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Current Trends in Training of Managers in the Field of Information And Communication Technologies And Identifying the Barriers to Education of Managers

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Abstract

Lately lifelong learning has become an integral part of the whole society. This is also the reason for the greatest development of new concepts serving just the implementation of lifelong learning policy. These changes in the process of continuous education are in practice much more than a comprehensive adaptation of the education system, which is why this trend is currently understood mainly in the developed countries of the world as a response to the changing labor market. Lifelong learning thus provides individuals with a better perspective and at the same time increases the chances of an organization in which they succeed and differentiate themselves on a global scale. That is why we can designate lifelong learning, learning and constant improving as an essential part of the development of managers. Education and training of human resources in organizations form a significant part of lifelong learning. Employee training focuses on shaping individuals, their skills and increasing their competitiveness on the global market. In today's turbulent and difficult-to-anticipate period, educational activities in management and training are important. This brings the ever-increasing demands for expanding, specialized and retraining education and thus the constant demand for new and more efficient forms of education.

Keywords

Information and communication technologies, business performance, manager, educating of managers.

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Introduction

Human resources and capacities are one of the organization's most important competitive advantages, and therefore their education and development should be given the appropriate attention and should be firmly placed in the corporate strategy. In this paper we will pay the most attention to the education and development of the organization's employees. We present the specific forms and methods of education used today and compare them in terms of effectiveness in relation to the performance of the organization. Performance is a concept whose presence in our everyday life is quite common regardless of a specific professional interest. In general, the more common a term we use in our language, the more natural part of our life and our expectations is. The exception, therefore, is not the demands and expectations that we have in common communication with our partners, employees and associates, and we assume that this term is both accepted and interpreted in terms of content and priority, that they are familiar with its content and understand its meaning. In general the term performance is mostly used in the connection with the main existence of the firm on the market and its success and ability to survive in future (Fulantelli and Allegra, 2003). When evaluating the success the running of the organizazion, the following three terms are mostly used:

- Performance – the term defining the general rate of the effort of an individual and links the contribution, usefullness and the used resources.
- Effectiveness – the term generally defined as the effectiveness of the sources, and means to achieve the set objectives. It is also

a value showing the rate between the incomes and outcomes, or the results of the economic activities and the costs in whole (Ongori and Migiro, 2010).

- Productivity – expresses the performance of the empolyee, organization or a machine as a unit.

The measurement of the performance process should obtain needs and expectations of the parties involved, as it can be searched in two basic levels:

- On the level of the organization as a whole.
- On the level of an individual (Veber, 2004; Erumban and Jong, 2006).

Parallel sets of indicators are very frequent analytical processes. The individual indicators forming the system are equivalent and are grouped according to the area of the company management. An example of a parallel set of indicators is a set of indicator groups reflecting the financial health of an enterprise, which consists of the following five groups (Bresnahan et al., 2002; Adeosun et al., 2009; Ongori, 2009):

- Liquidity indicators.
- Returns indicators.
- Indicators of activity.
- Debt indicators.
- Market Value Indicators.

On the way to achieving such perfection, each organization must first assess its current situation and its possibilities (Hennyeyová and Depeš, 2010), (Hennyeyová et al., 2013). It is the ability to perceive and critically assess your strengths and weaknesses as the starting point for the choice of direction and all the corresponding activities. It enables an enterprise to effectively focus attention on enhancing its strengths and eliminating or minimizing identified shortcomings. Just identifying the nature of the problem and focusing attention on change is a basic prerequisite for success (Pavic et al., 2007; Cohen and Georgilla, 2006).

The development of an information society and the constant expansion of information and communication technologies provide an opportunity to learn and acquire new digital skills and competences that have become necessary for employment, education and training, personal development and social engagement (Šilerová et al., 2015; Šimek et al., 2008). As society becomes more and more a knowledge-based society, it also changes the content of what people need to learn and know. ICT changes the way people work, learn and improve their skills. This process also affects managers of organizations and businesses. It is more than necessary to realize the importance of learning in this area, which is often overlooked. Only then will they be able to meet the requirements of their ICT skills and flexibly respond to the changes brought about by this digital era (Fink and Disterer, 2006).

Boyasitz (1982) defines IT managners' knowledge as "specialized knowledge, a useful set of facts and relevant concepts for a particular job position". Based on this definition, Bassellier et al. (2001) identified three main areas of knowledge that managers should have in order to be able to use ICT in their own benefit and at the same time for the benefit of the organization as such:

- Have the latest information and overview of current ICT activities and opportunities.
- Understand the value and potential of IT.
- Know the potential as well as the current and future IT constraints while also seeing how the competing companies use IT (Dor and Elovici, 2016).

