders of businesses (item 7.6) to be the second greatest threat due to a large proportion of total fees creating financial dependence. Almost the same ranking was given to a threat that arises when audit fees generated from a client represent a large proportion of an audit firm's total fees (item 7.5), resulting in high financial dependence. Respondents viewed simultaneous pursuit of such non-audit services as provision of tax consultancy services, information technology consultancy, property valuation, etc. to audit clients (item 7.8) as the least offensive and threatening to audit independence.

Audit independence is a phenomenon which can be interpreted from different aspects, and interest groups associate it with auditors' personal independence – excluding audited companies and their stakeholders and family and friendly relationships with entity management.

It should be noted that the author of this study is fully aware of the limitations of previous and the current research conducted into the audit expectation gap. This study attempts to express general and homogeneous opinion about a profession that requires a high level of professional knowledge and constant evolutionary development, even though the author is aware that this profession is a total of individuals whose professional knowledge, attitude to their profession and reliability may differ. Contrary to individuals pursing this profession, audit interest groups also consider the audit profession to be a homogeneous total when they make decisions about the audit future, duties and responsibilities to be performed.

It is envisaged that the findings reported in this study may provide useful information to all three interest groups. Auditors should consider making some modifications concerning certain aspects of regulatory character and identifying ways of further increasing audit performance. Auditees and audit users should further improve their knowledge on audit functions and limitations, the lack of which results in unreasonable expectations and false interpretations of the true content of independent audit reports in some cases.

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The Relationship Between a Performance Management System and the Motivational Level of Employees: A Case Study at the Ministry of Finance and Economic Development of the Republic of Mauritius

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SUMMARY

This research is mainly focussed on analysing a Performance Management System (PMS) and its impact on the motivational level of employees at the Ministry of Finance and Economic Development (MOFED) of the Republic of Mauritius. A survey was carried out using the convenience sampling technique to grasp the views of the employees. 200 questionnaires were distributed and the response rate was 55%. The results indicate that the main elements of a PMS process which are motivating elements for employees were missing in the organisation: regular feedback, communication and training. Thus, recommendations were made to the top management to market the concept of PMS, improve the communication strategy and feedback strategy, encourage employee participation and recognition, link PMS to pay and training and provide a supporting management who would promote organisational learning.
Keywords: performance management system, motivation, public sector
Journal of Economic Literature (JEL) codes: J28, M54
DOI: http://dx.doi.org/10.18096/TMP.2017.02.03

INTRODUCTION

A performance management system (PMS) is viewed as a tool whereby employees develop and achieve high standards of performance through the assistance and guidance of their managers. There is no iota of doubt that a PMS brings along in its trail a manifold of advantages, be it at organisational, management or individual level, and that all these benefits contribute in developing a motivating culture within the organisation. PMS aligns corporate and individual objectives, provides for continuous improvement and development, improves training and development processes and helps to retain employees in the organisation (Taylor & Pierce 1999).

However, performance management systems have certain limitations. Self-esteem may be lowered and relationships may be damaged (Aguinis 2005). According to Armstrong and Baron (2005), some employees are dissatisfied with performance rating systems as there is often an absence of clear indices of measurement. They also found that managers are unreceptive towards performance management system and dislike form-filling. A performance management system is often considered as

only a bureaucratic task or waste of time (Armstrong 2012). There are problems of inaccuracy, manipulation and counter-productivity linked with performance appraisal (Gabris & Ihrke 2000). Some employees might perceive a PMS as a sword of Damocles hanging over their head, as they might feel that by refusing to carry out non-official work given by their appraiser, their ratings might be affected.

Since no mid-term assessments are carried out, it becomes frustrating for employees when they are assessed only at the end by their employees. If proper feedback is provided to the employees on a regular basis, they can improve themselves before the final assessment. The presence of bias is also another issue raised by employees (Le Mauricien 2016a).

Le Mauricien's article also included the views of the President of the Ministry of Health Employees Union, who stated that a PMS is an oppressive system which is often implemented against the will of employees (Le Mauricien 2016a). Employees are often unaware of the impact of such systems and nothing is usually done to enhance their awareness. He also believed that it is unfair to emphasise financial benefits only in order to create motivation.

➢ Beginning in 2012, all Ministries in the Republic of Mauritius adopted a performance management system in order to assess the performance of their employees. The PMS system is a replacement of the 1963 Annual Confidential Report (ACR), which had become obsolete. However, there is yet no evidence whether the objectives behind the implementation of the PMS system are being met, most particularly whether the PMS is a catalyst for employees to work more efficiently. Thus, the main purpose of this research is to explore the implementation of the PMS system at the Ministry of Finance and Economic Development (MOFED) of the Republic of Mauritius and to assess whether there are any links between the PMS system and the motivational level of employees. The study was broken down into more detailed objectives, which are as follows:

➢ to describe the PMS system that has been adopted by MOFED,

➢ to analyse whether employees at MOFED have a good understanding of what a performance management system is,

➢ to investigate whether or not employees understand the process and objectives of a PMS,

➢ to investigate the extent to which the PMS system has helped to enhance the performance of the employees,

➢ to examine the problems faced by MOFED in using a PMS and

➢ to gauge the intentions of the employees to use the PMS to manage their performance.

LITERATURE REVIEW

Performance management (PM) may be defined as a process of managing and developing the performance of employees in an organisation. It is a continuous process through which managers and employees agree on a plan of goals and objectives within an agreed timeframe and the employees are assessed based on those factors at the end of the timeframe. Through a PM process, the fortes and weaknesses of the employees are identified, observed, measured, noted and tackled, thus instilling a motivating climate for them. A PMS is a process through which the employees and organisation are made aware of each other's expectations and incorporate issues such as: the performance targets of employees, how the employee's job description is aligned to the organisational objectives, measurement of performance in terms of measurable outputs, accountabilities and training targets, a partnership between the supervisor/appraiser and employee/appraisee to create, sustain and improve existing employee performance, linking performance to pay, identifying training and development opportunities for the employee and spotting and eliminating obstacles to performance (Armstrong 2012). The main elements of a PMS process are summarised in Table 1.

Table 1
Elements of a Performance Management System

Elements	Characteristics/Purpose
Mission statement	Defines and communicates the purpose of the organisation
Strategies and objectives	Provides clear guidance on the future conduct and performance decreed to accomplish the mission of the organisation
Values statement	Conveys how the organisation confronts issues and problems
Identification of critical success factors	Communicates the factors which contribute to successful performance
Performance indicators	Links critical success factors and the final results to be appraised
Performance reviews	Appraises the performance and competencies of the individual employees
Pay reviews	Links reward to performance (merit pay, individual bonuses or allowances)
Performance improvement	Improves performance of employees through training, career development, coaching and counselling

Source: Sparrow and Hiltrop (1994)

Managing Performance in the Public Sector and the Evolution of PMS

According to the Human Resource Development Council of the Republic of Mauritius (NHRDP 2017), the public sector is an important part of the economic and administrative life of a country, taking part in a large array of activities from collection of tax revenues, delivery of energy to businesses and private households to the delivery of goods and services by and for the Government at national, regional and local levels. The basic motive of the public sector is to maximise welfare of the population rather than making a profit (United Nations 2008). Unfortunately, governments are often criticised for the poor quality of service and cumbersome procedures and are often termed as "lame ducks" or "white elephants" for their lethargy (Fryer et al. 2009).

The Mauritian Civil Service (MCS) began during the French Colonial rule from 1715 to 1810, by founding a Provincial Council (NHRDP 2017). As of May 2016, nearly 85,000 people were employed in the Civil Service (MOFED 2016). The Pay Research Bureau (PRB) undertakes a general pay review and conditions of service for the public sector once every five years. The PRB 1987 recommended an improved appraisal system, as the Annual Confidential Report had become obsolete (MCSAR 2013). In 1994, the Ministry of Civil Service and Administrative Reforms (MCSAR) introduced a PMS in four ministries on a pilot basis. However, in 1998, the project failed, as the employees were averse to the new concept (Ramgutty-Wong 2014). The notion of a PMS reappeared in 2001 when the MCSAR developed a three-year strategy (2001–2003) to modernise the public service, and the plan included the introduction of a result-oriented PMS.

The Pay Research Bureau through the PRB 2003 report ratified the framework of a performance management system and appointed the MCSAR as the coordinating ministry responsible for pioneering the project in the public service (PRB Report 2003). In 2006, a PMS was implemented for pilot testing in three departments and was gradually extended to other departments and ministries (MCSAR 2013). PRB 2008 highlighted the role of a PMS in improving individual as well as organisational efficiency and effectiveness. As the report hinted towards there being dissatisfaction and demotivation among public officers, since their efforts were neither recognised nor awarded, it proposed incorporating Performance Related Pay (PRP) as an element of the PMS so as to enhance the motivational level in the public sector. It also proposed the weeding out of the ACR and adoption of a PMS as from January 2012 (PRB Report 2008).

PRB 2013 elaborated on the need to attract, motivate and retain employees and emphasised the use of the PM Report for promotion exercises. It also recommended the implementation of an Electronic Performance Management (EPM) instead of the traditional paper-based system for the analysis of data and storage of data (PRB Report 2013). PRB 2016 further elaborated on the purpose and objectives of a PMS. The main objectives are to boost both individual and organisational performance. Other objectives include the identification of training and development needs, allowing for succession planning, addressing issues of underperformance, aligning employees' objectives to the objectives of the organisation and fostering good relations between appraisers and appraisees (PRB Report 2016).

Motivation and its Importance

Motivation is a *sine qua non* factor for the success and long term running of any organisation.

Abonam (2011) stated that a motivated workforce lead to effective performance of the organisation. A research report done by Employees Direct revealed that employee motivation leads to increased productivity and profitability (Michie et al. 2002). A motivated organisation leads to cost reductions. Conversely, an organisation is exposed to difficulties when it has low motivated employees as they are unprepared to make extra efforts for the organisation (Jasmi 2012).

One myth associated with public sector employees in Mauritius is that they underwork but are overpaid (Le Mauricien 2016b). It is often assumed that public servants are often difficult to motivate as their main concern is job security. However, Anderfuhren-Biget et al. (2010) emphasised that motivation at work is an important variable for organisational performance in the private and public sectors, as well as non-profit sectors. In Mauritius, the PRB reports have always stressed on the importance of improving the motivational level of public employees.

Linkage between a Performance Management System and Motivation

Goal setting theory
People perform better when they are working towards specific goals (Kagaari et al. 2010). According to Locke and Latham (2002), there are four mechanisms that link goals to end results:
➢ goals give direction to employees on which work to prioritise,
➢ goals motivate employees to put in more effort in order to achieve the set objectives,
➢ goals encourage people to tap into their skills and knowledge in order to succeed and
➢ challenging goals induce the workers to make full use of their skills.

S	• **Specific/Simple** *Clear, unambiguous and easy to understand*
M	• **Measurable** *There is no point setting a target for which success cannot be gauged. They should refer to specific measures*
A	• **Agreed/Achievable** *Goals must be specific and realistically achievable. There should be a "stretch" element to them (requiring effort and commitment without being out of reach)*
R	• **Realistic** *Objectives must be relevant to those who will be required to meet them; staff must have enough control over their work to be able to meet their targets.*
T	• **Time-based** *There should be a set timescale for achieving a target; open-ended targets may not encourage focused effort on improving performance*
E	• **Enhancing** *Great objectives enhance growth. For example objectives should allow employees to be fully or partially engaged in new areas of work or in work requiring new skills and tools*
R	• **Reviewed** *Reviewing performance objectives regularly ensure continuous relevance and understanding.*

Source: PRB 2013

Figure 1. SMARTER Goals

Armstrong (2017) upholds that establishing objectives and goals on the performance agreement against which the employee will be assessed motivates employees to work hard and be diligent at the work place. Goals should be 'SMART', that is, they should be specific, measurable, attainable, realistic and time-bound. Employees are more enthusiastic about working when goals are specific and challenging and are linked to feedback (Lunenburg 2011). In Mauritius, the 2013 PRB report mentioned that the objectives under the performance agreement should be 'SMARTER' (PRB 2013), as shown in Figure 1.

Specific goals increase motivation, thus leading to reduction in absenteeism and lateness as well as increase in turnover (Locke & Latham 2002).

Control Theory

Control theory focuses on the use of feedback to shape the behaviour of employees (Armstrong 2017). Feedback is an important element of a PMS. When objectives are set, the performance of employees can be reviewed and feedback can then be provided to either encourage the employees perform better or motivate them to continue working hard. When supervisors give feedback to their subordinates on a more regular basis, the employees become more energised (Ammons 1956).

Extrinsic and Intrinsic Motivation

Extrinsic motivation is in the form of either reward, such as praise, incentives, increases in pay and promotion or punishment in the form of disciplinary action, withholding pay or criticism. Intrinsic motivation is self-generated factors that affect people's behaviour and can arise when workers feel that their work gives them a reasonable level of autonomy and opportunities to use and develop their skills and abilities (Armstrong 2017). According to Whately (2004), a person is strongly motivated when he has both an intrinsic and extrinsic stake in an organisation's success.

Performance Management Systems and Psychological Contracts

A performance management system has an important role to play in developing a positive psychological contract (Armstrong & Baron 2006). "A psychological contract is a set of unwritten expectations which exist between individual employees and their employers." (Armstrong 2010 p.144). A PMS creates the framework in which the psychological contract is determined; objectives are set and performance is evaluated (Newaz 2012). A positive psychological contract leads to higher satisfaction, higher commitment and better employee relations (Armstrong 2012).

Rewards Linked with Motivation

Many people believe that they should work in the public sector so as to benefit from job security (Le Mauricien 2016a). However, job security is not the only factor which people seek when hunting for jobs. An appropriate reward system must also exist to enhance the motivation and morale of the public servants.

Organisations are adopting performance based rewards so as to become more competitive (Zhang, 2012).

Performance management and rewards play vital roles in justifying the balance of interest between employers and employees. To be effective, a PMS must be linked to financial compensation or some other forms of rewards. However, it should be considered as an on-going process and not be limited to only an annual payment.

RESEARCH METHODOLOGY

Primary data was obtained through the administration of a survey to gather data and information from the MOFED employees. Secondary data was collected from journals articles, newspaper articles, textbooks, reports, government publications and internet items for the literature review, methodology and recommendations. Furthermore, this study includes both qualitative and quantitative methods. Qualitative research was used so as to gain an in-depth understanding of the theories and quantitative research was carried out to find the number or percentage of employees who are satisfied with and motivated by the present performance management system.

The research instrument used was self-administered questionnaires. The questionnaire consisted of 34 questions and was divided into 4 sections: background and employment information, conditions of work, motivation of employees, performance management system aspects and motivational level of employees. It consisted of multiple-choice questions, close-ended questions, dichotomous questions and Likert scales. There was also an open-ended question so as to obtain additional information from the respondents. The wordings of the questions were kept short and simple so as not to confuse the respondents. A covering letter was attached to enlighten the respondents on the objectives of the survey and also to assure them that their responses would be kept confidential. Each question was based on the factors discussed in the literature review.

For this study, the survey targeted only the employees of the Ministry of Finance and Economic Development (MOFED), which was 273 as of June 2016. As surveying the entire population is time consuming and costly, convenience sampling was used. Thus, out of the 273 employees, only 200 were chosen for the survey. The response rate was 55%. SPSS software and Microsoft Excel were used to compute and analyse the data. Diagrams, charts and graphs are used to illustrate the results of each question.

Ethical issues were also taken into consideration. The consent of the HR Manager was sought before the distribution of the questionnaire to the MOFED employees. Each respondent was made aware of the objectives of the study and was assured of anonymity. Arrangements were made with the HR manager to assure the non-disclosure of sensitive information.

Findings of the Study

The first part of the questionnaire gathered demographic data. 110 questionnaires were received out of the 200 that were distributed. Most of the respondents were under 30 years and were mainly female. 58.2% were married while the remaining were single. The majority were from lower level management, had service of less than 5 years and were either diploma or degree holders.

The respondents were then asked to choose features that they would expect to be present in a performance management system. The list of features and their responses are summarised below in Figure 2.
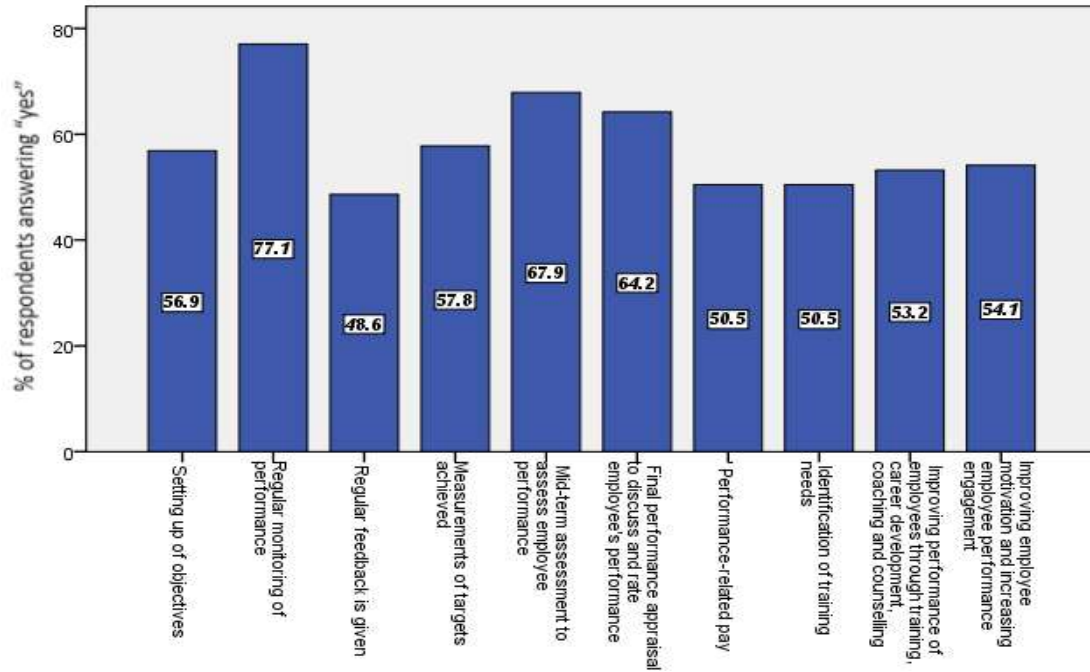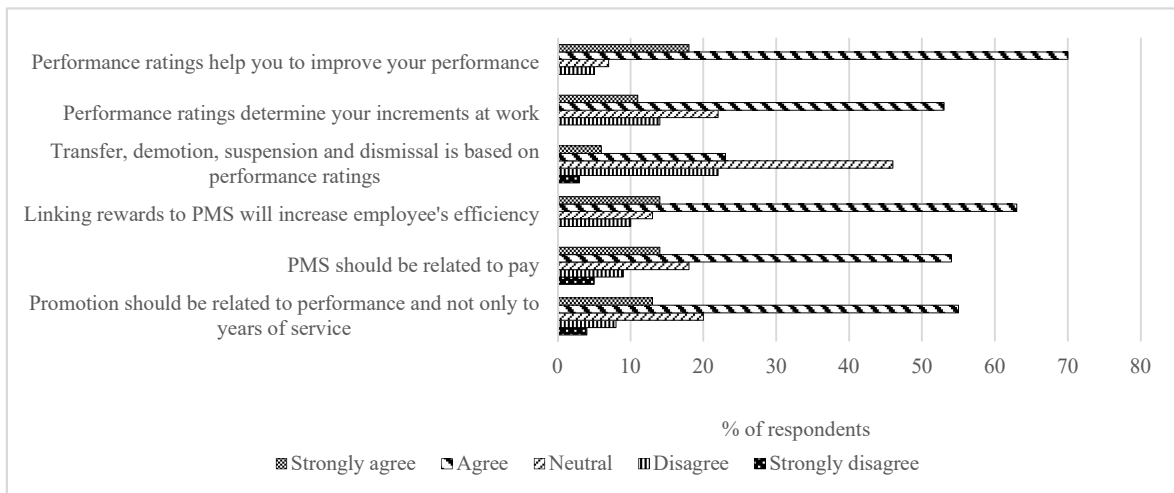
Source: own data

Figure 2. Features of Performance Management Systems

The majority believed that a performance management system must include the regular monitoring of employees' performance by their employers. Also, a majority can be seen agreeing to the statement that a PMS must include a mid-term assessment and a final performance appraisal to discuss and rate the employee's performance. 56.9% of respondents agreed that objectives must be set at the start of a performance management process.

Employees like to be appreciated for their hard work and feedback encourages them to perform even better. But when asked whether they receive any formal and written feedback on the progress toward goals set, only 19.1% stated that they received feedback continuously, 41.8 % received only once in their careers while the rest did not receive any feedback at all. Also, only 56.4% received feedback on their strengths and weakness at the end of the performance appraisal. It should be pointed out that a PMS process is futile if employees do not receive feedback. It is only when employees are informed of their strengths and weaknesses that they will be able to correct themselves and develop their capabilities further. The employees were also asked their opinions on rewards and performance and the results are summarised in Figure 3.

