



**БЕЛКООПСОЮЗ  
УЧРЕЖДЕНИЕ ОБРАЗОВАНИЯ  
“БЕЛОРУССКИЙ ТОРГОВО-ЭКОНОМИЧЕСКИЙ  
УНИВЕРСИТЕТ ПОТРЕБИТЕЛЬСКОЙ КООПЕРАЦИИ”**

# **ИННОВАЦИОННЫЕ ТЕХНОЛОГИИ В ЭКОНОМИЧЕСКОМ И БИЗНЕС-ОБРАЗОВАНИИ**

**СБОРНИК НАУЧНЫХ СТАТЕЙ  
II МЕЖДУНАРОДНОГО ВЕСЕННЕГО ФОРУМА**

**Гомель, 21–24 мая 2013 г.**

**В двух частях  
Часть 2**



## THE CONNECTION BETWEEN ICT DEVELOPMENT LEVEL AND THE USE OF INFORMATION SYSTEMS BY MICRO-ENTERPRISES

In the era of unstoppable IT development, the use of various information systems is an essential requirement for all enterprises. In particular, micro-enterprises are in a difficult position since they need continuous development to remain competitive with the possible help of information systems. At the same time, these enterprises that employ only a few people cannot afford to implement expensive software applications. Analysing the use of information systems among micro-enterprises is very important as they typically form the majority of enterprises, having a significant influence on the economic situation of each country. The present paper is aimed at analysing the use of information systems by micro-enterprises in Germany, Hungary and Slovakia.

Использование информационных систем необходимо на любом предприятии. Однако небольшие предприятия (микропредприятия) часто не имеют достаточных ресурсов для внедрения информационных технологий в свою деятельность. В то же время они существенно влияют на экономическую ситуацию в каждой стране. В данной работе анализируются пути использования информационных систем на предприятиях Германии, Словакии и Венгрии.

The type of the applied information systems in each country probably depends on the degree of their ICT development. Therefore, before analysing the responses to the questionnaire, it is required to characterize the three countries from the aspect of the level of their individual ICT development. One of the best indices for measuring the level of ICT development is the ICT Development Index (IDI). The IDI is a compound index published by the United Nations International Telecommunication Union based on the internationally agreed ICT indicators. It provides a valuable tool for measuring the most important indicators of the information society. The IDI consists of eleven indicators altogether, grouped in three clusters: access, use and skills. The main objective of introducing this compound index was to measure and compare the temporal evolution of ICT development, to study the progress of ICT development in both developed and developing countries, to measure the digital divide and detect the potential of ICT development within and across countries.

According to the latest rankings, Germany was ranked in the highest position among the surveyed countries, reaching the 10th position in the regional ranking list in Europe. Slovakia, outstripping Hungary by only one position was ranked 27th. Apart from the leading countries, the IDI gave special attention to the most dynamically developing countries which could show an improvement by up to 5-7 positions from 2010 to 2011. However, those countries are not examined in the present study so it can only be stated on the ranking list with reference to the level of ICT development that Germany reached the highest level, followed by Slovakia and Hungary [1]. This paper focuses on to what extent the level of ICT development determines the IT supply of micro-enterprises in these three countries.

### *Test methodology*

Our survey is based on a primary research, enterprises were asked to fill in a questionnaire in Hungary and Slovakia in the first quarter of 2011, where as the identical questionnaire was filled in by German enterprises in the last quarter of 2012.

The questions were aimed at exploring several areas within the enterprises, now we focus on only one major area. The introductory questions were directed at some background information of the surveyed enterprises, their IT infrastructure, their Internet usage patterns together with their information management practices were also subject of the inquiry. Present article deals with the use of information systems by taking a closer look at the responses given to the questions related to them.

*Initial assumption.* Beyond the examination of information systems, our aim was to put our the initial assumption to the test. After studying the relevant literature, we came to the assumption that the IT supply micro-enterprises was reflected by the ICT development level of the country they operate in [2]. This connection is tested in our paper by comparing the results of the survey to the index showing the level of ICT development.