Several authors believe that the main goal of IT managers' knowledge is to enable managers to communicate effectively with IT staff. Many authors define interconnection as a stage in which IT missions, goals and plans support business mission, goals and plans through their mutual alignment. Managers are increasingly aware of the need to constantly flexibly reflect on the current needs of organizations, and naturally expand their horizons through lifelong learning. The issue of lifelong learning is not only about managers but it is an all-society phenomenon that is also anchored in the lifelong learning strategy and lifelong guidance as a tool for forming a knowledge society (Jarolímek and Vaněk, 2003; Stočes et al., 2016; Jones et al., 2003; Šilerová, et al., 2016; Stubna et al., 2014). The most effective way to increase the level of information literacy of the managers is their continuous education. However, learning brings with it barriers that arise from both the external and the internal environment. Barriers arise in an educated subject, a sending organization, an organization providing education, but also a state with its legal regulations. Barriers in the literal sense of the word mean obstacles. We define them as factors that prevent us from doing something, in our case education. The barriers faced by managers in their education are often related to their family situation, education, employment,

and last but not least their psychological condition.

Based on a study of foreign literature, we identified the following major barriers in the training of current ICT managers:

- Lack of time to learn.
- Lack of finance.
- The enterprise does not support education.
- Low education offer.
- Low quality of education.
- One-off, non-systemic.
- Unwilling access of a trainer.
- Fear.

The list is an aggregation of projections from leading forecasters such as the , personal observations and a good dose of guesswork. According the Johnson et al. (2010), the Top 10 Global trends in ICT and education of managers are:

1. Mobile Learning. New advances in hardware and software are making mobile smart phones indispensable tools. Just as cell phones have leapfrogged fixed line technology in the telecommunications industry, it is likely that mobile devices with internet access and computing capabilities will soon overtake personal computers as the information appliance of choice in the classroom.
2. Cloud computing. Applications are increasingly moving off of the stand alone desk top computer and increasingly onto server farms accessible through the Internet. The implications of this trend for education systems are huge; they will make cheaper information appliances available which do not require the processing power or size of the PC. The challenge will be providing the ubiquitous connectivity to access information sitting in the cloud.
3. One-to-One computing. The trend in classrooms around the world is to provide an information appliance to every learner and create learning environments that assume universal access to the technology. Whether the hardware involved is one laptop per child (OLPC), or - increasingly - a net computer, smart phone, or the re-emergence of the tablet, classrooms should prepare for the universal availability of personal learning devices.
4. Ubiquitous learning. With the emergence of increasingly robust connectivity infrastructure and cheaper computers, school systems around the world are developing the ability to provide learning opportunities to students "anytime, anywhere". This trend requires a rethinking of the traditional 40-minute lesson. In addition to hardware and Internet access, it requires the availability of virtual mentors or teachers, and/or opportunities for peer to peer and self-paced, deeper learning.
5. Gaming. A recent survey by the Pew Internet and American Life Project per the Horizon Report found that massively multiplayer and other online game experience is extremely common among young people and that games offer an opportunity for increased social interaction and civic engagement among youth. The phenomenal success of games with a focus on active participation, built in incentives and interaction suggests that current educational methods are not falling short and that educational games could more effectively attract the interest and attention of learners.
6. Personalized learning. Education systems are increasingly investigating the use of technology to better understand a student's knowledge base from prior learning and to tailor teaching to both address learning gaps as well as learning styles. This focus transforms a classroom from one that teaches to the middle to one that adjusts content and pedagogy based on individual student needs – both strong and weak.
7. Redefinition of learning spaces. The ordered classroom of 30 desks in rows of 5 may quickly become a relic of the industrial age as schools around the world are re-thinking the most appropriate learning environments to foster collaborative, cross-disciplinary, students centered learning. Concepts such as greater use of light, colors, circular tables, individual spaces for students and teachers, and smaller open learning spaces for project-based learning are increasingly emphasized.
8. Teacher-generated open content. OECD school systems are increasingly empowering teachers and networks of teachers to both identify and create the learning resources that they find most effective in the classroom. Many online texts allow teachers to edit, add to, or otherwise customize material for their

own purposes, so that their students receive a tailored copy that exactly suits the style and pace of the course. These resources in many cases complement the official textbook and may, in the years to come, supplant the textbook as the primary learning source for students. Such activities often challenge traditional notions of intellectual property and copyright.

9. Smart portfolio assessment. The collection, management, sorting, and retrieving of data related to learning will help teachers to better understand learning gaps and customize content and pedagogical approaches. Also, assessment is increasingly moving toward frequent formative assessments which lend itself to real-time data and less on high-pressure exams as the mark of excellence. Tools are increasingly available to students to gather their work together in a kind of online portfolio; whenever they add a tweet, blog post, or photo to any online service, it will appear in their personal portfolio which can be both peer and teacher assessed.
10. Teacher managers/mentors. The role of the teacher in the classroom is being transformed from that of the font of knowledge to an instructional manager helping to guide students through individualized learning pathways, identifying relevant learning resources, creating collaborative learning opportunities, and providing insight and support both during formal class time and outside of the designated 40-minute instruction period. This shift is easier said than done and ultimately the success or failure of technology projects in the classroom hinge on the human factor and the willingness of a teacher to step into unchartered territory.