Source: own data

Figure 3. Opinions on rewards and performance
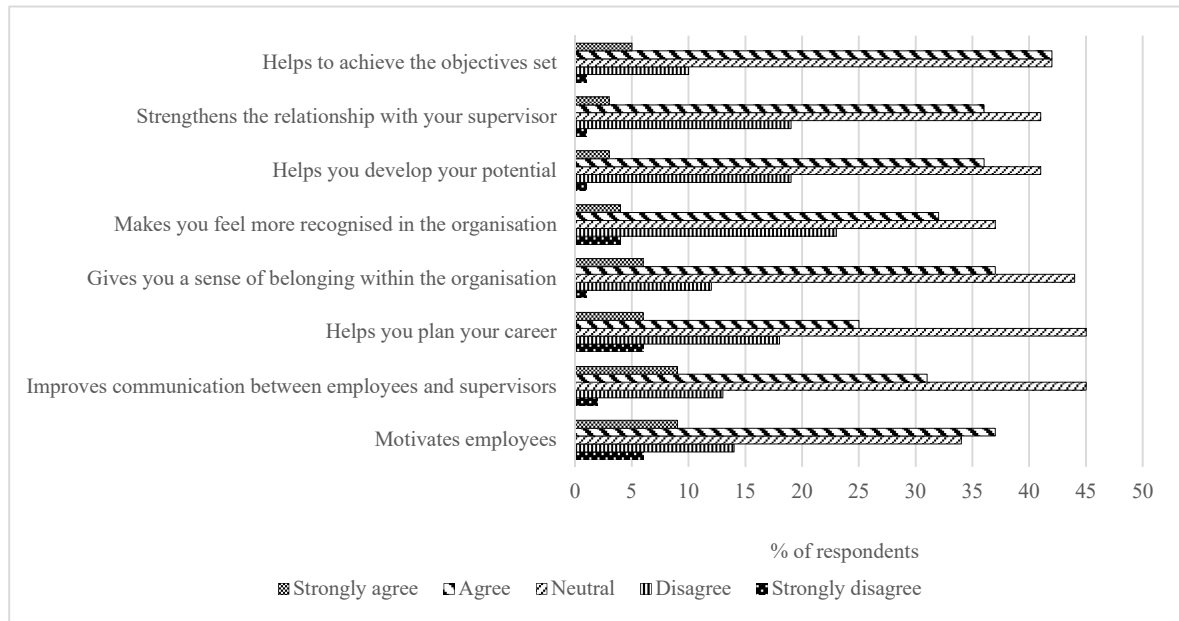
Source: own data

Figure 4. Evaluation of the current performance management system

54.5% believed that a performance management system should be linked to rewards. 70% believed that performance ratings help to improve performance and 61.8% consider that linking rewards to PMS increases employee's efficiency. 46% of respondents did not know whether transfer, demotion, suspension and/or dismissal are based on performance ratings. 55% stated that promotion should be related to performance and not to years of service. The responses of the employees of MOFED with regards to the current performance management system are summarised in Figure 4.

The majority of the employees agreed that a performance management system helps them to attain the objectives set, develops their potential and motivates them. However, for statements such as whether a performance management system strengthens the relationship with their supervisors, makes them feel more recognised in the organisation, gives them a sense of belonging in the organisation, helps to plan their career or improves the communication between them and the supervisor, they preferred to be neutral.

The last question was an open-ended in order to obtain suggestions for improving the motivational level of employees. Only 20.9% of employees responded to this question. Some of the suggestions that were made are: appropriate measures should be taken to accurately measure performance in terms of projects achieved, time and resources used; casual leaves and sick leaves that are not taken must be reimbursed; leaders should set good examples; introducing an employee-of-the-month concept, have a small interview with employees and put it on the intranet; provide necessary training so as to enhance capacity and growth; introduce a performance management system; provide reasonable and constructive

feedback to employees and to allow employees to rate their appraisers as well (a two-way appraisal).

Based on the overall findings of the survey carried out at MOFED, it can be deduced that a performance management system is not a silver bullet and will not on its own bring much benefit to the organisation. According to the MOFED employees, the current performance management system is still lacking in communication, providing feedback and training. It is because of these deficiencies that the current PMS is unable to motivate some of the employees. Although most of the employees are aware of the objectives of a PMS, they are often ignorant of the numerous benefits that a PMS can bring. Higher productivity in any organisation comes from motivated employees. The major aim to applying private-sector practices in the public sector is to motivate employees in order to assist them to work more effectively and efficiently so that the whole organisation can benefit.

RECOMMENDATIONS

Marketing the Concept of a Performance Management System

According to the survey, a minority of people are not aware of what a PMS is and 5% of the employees believe that a PMS is not important. Top management should stay firm to the strategy and provide appropriate resources for the success of PMS. It must also ensure that everyone understands what a PMS is, its process and objectives. Both management and employees must join hands together to make a PMS successful.

Communication Strategy

There must be an effective communication strategy for a PMS to be effective in motivating people. There must be open and two-way communication where employees can voice their opinions. More informal and informative staff meetings can be conducted so as to encourage employees to speak out.

Feedback Strategy

Feedback is imperative in improving employees' performance. With an effective feedback process, employees will be more motivated and committed and hence be more effective and efficient in their work.

Employee Participation and Recognition

Employees should feel that the organisation cares for them. Management can encourage participatory empowerment of employees through employee suggestion schemes; in which employee's opinions are sought in decision making. It must ensure that the goals set are SMARTER and can hold meetings to provide guidance and direction for work and offer hands-on coaching to help employees. Employee involvement leads to employee ownership and commitment as well as positive response to challenging job tasks.

Furthermore, emphasis can be laid on public recognition of good and excellent employees. By doing so, the high-performing employees will feel that they are actively contributing to the well-being of the organisation and this is a major feeling of motivation. Therefore, management should use tools such as public praise, praise letters, moral rewards or one-shot responsibilities such as leadership.

Supportive Management and Organisational Learning

Top management should be committed and supportive to the PMS process. Instead of being authoritative, they can adopt directive, coaching and a participative management style to motivate employees. They must take initiative for performance improvement and lead by example to gain credibility. They can use concepts such as 'Management by walking around' and employee coaching for employees to feel the commitment of top management and thus increasing employee's efficiency.

Counselling will help employees to resolve the obstacles in their performance. Organisational learning, knowledge sharing, continuous improvement, team working, employee empowerment and training should be enhanced at the organisation. Also, it should be ensured that the working environment allows employees to work in autonomy and to share authority and responsibility in the performance of their duties.

Linking PMS to Pay

Presently, the PMS includes no financial or non-financial rewards. This can cause negative impacts at a later stage as the PMS may no longer be viewed as a sustainable system. MOFED can approachto the PRB to try to seek remedy for this situation. For instance, an annual increment may be given to those whose performance was excellent. Also, recommendations can also be made on linking promotion to performance and not only to years of service.

Training

Training is imperative in a PMS and for bringing motivation. Management must provide consistent and coherent training programmes through an evaluation of the needs of employees. Training must address issues such as transfer of technical skills, knowledge, team dynamics, interpersonal skills and communication.

Digital Performance Management System

Many countries across the world have already adopted digital performance management systems. Many employees are dissatisfied with the current paper-based PMS. This new system can be the emerging tool so as to make the employees accountable for their work, make them more effective and make work become more interesting, and thus ultimately motivating workers to work hard. Feedback can be aggregated easily and computation, analysis processing and sharing of ratings become easier.

CONCLUSION

For an organisation to be effective, it needs trustworthy and motivated employees. It cannot afford to have less committed people in its workforce. One might deduce that the Mauritian government and its departments do not believe in such principles. The government is often labelled as inefficient and ineffective. It is time to break this stereotype and make people believe that the government and its officials can not only be highly effective and efficient, but they can also become role models for others to follow.

A performance management system is a prerequisite tool for an organisation to have if it wants to tap its human resources fully and increase its success. Indeed, allowing employees to feel that their work has contributed to the success of the organisation is in itself a huge motivator. However, a PMS will be able to motivate employees only when there is an effective communication system across the hierarchy and supportive management. While employees are enthused by an effective performance management system, they become discouraged by gaps left in fair and equitable implementation. Management

must pay particular attention to all the elements of a performance management system so that these variables have a motivating effect on their employees. Thus, the use of a performance management system to motivate employees is no longer an option but rather a choice which all organisations need to make.

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Assessment of Competition in EU Liberalised Energy Markets in 2016

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SUMMARY

The liberalisation of gas and electricity markets had been achieved in almost all EU Member States by the end of the last century. It basically aimed at bringing competition into energy markets and benefiting from its favourable impacts. However, initial experiences showed that markets suffered from limited competition. The objective of this article is to give a brief assessment of the current market competition with special attention to two fundamental issues related to undistorted competition: unbundling of activities and developments in market concentration. The analysis shows that significant progress has been achieved in the unbundling of activities over the past few years. However, the market concentration in the retail segment in most Member States is still high (based on the HHI, C3, the number of undertakings with a market share over 5 percent, and the ARCI indicators).

Keywords: energy liberalisation, market concentration, network-based public utilities, demonopolisation, natural monopoly

Journal of Economic Literature (JEL) codes: Q40, Q48, Q49

DOI: http://dx.doi.org/10.18096/TMP.2017.02.04

INTRODUCTION

Gas and electricity markets have undergone significant changes over the last decades. We have witnessed the beginning of market liberalisation processes. By the late 2000s (earlier in some countries, later in others) energy markets in both sectors had been opened up to competition in almost all EU Member States. Liberalisation basically aimed at bringing competition into energy markets and thereby benefiting from its favourable impacts. However, the conducted analyses proved that structural reforms resulted in only limited competition according to the earlier experiences. The emergence of vertically integrated transnational market players encompassing cross-border or even cross-sectoral value chains of the whole sector led to significant impediments to the development of effective competition. Apart from high market concentrations, insufficient unbundling of network activities was another factor that restricted competition. Both implicit cross-financing opportunities and the hidden barriers to network access hindered the evolution of undistorted competition and enhanced the possibility to generate extra profit for energy market players already dominant in energy markets (Kádárné Horváth 2012).

THE AIM AND STRUCTURE OF THE STUDY AND THE METHODOLOGICAL BACKGROUND

This article aims at providing a brief assessment of the current competition with special attention to two fundamental issues related to undistorted competition: the unbundling of activities and the development of market concentration. The article consists of two major content parts.

The first part deals with issues related to unbundling of activities. To this end, the EU regulatory background related to unbundling is presented. In addition, the unbundling models applied in corporate practices in the EU member states are also introduced. Furthermore, the compliance of TSO and DSO systems with unbundling requirements is evaluated. The issues are presented within the framework of a secondary research study. This article provides a summary of the chapters of EU directives related to the topic, the main findings of the surveys conducted by CEER (2016a,b) and the data on certification procedures until February 2016 released by European Commission.

Table 1
Unbundling requirements in the EU legislation

Energy Package	Sector	Directive*	Unbundling transmission system operators	Unbundling distribution system operators
1st energy package	electricity	96/92/EC	accounting	accounting
	natural gas	98/30/ EC	accounting	accounting
2nd energy package	electricity	2003/54/ EC	legal, functional, decision-making	legal, functional, decision-making
	natural gas	2003/55/ EC	legal, functional, decision-making	legal, functional, decision-making
3rd energy package	electricity	2009/72/ EC	ownership or ISO or ITO	legal, functional, decision-making
	natural gas	2009/73/ EC	ownership or ISO or ITO	legal, functional, decision-making

*The exact and complete name of the directive is indicated in the references
Source: the author's own construction based on the directives

The second major content part of the article evaluates market concentration on retail electricity and gas markets. Several indicators were used for the evaluation. Apart from the Herfindahl-Hirshmann index (HHI), the concentration rate (C3), the number of companies with over 5% of market share and the ACER Retail Competition Index (ARCI) were used for investigating the market concentration and competitive situation in the UE member states.

UNBUNDLING OF ACTIVITIES - REGULATORY BACKGROUND

For undistorted competition, network access – which was in a natural monopolistic state (transmission and distribution networks) – needed to become non-discriminatory and fairly priced for competitors. Thus, an appropriate regulatory environment had to be developed. The core legislative agenda included such items as fulfilling the obligation of granting network access, setting access charges by competent authorities and unbundling the activities of vertically integrated undertakings. The European Union created three legislative packages (directives) where the objectives and phases of energy liberalisation were formulated. These directives stipulated the requirements related to separation of production and supply activities from network operations.

Table 1 shows that in the first legislative package the unbundling rules stipulated the accounting unbundling in case of both transmission and distribution networks (96/92/ EC, 98/30/ EC Directives). The second energy package regulated a full legal, organisational and decision-making unbundling (legal and functional unbundling) of networks while keeping accounting unbundling requirements. However, these formulated requirements were insufficient because they failed to grant non-discriminatory network access and to promote network investments and allowed cross-financing. According to

Illés (2000) the problem that cross-financing faces is that 'An undertaking or an interpreter conducting activities outsourced to several undertakings has great interest in manipulating cost information and within this in considerably increasing costs that are related to fees for network use and in using various tricks to pass costs associated with activities performed in the private sector to others. The point is that the costs shifted to networks are financed by others, whereas the activities of actors – a part of whose costs have been passed on to others – become less expensive and, in this way, these actors gain an unfair competitive advantage over other actors.' (Illés 2000, pp. 33-34, my translation). Thus, the conditions for the evolution of non-distorted competition were not created.

In order to safeguard fair competition, the European Union then called for ownership unbundling at transmission level, which means that network owners either in their own capacity or through their interests shall not exercise any other activities in the energy market. Literally speaking, they must operate independently from all market players. This requirement gave rise to heated debates because of the underlying extensive ownership concentration. As a result of these debates, these requirements were fine-tuned and the third energy package provided three theoretical models for unbundling (2009/72/EC and 2009/73/EC directives) depending on the preferences of individual EU countries. The three models (based on Directives 2009/72/EC and 2009/73/EC, Hungarian Energy Office (MEH) 2011, Vince in Valentiny et al. 2011) are as follows:

➢ ownership unbundling: the system operator is at the same time the network owner without any generation, supply or commercial interests in the energy sector;
➢ Independent System Operator (ISO): a system operator without any generation, supply or commercial interests is only a network operator, not its owner. The grid owner is a vertically integrated undertaking operating in the energy market.

> Independent Transmission Operator (ITO): a member of a vertically integrated group of undertakings that operates in the energy market. This group of undertakings is the network owner.

In order to secure undistorted competition, both the appointment of system operator and the operation of the system are regulated in detail and strictly verified. After transmission operators have been certified by national regulatory authorities, they are approved and designated as transmission system operators by Member States. The designation of transmission system operators must be notified to the Commission and published in the Official Journal of the European Union. Transmission system operators notify to the regulatory authority any planned transaction that may require a reassessment of their compliance with the requirements. The regulatory authorities, on the other hand, monitor the continuing compliance of transmission system operators with the requirements. Transmission system operators have to comply with organizational and conflicts of interest rules as well as accounting and information unbundling rules. In the case of ISO and ITO models, vertically integrated undertakings can maintain their ownership of network assets while ensuring effective separation of interests on condition that independent system or transmission operators perform all the activities related to system operation (pursuant to Article 16 of Directive 2009/72/EC). As regards these models, compliance with further provisions is required. The strictest provisions are related to the ITO model (including communication, brand-building and information systems, requesting consultancy services, independent accounting, human resources and management). Rules are addressed in detail in 2009/72/EC and 2009/73/EC directives.

Member States are given the choice provided the undertaking owning a transmission system was part of a vertically integrated undertaking on 3 September 2009, on the date when this directive came into force. Systems set up or owned after that date must comply with ownership unbundling provisions. Member States can opt for full ownership unbundling. In this case an undertaking has no right to set up an independent system operator or an independent transmission operator. Mention should be made that the ITO+ model is applicable in special cases. The directives stipulate the derogations and exemptions from relevant provisions such as isolated markets, emerging markets, etc. (See 2009/72/EC and 2009/73/EC directives).

Apart from transmission networks, mention should be made of Distribution System Operators (DSO), which play an essential role in the energy sector and act as an interface with retail markets. Legal and functioning unbundling of distribution system operators was required, pursuant to Directives 2003/54/EC and 2003/55/EC, from 1 July 2007. The third energy package did not stipulate ownership unbundling, so legal, organizational and decision-making unbundling requirements (legal and functional unbundling) remained. Accounting unbundling is an essential requirement and must comply with numerous conflicts of interest and other rules in order to secure undistorted competition. However, this article does not aim at addressing these rules. Member States may have decided not to apply unbundling requirements to integrated electricity undertakings serving less than 100,000 connected customers, or serving small isolated systems. Member States had to comply with unbundling requirements stipulated in the third energy package by 3 March 2011.

UNBUNDLING MODELS IN THE EU MEMBER STATES IN 2016

The Council of European Energy Regulators (CEER) evaluated the compliance of both transmission system operators (TSO) and distribution system operators (DSO) with unbundling requirements in the European Union in 2016 based on the February data (CEER 2016a and CEER 2016b). The data were obtained via a survey of national energy regulatory authorities of 26 EU countries (excepting Bulgaria and Ireland).

Compliance of Transmission System Operators (TSOs) with Unbundling Requirements

European Commission data (European Commission 2016) show that 109 certification procedures (51 in the electricity sector and 58 in the gas sector) were conducted in the EU until February 2016. As a result, transmission system operators (TSO) complied with unbundling requirements stipulated in the third energy package.

Table 2

Unbundling model of transmission system operators in the EU in 2016

	Electricity					Natural gas				
	Number of TSO-s	Ownership unbundling	ITO	ISO	Others	Number of TSO-s	Ownership unbundling	ITO	ISO	Others
Austria	3	1	1	1	0	6	0	4	1	1
Belgium	1	1	0	0	0	2	2	0	0	0
Bulgaria	*No data*					1	0	1	0	0
Cyprus	Derogation					Derogation: isolated market, emerging market				
Check Republic	1	1	0	0	0	1	0	1	0	0
Denmark	1	1	0	0	0	1	1	0	0	0
United Kingdom	21	17	0	0	4	5	4	0	0	1
Estonia	1	1	0	0	0	Derogation (temporary) : isolated market				
Finland	1	1	0	0	0	Derogation (temporary) : isolated market				
France	1	0	1	0	0	3	1	2	0	0
Greece	1	0	1	0	0	1	0	1	0	0
the Netherlands	1	1	0	0	0	2	1	0	0	1
Croatia	*No data*					*No data*				
Ireland	1	0	0	0	1	1	0	1	0	0
Poland	2	1	0	0	1	3	1	0	2	0
Latvia	1	0	0	1	0	Derogation (temporary) : isolated market				
Lithuania	1	1	0	0	0	1	1	0	0	0
Luxemburg	Derogation					Derogation				
Hungary	1	0	1	0	0	2	1	1	0	0
Malta	Derogation					Derogation				
Germany	6	3	2	0	1	15	4	11	0	0
Italy	1	1	0	0	0	4	2	2	0	0
Portugal	1	1	0	0	0	1	1	0	0	0
Romania	1	0	0	1	0	1	0	0	1	0
Spain	1	1	0	0	0	5	3	0	2	0
Sweden	1	1	0	0	0	1	1	0	0	0
Slovakia	1	1	0	0	0	1	0	1	0	0
Slovenia	1	1	0	0	0	1	0	1	0	0
Total	**51**	**35**	**6**	**3**	**7**	**58**	**23**	**26**	**6**	**3**
Proportion (%)	**100**	**68.6**	**11.8**	**5.9**	**13.7**	**100**	**39.7**	**44.8**	**10.3**	**5.2**

Source: the author's own construction based on the certificates issued on 14 February (European Commission 2016 cited in CEER 2016a)

https://ec.europa.eu/energy/sites/ener/files/documents/Received%20notifications%20corr.xlsx

Table 2 clearly illustrates that in the electricity sector 68.6% of certified transmission system operators referred to full ownership unbundling (In 2009 this ratio amounted only to 40.5% according to EC data 2011, pp. 36-39). About 11.8% of transmission systems were certified under the Independent Transmission Operator (ITO) model, 5.9% were granted certifications under the Independent System Operator (ISO) model and 13.7% were certified under other models. As for the natural gas sector, full ownership unbundling was implemented in about 39.7% of certified transmission system operators (in 2009 this ratio amounted to only 16.9% according to EC data 2011, pp. 36-39). About 44.8% of transmission systems were certified under the Independent Transmission Operator (ITO) model, 10.3% were granted certifications under the Independent System Operator (ISO) model and 5.2% were certified under other models.

Table 3
Ownership structure of transmission systems

	Electricity	Natural gas
100% public ownership	Croatia, Cyprus, Czech Republic, Denmark, Estonia, Greece, Hungary, Latvia, Poland, Slovakia, Slovenia, Sweden, the Netherlands	Croatia, Denmark, Hungary, Poland, Slovenia
> 51% public ownership	Austria, Finland, France, Lithuania, Romania	Belgium, Estonia, Finland, Greece, Italy, Lithuania, Slovakia
> 51% private ownership	Belgium, Italy, Luxembourg, Spain	Austria, France, Luxembourg, Spain, Sweden
100% private ownership	United Kingdom, Portugal	Czech Republic, United Kingdom, Portugal, Latvia

* In Germany there are undertakings with mixed public and private ownership in both sectors. No information is available about other member states.
Source: the author's own construction based on CEER (2016a)

Table 3 clearly shows that the TSO public ownership is stronger in the electricity sector than in the gas sector. In more than half of the Member States the TSO ownership structure is public and amounts to 100%. Only two Member States have a full private ownership structure for their TSOs and in other Member States there is mixed public and private ownership for electricity TSOs. Only in four EU countries do gas TSOs have a public ownership of 100%. In other countries most of the TSO ownership structure is private. According to CEER 2016a, the ownership structure of the TSO has changed in two thirds of the Member States since the third energy package entered into force.

The CEER 2016a study investigated monitoring tools used by National Regulatory Authorities (NRAs) to ensure compliance of TSOs with unbundling requirements and monitored issues and measures taken by NRAs in cases where non-compliance with unbundling rules were experienced. The study found that the three unbundling models proposed in the Third Energy Package (including the 'most relaxed' ITO model) and the related unbundling requirements are sufficient to ensure effective unbundling of network operation from production and supply activities.

Compliance with Unbundling Requirements of Distribution System Operators (DSOs)

The basic functional model of distribution system operators is similar in all Member States. However, the number of distribution system operators, their size, technical parameters and the profile of their activities differ greatly in these Member States. In 2015 there were 714 distribution system operators in the German gas market, out of which 689 supplied less than 100,000 connected customers. As many as 803 out of 880 German electricity DSOs serviced less than 100,000 connected customers. In several countries the number of DSOs was below 10. As for distribution systems, the Energy Package imposed the obligation of accounting unbundling as well as legal and functional unbundling requirements. Unbundling of accounts is mandatory for all distribution system operators. However, exemptions from legal and functional unbundling rules may be granted. For example, DSOs servicing less than 100,000 connected customers are entitled to exemptions. Member States transposed the rules into their national legislation in different ways. For example, in the Netherlands the implementation of full DSO ownership unbundling is required. In other countries all DSOs including those with less than 100,000 connected customers are obliged to implement legal and functional unbundling. More than half of the Member States grant small DSOs exemptions from unbundling rules. Several Member States have adjusted the threshold of 100,000 connected customers to their own circumstances. There are states where different requirements are imposed on gas and on electricity. In Malta and Cyprus only accounting unbundling is required due to their special situation (isolated and emerging market). In the majority of Member States distribution systems belong to vertically integrated undertakings.

