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## ICT Use in EU According to National Models of Behaviour

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### Abstract

As information and communications technologies, along with follow-up processes, are being rapidly developed and implemented in various aspects of everyday life, a need has arisen to explore and describe these changes. The authors reflect on whether there are any significant differences in the availability and use of Information and Communication Technologies (ICT) in individual EU countries related to cultural differences among these countries. The aim of the paper is to analyze selected aspects of the use of information technologies in selected EU countries in connection with “national behaviour patterns”, and to ascertain, using a multidimensional data analysis, whether or not there are any significant differences at the level of individuals within an international comparison of the selected EU countries.

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### Introduction

In the 18<sup>th</sup> and 19<sup>th</sup> centuries, the world economy was impacted by the results of the industrial revolution followed by electrification. In the 1990s, the Internet spread on a global scale as a result of the scientific-technological revolution, which, in a way, has not finished yet. Information and communications technologies significantly contribute to an increase in efficiency and work productivity, and their implementation keeps economies competitive to a large extent.

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Creating an ideal environment for the technologies to penetrate all aspects of life became (particularly for economic reasons), especially in the last quarter of the 20<sup>th</sup> century, one of national governments and international institutions' priorities. On the one hand, thanks to increasingly efficient information technologies, the world is becoming more homogeneous and differences among national markets are disappearing. On the other hand, there are still significant differences in value systems of citizens living in individual countries. Nowadays, the Internet impacts both personal, professional and social lives of many people, it has changed the way business and education are done and the way people obtain information, it affects even common daily activities, e.g. paying bills, listening to music, watching films, shopping, the way people communicate with friends, etc. Naturally, these changes also influence our cultural environment. We may, however, ask ourselves if all cultures are experiencing equally intensive influence and if they have been influenced in the same way. Does the Internet result in a greater cultural homogeneity or is it the other way round? The aim of the paper is to analyse selected aspects of information and communications technologies (the way individuals use the Internet) in selected EU countries in connection with "national patterns of behaviour". The aim is strongly related to globalization, which has become an inevitable process including all the positive and negative consequences.

## 1. Current state

The Internet is increasingly perceived as a critical factor of social and economic development. It enables interconnection of a range of innovative applications in areas as diverse as power industry, e-health, e-government, and of course, in agriculture (Szilágyi, 2012). Obstacles in the form of insufficient broadband coverage appear mainly in lower social classes, in the countryside, and in small businesses (Struzak, 2010; Botos, 2012). Wide-scale extension of products and services of information and communications technologies even into less developed European regions is an economic, social, ethical and political necessity (Ruhle et al., 2011), which will significantly impact other economic industries (Pentek & Herdon, 2009; McChensey, 2013).

Rich reference literature can be found exploring the benefits of information and communications technologies for economic growth on a national scale. These studies usually focus on the USA and the EU countries, e.g. (Jorgenson et al., 2008), (Martínez et al., 2010) in the USA, (Correa, 2006) in the UK; (Antonopoulos & Sakellaris, 2009) in Greece, and (Dimelis & Papaioannou, 2011) compared the EU and the USA. The survey following the impact of the ICT development on the consumption ethics has been conducted by (Lekakis, 2013).

Meaningful and positive impact of information and communications technologies on economy has been confirmed by (Seo, Lee & Oh, 2009), and (Nasab & Aghaei, 2009). (Vu, 2011) confirms the hypothesis that Information and Communication Technologies (ICT) penetration has a positive impact on economic growth.

As the world is increasingly interconnected via ICT, two hypotheses have appeared regarding the extent of the impact that globalization has on the cultural environment (Webber, 1969; Yang, 1986; Ronen, 1986). The first hypothesis (convergence) claims that new technologies, e.g. the Internet, support cultural homogeneity immensely. The second one (divergence) indicates that cultures tend to resist assimilation and they adapt to new technologies in different ways.

In paper (Marcus & Gould, 2000) assume that creating websites is much less costly than designing the whole information system; therefore they often tend to follow cultural practices. They examined and judged websites of various cultures while referring to works by (Hofstede, 1980), (Hofstede, 1991)..

Geert Hofstede was the first to compare intercultural values on a wider scale. He derived his cultural values from the research he had conducted in different national IBM subsidiaries. He adds, however, that many other surveys have arrived at the same or similar conclusions. He focuses on dimensions which cause distinct understandings of fundamental parameters of human lives and which are significantly reflected in work, management, and means of communication.