*Sample structure.* In all three countries, hundreds of enterprises of different size received the questionnaires either electronically or on paper. In Hungary, 94 enterprises responded to the questionnaire, 21% of them were micro-enterprises, 29% of them were small-sized enterprises. Medium-sized

enterprises also reached 29% and 21% of the respondents were corporations. In Germany, only 34 enterprises showed willingness to respond to the questionnaire, 19 of which were micro-enterprises, with 8 small-sized enterprises, 1 medium-sized enterprise and 6 corporations. With 51%, more than half of the 86 respondents in Slovakia were micro-enterprises, 26% of them were small-sized enterprises, 15% of them were medium-sized enterprises and only 8% of them were corporations. The present article deals with only the examination of the micro-enterprises, the other size categories are not taken into consideration here.

### *Analysing the ict usage patterns of micro-enterprises*

From the classification methods presented above, the questionnaire used the distinction based on the types of activities. Those types of activities were highlighted for comparison that are essential for the operation of micro-enterprises. In all three countries, most respondents used transaction processing systems, followed by the use of office automation systems. The third most frequently used systems were supply chain management systems, these applications were used in all of the three surveyed countries. The question is: in which country did micro-enterprises use information systems in the largest proportion? As it is shown in Figure 1, the German enterprises led the way in applying all types of information systems, followed by the Slovakian enterprises while the proportion of applying such systems was the lowest among the Hungarian micro-enterprises. The proportion of companies planning to introduce an information system was about the same in Hungary as in Slovakia but in most cases Germany put these two neighbouring countries behind.

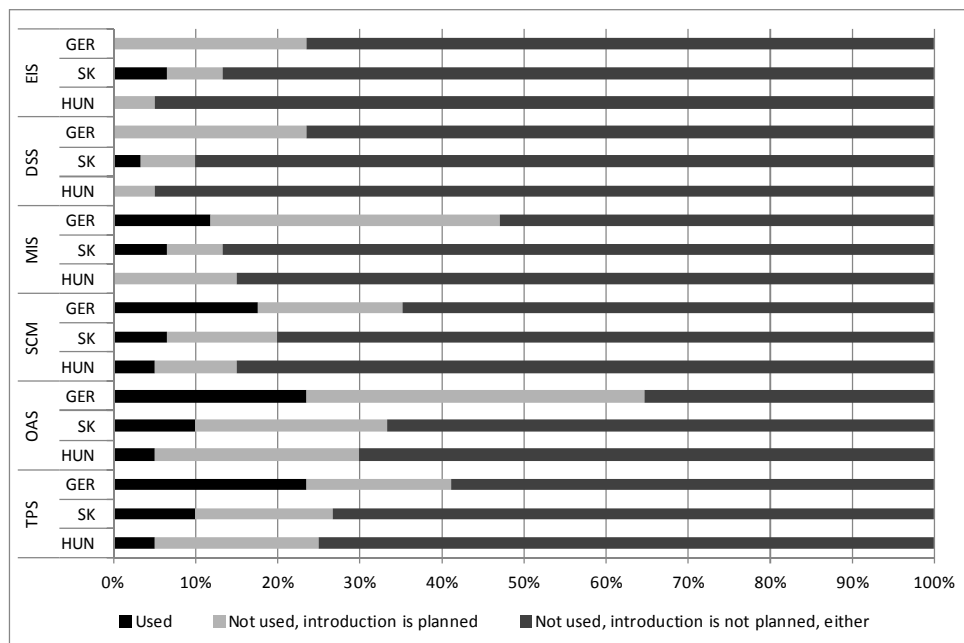


Figure 1 – Information systems used by the type of activities

The questionnaire also included some questions about the reasons for introducing the information systems shown in Figure 1, the answers are presented in Figure 2 below. The organizational causes for the introduction of such systems were given a great importance among the German and Slovakian respondents, whereas they were regarded as an insignificant factor by the Hungarian microenterprises. In Germany micro-enterprises had a tendency to use information systems due to business considerations and the nature of their activities. The importance of strategic reasons and business considerations both refer to the high level of the country's business culture. The primary cause for the Hungarian micro-enterprises to introduce such systems was that their activities required a very fast flow of information. Of the three countries, the majority of the Hungarian micro-enterprises declared that they had to introduce information systems to adapt to their competitors that had already used certain information systems. Such technical causes as replacing the existing inflexible, outdated system were mostly characteristic to the Slovakian micro-enterprises. On the whole it can be said that the micro-enterprises in the surveyed countries identified similar reasons for introducing information systems, a significant difference occurred only in the case of organizational reasons and business considerations.