The CEER 2016b study reported that, in general, the legal form chosen for distribution system operators guarantees a sufficient level of independence. Distribution system operators have sufficient financial resources at their disposal to ensure full independence and decision-making power. The study highlights some weaknesses in branding and communication policies, namely, that corporate identity is not fully separated from the integrated company group. The role of regulatory authorities in monitoring and control is an important factor in ensuring compliance programmes (CEER 2016b).

MARKET CONCENTRATION IN RETAIL MARKETS – METHODOLOGICAL BACKGROUND

One of the major barriers to creating a real competitive business environment is vertical integration encompassing the whole value chain of the sector, that is, the emergence of dominant market players. In this sub-chapter the degree of market concentration and the competition level in the retail market is investigated.

Several indicators were taken into consideration when the market concentration was measured. First, the values of the frequently used Herfindahl-Hirschman index (HHI) were analysed. The Herfindahl-Hirschman index (HHI) is calculated by adding the squares of the percentage market share of each market player. Its value ranges between 0 and 10,000. The higher the value of the indicator is, the more concentrated the market is. The index can be as high as 10,000 if there is only one market player in a monopoly position on the supplier side. When the index value is over 5,000, the market concentration is very high. Even a 1,800 index value is said to be high. This value can be considered to be a threshold, as market concentration above this value may lead to the possibility of abusing a dominant market position. A Herfindahl-Hirschman index value between 1,000 and 1,800 indicates a moderately concentrated market. If this index is below 1,000, the market is deconcentrated (Kovács, 2011).

In order to gain a more complete picture of market concentration, further indicators for assessing market competition are also worth considering. This assessment focuses on conventional market concentration indicators with an emphasis on three largest corporate market shares (C3 indicator) and on a number of undertakings with a market share over 5%. In addition, this study presents a compounded indicator produced to assess the relative level of competition (the ACER Retail Competition Index). Before analysing the data, mention should be made of ARCI methodology. For more details, see the description of the ARCI methodology and its values in detail in IPA (2015) and ACER/CEER (2016).

The ACER Retail Competition Index and its 9 sub-indicators assess the relative level of competition in retail energy markets at a national level in the household segment in EU Member States. This composite index consists of the following indicators (based on IPA 2015 and ACER/CEER 2016):

1. Market structure indicators: analyse market concentration ratio
   a. market share of the three largest undertakings (C3) expressed as percentages (2015): these data are normalised into a range of 0 to 10. A score of 10 corresponds to 30% or below and indicates a competitive market. If the value ranges between 30% and 100%, the potential value of the normalised value decreases linearly to zero. A score

of 0 shows that the value of the C3 indicator is 100%.
   b. the number of undertakings with a market share over 5% (2015): This indicator is computed on a scale ranging from 0 to 10 (0 indicates monopoly of an undertaking, 10 means 10 or more suppliers)
   c. difficulties of price comparison (2015): The price comparison is based on customer surveys. A ten-point scale is used for estimating the ease or difficulty of comparing service and product prices set by different retailers. (0 indicates the greatest ease, 10 means that comparing is difficult). Normalisation is not required. This component is subjective.

2. Market behaviour indicators:
   a. average rate of customers switching suppliers (external) and switching tariffs activities (internal) (2011-2015): This indicator shows what percentage of customers have switched energy suppliers or switched to different tariffs with historically incumbent suppliers. Higher switching rates and activities indicate greater competition. However, lower rates do not necessarily mean limited competition. (The rates were converted to linearly increasing scores on a scale from 0 to 10. Zero indicates that the switching rate is 0%, 10 means that the switching rate is 20% or above. It is assumed that such a switching rate has no further impact on competition. (I think this indicator can be applied to characterise competition, with certain reservations, in Member States applying regulated prices.)
   b. consumer inactivity: This indicator expresses the proportion of consumers who do not switch suppliers, but remain with an incumbent supplier (2015). These data are estimated based on the supplier's market share. Normalisation is a conversion to a scale ranging between 0 and 10. 10 indicates that 1/3 of the consumers switched to non-incumbent suppliers, while 0 shows that 100% of consumers remained with incumbent suppliers. (I think this indicator can be applied for characterising competition with certain reservations in Member States applying regulated prices.)
   c. average net market entry (2013-2015): This indicator shows a change in the number of domestic suppliers, namely, market entries minus market exits. This indicator is problematic. (For example, the average net market entry is 0 if there are no market entries or market exits, or if the same number of undertakings have entered or exited the market). (Normalisation on a scale ranging between 0 and 10: 0 means that the net market entry is zero, 10 indicates that the net market entry is 5 or more. The normalised score between two values increases linearly.)
   d. Number of offers per supplier (2015) (examined in the European capital cities): This indicator shows the number of offers divided by the number of

service providers. On a scale ranging between 0 and 10, 0 means one offer per supplier, 10 indicate five or more offers per supplier).

3. Competition performance indicators:
    a. customer satisfaction indicator: This indicator measures how markets meet customer expectations (2015) in terms of service and product prices and quality offered by suppliers. This indicator is based on a consumer survey and is a very subjective element. Normalisation is not required. A scale of 0 to 10 is used for evaluation (0 – low, 10 – extremely high satisfaction).
    b. average price margin: This indicator shows the difference between wholesale and retail prices. Average price margin = (retail price - wholesale price)/retail price. In the case of retail prices, average retail prices are used as the basis for calculations. In the case of wholesale prices, the energy component of the retail price is considered. It should be noted that a low average price margin may result from regulated end-user prices and not necessarily from market competition. This fact is taken into consideration when the data are normalised. Normalisation uses the proportion of consumers on non-regulated prices. (Based on IPA (2015) and ACER/CEER (2016))

Certain indicators were normalised and computed on a scale from 0 to 10. Then each indicator was assigned equal weight and a single weighted composite index was produced. The ARCI value ranges on a scale from 0 to 10. A zero score indicates that the level of competition is low. The higher the score is, the stronger the competition experienced in the market. The index has all the general critical features of composite indices, which should be taken into account in the evaluation of the obtained results. ARCI indicates that the competition level in the energy retail market in Member States varies. Energy markets can be ranked based on this index. By examining each component of the nine sub-indicators, it becomes evident which areas need to be improved in individual Member States. To this end, the present assessment does not intend to present further details related to this issue (see IPA (2015) and ACER/CEER (2016)).

EVALUATION OF THE MARKET CONCENTRATION IN ENERGY RETAIL MARKETS

HHI clearly shows that (See: Table 4) there is market deconcentration in both sectors only in Germany. There is moderate market concentration in several Member States. In the majority of Member States the HHI in retail is high or very high in both sectors.

Table 5 presents the ARCI, ranking based on ARCI, reliability of data for ARCI, the market share of the three largest suppliers (C3) and the number of undertakings with a market share over 5% in the electricity and gas sectors in the EU Member States in 2015. Since Malta and Cyprus do not have retail gas markets and in Finland and Sweden the gas retail market is small, the data on this market are incomplete.

Table 4
HHI value in electricity and gas retail markets based on the data of 2012

2012*	Electricity	Gas
Very high market concentration (HHI>5000)	Cyprus (10000), Estonia, Greece, Latvia, Luxembourg, Malta (10000), Portugal	Estonia, Latvia (10000), Lithuania, Luxembourg, Poland
High market concentration (HHI 1800-5000)	Belgium, Croatia, France, Ireland, Italy, Lithuania, Poland, Spain, Netherlands	Austria, Belgium, Denmark, France, Ireland, Portugal, Slovenia, Spain, Netherlands, United Kingdom
Moderate market concentration (HHI 1000-1800)	Austria, Hungary, Romania, Slovenia, United Kingdom	Croatia, Czech Republic, Hungary, Italy
Market deconcentration (HHI<1000)	Germany	Germany

* In case of missing Member States data were not available.
Source: the author's own construction based on European Commission (2014)

Table 5
Indicators measuring market competition in the electricity and gas sectors
in the EU Member States in 2015

Country	Electricity					Natural gas				
	ARCI	Ranking based on ARCI	Reliability of data for ARCI	C3	Number of undertakings with a market share over 5%	ARCI	Ranking based on ARCI	Reliability of data for ARCI	C3	Number of undertakings with a market share over 5%
Austria	6	7	High	60	5	4.5	11	Moderate	> 70	3
Belgium	5.7	8	High	>70	5	6.8	1	High	>70	5
Bulgaria	2.2	27	Moderate	100	3	2.1	22	High	100	2
Cyprus	2.4	26	Moderate	100	1	-	-	-	-	-
Czech Republic	6.1	4	High	>70	5	5.5	5	High	>70	5
Denmark	5.6	9	Moderate	>40	6	3.5	13	High	>90	3
United Kingdom	6.8	3	High	>50	6	6	2	Moderate	>60	6
Estonia	5.3	11	High	>80	2	4.1	12	Moderate	>90	1
Finland	7.7	1	Moderate	40	4	-	-	-	>90	1
France	3.3	20	High	>90	2	3.5	14	High	>90	2
Greece	2	28	High	100	1	2	24	High	100	1
the Netherlands	6.1	5	High	>70	3	5.8	4	High	>70	3
Croatia	2.5	25	High	>90	1	2.5	19	High	>60	3
Ireland	5.1	13	High	90	4	5.1	9	High	>80	5
Poland	5.1	14	High	>70	5	2.2	20	High	100	1
Latvia	4	18	High	>90	1	2	23	High	100	1
Lithuania	2.9	24	High	100	1	2.1	21	High	100	1
Luxembourg	4	19	High	>90	2	3.1	16	High	100	2
Hungary	3.1	21	High	>70	2	3	17	High	100	4
Malta	3.1	22	Low	100	1	-	-	-	-	-
Germany	6.1	6	High	40	4	6	3	High	>20	3
Italy	5.2	12	High	>80	1	5.3	6	High	>50	4
Portugal	5.5	10	High	>90	2	5.2	7	High	100	3
Romania	4.2	17	High	>80	4	2.8	18	High	>90	2
Spain	4.5	16	High	90	3	5..2	8	High	>80	4
Sweden	7.2	2	Moderate	>40	4	-	-	-	>80	4
Slovakia	3.1	23	High	>80	3	3.2	15	High	>90	3
Slovenia	5	15	High	>60	7	5	10	High	>60	5

Source: the author's own construction based on IPA 2015 és ACER/CEER 2016

Conventional market concentration indices show that retail markets are still relatively highly concentrated. The market share of the three largest suppliers (C3) in the majority of EU Member States amounts to about 70-100% in both sectors. The grey areas in Table 5 show values below 70%. The number of undertakings with a market share over 5% is also small in almost all Member States.

According to the ARCI created to compare relative levels of competition in energy retail markets, the competition in the electricity market is the highest in Finland, Sweden, the United Kingdom, the Czech Republic and the Netherlands. In the gas retail market the competition is the most advanced in Belgium, the United Kingdom, Germany, the Netherlands and the Czech Republic. The level of competition in the electricity market is the lowest in Greece, Bulgaria, Cyprus, Croatia and Latvia. As for the gas market, it is the weakest in Greece, Lithuania, Bulgaria, Latvia and Poland.

CONCLUSION

The findings of the present assessment show that a significant improvement has been made in the unbundling of activities over the past few years. Full ownership unbundling has been implemented in a large proportion of transmission systems. However, this proportion varies in the gas and electric sectors. As for the other two models, ISO and ITO, the introduced stringent regulations and the tight control exercised by authorities create conditions for the evolution of undistorted competition. The studies referred to show that legal and functional unbundling stipulated for distribution system operators and supplemented by strict regulation regimes is considered to be appropriate.

A significant scope for improvement remains in market concentration. As for the retail energy markets, the market concentration indices still show a high level of concentration both in the electricity and gas markets, despite the fact that the market competition increased in 2015 compared to the initial period (beginning from years 2007-2008).

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Empirical Analysis of the Wagner Hypothesis of Government Expenditure Growth in Kenya: ARDL Modelling Approach

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SUMMARY

Government spending patterns in developing countries have changed dramatically over the last several decades. This paper aims at analysing the relation between government expenditures (GE) and economic growth in Kenya. The study focuses on testing the various versions of Wagner's hypothesis using Kenya, data from 1967-2012 by an Autoregressive-Distributed Lag (ARDL) model. Overall, we conclude that the Musgrave version is best suited for Kenyan cases since it produced significant long-run and short-run results that were accepted by diagnosis and stability tests. The results rejected Wagner's hypothesis in Kenya.
Keywords: Wagner's hypothesis, ARDL model, Kenya
Journal of Economic Literature (JEL) codes: E62, E12, H50, C22
DOI: http://dx.doi.org/10.18096/TMP.2017.02.05

INTRODUCTION

Fiscal instruments are deemed to be essential in creating opportunities for widening the base from which developing countries such as Kenya could grow. Within the East Africa Community (EAC), the Kenyan economy is the anchor and is much more dynamic than those of other member countries. The bases for a strong economy are boosted by recent institutional reforms that have culminated in the adoption of a new constitution (GoK 2010) that provides for devolved governance, a strong private sector that has evolved under relatively market-friendly policies and a relative political stability with minimal negative dramatic ideology. Recent statistics show that Kenya's GDP (Gross Domestic Product) accounts for 40 per cent of the region's GDP, followed by Tanzania at 28 per cent, Uganda at 21 per cent, Rwanda at 8 per cent, and lastly Burundi at 3 per cent (IMF 2017). Although the Kenyan economy is the greatest in EAC, its trends in the growth of the GDP and government expenditures (GE) over the period of study (1967-2012) has been fluctuating. The trend in GDP growth was cyclical, depicting neither clear pattern nor responsiveness to the changes in government expenditure, characterized by a negative pattern on average. The economic performance of Kenya is fragile and prone to political and environmental shocks. Serious depression in the GDP growth coincides with the previous election periods (e.g. 1972/73, 1982/83, 1992/93, 2002/03 and 2007/08) and drought periods (e.g. 1980, 1984, 2009). Recently, from 2002 there has been remarkable economic performance that can be attributed to increased government expenditure in areas of infrastructure such as roads, railways, electricity and also due to the expansion of recurrent expenditure on vital services such as education, health and housing. The economy has progressively overcome negative shocks, posting a growth rate of 6% in the past five years.

Among the fiscal instruments, government spending, which is the focus of this study, is very important to the Kenyan economy. This study focuses on establishing whether there is relation between government expenditures and economic growth in the Kenya using several propositions that have been developed in relation to Wagner's hypothesis. The study focuses on addressing three questions:

1. Which amongst the available Wagner's hypothesis interpretation is relevant to Kenya case?
2. By how much do government expenditures change with GDP in the long run and by how much in the short run?
3. Is the relation between government expenditures and GDP robust over time?

According to Arpaia & Turrini (2008), better insight on the dynamic relationship between real GE and real GDP is relevant to policy in two major respects. First, it improves the understanding of long-term, structural public finance issues and second, a better understanding of the dynamic relation between government expenditure and GDP helps comprehension of policy-relevant issues over a short-to-medium term horizon. Judging whether expenditure policy is expansionary or contractionary requires some idea about how expenditure policy would look. These issues are treated in a wide theoretical view in Zagler & Dürnecker (2003) or in a post-crisis European perspective in Bartha & Sáfrányné Gubik (2012). Estimating the long-term relation between GE and GDP provides a benchmark for expenditure policy grounded on empirical evidence. Useful information for policymaking would also be provided by estimating the speed at which GE adjusts to its long-term relation with GDP after a shock in economic activity.

In terms of the notion of GE and GDP, there are two growing strands of research. The first one aims at explaining cross-country structural differences in the size of government on the basis of political fundamentals that shape the extent of the deficit bias related with free-riding in GE provision and governments' myopia. It has been shown that the size of government tends to be larger in parliamentary than in presidential regimes (Persson et al. 2000). However, the question of whether or not such expansion causes economic growth has divided policy makers into two distinctive theoretical camps, as proponents of either a big government or small government. Economic theory would suggest that on some occasions lower levels of public expenditure would enhance economic growth while on other occasions higher levels of public expenditure would be more desirable (e.g. Knoop 1999; Jiranyakul & Brahmasrene 2007). The second strand of literature examines the link between GE and economic growth over time. Some work aims at describing long-term tendencies in history (Tanzi & Schuknecht 2000) while the majority of research is more specifically focused at the empirical estimation of elasticity of GE with respect to GDP, often with the explicit aim of providing an empirical test of the so-called "Wagner law", that is, the hypothesis that GE increases more than proportionally with economic activity (e.g. Adil et al. 2016). The latter topic seemed to be ideal for the present study and therefore this paper aims at testing the different versions of Wagner's hypothesis that specifically purport the existence of long-run relationship between public expenditure (PE) and gross domestic product (GDP) using annual time series data in Kenya context using Autoregressive-Distributed Lag (ARDL) model.

The paper is organized as follows. In Section 1, the theoretical foundation of Wagner's hypothesis is discussed and we review the findings of the previous studies on the effects of government expenditure (GE) and gross domestic product (GDP). The data and methodological framework used in this study are presented in Section 2. In this section, measures of unit root tests are discussed together with the concept and rationale for using the ARDL modelling approach in this study. In Section 3, the empirical results are presented and interpreted along with their policy implications for the Kenya economy. Finally, concluding remarks are presented in Section 4.

THEORETICAL FOUNDATION OF WAGNER'S HYPOTHESIS

The theoretical foundation of Wagner's hypothesis was inspired by the rapid urbanization and industrialization in the late nineteenth century, during which Wagner observed that economic development in countries undergoing industrialization transformation was being accompanied by growing public activity relative to the economy growth. Motivated by rate of industrialization of European countries such as Britain and Germany, as well as the United States and Japan in the nineteenth century, he designed a research project that aimed at understanding the economic history of the industrialization. On the basis of his study, he proposed to explain the observed phenomenon of the growth in public activity relative to the economy growth in the context of industrializing economies. In his study, Wagner writes as follows: *"Historically there exists a clear tendency for an expansion of public activity together with the progress of the economy…"* (Biehl 1998, p. 107). This concept formed the ideal premises of many subsequent scholars in this field and provided scope for a range of different interpretations in the existing literature (e.g. Peacock & Wiseman 1961; Gupta 1967; Goffman 1968; Pryor 1968; Musgrave 1959; Goffman & Mahar 1971; Mann 1980; Florio & Colautti 2005).

This paper made use of four interpretations, namely Peacock & Wiseman (1961), Gupta, (1967), Goffman (1968) and Musgrave (1959) to investigate which among them best explains the relationship between government expenditures (GE) and economic growth in reference to the Kenyan economy. The four were selected for their wide application and consistency in explaining the short- and long-run relation between GE and GDP (e.g. Magableh 2006; Gisore et al. 2014; Adil et al. 2016). The interpretations, functional form and empirical model specifications are summarized in Table 1 below. It is worth noting that except for Gupta, who adopted a double logarithmic functional form, the researchers opted for a linear relationship between the two economic variables. In order to verify the long run relations between GE and GDP in Kenya, the general specifications have formed the basis for testable models of the Wagner's hypothesis in the existing study, as shown in the fourth column. The double logarithm technique was adopted in order to estimate the effect of GDP on GE in terms of responsiveness.

Table 1
Versions of Wagner's law

Model	Wagner's hypothesis interpretation	General form	Empirical model
Peacock & Wiseman (1961)	*"The proportion of public expenditures to gross national product must be expected to rise over the foreseeable future"*	$GE = f(GNP)$	$LnRGE_t =$ $= \beta_1 + \beta_2 LnRGDP_t + \mu_t$
Gupta (1967)	*"Government expenditure must increase at a rate faster than that of the national income"*	$GE/P =$ $f(GNP/P)$	$Ln\left(\frac{RGE_t}{p_t}\right) =$ $= \beta_1 + \beta_2 Ln\left(\frac{RGDP_t}{p_t}\right) + \mu_t$
Goffman (1968)	*"As a nation experiences econo-mic development and growth, an increase must occur in the activity of the public sector and the ratio of increase, when converted into expenditure terms, would exceed the rate of increase in output per capita"*	$GE =$ $f(GNP/P)$	$LnRGE_t =$ $= \beta_1 + \beta_2 Ln\left(\frac{RGDP_t}{p_t} + \mu_t\right)$
Musgrave (1959)	*"The proposition of expanding scale, obviously, must be inter-preted as postulating a rising share of the public sector in the economy. An absolute increase in the size of the budget can hardly fail to result as the economy expands"*	$GE/GNP =$ $f(GNP/P)$	$Ln\left(\frac{NGE_t}{NGDP_t}\right) =$ $= \beta_1 + \beta_2 Ln\left(\frac{RGDP_t}{p_t}\right) + \mu_t$

Source: Own construction from Magableh 2006; Adil 2016
Notes: RGE – Real Government Expenditure; RGDP – Real Gross Domestic Product; P – Population; NGE – Nominal Government Expenditure; NGDP – Nominal Gross Domestic Product

The importance of GE in enhancing economic growth cannot be underestimated. There have been numerous studies on the role of government spending in long-term growth in Kenyan economies (e.g. Musyoki 2010; Muthui et al. 2013; Simiyu 2015). A review of the recent studies found conflicting results about the effects of government spending on economic growth. For instance, Musyoki (2010), examined the case for Kenya by analyzing the relationship between government expenditure and GDP growth using historical annual data for Kenya from 1963-2008 obtained from published government documents, mainly the annual economic surveys and statistical abstracts. The authors used a multivariate time series analysis with emphasis on the shape of impulse response functions under VAR and causal patterns established using Granger causality tests were adopted to show how government expenditure and size of government interact with GDP growth. The results of the analysis show that even though GDP level in one period determines its own level in future periods, government expenditure actually influences GDP in the medium and long term. Similarly, government size has a positive influence on GDP only in the short run but this effect becomes negative in the long run. Thus, government must continue to spend more in productive areas to ensure economic growth.

However, the rapid growth in public expenditure experienced in Kenya since independence has caused concern among policy makers regarding its implications for economic growth. Motivated by this concern, Muthui et al. (2013) developed a study that aimed at investigating the impact of expanding public expenditure composition on economic growth in Kenya from 1964 to 2011. To ensure appropriateness of the time series date, these authors conducted a stationarity test, causality test and cointegration tests before applying vector error correction model to estimate the long-run and short-run relationship between government expenditure (particularly on health and education) and GDP. The study found that though government expenditure on education is positively related to economic growth it does not spur any significant change to growth. Based on this study, investing more and better-distributed education in the labor force will help create conditions that could lead to higher productivity and higher economic growth. For health, the authors found that increased government expenditure on improving health could also be justified purely on the grounds of its impact on labor productivity. This supports the case for investments in health as a form of human capital.