## 2. Data analysis

The data were evaluated by means of cluster analysis, which is a method of multi-dimensional statistical classification. The method involves simultaneous search for similarities and differences, grouping data in meaningful wholes (clusters), where cases from one cluster show maximum similarity, while showing minimum

similarity to cases from a different cluster. Another typical feature of cluster analysis is the fact that it identifies similarities and differences, structure in data without explaining the reasons for these relations.

The aim of cluster analysis is to categorize  $n$  objects (countries, in this case), each of which is described with  $p$  characteristics, into several homogenous, if possible, groups (clusters). The requirement is that the objects inside a cluster should show maximum similarity whereas objects from different clusters should show minimum similarity. The exact number of clusters is usually not known. A visual outcome of cluster analysis is a dendrogram, which is typically used to represent results of an agglomerative hierarchical procedure by visualizing individual steps of cluster analysis calculation.

The data used to compare selected 27 EU member countries in terms of ICT use were provided by Eurostat, the statistical office of the European Union. The data were gathered during a Europe-wide Community survey on ICT usage in households and by individuals, which is coordinated annually by Eurostat. The paper deploys data of 2013 regarding the following entries:

- Individuals who used the Internet in the three months or 12 months before the survey
- Individuals who used the Internet in the calendar year prior to the survey in order to contact the state administrative bodies for personal purposes
- Individuals who used the Internet in the 12 months prior to the survey in order to buy or order goods for personal purposes without writing emails.
- Individuals who used the Internet for internet banking in the period of 3 months prior to the survey.
- Individuals who had never used the Internet (at home, at work or anywhere else, for personal or job-related purposes).
- All the individuals concerned were aged 16 -74.

The data on cultural values were taken from Hofstede, who distinguished the following dimensions:

- Power distance - in large power distance cultures, people tend to greatly respect their superiors and senior citizens, and they see powerful people as examples (Wursten & Fadrhonc, 2012). In small power distance cultures, people tend to take decisions more independently and they like to differ from the others (Ting-Toomey & Oetzel, 2003). France, Belgium and Portugal score the highest within the EU.
- Individualism vs. collectivism – in case of collectivism, people are motivated by norms and duties imposed on the whole group. However, the degree of individualism and collectivism varies in individual countries (Green, Deschamps & Páez, 2005), (Nayeem, 2012), (De Mooji & Hofstede, 2011). The United Kingdom and the Netherlands score the highest, while Portugal and Greece score the lowest.
- Masculine vs. feminine characteristics in a society. In masculine cultures, performance and achievement are important (Hofstede, 1980) while in feminine cultures, free time and flexibility are more favoured, and people believe that collaboration and interaction are more important (Wursten & Fadrhonc, 2012). Countries which respect feminine values are Scandinavian countries, the Netherlands and Portugal.
- Fear of uncertainty – cultures opposed to uncertainty have strict formal rules affecting life. People in such cultures tend to be less open to new products, services and technologies (Roozmand et al., 2011). The UK, Denmark and the Netherlands have lower scored, while Greece and Portugal score the highest.
- Long-term vs short-term orientation – in his original research, Hofstede only worked with four dimensions, this dimension was added in 1991 by Michel Bond. The European Union as a whole is an example of a short-term oriented society.
- Indulgence – the last issue of his work (Hofstede, 2010) contains another, sixth, dimension, which shows to what extent members of a society can enjoy life and have fun (e.g. Denmark and Sweden), or to what extent the society tries to control such desires and establishes strict social norms.

Software Statistica 12 and MS Excel were used to process and evaluate the data.

The Internet is most widely spread in north European countries, while south and south-east European countries report the lowest numbers of Internet users. Significant differences can also be found when monitoring the level of

not using the Internet in individual countries. The highest number of citizens who don't have experience with using the Internet (either at home, in the workplace or anywhere else) can be found in Rumania (42%), in Bulgaria (41%) and in Greece (36%), whereas Denmark and Sweden report the lowest number of such citizens (4%).

Public administration bodies are fully equipped with the Internet, which is also widely used by those who use services offered by the public administration.