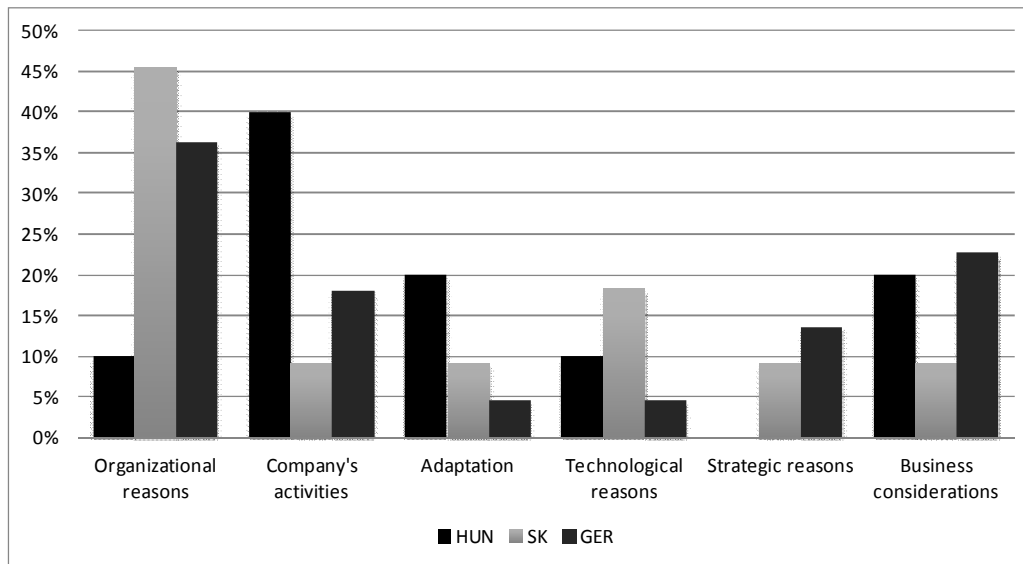


Figure 2 – Reasons for the introduction of applied information systems

The aspects for selecting an implemented information system also carry important information on the ICT development level as it can be seen in Figure 3. One of the most important aspects was usability, it was preceded by only costs among the German, warranty, security and costs among the Slovakian micro-enterprises. The Hungarian micro-enterprises also weighed up costs but flexibility, customization and security were also important aspects. In the course of selecting an information system, technology proved to be the least important factor in all of the three countries. Figure 3 also shows that while in Hungary such short-term considerations as costs and usability were regarded as more important criteria, micro-enterprises in Slovakia and Germany put more emphasis on such long-term criteria as warranty and support service when deciding upon the introduction of an information system.

After exploring what types of information systems are used by micro-enterprises in general, we also have to take a look at what results can be achieved by applying such information systems according to the users themselves. As it is shown in Figure 4, the sense of user satisfaction was measured on a 1-5 Likert scale. At first sight, the high scores given to a new standard of connection with suppliers and customers and the improved internal communication can be spotted in Slovakia, the latter was also in the first place in Germany. In the case of the Hungarian micro-enterprises, the most important result of applying an information systems was to improve information supply for decision-makers. According to the German and Slovakian respondents, information systems played a minor role in improving competitiveness; however, their Hungarian peers put it in the second place.