A similar study was recently conducted by Simiyu (2015) in Kenya. The motive behind this study was to investigate whether there exists a relationship between economic growth on key public expenditure (health, education, military and infrastructure) in Kenya. The study used a time series data collected between 1963 and 2012. The Johansen Cointegration Test and Vector Error Correction Model (VECM) were applied on the time series

data to estimate the short-run and long-run relationships between public expenditures and economic growth in Kenya. The study found that public expenditure components and economic growth co-move towards a long-run equilibrium with a speed of adjustment of approximately 3.6% after short-run fluctuations in the equilibrium. Furthermore, the results show no causal relationship between public expenditure and economic growth in Kenya. However, a unidirectional causation was found between military and health expenditures – military expenditures "Granger Cause" health expenditures. Hence, a change in military expenditures causes a change in Health expenditures. These findings suggest that the Government of Kenya should switch military expenditures for health expenses in Kenya, but not vice versa.

In summary, this section has presented the various theories that explain public expenditure and economic growth of the countries. The review carried out above has also presented the various effects of public expenditure on economic development of Kenya. As can be observed, studies have found mixed results on the causal relationship between public expenditure and economic growth. Further, the econometric method employed in most studies was the VAR or VEC model, which require a priori determination of order of integration and can be only be applied to series that are integrated of the same order.

METHODOLOGICAL FRAMEWORK AND DATA

Data

Secondary data was used in this study to analyze the effect of the Wagner's hypothesis in the context of government expenditure on economic growth in Kenya (for available data sources, see Arasa & K' Obonyo 2012). We collected annual time series data of the government expenditures and GDP in Kenya ranging from 1967 to 2012. This type of data was obtained from international organization databases: World Bank (Global Development Data) and International Monetary Fund (International Financial Statistics database). All the data obtained were converted to real data for ease of analysis using STATA.

Stationarity Tests

The stationarity of the variables was examined to avoid the existence of spurious estimation results. Stationarity tests allow us to verify whether a series is stationary or not. Stationarity can be done in twofold; 1) the null hypothesis H_0 that the series is stationary (e.g. KPSS test for stationarity) and 2) unit root tests, such as the Dickey-Fuller test and its augmented version, the augmented Dickey-Fuller test (ADF) (Dickey & Fuller 1979), or the Phillips-Perron test (PP) (Phillips & Perron, 1988), for which the null hypothesis H_0 is on the contrary that the

series possesses a unit root and hence is not stationary. In this study unit root test was done by conducting both the ADF and PP test. In both ADF and PP tests the null hypothesis of a unit root is present in a time series sample. The alternative hypothesis is different depending on which version of the test is used, but is usually stationarity or trend-stationarity. If a series is stationary without any differencing, it is said to be $I(0)$ or integrated of order 0. On the other hand, if a series is stationary after first-difference it is said to be $I(1)$ or integrated of order 1. However, the advantage of the PP over the ADF test is that the PP test is robust to general forms of heteroskedasticity in the error term and also the user does not have to specify a lag length for the test regression.

ARDL Cointegration Approach

After establishing whether the series is stationary in levels or first-difference (and if the series are integrated of the same order), then a cointegration test needs to be conducted to determine whether the variables are cointegrated or not. Several methods are available for conducting the cointegration test and the most commonly and widely used methods include the residual based Engle-Granger (Engle & Granger 1987) test, the maximum likelihood based on Johansen (1991; 1995) and Johansen-Juselius (Johansen & Juselius 1990) tests. Due to the low power and other problems associated with these test methods, the OLS based autoregressive distributed lag (ARDL) approach to cointegration was applied. The main advantage of ARDL modelling lies in its flexibility, as it can be applied when the variables are of different order of integration (Pesaran & Pesaran 1997). Compared to other cointegration test approaches that requires order of integration of the variables to be determined first, which may lead to misclassification of variables as $I(0)$ or $I(1)$, an ARDL uses a bounds testing procedure to draw conclusive inference without knowing whether the variables are integrated of order zero ($I(0)$) or one ($I(1)$) (Pesaran et al. 2001). Examples of integration order problems can be found in the analysis of the Hungarian case (see Mellár 2001; Kotosz 2006; Kotosz & Peák 2013). Another advantage of this approach is that the model takes a sufficient numbers of lags to capture the data generating process in a general-to-specific modelling framework (Laurenceson & Chai 2003). Its popularity also stems from the fact that cointegration of nonstationary variables is equivalent to an error-correction (EC) process (for the linear transformation see e.g. Banerejee et al. 1993), and the ARDL model has a reparameterization in EC form (Engle & Granger 1987; Hassler & Wolters 2006). The EC integrates the short-run dynamics with the long-run equilibrium without losing long-run information and the existence of a long-run cointegrating relationship can be tested based on the EC representation. In addition, it is also argued that using the ARDL approach avoids problems resulting from non-stationary time series data (Laurenceson & Chai 2003).

In practice, ARDL involves three distinct steps: first, the determination of the existence of the Long Run Relationship of the variables, second, choice of the appropriate lag length for the ARDL Model/Estimation of the Long Run Estimates of the Selected ARDL model, and third, reparameterization of ARDL model into the Error Correction Model. At the first stage the existence of the long-run relation between the variables under investigation is tested by computing the Bound *F* or *t*-statistic (bound test for cointegration) in order to establish a long-run relationship among the variables. This bound *F* or *t*-statistic is carried out on each of the variables as they stand as endogenous variable while others are assumed as exogenous variables. This approach is illustrated by using an ARDL (*p, q*) regression with an *I*(*d*) regressor as follows

$$LnRGE_t = C_0 + \beta_1 LnRGE_{t-1} + \cdots + \beta_p LnRGE_{t-p} + \alpha_0 LnRGDP_t + \alpha_1 LnRGDP_{t-1} + \cdots + \alpha_q LnRGDP_{t-q} + \mu_t \quad (1)$$

or

$$LnRGDP_t = C_0 + \beta_1 LnRGDP_{t-1} + \cdots + \beta_p LnRGDP_{t-p} + \alpha_0 LnRGE_t + \alpha_1 LnRGE_{t-1} + \cdots + \alpha_q LnRGE_{t-q} + \mu_t \quad (2)$$

where i =1, 2, … T and $\mu_t \sim iid(0, \sigma^2)$, C_0 is the drift and LnRGDP$_t$ and LnRGE$_t$ are the log of gross real domestic product (RGDP) and the log of real government expenditure (RGE), respectively and are an *I*(*d*) process generated by

$$LnRGE_t = LnRGE_{t-1} + \varepsilon_t \quad (3)$$

or

$$LnRGDP_t = LnRGDP_{t-1} + \varepsilon_t. \quad (4)$$

Note u$_t$ and ε_t are uncorrelated for all lags such that $LnRGE_t$ (or $LnRGDP_t$) is strictly exogenous with respect to u$_t$. ε_t is a general linear stationary process. In practice the ARDL (p, q$_1$, q$_2$ ... q$_k$) model for cointegration testing is expressed as

$$\Delta LnRGE_t = C_0 + \sum_{i=1}^{k} \beta_i \Delta LnRGE_{t-i} + \sum_{j=0}^{k} \alpha_j \Delta LnRGDP_{t-j} + \delta_1 LnGE_{t-1} + \delta_2 LnRGDP_{t-1} + v_{1t} \quad (5)$$

or

$$\Delta LnRGDP_t = C_0 + \sum_{i=1}^{p} \beta_i \Delta LnRGDP_{t-i} + \sum_{j=0}^{q} \alpha_j \Delta LnRGE_{t-j} + \delta_1 LnRGDP_{t-1} + \delta_2 LnRGE_{t-1} + v_{1t}. \quad (6)$$

Here, *k* is the ARDL model maximum lag order and chosen by the user. The *F*-statistic is carried out on the joint null hypothesis that the coefficients of the lagged variables ($\delta_1 LnGE_{t-1}$, $\delta_2 LnGDP_{t-1}$ or $\delta_1 LnGDP_{t-1}$, $\delta_2 LnGE_{t-1}$) are zero. The null of non-existence of the long-run relationship is defined by; *H$_0$*: $\delta_1 = \delta_2 = 0$ (null, i.e. a long-run relationship does not exist) *H$_1$*: $\delta_1 \neq \delta2 \neq 0$ (Alternative, i.e. a long-run relationship exists). The model is "autoregressive" in the sense that $LnGE_t$ or $LnGDP_t$ is explained (in part) by lagged values of itself.

Pesaran et al. (2001) provide lower and upper bounds for the asymptotic critical values depending on the number of regressors, their order of integration, and the deterministic model components based in *F*-test or *t*-test. Based on Pesaran et al. (2001), we fail to reject the null H_0^F or H_0^t respectively if the test statistic is closer to zero than lower bound of the critical values and reject the null H_0^F or H_0^t respectively if the test statistic is more extreme than the upper bound of the critical values. The existence of a (conditional) long-run relationship is confirmed if both null H_0^F or H_0^t are rejected. If a long-run relationship exists between the underlying variables, while the hypothesis of no long-run relations between the variables in the other equations cannot be rejected, then the ARDL approach to cointegration can be applied.

Step two involves determining the appropriate lag length for each of the underlying variables in the ARDL model. This is because we want to have Gaussian error terms (i.e. standard normal error terms that do not suffer from non-normality, autocorrelation, heteroskedasticity, etc.). The optimal lag orders *p* and *q* (possibly different across regressors) can be obtained with proper model order selection criterion, e.g. the Akaike information criterion (AIC) or the Bayesian information criterion (BIC) or Hannan-Quinn Criterion (HQC). For this case, we adopted AIC criteria expressed as

$$AIC_p = -n/2(1 + log 2\pi) - n/2 log \delta^2 - p \quad (7)$$

where δ^2 is the Maximum Likelihood (ML) estimator of the variance of the regression disturbances and n is the number of estimated parameters, *p*=0, 1, 2......P, where P is the optimum order of the model selected.

Having confirmed that a long-run relationship exists among variables and having identified the number of lags to include for each variable, then the long-run model for *LnRGE* can be describe in the ARDL (*p, q*) model as:

$$LnRGE_t = C_0 + \sum_{i=1}^{p} \beta_i LnRGE_{t-i} + \sum_{j=0}^{q} \alpha_j LnRGDP_{t-j} + \mu_t. \quad (8)$$

In its basic form, this ARDL regression model looks like this:

$$LnRGE_t = C_0 + \beta_1 LnRGE_{t-1} + \cdots + \beta_p LnRGE_{t-p} + \alpha_0 LnRGDP_t + \alpha_1 LnRGDP_{t-1} + \cdots + \alpha_q LnRGDP_{t-q} + \mu_t \quad (9)$$

where μ_t is a random "disturbance" term (white noise error term) and C_0, *LnGDP* and *LnGE* are as earlier defined.

If we allow the variables in $(LnGDP_t, LnGE_t)'$ to be purely $I(0)$, purely $I(1)$, or mixed cointegrated then the ARDL model can be reparameterized in conditional ECM form as follows;

$$\Delta LnRGE_t = C_0 - \gamma(LnRGE_{t-1} - \vartheta LnRGDP_{t-1}) + \sum_{i=1}^{p-1} \varphi_{LnGE_i} \Delta LnRGE_{t-i} + \sum_{j=0}^{q-1} \varphi_{LnGDP_i} \Delta LnRGDP_{t-j} + \mu_t \qquad (10)$$

with the speed-of-adjustment coefficient
$$\gamma = \sum_{j=1}^{p} \varphi_i \qquad (11)$$

and the long-run coefficients

$$\theta = \frac{\sum_{j=0}^{q} \beta_i}{\gamma} \qquad (12)$$

where φ_{LnGE_i} and φ_{LnGDP_i} are the short-run dynamic coefficients of the model convergence to equilibrium. If the value of speed of adjustment is zero, it means that there exists no long-run relationship. If it is between -1 and 0, there exists partial adjustment; a value smaller than -1 indicates that the model over-adjusts in the current period; a positive value implies that the system moves away from equilibrium in the long run (Oktayer & Oktayer 2013).

The model was further subjected to diagnostic and the stability tests to ascertain the appropriateness of the ARDL model. The diagnostic tests check for normality (Shapiro-Wilk W test for normal data: H_0: Normal), serial correlation (LM Test – Breusch-Godfrey LM test for autocorrelation: H_0: no serial correlation), the autoregressive conditional heteroscedasticity (ARCH Test – Breusch-Pagan/Cook-Weisberg test for heteroskedasticity: H_0: Constant variance), and finally the functional form of the model (Ramsey (1969) RESET test

using powers of the fitted values: H_0: model has no omitted variables). In addition, the stability tests of ARDL model for long-run and short-run parameters were conducted by using the cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares (CUSUM square) of recursive residuals.

EMPIRICAL RESULTS

Unit Root Test

Summary statistical results of the unit root test in real terms of GE and GDP are presented in this section. The test was carried out in order to eliminate any possibility of spurious regressions and erroneous inferences. This involved determining the order of integration of the time series through a unit root test. Accordingly, ADF and PP test were conducted at level and at first difference and the results of the two are reported in Table 2 below. As indicated in the table, the ADF test failed to reject the null hypothesis of unit root at level, implying that variables are non-stationary at levels. But at first difference, the null hypothesis is rejected implying that the variables become stationary at first difference. To complement the ADF results, we also performed the PP test, which is more robust for measuring autocorrelation and heteroskedasticity. The PP test also supports the ADF test for the ratio of nominal GE to GDP ($Ln(NGE/NGDP)$) but disagrees for other variables, implying that they are stationary at levels, which perhaps could be explain by the different lag length applied in the two statistical test methods. However, since first order differencing in all cases eliminates the unit root of most of the variable under consideration, the maximum order of integration can be concluded to be $I(1)$.

Table 2
Summary result of Unit Root Test

	Augmented Dick Fuller Test				Phillips-Perron test			
	Level – $I(0)$		1st Difference $I(1)$		Level – $I(0)$		1st Difference $I(1)$	
Variable	t-statistics	lags	t-statistics	lags	t-statistics	lags	t-statistics	lags
$LnRGDP$	-2.384 (0.1463)	0	-9.399*** (0.0000)	0	3.485*** (0.0084)	3	-9.200*** (0.0000)	3
$LnRGE$	-1.685 (0.4390)	5	-2.893*** (0.0461)	5	-3.892*** (0.0021)	3	-7.489*** (0.0000)	3
$Ln(RGDP/Pop)$	-2.625* (0.0880)	0	-9.655*** (0.0000)	0	-3.328** (0.0137)	3	-9.531*** (0.0000)	3
$Ln(RGE/Pop)$	-2.314 (0.1674)	5	-2.974*** (0.0374)	5	-3.835*** (0.0026)	3	-7.601*** (0.0000)	3
$Ln(NGE/NGDP)$	-2.069 (0.2572)	0	-6.463*** (0.0000)	0	-2.157 (0.2224)	3	-6.463*** (0.0000)	3

Source: Own computation
p-values in parentheses, * Significant at 10% level; ** Significant at 5% level; *** Significant at 1% level

Table 3

Result of the cointegration test using ARDL Approach

K	*10% Sign. level		**5% Sign. level		***2.5% Sign. level		****1% Sign. level	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
F_c	4.04	4.78	4.94	5.73	5.77	6.68	6.84	7.84

Models	Dependent variable	Independent variable	F-test Statistic	Cointegration
Peacock-Wiseman	LnRGDP	LnRGE	5.428*	YES
	LnRGE	LnRGDP	4.578	NO
Gupta	Ln(RGDP/Pop)	Ln(RGE/Pop)	4.994*	YES
	Ln(RGE/Pop)	Ln(RGDP/Pop)	4.955*	YES
Goffman	LnRGE	Ln(RGDP/Pop)	3.104	NO
	Ln(RGDP/Pop)	LnRGE	0.423	NO
Musgrave	Ln(NGE/NGDP)	Ln(RGDP/Pop)	5.073*	YES
	Ln(RGDP/Pop)	Ln(NGE/NGDP)	10.571****	YES

Source: Own computation

ARDL Modelling Approach to Cointegration Analysis

The next step was to examine the existence of cointegration. Since the variables are of different order of integration (based of PP test), we used ARDL modelling due to its flexibility that allows it to be applied when the variables are of different orders of integration (Pesaran & Pesaran 1997).

The bounds test approach on all four alternative versions of Wagner's hypothesis was used to examine the long-run relationship between the variables. The maximum lag length of the variables in ARDL model was selected using the AIC. Based on the results (Table 3), there is strong evidence of cointegration at different level of significance between real GE and real GDP for three versions of Wagner's hypothesis, because the calculated *F*-statistic is greater than the critical values of upper bound (given in Pesaran et al. 2001) for Peacock and Wiseman and Gupta at the 10% level of significance and for Musgrave at the 1% level of significance. Gupta and Musgrave demonstrate a bi-direction relationship while Peacock and Wiseman show a unidirectional relationship.

The *F*-statistic of the Goffman model is insignificant at all levels, implying the variables are not cointegrated.

Long-run and Shortrun Estimation of the Model

Long-run relationship

Presented in Table 4 are the results of the long-run coefficient of the four versions of Wagner's hypothesis. The result shows that the government expenditure coefficient for the Peacock and Wiseman model is significant at the 1% level while that of Musgrave model is significant at the 5% level. Two versions (Peacock-Wiseman and Gupta) have positive sign coefficients. Based on two versions, a 1% increase in GDP (per capita GDP) would result in a 0.92% and 0.46% increase in the GE (per capita GE) for the Peacock-Wiseman and Gupta models, respectively. The first one suggests that with increasing GDP, GE also increases, but GE is inelastic to GDP. In the Musgrave model, the impact is negative, showing a *contradicting* result to the Wagner's hypothesis (but it conforms to the inelastic GE from Peacock-Wiseman model). In the model of Goffman the long-run coefficient is insignificant at all levels, which confirms the earlier results of the cointegration test.

Table 4

Estimated Long-Run Statistic Using ARDL Approach

Model	Dependent variable	Independent variable	Coefficient	Std. Error	p-value
Peacock-Wiseman	LnRGE	LnRGDP_L1.	0.9183***	0.0824	0.000
Gupta	Ln(RGE/Pop)	Ln(RGDP/Pop)_L1.	0.4550	0.2848	0.118
Goffman	LnRGE	Ln(RGDP/Pop)_L1.	-19.9596	333.2296	0.953
Musgrave	Ln(NGE/NGDP)	LnRGDP_L1.	-0.1845**	0.0781	0.023

Source: Own computation
* Significant at 10% level; ** Significant at 5% level; *** Significant at 1% level

Table 5
Estimated Short Run Statistic Using ARDL Approach

Model	Dependent variable	Independent variable	Coefficient	Std. Error	p-value
Peacock-Wiseman	*LnRGE*	*LnRGE_LD.*	0.05244	0.0779	0.505
		LnRGE_L2D.	0.05444	0.0774	0.486
		LnRGE_L3D.	0.17038**	0.0744	0.028
		LnRGDP_D1.	0.94613***	0.0818	0.000
		ADJ_LnRGE_L1.	-0.23340***	0.0792	0.006
		_cons	-0.23824	0.2205	0.287
Gupta	*Ln(RGE/Pop)*	*Ln(RGDP/Pop)_D1.*	0.85642***	0.0777	0.000
		ADJ_Ln(RGE/Pop)_L1.	-0.15423**	0.0713	0.037
		_cons	-0.90208***	0.2893	0.003
Goffman	*LnRGE*	*Ln(RGDP/Pop)_D1.*	0.84657***	0.0870	0.000
		ADJ_LnRGE_L1.	-0.00357	0.0543	0.948
		_cons	-0.48070	1.2486	0.702
Musgrave	*Ln(NGE/NGDP)*	*LN_RGDP_D1.*	-0.03693**	0.0152	0.020
		ADJ_Ln(NGE/NGDP)_L1	-0.20019**	0.0768	0.013
		_cons	0.00256	0.1462	0.986

Source: Own computation

* Significant at 10% level; **5% Significant at level; *** Significant at 1% level

Short-Run Error Correction Model (ECM)

In this section, we present the short-run dynamics of the variables in ECM. Accordingly, the short-run versions of ARDL models were estimated and the respective results are reported in Table 5. Note that the ECM coefficient is reported as adjustment variable in STATA. The ECM model has two important parts: estimated short-run coefficients and the adjustment variable coefficient. The adjustment variable provides the feedback and/or speed of adjustment from short-run to long-run equilibrium. There are two important things about the adjustment variable. The coefficient should be significant and it must be negative, so that it provides further proof of a stable long-run relationship (Shahbaz & Rahman 2010). The results of the short-run model show that adjustment is acceptable in all versions except that of Goffman, which has the expected negative sign but is not significant at any usual level of significance. In the case of Peacock-Wiseman the coefficient is positive and significant, implying divergence from the long run equilibrium. In case of Goffman, the adjustment coefficient is negative as well as insignificant,

thus we cannot rely on adjustment for short-run adjustment.

Diagnostic Tests

The model was further subjected to diagnostics to ascertain the appropriateness of the ARDL model. The diagnostic tests (see Table 6) involved checking for normality (Shapiro-Wilk W test for normal data), serial correlation (Breusch-Godfrey LM test), the autoregressive conditional heteroskedasticity (ARCH Test – Breusch-Pagan/Cook-Weisberg test) and finally the functional form of the model for omitted variables (Ramsey RESET test). Based on the results of different diagnostic tests, the statistics reported depict that the models (except for the otherwise insignificant Goffman model) are fit to be used for the estimation purpose since the model show that there is an absence of autocorrelation, functional form misspecification, and heteroskedasticity in the models and the errors follow the normal distribution, since the p-values in all tests are greater than 0.05.