Internet banking has become the most dynamic electronic distribution channel for banks. Internet banking is least used in Rumania and Bulgaria. Above average and high utilization of e-banking for financial transaction and checking the account balance have been recorded mainly in states with a highly developed banking sector and in Scandinavian countries.

The number of individuals who have ordered goods or services on the Internet for personal purposes is rising. More than two thirds of individuals in Denmark, the United Kingdom, Sweden, Luxembourg, Germany and the Netherlands have order either goods or services over the Internet, while in Italy it was no more than one person in five, and in Bulgaria and Rumania it was approximately one person in ten.

A summary is given in Fig. 1.

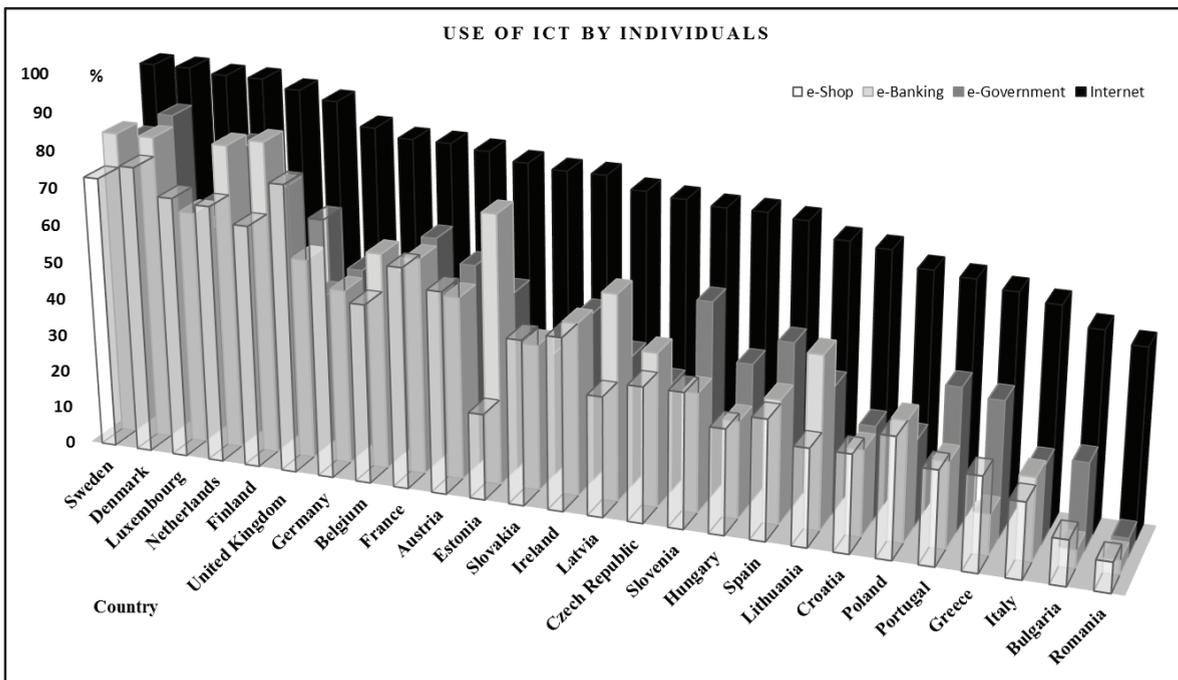


Fig. 1. Use of ICT by Individuals for Different Activity. (Source: Eurostat, 2015)

### 3. Cluster analysis

For the purposes of the cluster analysis, the data were divided into two groups. The first group deals with information on the usage of the Internet by individuals in selected EU countries, and the other group covers information on cultural national dimensions of these states. In both cases, the vertical axes show the distance (difference) between individual clusters, and the horizontal axes show individual countries. After the data had been standardized, a dendrogram was created. Complete linkage was used as a rule for grouping and the Euclidean distance was used as the metric.