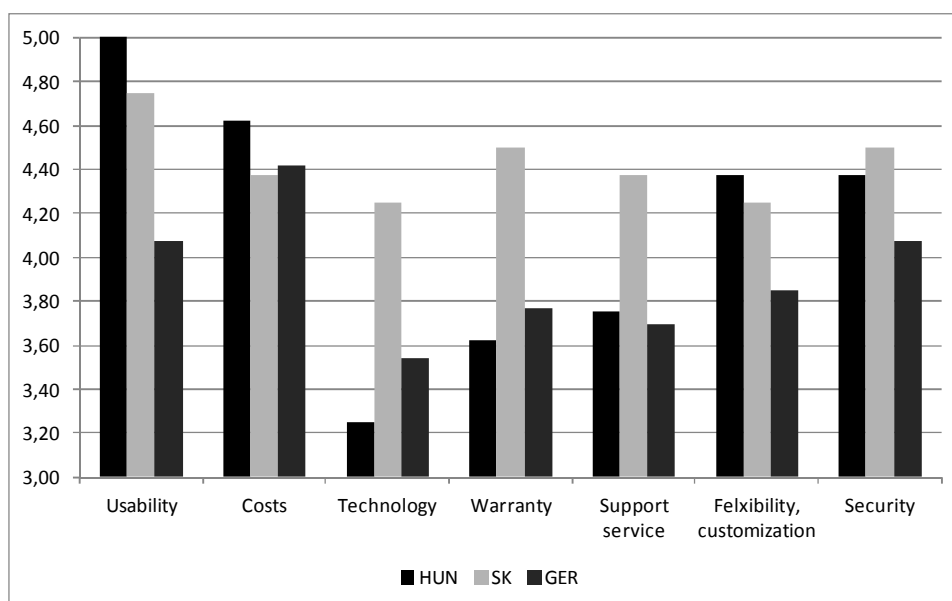


Figure 3 – The aspects for selecting an information system

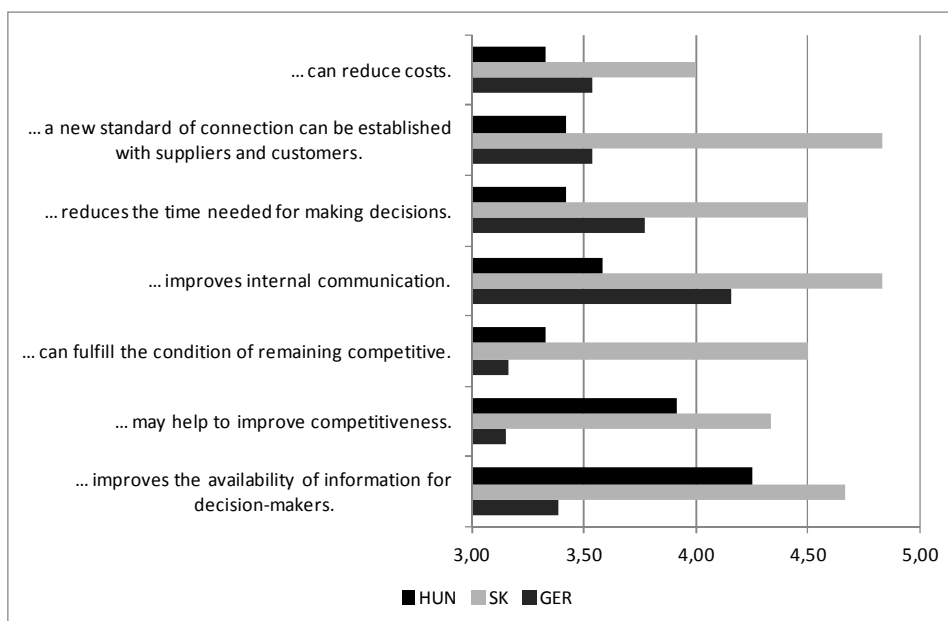


Figure 4 – Results achieved by introducing an information system

By examining the usage patterns of information systems among micro-enterprises, it is possible to draw some conclusions on their connection to the general ICT development level of each country. The IDI index ranks Germany as the most advanced of the three surveyed countries, followed by Slovakia and Hungary. According to the initial assumption we examined what influence the level of ICT development had on the ICT usage patterns of micro-enterprises.

After analysing the questions of the survey, it can be stated that information systems are most frequently used by the German micro-enterprises while their Hungarian counterparts used them the least. Introducing an information system is also planned in the largest number among the German micro-enterprises. Based on these findings, our initial assumption was justified. In terms of the aspects determining the introduction of an information system, the Slovakian micro-enterprises gave the highest scores to all of the listed criteria. While the short-term criteria were more important for the Hungarian micro-enterprises, their German counterparts put the question of using information systems in a longer-term perspective, which also refers to a higher development level. In reference to the results that can be achieved by using information systems, the Slovakian micro-enterprises had the most positive opinion. The Hungarian micro-enterprises mainly used information systems for improving their competitiveness, in Germany they were mostly used for improving internal communications instead.

In summary, the findings of the questionnaire showed that there was a clear connection between the actual level of ICT development and the ICT usage patterns of micro-enterprises. As it was indicated by the IDI index, the most advanced country among the three surveyed countries was also the one where various types of information systems were used in the greatest number and the micro-enterprises operating there had a tendency to plan for a longer term than their counterparts operating in Slovakia and Hungary.

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