Table 6
Results of Diagnostic Tests at constant prices

| Model	Dependent variable	Normality test	LM test	ARCH test	RESET test
Peacock-Wiseman	*LnRGE*	0.95684 (0.11373)	0.006 (0.9385)	0.018 (0.8931)	1.62 (0.2046)
Gupta	$Ln(RGDP/Pop)$	0.96124 (0.13615)	0.012 (0.9145)	0.051 (0.8220)	1.33 (0.2787)
Goffman	*LnRGE*	0.93566** (0.01494)	0.319 (0.5722)	0.17 (0.6801)	1.23 (0.3121)
Musgrave	$Ln(NGE/NGDP)$	0.97699 (0.50302)	0.017 (0.8950)	1.33 (0.2487)	0.51 (0.6747)

Source: Own computation

* Significant at 10% level; **5% Significant at level; *** Significant at 1% level

Stability Test Using CUSUM and CUSUM Square

The coefficient stability of any model is considered to be crucial (Adil et al. 2016). The coefficient stability is tested by plotting the CUSUM and CUSUM squares. Under the null hypothesis, the statistic is drawn from a distribution called the CUSUM distribution. If the calculated CUSUM statistics appear to be too large to have been drawn from the CUSUM distribution, we reject the null hypothesis (of model stability). The output will be a graph of the CUSUM statistics and bands representative of the bounds of the critical region for a test at the 5% significance level. In all the graphs shown in Figure 1, the straight lines represent critical bounds at the 5% significance level and since the plots of these two tests do not cross the critical value line in the Goffman and Musgrave models, this implies that there is a stable long-run relationship between GE/GDP ratio and per capita GDP.

Peacock - Wiseman model

Gupta model

Goffman model

Musgrave model
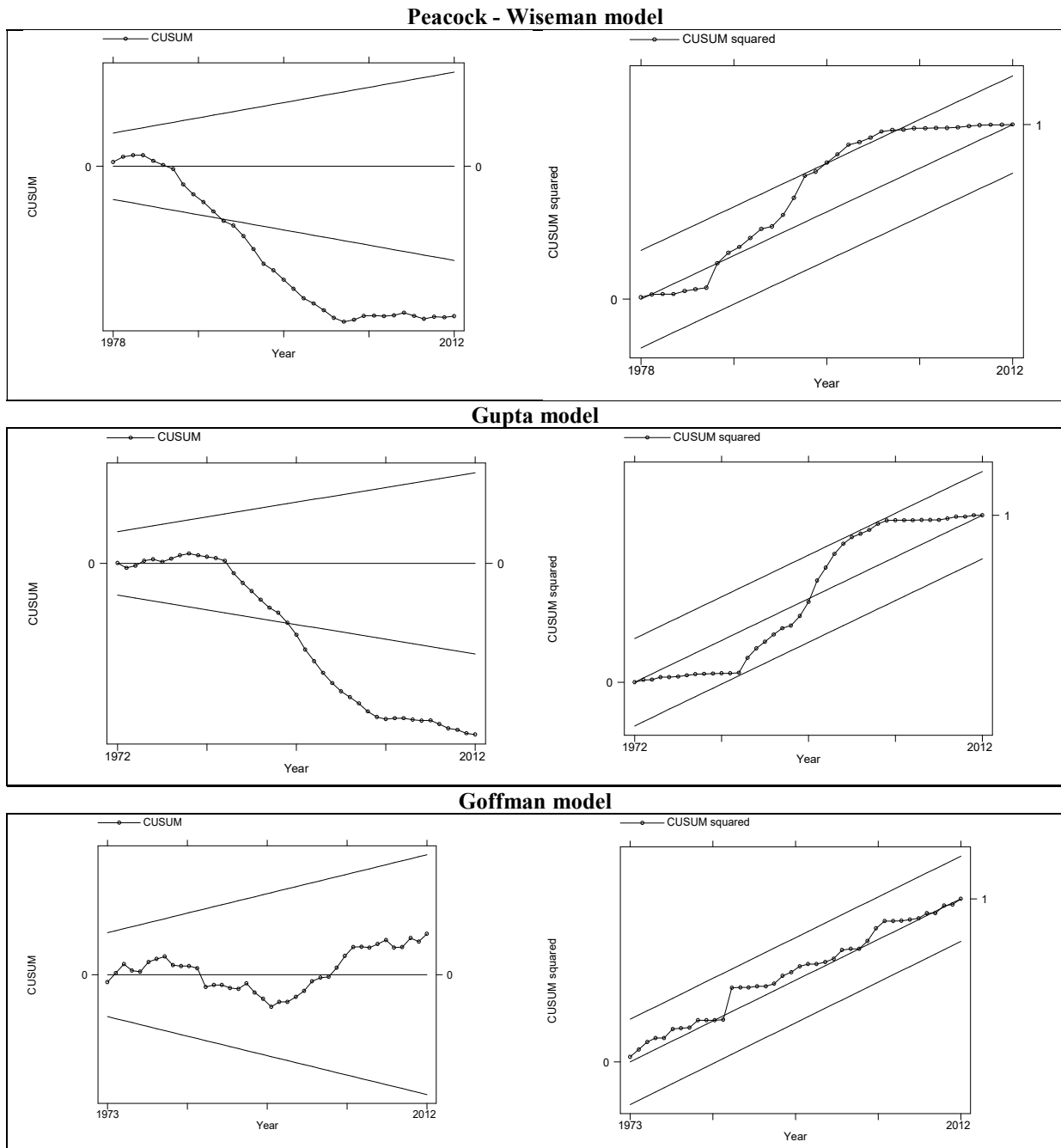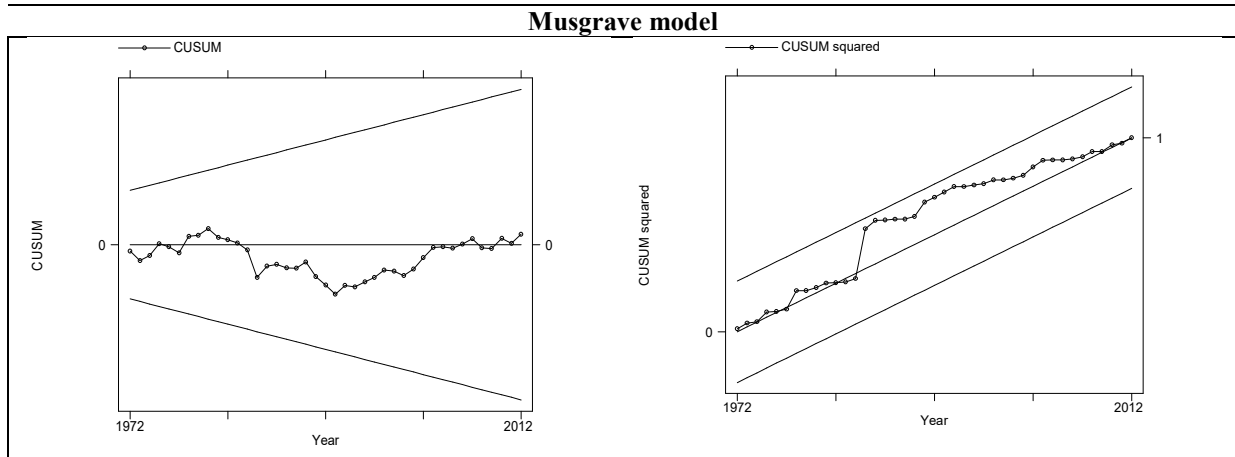
Figure 1. CUSUM and CUSUM square test results

CONCLUSION

This paper focuses on analyzing the relationship between government expenditures (GE) and economic growth in Kenya. More specifically, the study focuses on addressing the questions of whether the available Wagner hypothesis interpretations are relevant to the case of Kenya, by how much government expenditures change with GDP in the long run and by how much in the short run, and whether the relation between government expenditures and GDP is strong over time. An Autoregressive-Distributed Lag (ARDL) model that combines long and short run into a single equation was adopted. The ARDL approach was selected because of its flexibility and because it can be applied when the variables are of a different order of integration. The ARDL model for real GE and real GDP was fitted and results were subjected to various statistical and stability tests. Only the Musgrave model survived all significance and diagnostic tests, suggesting the rejection of Wagner's hypothesis for the economy of Kenya. The Peacock-Wiseman model's parameters also suggest the inelasticity of government expenditures on GDP in the long run.

With respect to the Musgrave version, the relationship between government spending and real GDP was found to be negative and significant with the causality running from real GDP to the relative value of nominal government expenditure, meaning that the results contradict Wagner's hypothesis. One of the reasons for this finding is poor governance and the persistence of high levels of corruption (Kempe 2014) that tend to have become more common in the Kenyan economy in the recent past three decades. Another possible cause for the negative relation could be associated with what Mitchell (2005) referred to as 'extraction cost'. The Kenyan government has been experiencing costly financing choices (especially for long-term infrastructural facilities such as roads, standard rail gauge, etc., constitutional implementation of a devolved system of government, and free primary education and health services), but all of the options used to finance government spending, such as increasing taxes, internal and external borrowing have adverse consequences in the short run (GoK 2007; Mutua 2012). Although Kenya has been showing progressively positive economic growth, posting a growth rate of 6% in the past five years, the gap between the GDP growth and GE expenditure has been widening, hence the negative relationship.
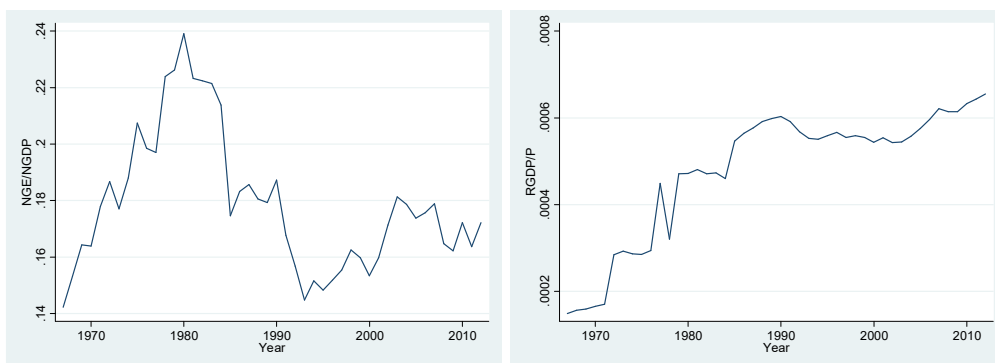

Figure 2. Government expenditures/GDP and real per capita GDP in Kenya

From 1967 to 1990 the per capita GDP increase was positive, which could be associated to moderate population growth, but the high population growth rate currently experienced in Kenya has exerted pressure on the economic performance of Kenya, causing widespread economic distortion. The high population growth creates pressures on limited natural resources, reduces private and public capital formation, and diverts additions to capital resources to maintaining rather than increasing the stock of capital per worker. As a result, the ratio of real GDP to real GE growth is modestly incomparable to the per capita GDP in the short term, but faster growth in the longer term is predicated on the assumption that the present infrastructure push will successfully addresses key bottlenecks (IMF&IDA 2016). Clearly, Figure 2 shows the increase in the ratio of government expenditure to GDP from the 1970s to around 1990, but due to population pressure against limited resources, a negative sign switch was experienced from early 1990s. A policy intervention requires a proper measure of cost and benefits of various governments spending in this respect and a clear set of specified criteria for deciding the allocation of resources to avoid arbitrary allocations and rent seeking by promoting transparency and accountability.

From the findings of this study, it is important to explore further what portfolio of government spending outlays would be ideal for growth to support resource constrained governments in optimal resource allocation and prioritization of expenditure. Thus, an important avenue for future research could be to extend the ARDL regression framework so as to account for the effect on economic growth of government spending choices on key Kenyan economic sectors, namely agriculture, defense, education, health, social security, transportation and communication (as Dritsakis & Adamopoulos 2004 did). Such research should also be extended to compare other interpretations of the Wagner hypothesis.

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Sustainable Energy in Post-Communist East-Central Europe - A Comprehensive Study

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SUMMARY

Energy is managed in a complex way by the theories of sustainability. All three pillars of sustainability (society, environment, and economy) are inseparable from the energy sector, because energy consumption causes so many externalities that threaten welfare in the long run. Most environmental problems are in close connection with energy use and production, such as nuclear waste management, oil spills, emission, etc. Furthermore, energy is an integral part of the economic and social development, and sustainable energy is a core issue. In this review a previously developed but recently improved methodology is presented which is suitable for the measurement of sustainable energy. Using panel data and estimating a Fixed Effects Model, we examine whether economic development contributes to the effectiveness of policy implementation for sustainable energy development in East-Central Europe.
Keywords: sustainable energy, energy dependence, energy efficiency, panel data, fixed effects model, East-Central Europe
*Journal of Economic Literature (JEL) codes: C23, Q43*
DOI: http://dx.doi.org/10.18096/TMP.2017.02.06

INTRODUCTION

The global population has increased rapidly in the past century: according to the United Nations (2004) it barely exceeded 2.5 billion in 1950, reached 4 billion in 1974, then 7 billion in 2012 and the 9 billion mark is projected for 2030. The situation is exacerbated by the sources of the population growth in the future, approximately 90 percent of which will stem from developing countries and 90 percent living in overcrowded cities (Buday-Sántha 2006).

Population growth is closely connected with energy consumption: energy is an essential resource not only in developing countries but in developed countries as well. It is needed for economic and social development and reducing poverty (Bindra & Hokoma 2009). According to the World Energy Council (2012) – assuming the stability of energy prices – the world energy demand in 2020 will be 50-80 percent higher than in 1990. But the main demand for energy, mainly for crude oil, does not stem from the industrialized, developed nations, but from the emerging economies, such as China and India. The modernization processes in these countries strongly contribute to the increasing energy hunger (Zhang et al. 2011). With regard to the development of the BRIC countries (Brazil, Russia, India, and China) the centers of the world economy have shifted and trade relations are changing. The financial crisis (2008-2009) accelerated these tendencies: the economic growth of the Triad (USA, Europe and Japan) declined and energy consumption decreased, so the center of demand moved to the emerging countries. While the developed nations try for sustainability and energy savings in all economic sectors, the energy consumption of the BRIC countries is continuously increasing because of their rapid economic and population growth (Figure 1).
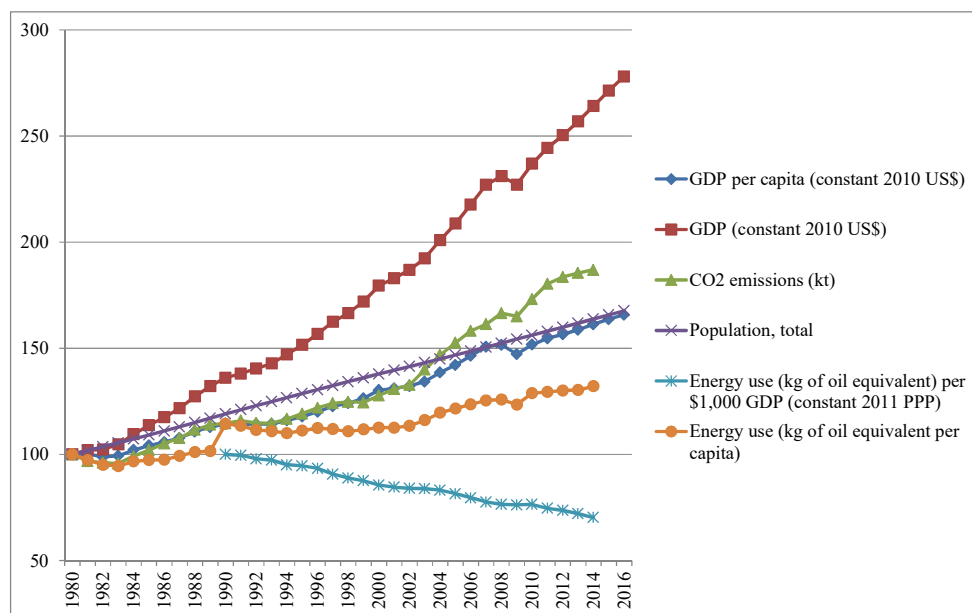
Source: World Bank database (2017)

Figure 1. The main economic and energy statistical data of the world (1980-2016)

The issue of energy security has become more and more important. The high volatility of oil prices and the increasing competition for the crude oil resources provide opportunities which are exploited by some producing nations to reach their economic and political goals. The Russian remonstrance to the third energy package of the European Union or the conflict between Iran and the international community (before the nuclear agreement) with regard to the Iranian nuclear program are good examples. It is enhanced by the new "big consumers", such as China, looking for crude oil sources in those countries (such as Iran, Sudan, Venezuela) with problematic diplomatic and political relationships with old consumers, such as the developed core countries (Europe and North America) (Róbel, 2006). According to the IEA (2017) the share of the Chinese energy consumption was 7 percent of world consumption in 1973, while the share of the OECD countries was 61.4 percent. This ratio has changed in the past four and half decades: in 2015 the share of China was 21.9 percent, while the consumption share of the OECD countries had decreased to 38.5 percent. Today China is the 2nd biggest oil importer and the 6th biggest oil producer (IEA 2017).

It has been estimated that if a significant improvement in energy efficiency had not occurred after the 1973 oil price shock, current energy consumption would be 50 percent higher (Dinya 2010: 914). According to the Energiaklub (2006), energy consumption would be 40 percent higher in the European Union without the development in technology and legislation and campaigns that have been carried out.

Increasing energy consumption causes a lot of other problems: greenhouse gas emissions generated by the burning of fossil fuels are responsible for global climate change. Energy efficiency is thus justified not only for economic reasons but also by many environmental factors.

Hereinafter, we examine the relationship among energy use, energy management and sustainability. Our research question are whether the index of effectiveness of energy policy implementation shows similar results with the rank determined by the Energy Trilemma Index and whether the national energy policies serve well the concept of sustainable energy.

In the theoretical background the definition of sustainable energy, energy management and energy security are presented. We describe the complex condition systems of sustainable energy and the necessity for energy efficiency improvements is highlighted as well. The Energy Trilemma Index shows the current result of the sustainable energy measurement. Using a slightly modified formula we attempt to calculate the effectiveness of energy policy implementation and we analyze the connection between this index and GDP growth with the estimation of a Fixed Effects Model.

THEORETICAL BACKGROUND

The starting point is to define *energy management*, *sustainable development, sustainable energy* and *energy security*. Energy management is "every practical activity to ensure and manage the utilization of the available energy sources and reserves in the most economical way, meet the energy needs safely and economically, decrease the energy losses and diminish the unnecessary loss of resources" (Barótfi et al. 2003: 3.). Its four main parts are exploitation, conversion, distribution and consumption; the main issue is to minimize the energy needs through energy saving policies.

The most frequently quoted definition of sustainable development is from the Brundtland Report: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (UN, 1987: 41).

A new but frequently used term is sustainable energy, which is a narrower category than sustainable development: "it means the socially, economically and ecologically integrated implementation of the complex process of energy production, storage, transport, and use. So it is converting classical energy management with regard to the sustainability principles" (Dinya 2010: 914). We note here that the starting point of the models, describing sustainable development, the limits of economic growth and the possibility of substitution, was the recognition of the scarcity of fossil fuels (Cleveland 2003). Naturally, the long-term goal of sustainable energy is sustainable development, which ensures economic and social welfare. The two pillars of sustainable energy are increasing the share of renewable energy sources and decreasing energy consumption. The latter can be performed by promoting energy saving (energy conservation) and improving energy efficiency (Rohonyi 2007).

Figure 2 illustrates the relationship of sustainable energy and its more specific areas to sustainable development. Energy is managed in a complex way by the theories of sustainability. Each of the three pillars of sustainability (society, environment, and economy) is inseparable from the energy sector, because energy consumption causes so many externalities that threaten welfare in the long run. environmental problems are in tight connection with energy use and production, such as nuclear waste management, oil spills, emission, etc.

Furthermore, energy management is an integral part of the economic and social development: millions of people live in energy poverty (the World Energy Council (2012) estimates 1.6 billion people do not have access to electrical energy), and according to the World Health Organization (2012) database as many people (circa 1.6 million people) die from respiratory diseases per year as from AIDS because of inappropriate energy use.

Energy security is closely related to energy management. Energy security means the ability of the economy to contribute to the economic and social welfare with sustainable energy services (Blum 2012. p.1988.). According to Blum and Legely (2012) energy security is characterized by three main attributes from the perspective of the ecological economist: 1) resilience, 2) adaptability, and 3) transformability. Resilience is a widely used term; it is widespread in environmental and ecological economics and in finance and organization theories as well. In energy management it means "a measure of the economy's ability to handle energy related (temporary and permanent) effects", while adaptability is "the preparedness to respond to sudden energy related changes", and transformability is "the capacity to evolve towards a more energy secure configuration" (Blum 2012:1984). Energy security can be characterized by the following 4R conception (Chaturvedi & Samdarshi 2011: 4651):

1. Understanding the problem (Review).
2. Shifting to secure sources (Replace).
3. Limiting new demand to secure sources (Restrict).
4. Using less energy with energy efficiency improvements and energy savings (Reduce).
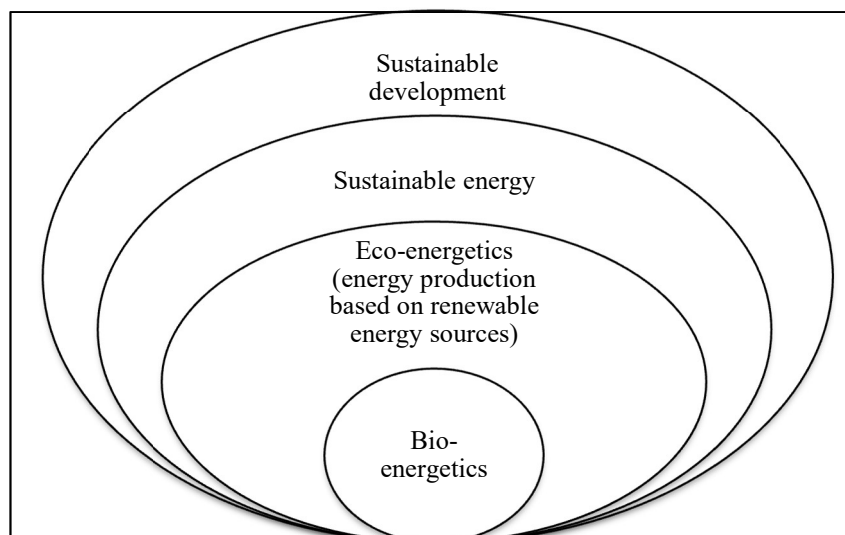
Source: own compilation on the basis of Dinya, 2010, p. 914

Figure 2. Sustainable energy

## Complex Condition Systems of Sustainable Energy

The complex condition systems of sustainable energy (Figure 3) are shown by Press and Arnould (2009). Efficient environment and energy policy are inseparable. The main objective of the energy policy is to "ensure the citizens' welfare and the efficient operation of the economy; normal (uninterrupted) access to the energy services for every private and industrial consumers in payable price and to take into consideration the environmental aspects, and the shifting towards the sustainable development" (Buday-Malik et al. 2012: 14).