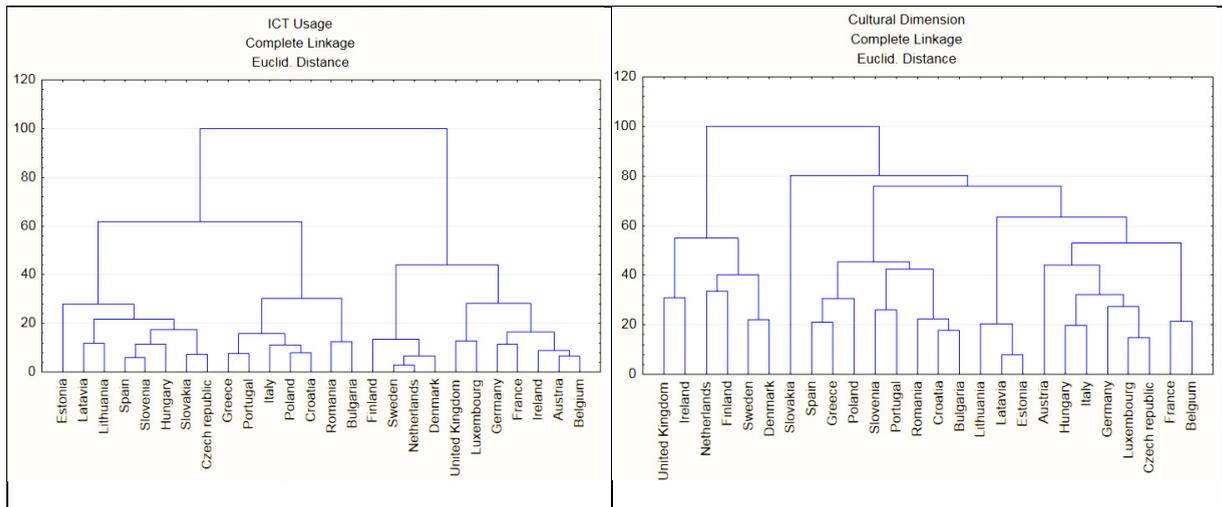


Fig. 2. (a) Results for ICT Usage; (b) Results for Cultural Dimension (Source: Own processing.)

In the three-cluster solution, dealing with the data on the usage of the Internet, the first cluster (from left to right) features countries where more than 68% of individuals use the Internet in a usual way, but at the same time, they are less interested in specific ways of using it, e.g. shopping online or contact with the public administration.

The second cluster consists of countries with a relatively high percentage of individuals who have never used the Internet (more than 30%), and if they use it, they hardly ever do their shopping online or e-banking.

The third cluster is made up of countries where the Internet has become an inseparable part of people's lives, and the number of individuals who have never used it is at a minimum level. Citizens in these countries use the Internet to contact the state administration, to do shopping and e-banking. On average, more than 60% of individuals who use the Internet also use the above mentioned services.

The data on cultural dimensions were put into four clusters. The first one consists of countries showing a high rate of individualism, a low level of fear of uncertainty, and short-term orientation. At the same time, these countries show a relatively high "indulgence" rate. Countries which are compared here are marked as close in terms of using the Internet. They are countries where the Internet is used on a wide scale.

The second cluster is only made up of one country, Slovakia, which is quite specific in terms of cultural dimensions, and shows very high values of Power distance, Masculine and Long-term orientation indicators. The third cluster is made up of countries, whose citizens, to a large extent, accept unevenly distributed power, show a low individualism rate, are restrained and avoid uncertainty. In these countries, the Internet is used on a lower scale and the interest in further services is low. The fourth cluster consists of countries which show a high rate of masculinity and long-term orientation of people. A "smaller" cluster can be identified within this cluster made up of Baltic states. Citizens in these countries perceive the Internet as part of their lives but are not necessarily interested in further services.

## Conclusions

In current conditions of the information society and in accordance with worldwide statistics and analyses, the EU countries focus on the development of global information environment (in particular the Internet), the extend and structure of its usage both at the level of individuals or households and at the level of businesses and economic sectors. A new phenomenon has appeared with the introduction of modern information technologies. This is a new kind of social differences between those who have access to new technologies and can work with them and those who cannot or are not allowed to use the new technologies. In their paper, the authors tried to analyse the rate at which the Internet is used by individuals in selected EU countries within cultural dimensions defined by Hofstede.

A conclusion has been drawn that the Internet has become part of life in all the countries concerned, but using some of the specific options, e.g. internet banking, depends on each country's culture. Therefore, it is necessary to respect regional differences and to think of what values and ways are natural to individual nations, and what individuals find easy to identify with when new services are being implemented within ICT, such as e-government or e-banking. In other words, in order for the ICT to be implemented in a sustainable way, it is necessary to take into account both the mentality of citizens and the readiness of users and wide public to use new information services.

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