Political issues are related to infrastructure and energy markets. The reduction of state interventions and the liberalization of the energy markets contribute to the efficient use of energy sources and to energy security. Regional approaches have to be enforced by the utilization and support of renewable energy sources. With regard to the European Union's targets and the principle of subsidiarity, an efficient regional energy policy is needed with the decentralization of the energy production and the increasing share of renewables (Csákberényi-Nagy 2005: 7). The main task of the state is to develop a predictable and stable market environment where the energy market players are committed to the energy security with infrastructural investments and developments in the long run.
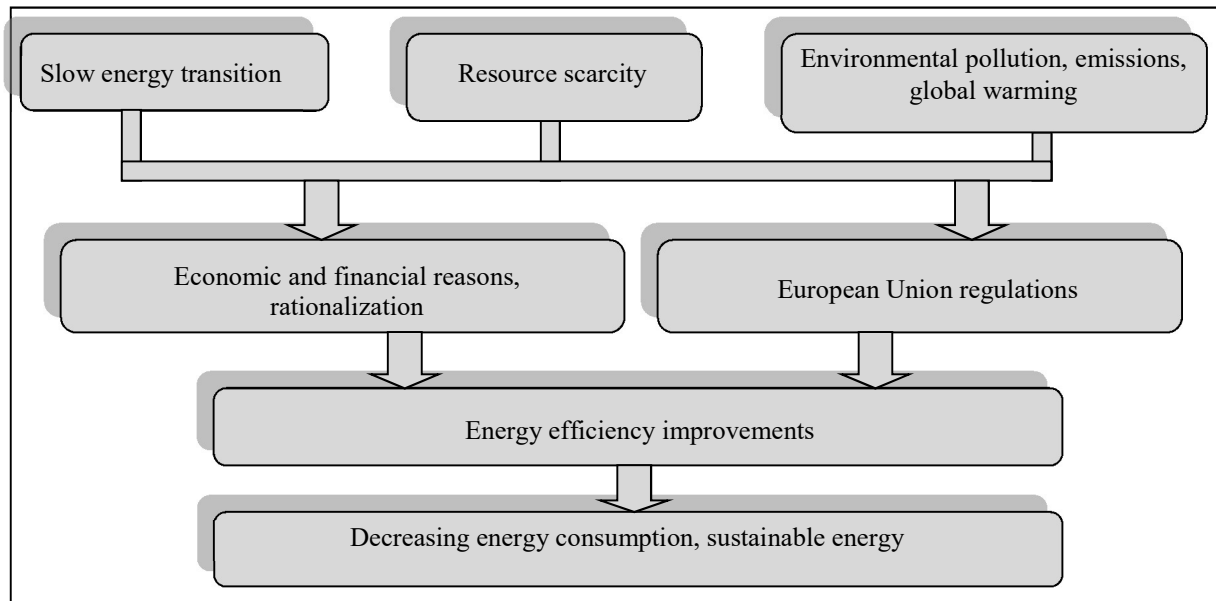
The availability of different kinds of energy sources – with special regard to the renewable sources – is one of the main pillars of sustainable energy. The restrain of each energy source (even if it is caused by technical conditions) – such as wind energy – cannot be acceptable in the long run, because it sets back the diversification of the sources, which should be one of the core elements of energy strategies.

The price control of the energy sources in the household sector (with special regard to price support) apparently means an advantage for the consumers, but in the long run it reduces the competitiveness of the energy sector, distorts the market and eliminates the energy efficiency measures. The extensive information and education of the general public contributes to the validation of consumer rights and the wider adoption of the existing technologies (Press & Arnould 2009) "The illusion of cheap and unrestricted energy sources does not encourage the consumers to save energy and to replace old low-efficiency equipment, so efficiency improvements do not prevail among the end consumers" (Energiaklub 2006: 14).
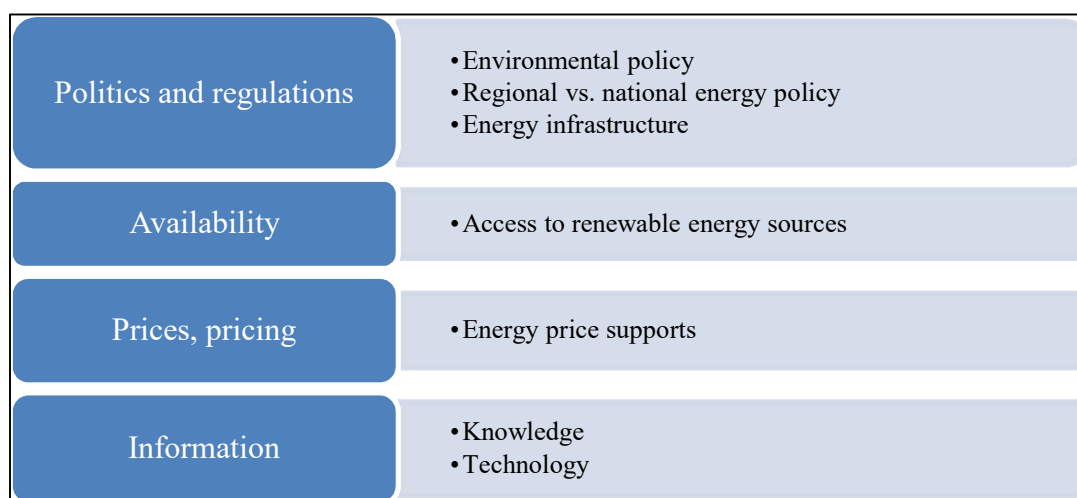
Source: own compilation based on Press and Arnould (2009)

Figure 3. Criteria of sustainable energy

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┌──────────────────────────────────────────────────────────────────────────────┐
│  ┌──────────────────┐   ┌──────────────────┐   ┌──────────────────────────┐   │
│  │ Slow energy      │   │ Resource scarcity│   │ Environmental pollution, │   │
│  │ transition       │   │                  │   │ emissions,               │   │
│  └──────────────────┘   └──────────────────┘   │ global warming           │   │
│                                                 └──────────────────────────┘   │
│  ┌──────────────────────────────────┐    ┌──────────────────────────────┐     │
│  │ Economic and financial reasons,  │    │ European Union regulations   │     │
│  │ rationalization                  │    │                              │     │
│  └──────────────────────────────────┘    └──────────────────────────────┘     │
│            ┌────────────────────────────────────────────────────┐             │
│            │ Energy efficiency improvements                     │             │
│            └────────────────────────────────────────────────────┘             │
│            ┌────────────────────────────────────────────────────┐             │
│            │ Decreasing energy consumption, sustainable energy  │             │
│            └────────────────────────────────────────────────────┘             │
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Source: own compilation

Figure 4. The necessity for energy efficiency improvements

Sustainable energy is composed of several parts: the increasing use of renewable energy sources, rationalization of the supply chain, and the energy efficiency improvements that contribute to achieve it. The need for energy efficiency improvements is confirmed by many factors, as shown in Figure 4. The economic factors (such as households and the production sector) try to achieve energy efficiency because of financial considerations and rationalization. The scarcity of these sources plays a role as well, and unfortunately the limits are becoming visible. Global climate change and greenhouse gas emissions can be reduced by actions taken for energy efficiency, which is a basic element of many official European Union documents (where the main strategies determine specific goals). A less well-known argument is energy transition, meaning that a long time horizon is needed for energy systems to switch their energy source. According to Smil (2009) and Vajda (2004), these energy transitions last for many decades and they are characterized by extremely high inertia. The development of new sources to the point of market readiness and replacement of the technologies take long decades, which conserve the given energy source. So in the short run the improvement of energy efficiency is the only solution. Energy efficiency has many positive effects, not only on sustainable economic development but on sustainable energy as well (Hertwich 2005).

Energy Trilemma Index

The World Energy Council (2016) has developed the Energy Trilemma Index (ESI) to measure the sustainable energy, which assess the world countries with regard to three dimensions:

1. Energy security: Effective management of primary energy supply from domestic and external sources, reliability of energy infrastructure, and ability of energy providers to meet current and future demand.
2. Energy equity: Accessibility and affordability of energy supply across the population.
3. Environmental sustainability: Encompasses achievement of supply- and demand-side energy efficiencies and development of energy supply from renewable and other low-carbon sources. (World Energy Council 2016: 7)

Taking a look at the East-Central region, we see that in 2016 Slovenia was 12th among the 125 countries that took part in the study, Slovakia was 16th, the Czech Republic 19th, Hungary 21st and Poland was 36th. The study makes recommendations for policy decision makers to achieve energy sustainability:

➢ Policy choices, and creating a regime to support a robust energy sector, are critical to lasting energy trilemma performance regardless of a country's resources or geographic location.
➢ Policies and investments intended to change energy supply and demand at a national level will take time and will likely be disruptive. Countries must act now to progress on the trilemma with secure, equitable and environmentally sustainable energy to support a thriving energy sector, a competitive economy and a healthy society. (World Energy Council 2016: 19)

Table 1
Review of basic indicators of the effectiveness of energy policy implementation

Data	Unit	Source	Indicator
Primary energy production (all products)	Thousand tonnes of oil equivalent (TOE)	Eurostat	**EI** - Energy independence, % (Primary energy production/ Gross inland energy consumption) **PRES** - Energy production from renewable sources, % (Primary production of renewable energies/ Primary energy production) **EPP** - Energy production per capita, kg of oil equivalent per capita (Primary energy production/Population) **ECP** – Energy consumption per capita, kg of oil equivalent per capita (Gross inland energy consumption/Population)
Gross inland energy consumption (all products)	Thousand tonnes of oil equivalent (TOE)	Eurostat	
Primary production of renewable energies	Thousand tonnes of oil equivalent (TOE)	Eurostat	
Population	Total	Worldbank	

Source: own compilation

DATA AND METHODOLOGY

One way to measure sustainable energy was worked out by Golusin et al. (2011) using the following formula:

$$EEP = EI * wc_1 + PRES * wc_2 + EPP * wc_3 - ECP * wc_4$$

where EEP is the effectiveness of energy policy implementation, EI is the energy independence (from energy imports), PRES is the energy production from renewable energy sources, EPP is the energy production per capita, ECP is the energy consumption per capita and wci are the selected weight factors (wc_1=30, wc_2=20, wc_3=15, wc_4=25). These components are presented in Table 1.

The survey (Golusin et al. 2011) was carried out for Southeast Europe (Albania, Bosnia and Herzegovina,

Bulgaria, Croatia, Greece, Hungary, Macedonia, Montenegro, Serbia, Slovenia, and Romania) for 2010. According to its results the energy policies of Hungary and Greece are not sustainable, Slovenia is a borderline case for energy sustainability. In their view mainly economic growth is the primary goal in these three countries, sustainability is just of secondary importance.

We modified this formula in order to estimate the effectiveness of energy policy implementation in the region of East-Central Europe. From a methodological view one small problem is that the sum of the values of the weight coefficients is not equal to 100, rather just 90. The difference of 10 is distributed equally among all the weights. Table 1 shows the basic indicators applying in the formula. The examined time period is 2000–2015, and the geographical field is the region of East-Central Europe (Hungary, Poland, the Czech Republic, Slovakia, and Slovenia).
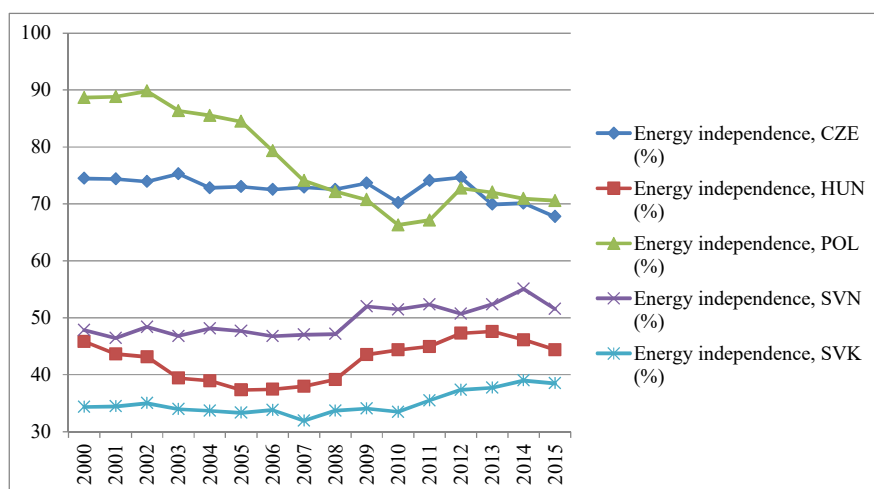
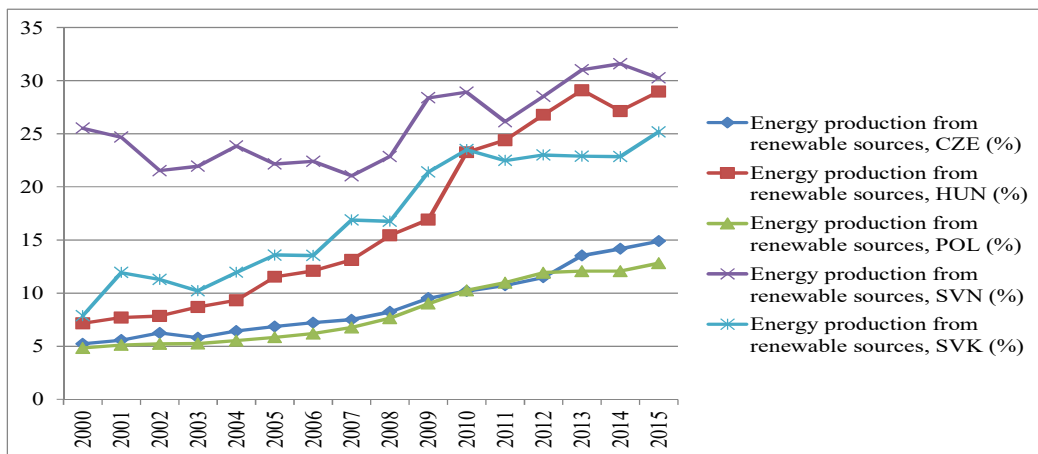Source: own compilation on Eurostat (2017) database

Figure 5. Energy independence in East-Central Europe, 2000–2015 (%)

The countries in the region of East-Central Europe are characterized by high energy dependence. These are not independent and they should import energy to cover their needs. With the exception of Poland and the Czech Republic energy independence stagnates or slightly increases and no significant shift can be observed. An interesting fact is that the economic crisis in 2008-2009 did not influence the energy systems (in comparison to other economic indicators), which can be explained by the high inertia of these systems and the inelastic energy demand (Figure 5).

The European Union in the Energy 2020 strategic document set a target for increasing the share of renewable energy sources in gross final energy consumption: "In 2007 the European Council adopted ambitious energy and climate change objectives for 2020 – to reduce greenhouse gas emissions by 20%, rising to 30% if the conditions are right, to increase the share of renewable energy to 20% and to make a 20% improvement in energy efficiency" (Energy

2020: 2) On average the countries of the examined region have undertaken a goal of 16.43 percent: Slovenia has the highest (25 per cent to 2020), Poland 15.48 per cent, Hungary 14.65 per cent, Slovakia 14 per cent and the Czech Republic 13 per cent. Now (in September 2017) we are beyond halfway and some countries have achieved high growth in the past decade, although the 2008-2009 recession caused a minor setback in Poland, the Czech Republic and Slovakia (Figure 6).

Figure 7 shows that the energy production per capita is roughly constant in Hungary and Slovakia. This can be explained by the decreasing population, the rate of energy imports (with special regard to electricity) and improving energy efficiency. In Poland this ratio slightly decreases, in Slovenia slightly increases and in 2014 it was nearly equal in these two countries. The Czech Republic is the only nation where the energy production per capita has decreased from the early 2000s.
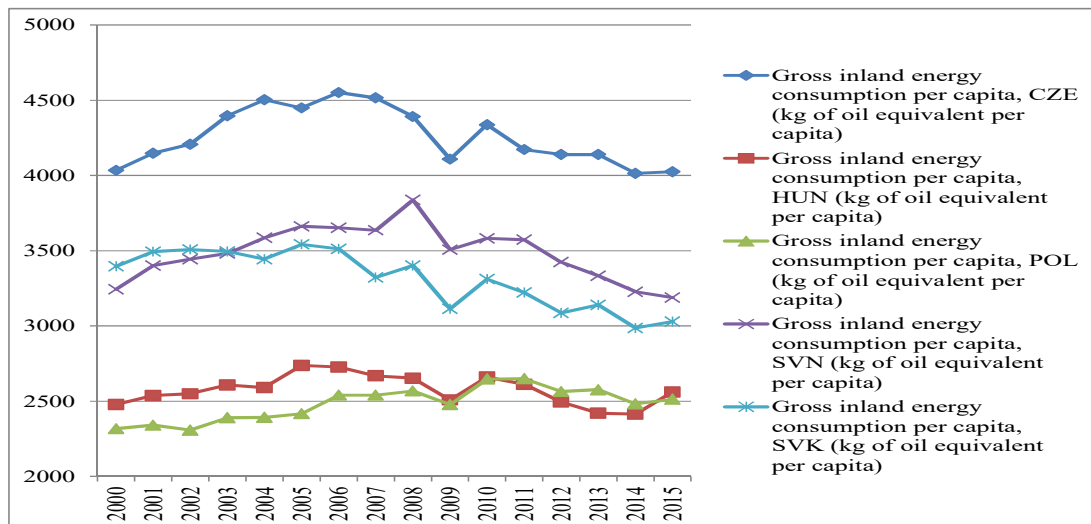

Source: own compilation from Eurostat (2017) database

Figure 6. Energy production from renewable sources in East-Central Europe, 2000–2015 (%)
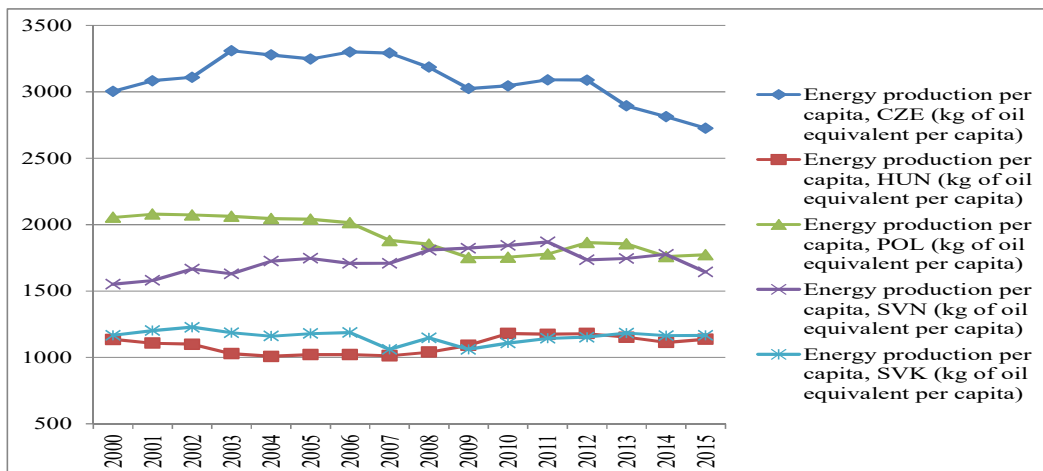
Source: own compilation on Eurostat (2017) and World Bank (2017) database

Figure 7. Energy production per capita in East-Central Europe, 2000-2015 (koe/ capita)

Source: own compilation based on Eurostat (2017) and Worldbank (2017) databases

Figure 8. Energy use per capita in East-Central Europe, 2000-2015 (koe/capita)

The energy consumption per capita strongly improved in Slovenia and in the Czech Republic until 2008. But in the other countries of the region rather stagnation or slight decrease can be observed due to the energy efficiency improvements and the recession as well. Actually, there are significant differences among the energy use per capita which is explained by the heterogeneous geographical and climatic conditions and the different economic structures (Figure 8).

EMPIRICAL RESULTS

Diversity and different units of the examined indicator raise some questions and problems. To avoid the problems created when indicators are represented in different units, all of the data have been ranked using their absolute values. The highest one has got the value of 100 and the others were proportioned to it (the method is called scale transformation).

The indicators were placed on a scale based on the maximum value (it has got value of 100); Table 2 shows a template for the year 2000. The effectiveness of energy policy implementation – the EEP indicator – in the Czech Republic is calculated using the 2000 data as follows:

$$EEP_{CZ, 2000} = 32.5*0.84 + 22.5*0.2 + 17.5*1 - 27.5*1 = 21.9$$

Results are shown in Figure 9. The indicator of the effectiveness of energy policy implementation improved throughout the region. The most significant growth can be observed in Slovakia and in Hungary. These results roughly confirm the rank determined by the Energy Trilemma Index. The only exception is Poland, which is the most successful nation with regard to the effectiveness of energy policy implementation, but according to the Energy Trilemma Index it would be the last one because of the weak evaluation of energy security.

Table 2
State of scaled indicator in East-Central-Europe in 2000

	EI		PRES		EPP		ECP	
CZE	74.48	*84*	5.23	*20*	3004.28	*100*	4033.81	*100*
HUN	45.85	*52*	7.16	*28*	1135.87	*38*	2477.56	*61*
POL	88.67	*100*	4.84	*19*	2054.58	*68*	2317.06	*57*
SVN	47.82	*54*	25.53	*100*	1551.14	*52*	3243.56	*80*
SVK	34.35	*39*	7.90	*31*	1166.79	*39*	3396.32	*84*

Source: own compilation
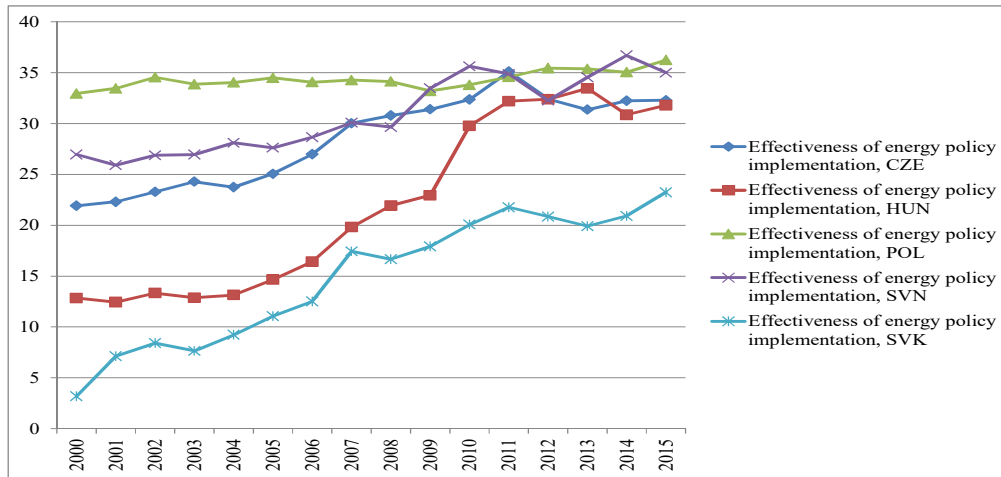
Source: own compilation

Figure 9. Effectiveness of energy policy implementation in East-Central Europe, 2000–2015

The question arises as how changes in GDP and economic development affect energy sustainability. To measure the welfare and economic development many kinds of alternative indicators are available, such as the *Measure of Economic Welfare* (MEW) developed by Nordhaus and Tobin (1972), or the *Index of Sustainable Economic Welfare* (ISEW) of Daly et al. Slightly modified versions of the ISEW are the *Genuine Progress Indicator* (GPI) and the *Sustainable Net Benefit Index* (SNBI). To calculate social development the *Human Development Index* (HDI) assesses the countries on three dimensions: health, education and economy. In parallel with the GPI the index of *Ecological Footprint* (EF) was worked out, which "tracks on the demand side, how much land and water area a human population uses to provide all it takes from nature. This includes the areas for producing the resource it consumes, the space for accommodating its buildings and roads, and the ecosystems for absorbing its waste emissions such as carbon dioxide." (Global Footprint Network, 2014). Mally (2011) developed the *Development Balance Index* (DBI) with the combination of the HDI and the EF, which weights the three dimensions of the HDI and the EF, unifying their advantages.

The IEA worked out the Energy Development Index (EDI) in 2004 to measure the connection between the energy use and the human development. It takes into consideration not only the quantity of the energy consumption but the quality of it as well. It applies the principle that energy use is not the consequence but the cause of economic development. According to its results, among the developing nations the Gulf States have the highest EDI values, while the lowest ones belong to the African region. Based on the 2030 forecast the value of EDI will increase in the developing nations, especially in India and in Africa. In spite of that, the indicator will still be far from the values of OECD countries (IEA 2004)-

However, these indicators have not only advantages but disadvantages as well. A frequently mentioned disadvantage is that the theoretical foundations are really solid, and that these indicators approach the welfare and the development from monetary perspective (Niemi & McDonald 2004). Another negative feature is that in the calculation the costs and benefits are chosen with regard to the personal preferences of the analyst, so the subjectivity is rather high (Clarke & Lawn 2008). It is also problematic that these indicators are only available for a few countries (such as the United States of America), most of data are only cross-sectional, and time series are rare. The lack of data increases in parallel with aggregation level: at the regional or subregional level in just a few cases were the indicators calculated (such as in Victoria state – Australia, Alberta province – Canada). In our case – mainly because of the lack of data – we apart from the analysis of the welfare and the examination concentrate on the GDP but it should be noted that the GDP is not suitable for measuring the welfare and the economic development.

The connection between economic growth and energy consumption is not new in energy economics but most of the analysis focuses on the determination of the causality directions. Mostly the Granger causality directions between the GDP (or the GNI) and the primary energy production are examined with different kinds of econometric methods (usually using time series or panel data and applying Vector Autoregressive, Vector Error Correction, Fixed Effects or Random Effects models); see Sebestyénné Szép (2014) for a detailed overview. In an earlier analysis we concluded that there is a significant relationship between energy consumption and economic growth in East-Central Europe (Czech Republic, Hungary, Poland, Slovakia, and Slovenia). Energy consumption Granger causes the GDP in the long run, so energy consumption can induce economic growth.

Hereinafter we examine how changes in the GDP affected the EEP indicator. We assume that if the GDP increases, it affects the energy sustainability positively. Figure 10 presents the GDP growth (constant 2005 US$ in per capita and in absolute value) between 2000 and 2016 in East-Central Europe.
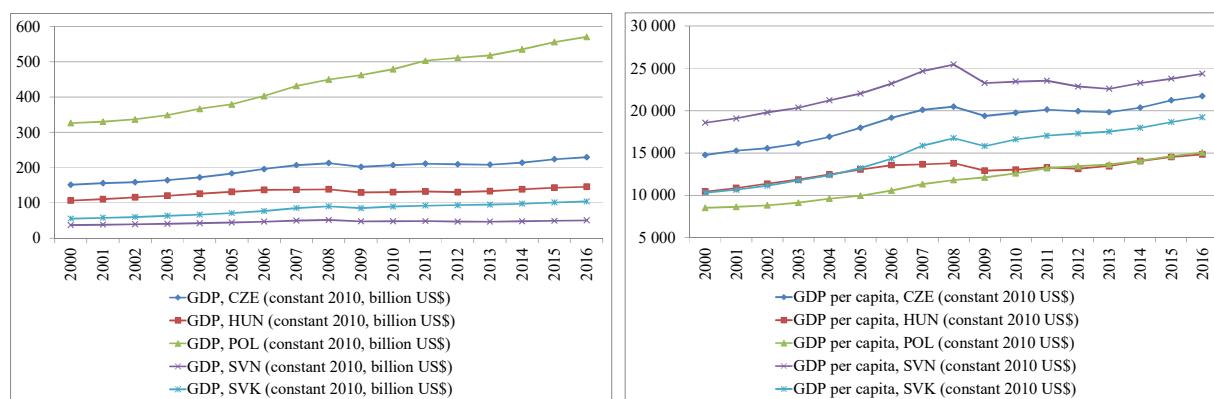
Source: Worldbank database

Figure 10. GDP growth in East-Central Europe, 2000–2016 (constant 2005 US$):
absolute value (left), per capita (right)

To examine the relationship between the EEP and the GDP firstly a Pooled OLS (pooled least squares) method is estimated. Panel data are applied and the number of observations is 80 (5 countries and 16 years). Using the Breusch-Pagan test statistic (LM = 162.648 with p-value = prob(chi-square(1) > 162.648) = 2.98598e-037) we have to accept the first hypothesis against the null hypothesis (the null hypothesis is that the pooled OLS model is adequate, in favor of the random effects alternative), so secondly we calculate a random effects model. Testing the Hausman test statistic (H = 19.3889 with p-value = prob(chi-square(1) > 19.3889) = 1.06625e-005) the low p-value counts against the null hypothesis that the random effects model is consistent, in favor of the fixed effects model. So, finally with these data (GDP and the effectiveness of energy policy implementation) the Fixed

Effects Model is estimated, obtaining the following equation:

$$lnEEP_{it} = \alpha_i + \beta lnGDP_{it} + u_{it}$$

All of the indicators are in logarithmic form. Estimates in Table 3 were tested for validity, all of the tests are performed.

It can be stated that the GDP growth has a positive effect on the effectiveness of energy policy implementation and can contribute to its improvement. Compared to Golusin et al. (2011), with regard to our long time series and panel data it is clear that the countries of East-Central Europe have moved towards sustainable energy and positive changes can be observed in their energy use.

Table 3
Fixed Effects Model (FEM). Effectiveness of energy policy implementation.
Panel of countries in East-Central Europe.

	coefficient	std. error	t-ratio	p-value
constant	−29.8524	4.61709	−6.466	0.000 ***
ln(GDP)	1.47073	0.180424	8.151	0.000 ***
Number of observations	80	**Mean dependent var**		7.783157
Number of cross-sectional units	5	**S.D. dependent var**		0.465889
Time-series length	16	**Sum squared resid**		4.012382
LSDV R-squared	0.766003	**Durbin-Watson**		0.266907
Within R-squared	0.473111	**S.E. of regression**		0.232855
LSDV F (5, 74)	48.44879	**P-value (F)**		0.000 ***

Comment: * 10% significance level, ** 5% significance level; *** 1% significance level
Source: own compilation

CONCLUSION

A major difference between neoclassical economics and energy economics is their different opinions about the role of energy in economic development. According to neoclassical theory, energy is just an intermediary input among other production factors (land, capital and workers) that determine economic development directly or indirectly. For energy economists (such as C.J. Cleveland, H. Herring, or D.I. Stern) energy affects the income and the welfare significantly, and the economy depends on changes in energy consumption. Energy consumption, economic growth and sustainable development and the relationship of these variables were core topics as early as the industrial revolution and continue to be relevant today. The recognition of global problems has forced nations to determine economic goals to reduce emissions by improving energy efficiency and increasing the share of renewable energy sources in final energy consumption. These are the main dimensions of sustainable energy.

In post-communist East-Central Europe the process of the structural change occurring in the last two decades has strongly affected the energy systems and economic development. In this time period energy efficiency increased dynamically. This development stemmed mainly from the industrial sector, where development occurred mostly through structural changes. The most important issue is to what extent the energy systems are sustainable.

In our analysis we reviewed the main pillars of the sustainable energy and quantified the effectiveness of energy policy implementation based on the methodology of Golusin et al. (2011). Our survey covered five countries in the region of East-Central Europe using long time series (2000-2015). During that period the effectiveness of energy policy implementation improved due to increasing energy efficiency and the growing share of the renewable energy sources, implementing the goals of the EU Energy 2020 strategic document. In this region the countries are in different economic stages: the most developed nation is Slovenia with regard to the GDP per capita, while the lowest ones are Hungary and Poland. After a panel data analysis (applying the Fixed Effects Model) it has been verified that the economic development (measured here with the GDP) affects the energy systems and the implementations of sustainable energy significantly.

ACKNOWLEDGEMENT

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Practical Issues with Decision Preparation of Facility Investments in the National Manufacturing Industry

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SUMMARY

This study deals with a few practical issues related to preparing facility investment decisions and is based on the findings of a questionnaire survey conducted in 2016. This study discusses the length of time required to prepare economic decisions on investing in facilities, the people to be engaged in investment preparation processes and corporate practices concerning analyses of economic efficiency and ranking of projects. Survey findings show that companies spend several months preparing decisions about facility investments and involve not only owners and top management in this process, but also financiers and investment experts. A relatively high proportion of companies usually evaluate the economic efficiency and rank the investments.

Keywords: facility management, facility investments, investment decisions, economic decision-preparation process, evaluation of economic efficiency

Journal of Economic Literature (JEL) code: M21

DOI: http://dx.doi.org/10.18096/TMP.2017.02.07

INTRODUCTION

Operation of a manufacturing company that lacks any facility for manufacturing purposes is simply unimaginable. Investment is considered to be one way of acquiring a corporate facility. Corporate facilities determine operation of a company for a long period of time. In addition, costs required for operating and maintaining corporate facilities make up a considerable ratio of total costs. Therefore, it is fundamental to pay particular attention to decisions related to preparing investments in facilities. Since these investments are of very complex and complicated nature, it takes weeks, and even months to prepare them in a highly professional manner. Taking into consideration all investment alternatives as well as the tasks built on each other and related to decision-preparation processes also increases the time needed for preparing sound investment decisions. Since different activities require different skills and professional knowledge, it is appropriate to involve experts from several fields (financiers, production managers, etc.) in investment preparation processes.

Calculation of the economic efficiency of investments is one of the operative stages in the preparation process of

facility investments. However, findings of many international research studies indicate that a relatively high percentage of companies neglect to calculate the economic efficiency of investments in advance or fail to rank alternative projects that are considered to be economically efficient. Some studies revealed that the surveyed companies calculate the economic efficiency of investments with methods different from those recommended by the economic literature.

A questionnaire survey dealing with some issues of facility management practices of manufacturing companies in Hungary was conducted in 2016. The survey investigated decision-preparation processes in facility investments, methods used for evaluating and ranking economically efficient investment alternatives, outsourcing practices of facility management activities, etc. The present study addresses issues encompassing wider areas, such as:

➢ How long is the economic decision-preparation process of facility investments?
➢ What employees are involved in preparing investments decisions?
➢ Do companies calculate the economic efficiency of alternative investments and rank economically efficient project alternatives?

A Brief Review of Previous Studies

A decision in a broad sense is not limited to the selection of possible alternatives. It encompasses a whole decision-preparation process. This process depends on several factors, such as corporate character, corporate situation and decision-makers' approaches (Fodor 2017). Taking into consideration that facilities have a long-lasting impact on managing a company, tie up a lot of capital, and involve high maintenance and operation costs, decision makers need to be extremely cautious when preparing investment decisions. In addition, investments in facilities are very complex and complicated.

Barta (1986), in the preface to his book, highlights that each decision is prepared in time and in space. According to Vargha (2001), there is a one-way relationship – stochastic – between the scope of an investment (measured in costs) and the complexity of decisionmaking, planning, preparation of the work and the required time. Due to the complex and complicated nature of the process, it is assumed that it takes weeks and even months to prepare investment decisions in a professional manner and that the process itself consists of a series of activities.

The majority of the tasks related to preparing economic decisions are built on each other and cannot be performed in parallel, which increases the time spent on preparing facility investments. While an investment decision is being prepared, different alternatives and options are worth considering in order to collect as much information as possible on the particular investment before a final decision on the investment is made. Consequently, information collection, systematisation and selection are likely to take far more time than expected. As a result, the time required to prepare an investment decision may also increase. In companies with a foreign-ownership structure, professionals and experts of parent companies often have to be involved in decision-preparation processes. This, in turn, is also likely to prolong investment preparation processes in foreign-owned companies.

Small companies are shorter of competent professionals than their large counterparts. Therefore, they are more likely to simplify decision-preparation processes, which can be done in two ways: either by skipping one or more phases of the process or by performing activities in a less detailed manner than large companies. A research study conducted in New Zealand supports this assumption. The findings of the study (Vos & Vos 2000) show that small New Zealand companies significantly simplify the calculations related to economic efficiency of investments. In 1999 the researchers investigated investment practices of small companies in New Zealand. While 41% of the responding companies indicated that their managers 'always' make intuition-based decisions, the managers of 26% of them make 'only' intuition-based investment decisions. When asked to indicate the method they use to calculate the discount rate, 42% of the companies

responded that they also use a 'similar' method. Action simplification practices result in the need to investigate whether small companies spend less time on preparing investment decisions. In addition, small companies execute lower capital-intensive investments and enjoy less complex and complicated management relationships than large companies, which also contributes to shortening the time spend on preparing investment decisions.

Managers of small companies, who are often single owners of these companies, are able to oversee and control corporate processes as a whole. It is quite a common practice among small companies that managers themselves prepare investment decisions (even facility-investment decisions). Contrary to this, managers of larger companies are unable to oversee the whole economic process in detail, and, therefore, are more likely to involve representatives of several areas (i.e. financial experts, heads of production, etc.) in the preparation of investment decisions. 2012 survey investigated decision-preparation practices and methods applied to calculate the economic efficiency of investments in Hungarian manufacturing companies and revealed that 39% of the responding companies involved three or fewer employees in investment decision-preparation processes, 36% of companies involved four or five workers and one-fourth of them involved six or more people. In addition, the number of people involved in these processes depended on the company size. The larger the company size was, the more employees were involved in the investment decision-preparation process. Managers of a specific corporate entity (a division, a unit) (in two-thirds of responding companies) and employees from finance departments (in 42% of responding companies) were also involved in these processes. A small percentage of companies, namely one-fourth of them, hired external experts or consultants to help prepare investment decisions (Szűcsné Markovics, 2016).

Apart from the survey conducted in New Zealand by Vos &Vos (2000), a considerable amount of national and international research into corporate practices has been carried out related to calculating the economic efficiency of investments. (The studies in this field of research that are usually referred to generally investigate investments and not facility investments.) Sangster (1996) observed that 8% of Scottish companies neglect the calculation of economic efficiency of their investments. Pike (1996) also conducted a survey among British companies in the same year as Sangster and his findings slightly contradict those of Sangster. He found that all the responding companies evaluate the economic efficiency of their investments. According to Osemy (2002), who surveyed investment practices of Egyptian companies, 7% of the sampled companies never conduct economic efficiency calculations when they invest. Andor et al. (2011) carried out a telephone survey and sampled four hundred companies employing twenty-five or more employees in ten Central European countries (Bulgaria, Czech Republic, Croatia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia). The research covered a wide range

of areas. It also investigated whether the surveyed companies apply any capital budgeting methods. The findings revealed that 17% of the surveyed companies never perform any economic efficiency evaluations before making a decision to invest. According to my own 2012 survey, a considerably high percentage of Hungarian manufacturing companies (34%) never evaluate the economic efficiency of their investments (Szűcsné Markovics, 2013). Wnuk-Pel et al. (2015) investigated corporate investment practices in Poland and Thailand. The research results published in 2015 show that 4.7% of Polish and 44.5% of Thai companies never calculate the economic efficiency of their projects. Andrés et al. (2015) surveyed Spanish companies and found that 4% of the companies never evaluate the economic efficiency of their investments.

Although numerous empirical research studies have been conducted that surveyed capital budgeting methods preferred by companies when investment decisions are made, they all – without exception – investigated methods that corporate managers applied for evaluating the economic efficiencies of project but not for ranking of projects. The survey of 2012 differed by analysing methods used for ranking projects by Hungarian manufacturing companies and found that a considerably high percentage of responding companies (38%) never rank economically efficient investment alternatives.

RESEARCH METHODOLOGY

This study addresses some issues related to facility management based on a questionnaire survey of 2016 conducted among Hungarian manufacturing companies. The eight-page questionnaire encompassed the following areas:

➢ general information about companies: 7 questions;
➢ information about corporate facilities: 4 questions;
➢ information about investments in facilities, their decision preparation and analysis: 10 questions;
➢ information about the operation of facilities: 3 questions;
➢ information about the practical implementation of facility management: 4 questions.

The questionnaire was completed by 114 companies in a form that could be evaluated. Of the responding companies, 19% were micro-sized companies, 20% were classified as small-sized companies, 46% belonged to medium-sized companies and the percentage of large companies amounted to 15%. As for their ownership structure, the highest percentage of companies (84%) had majority national ownership; 14% had majority foreign ownership and 2% had 50-50% national and foreign ownership. (Figure 1 shows the sample composition by company size and ownership structure).

The data in the completed questionnaires were summarised in Excel spreadsheet software and analysed with the SPSS Statistics software package. Simple descriptive statistical methods (partition coefficient, group mean, etc.) and comparative statistical analyses (correlation coefficient, Chi-squared indicator, discriminant analysis, variance analysis) were performed.
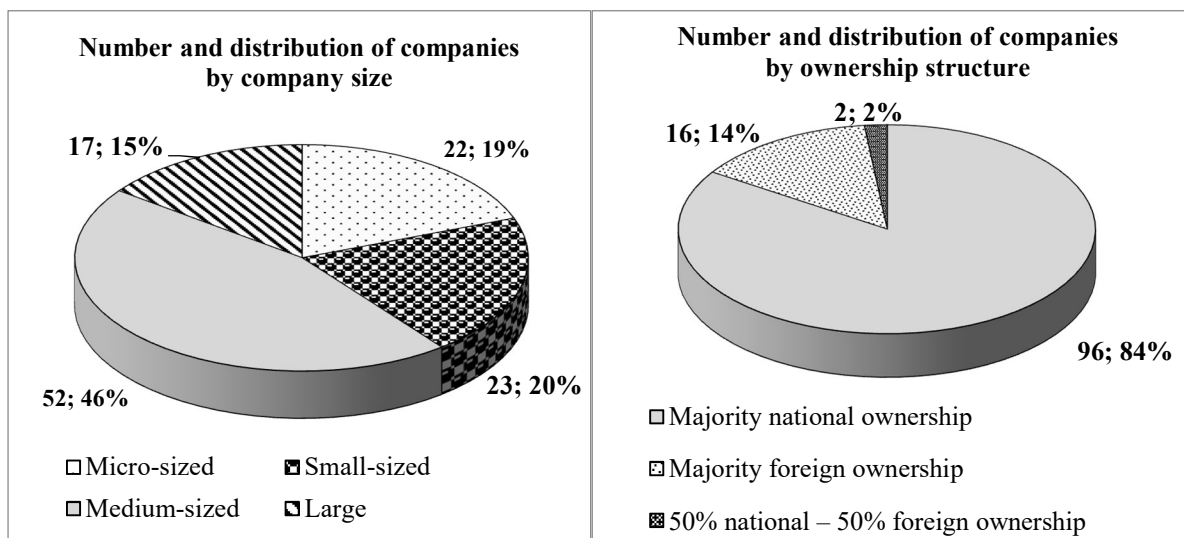
Source: compiled by the author based on the questionnaire responses

Figure 1. Composition of respondents by company size and ownership structure
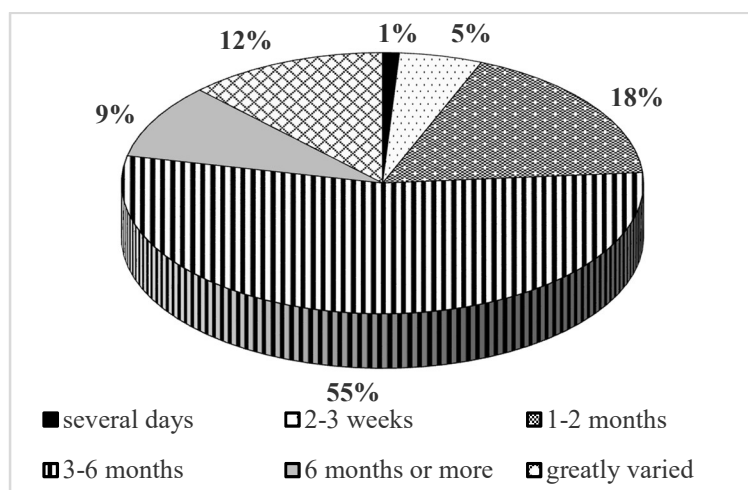
PRACTICAL ISSUES WITH DECISION-PREPARATION OF FACILITY INVESTMENTS BASED ON THE SURVEY RESULTS OF 2016

The Time Required for Preparing Decisions about Investing in Facilities

The questionnaire survey results confirmed the assumption that it takes companies several months to prepare decisions about investing in facilities. The responses of the surveyed companies show that 55% of respondents spent 3-6 months and 18% dedicated 1-2 months to prepare facility-investment decisions. In addition, the percentage of companies that spent as much as half a year to prepare their investment decision amounted to 9%. Only 5% of companies claimed that it took them 2-3 weeks to prepare investment-related

decisions. The respondents that spent only several days to prepare the decisions accounted for 1%. However, 12% of the responded companies claimed that the amount of time spent on decision preparation varied greatly (Figure 2).

The initial assumption was that the company size and the ownership structure greatly affect the time required for preparing decisions about investing in facilities. The conducted analyses show that it took micro-sized companies 1-2 months to prepare their investment decisions. However, it should be noted that a relatively high percentage of micro-sized companies (21%) chose the remaining three responses and indicated that they invest 3-6 months, 6 months or more, or a varied period of time in decision preparation. As for small-sized companies, 35% of them dedicated 1-2 months and 24% invested 3-6 months in preparing investment decisions. The investment decision-preparation process lasted 3-6 months in the majority of medium-sized and large companies (73% and 56%, respectively) (Table 1 shows the distribution of responses to this question.)

Source: compiled by the author based on the questionnaire responses

Figure 2. The time required for preparing decisions about investing in facilities

Table 1

The time required to prepare investment decisions by company size and ownership structure

Duration of decision-preparation activities	Company size				Proportion of ownership		
	Micro-sized companies	Small companies	Medium-sized companies	Large companies	With national majority	With foreign majority	50%national, 50% foreign
Several days	0%	0%	2%	0%	1%	0%	0%
2-3 weeks	7%	12%	2%	6%	5%	7%	0%
1-2 months	29%	35%	8%	17%	17%	13%	50%
3-6 months	21%	24%	73%	56%	57%	47%	0%
More than 6 months	21%	18%	6%	0%	10%	7%	0%
Greatly varies	21%	12%	8%	22%	10%	27%	50%

Source: compiled by the author based on the questionnaire responses

In order to identify the relationship between company size and the time required to prepare investment decisions, Pearson's Chi-squared test was performed. Its value was under 5% of the conventionally accepted significance level (2.3%), which indicated that there is a relationship between the two variables. Cramer's V value amounted to 0.307, which shows a moderately strong relationship between company size and the length of decision preparation.

As for the responses related to the proportion of ownership, the results reveal that there is no significant deviation in terms of preparing decisions about investments in facilities. Although there are some proportional differences between responses, companies with both national and foreign ownership structures invested 3-6 months in preparing investment decisions. Only in 2 responding companies was the proportion of the foreign ownership structure the same as the proportion of national ownership structure. One of these two companies invested 1-2 months in preparing investment decisions and in the other the length of decision preparation time greatly varied (see Table 1).

The distribution of responses relating to the ownership structure clearly reveals that there is either no or a very weak relationship between the time required to prepare investment decisions and the ownership structure. The conducted cross tabulation analysis also confirms this

assumption. Pearson's Chi-square test value well exceeded 5% of the conventionally accepted significance level, which indicated that there is no relationship between the two variables. Cramer's V value amounted to 0.205, which indicates a weak relationship.
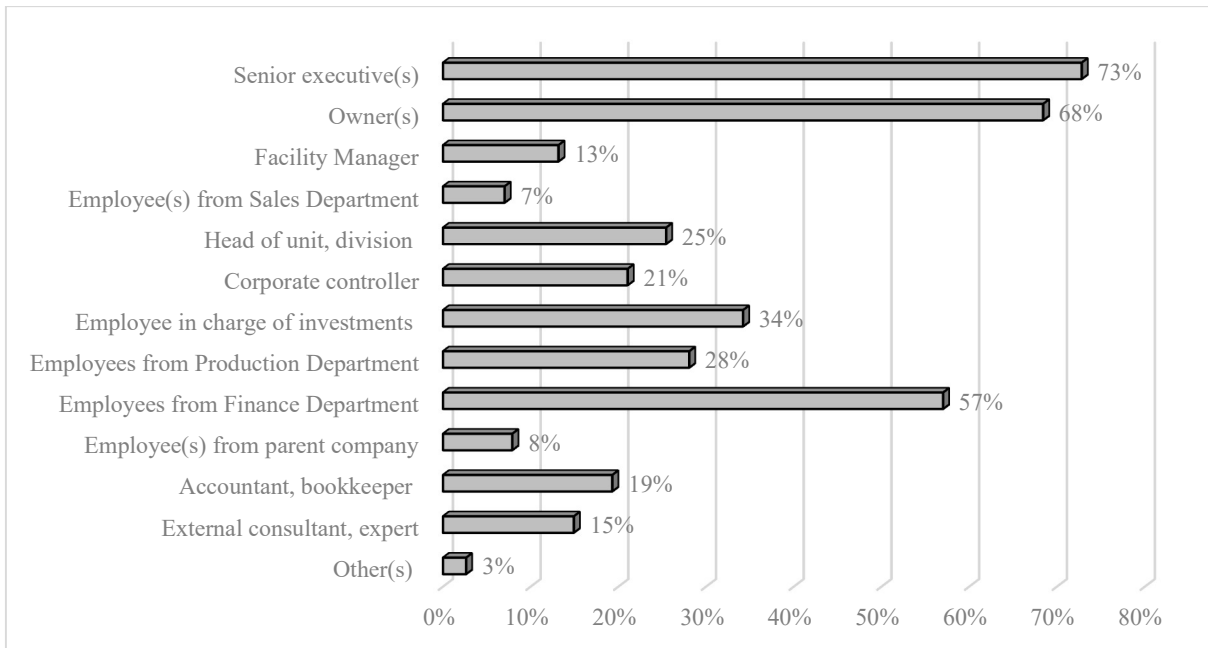
Employees Involved in Preparing Decisions about Investing in Facilities

In a high percentage of companies (45%) a maximum of three people participated in preparing investment decisions. One-third of respondents delegated this work to 4-5 employees and six employees took part in decision preparation in one-fifth of the responding companies (Figure 3). In a large majority of companies (73%), senior management was generally involved in preparing facility-investment decisions. The percentage of companies where owners also took part in decision preparation amounts to 68%. In 57% of respondents, finance people were involved in preparing investment decisions and in 34% of companies employees engaged in different investments were involved. A quite low percentage of respondents (15%) indicated that they hired external experts and consultants when preparing facility-related investment decisions (Figure 4).
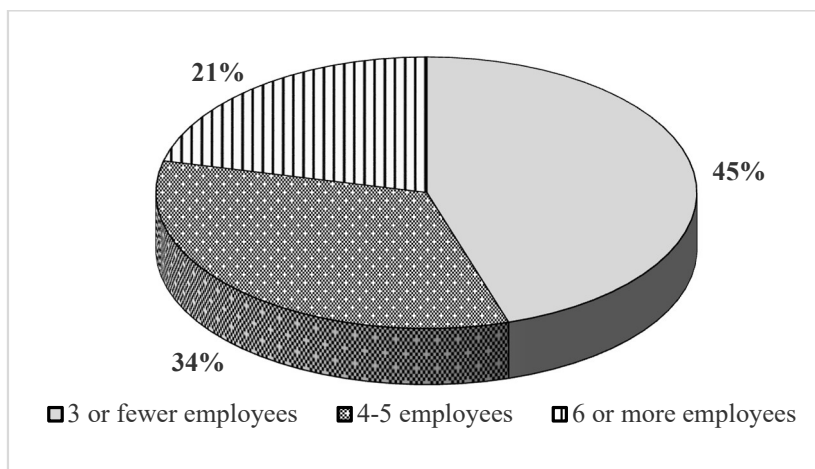
Source: compiled by the author based on the questionnaire responses

Figure 3. Number of employees involved in preparing decisions about investing in facilities

Source: compiled by the author based on the questionnaire responses

Figure 4. Employees involved in preparing decisions about investing in facilities

In order to confirm the initial assumptions that large companies involve experts from different areas in preparing investment decisions, the responses were analysed broken down by company size. In 41% of micro-sized companies 4-5 employees prepared decisions about investing in facilities, while in 36% of these companies 3 or fewer workers carried out the preparation. As for the small companies, about half of them (48%) delegated this work to six employees and in 39% of them a maximum of three colleagues were engaged in preparing investment decisions. It is a bit surprising that more than half of the medium-sized companies (51%) invited only three employees onto the decision-preparation team. Large companies also followed this small-team practice, since the percentage of these companies involving either

maximum three or 4-5 colleagues in decision preparation amounted to 44% and 44%, respectively. (Table 2 shows the response distribution in detail.)

In order to establish the relationship between the company size and the number of employees involved in decision preparation, a cross tabulation analysis was conducted. Pearson's Chi-square test value amounted to 2.5% and was below 5% of the conventionally accepted significance level, which indicated that there is a relationship between company size and the number of employees involved in decision preparation. Cramer's V value amounted to 0.252, indicating a weak relationship between the two variables. (The percentage distribution of responses also provided grounds for assuming this relationship.)

Table 2
Number of employees involved in decision- preparation of facility investments
by company size and ownership structure

Number of employees in decision-preparation	Company size				Proportion of ownership		
	Micro companies	Small companies	Medium-sized companies	Large companies	With national majority	With foreign majority	50% national, 50% foreign
3 or fewer employees	36%	39%	51%	44%	42%	56%	100%
4-5 employees	41%	13%	35%	44%	34%	31%	0%
6 or more employees	23%	48%	14%	11%	24%	13%	0%

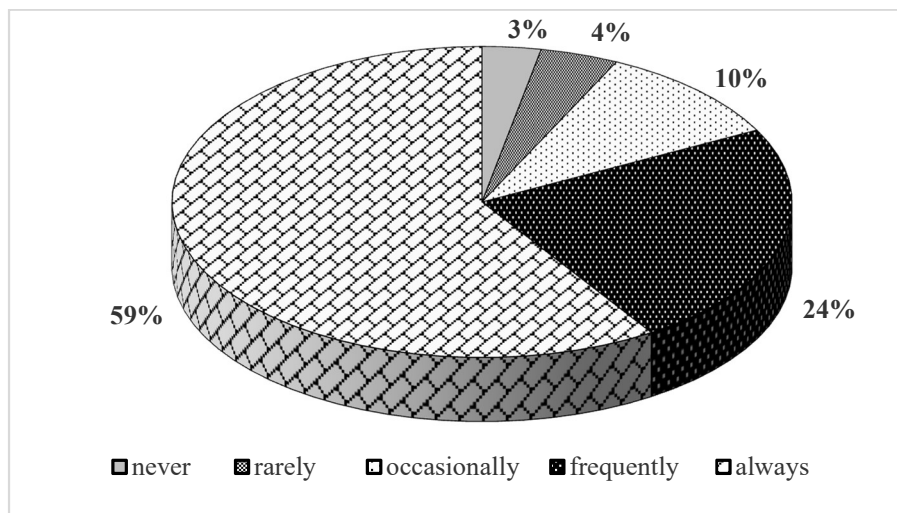Source: compiled by the author based on the questionnaire responses

The second assumption was that in companies with foreign-majority ownership, employees of parent companies also participate in preparing investment decisions and therefore more people are involved in decision-preparation processes than in companies with national-majority ownership. Although the distribution of responses provided by companies with national-majority ownership and with foreign-majority ownership showed some differences in corporate practices, these differences were insignificant. While 42% of companies with national-majority ownership engaged three or fewer employees in preparing investment decisions, 34% of these companies involved 4-5 employees in this process. As for the companies with a foreign-majority ownership structure, this proportion is 56% and 31% respectively. In companies with 50% national and 50% foreign ownership, the decision-preparation team was made up of three or fewer employees (Table 2 shows the distribution of the responses).

The distribution of the provided responses suggests that the relationship between the ownership structure and the number of people involved in preparing investment decisions is weak. The conducted cross tabulation analysis confirmed this assumption, since the Chi-square test value well exceeded the 5% conventionally accepted significance level. Cramer's V value amounted to 0.133, indicating a very weak relationship between the two variables.

Evaluation of Economic Efficiency of Facility Investments

The findings of the conducted questionnaire survey reveal that a high percentage of companies (59% 'always' and 23% 'frequently') calculated economic efficiency of investment alternatives. Considering the current findings in the light of previous research studies, it should be highlighted that only 3% of respondents never carried out economic efficiency calculations, which is a very positive trend. In previous national surveys this percentage was 17% (Andor et al. 2011) and 37% Szűcsné Markovics (2013). (Figure 5 shows the distribution of responses.)

As generally anticipated, evaluation practices of facility investments depend on a company's size. There are a few micro and small companies that never conducted economic efficiency analyses of investments. A relatively high percentage of micro-sized companies 'always' (43%) or 'frequently' (21%) calculated the economic efficiency of investments. As for the medium-sized companies, this ratio was not that high. Only 22% of the responding companies 'always' and 28% 'frequently' evaluated economic efficiency of potential projects. The efficiency evaluation was 'always' conducted by two thirds and 'frequently' by 29% of medium-sized companies. In large companies this percentage amounts to 83% and 6% respectively. (Table 3 shows the distribution of responses.).

Source: compiled by the author based on the questionnaire responses

Figure 5. Distribution of companies by evaluation of economic efficiency of facility investments

Table 3

Evaluation of economic efficiency of facility investments by company size and ownership structure

Frequency of economic efficiency calculations of facility investments	Company size				Proportion of ownership		
	Micro companies	Small companies	Medium-sized companies	Large companies	With national majority	With foreign majority	50% national, 50% foreign
Never	14%	6%	0%	0%	4%	0%	0%
Rarely	0%	11%	4%	0%	5%	0%	0%
Occasionally	21%	33%	0%	11%	13%	0%	0%
Frequently	21%	28%	29%	6%	24%	13%	50%
Always	43%	22%	67%	83%	54%	87%	50%

Source: compiled by the author based on the questionnaire responses

In order to establish the relationship between company size and the evaluation of economic efficiency of facility investments, a cross tabulation analysis was conducted. The first number of the Pearson's Chi-square test value was very close to zero, which indicated that there is a relationship between the two variables. Cramer's V value amounted to 0.353, indicating a moderately strong relationship between these variables.

Analysing the responses to the questions related to the ownership structure, it can be claimed that the responding manufacturing companies 'always' or 'frequently' calculate the economic efficiency of facility investments irrespective of the observed differences in percentage. While 54% of companies with national-majority ownership 'always' calculated the economic efficiency of facility investments, 24% of these companies 'frequently' performed this activity. As for the companies with a foreign-majority ownership structure, the percentage is even better because companies conducting economic efficiency evaluation amount to 87% and 13% respectively. In companies with 50% national and 50% foreign ownership, the economic efficiency evaluation

was never done by 4%, 'rarely' performed by 5% and occasionally conducted by 13%. (Table 3 shows the distribution of the responses in detail.).

In order to establish the relationship between the ownership structure and the evaluation of economic efficiency of facility investments, a cross tabulation analysis was conducted. The Pearson's Chi-square test value was very high, which indicated that there is no relationship between the two variables. The Cramer's V value of 0.193 indicated a weak relationship between these variables.

Ranking Facility Investments

If there are several potential alternative projects, the economic efficiency evaluation is followed by ranking of projects. The findings of the questionnaire survey revealed that 40% of the responding companies 'always' and 27% of them 'frequently' ranked projects. The percentage of companies that never ranked potential project alternatives is relatively low and accounts for only 3% (Figure 6).
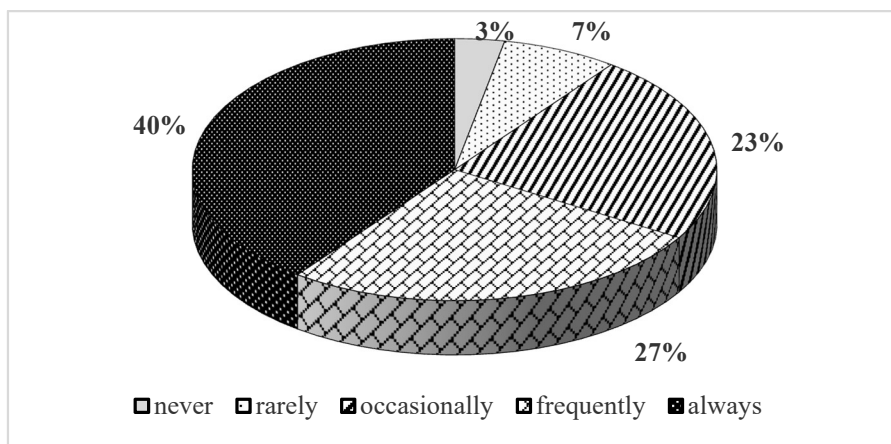
Source: compiled by the author based on the questionnaire responses

Figure 6. Distribution of companies by ranking economically efficient facility investments

Table 4

Ranking economically efficient facility investments by company size and ownership structure

Ranking frequency of economically efficient facility investments	Company size				Proportion of ownership		
	Micro companies	Small companies	Medium-sized companies	Large companies	With national majority	With foreign majority	50% national, 50% foreign
Never	21%	6%	0%	0%	5%	0%	0%
Rarely	0%	6%	6%	17%	6%	13%	0%
Occasionally	21%	39%	22%	11%	27%	7%	0%
Frequently	36%	33%	27%	11%	28%	13%	50%
Always	21%	17%	45%	61%	34%	67%	50%

Source: compiled by the author based on the questionnaire responses

Comparing the responses to the question related to project ranking by company size, the findings revealed significant differences in corporate practices. A high percentage of micro-sized companies (21%) never ranked investment alternatives. This percentage amounts to 6% in responses provided by small companies. There were no medium-sized and large companies that never ranked projects. Only one-fifth of micro-sized companies 'always' and 36% 'frequently' ranked economically efficient projects. So did 17% and 33% of small companies respectively. A significant percentage of medium-sized companies 'always' (45%) and 'frequently' (27) ranked projects. Ranking practices were even more frequently performed by large companies: 61% 'always' and 11% 'frequently' ranked projects. (Table 4 shows the distribution of the responses in detail.)

The conducted cross tabulation analysis confirmed the assumption that there is a relationship between company size and project ranking. Pearson's Chi-square test value was very low and accounted for only 0.5%, while the Cramer's V value of 0.308 indicates a moderately strong relationship.

Analysing the responses to the ranking question by the ownership structure, it can be claimed that companies with national majority ownership laid less emphasis on ranking projects than companies with a foreign majority ownership structure. One-third of companies with national majority ownership 'always' and 28% 'frequently' ranked projects. Companies with a foreign majority ownership structure showed a more positive attitude to ranking: two-thirds of them 'always' and 13% of them 'frequently' ranked economically efficient project alternatives. In companies with 50% national and 50% foreign ownership, ranking was 'always' done by one company and 'frequently' perfomed by the other company. (Table 4 shows the distribution of the responses in detail.)

In order to establish the relationship between the ownership structure and ranking economically efficient facility investments, the Chi-square test was conducted. Its 30% value well exceeded the 5% conventionally accepted significance level indicating no relationship between the two variables; Cramer's V value of 0.22 indicated a weak relationship.

SUMMARY

All corporate managers have to make decisions about investments, including facility investments that determine the future of their companies. Investments in facilities considerably affect how a company is managed for years or even decades. Therefore, it is essential to apply appropriate methods when decisions about investments are prepared.

This study addressed some practical issues related to preparing decisions about investing in corporate facilities, such as the length of time dedicated to decision preparation, the number of employees involved in preparation processes, the evaluation of economically efficient investment alternatives and ranking efficient projects. This study used the findings of a questionnaire survey conducted in 2016 and presented corporate practices of manufacturing companies operating in Hungary. The findings can be summarised as follows:

1. It takes several months to prepare decisions about investing in facilities. The majority of companies dedicate 3-6 months to this process. However, the amount of the time spent on preparing decisions depends on the company size. These results are consistent with the results of the survey on investment practices of Hungarian manufacturing companies (referred above) conducted in 2012 (Szűcsné Markovics 2013). The results of Hungarian surveys should also have been compared with the findings of international surveys, but research results on this issue published in English were not found.

2. Teams consisting of three or perhaps 4-5 employees participate in the decision-preparation process irrespective of the company size or the ownership structure. Apart from senior managers and owners, finance people and people engaged in different projects also participate in decision preparation. Involving external experts or consultant is not typical. These results slightly contradict with the results of the survey conducted in 2012 (Szűcsné Markovics 2013). According to the survey of 2012, it was typical that teams consisting of several members, such as 4 or 5

employees or minimum 6 people were generally involved in preparing investment decisions. In addition, the number of team members taking part in decision preparation showed a positive relationship with the size of companies. This means that in large companies the decision-preparation team was also large. (These findings were not compared with any results of international surveys either because of the lack of publications in this issue in English.)

3. A great majority of companies frequently evaluate the economic efficiency of facility projects and rank economically efficient projects. Investment practices of small and large companies greatly differ. A positive trend can be observed in corporate practices, since only 3% of the responding companies reported never conducting economic efficiency analyses and never ranking efficient projects. The survey seems to observe a very positive change compared to the findings of the Hungarian survey carried out in 2012 (Szűcsné Markovics 2013), which revealed that a high percentage of sampled companies in Hungary (34%) never performed capital budgeting evaluations. The obtained 3% indicates a very positive shift not only among national companies, but also among companies operating in international markets. This ratio is lower than in some other countries, such as 8% in Scotland (Sangster 1996), 41% in New Zealand (Vos & Vos 2000), 7% in Egypt (Osemy 2002) and 17% in Eastern and Central European countries (Andor et al. 2011). As for the ranking list of projects meeting the required rate of return, the results seem even more favourable. According to the 2012 survey (Szűcsné Markovics 2013), 38% of companies never ranked projects. Although a great number of international scholars have investigated capital budgeting methods used by companies, none of their studies mention any methods that corporate decision-makers use for ranking projects. Consequently, it was impossible to perform any comparison in this issue either.

Considering these findings, it can be claimed that manufacturing companies gave due consideration to preparing facility investments because they spent several months on preparing decisions about investments and involve several employees in this process. The majority of companies often conduct economic efficiency analyses of alternative investments and rank economically efficient alternative projects.

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