These trends are expected to continue and to challenge many of the delivery models fundamental to formal education as it is practiced in most countries.

Material and methods

Data collection was processed in the form of a questionnaire in 2017. The sample of respondents consists of managers of three selected agro-sector organizations of Western Slovakia in the total number of 55. Of the total number of respondents, 71% were men and 29% were women. The questionnaire was made available to a company employee on a web site. Questionnaires were distributed electronically to employees of the company in order to create feedback and to gather respondents' views on the forms of education that the company provides for their personal development. We also tried to save time by means of a questionnaire that was not required to be written but was available in electronic form. The questionnaire was based on collected information about the problem. The questionnaire consists of two parts, where the first part contains questions aimed at identifying and categorizing the respondents. The second, research part, gives respondents the opportunity to comment on the learning opportunities that are provided to them or which they themselves use. The questionnaire contains a total of 20 questions and its output is a view of the satisfaction of the employees of the company with its training program. The questionnaire uses two types of questions. The first type is a closed question with a four-level scale to measure the degree of satisfaction with a particular area of the education system. The second type is semi-closed questions that reveal the gaps in educational programs through the opinions of the respondents. We also added an open-answer option to some questions in order not to limit creativity responses. When creating a barrier list, we learned from several literary sources of domestic and foreign authors. The basic and also the starting point was the analysis of available resources dealing with this issue, especially research conducted abroad.

Several statistical methods have been used for the statistical evaluation. Verification of dependencies between the trait was carried out by use of chi-square test (χ^2), respectively. (χ^2) - square contingency. For the statistical analysis where the Chí-square test of independence could not be used, the Fisher's exact test was applied because the assumption numbers of cells in the pivot table was not followed. Fisher's exact test derives from the pivot table and verifies the null hypothesis of equality of the two units, namely the independence of two binary variables. This test is based on the assumption that all marginal frequencies (totals rows / columns) in the pivot table are fixed. This assumption is rarely met. They are mainly fixed in line frequency or in only the total frequency. If using the parametric methods was not possible because of failure in meeting the preconditions for their use, we applied nonparametric methods. Kruskal-Wallis H test is an extension of the Mann-

Whitney test for three or more samples. The aim of the test was to find out whether the differences found in the sample medians of each group (according to the level factor) are statistically significant (between variables, the relationship) or could not be random (between variables, the relationship). The null hypotheses concerning equality of all medians was tested. If the P-value is lower than the chosen significance level (0.05), the null hypothesis is rejected. This means that the difference between at least one pair of median values calculated from the sample is too large, it can only be the result of random selection. Therefore, it is statistically significant – there is the relationship between the variables. If the P-value equals to or is greater than the chosen significance level, the null hypothesis cannot be rejected. This means that the difference between each pair of medians calculated from the sample can only be the result of random selection, therefore, not statistically significant – there is not the relationship between variables. The questionnaire survey was evaluated with statistical methods for the detection of relevance and relations of the data collected to confirm or refute the hypothesis of statistical indicators. A total number of hypotheses were chosen two for this article:

Hypothesis 1: The use of ICT technology and interest of education in the area of ICT partially depends on the manager s age.

Hypothesis 2: The education in the area of ICT depends on the employee attitute and does not depend on the gender.

Results and discussion

All respondents agreed on the fact that education and staff development really affect the competitiveness of society. Almost 43% of surveyed managers consider development to be a key factor. The remaining 57% of managers are of the opinion that education and development are more likely to affect competitiveness. Up to 77% of surveyed managers are dissatisfied with the education and development opportunities provided by the employer in their company. Of this, 69% of managers are rather dissatisfied. Rather satisfied is 23% of managers. Absolutely dissatisfied with the learning opportunities provided is 8%, and no single manager is satisfied. The most common goal for managers in the field of education that is 45% is willingness to acquire new knowledge and skills. Ability to adopt new work processes is 25% of the managers asked. The same number is to overcome difficult obstacles. Only 7% of managers are satisfied with career growth opportunities and talent development in the organization. Enough support from the organization has 57% and insufficient 43% of managers. The manager lacks a number of areas of day-to-day activities, which the employer has no ambition to deal with. This may then be seen in a higher error rate when performing work tasks or a longer time frame within which managers are required to complete their work.

After quantifying the significance of individual barriers by gender, we tested the statistically significant gender impact on individual barriers. Most data were normally divided by $p > 0.05$. Statistical significance was tested using a parametric T-test. The statistically significant influence of gender was confirmed in the disability barrier, the non-systematic $p = 0.028$. The statistical significance was confirmed in the barrier of lack of quality education $p = 0.015$. After analyzing the significance of individual barriers according to the age group, we tested the statistical significance of the influence of age groups on individual barriers, at the level of significance $\alpha = 0.05$. Most data matched the normal data distribution condition $p > 0.05$. We then used the Anova method to test the normally distributed data. The statistically significant impact of the age group was confirmed by the lack of quality education $p = 0.0312$ and the lack of funding on the company side $p = 0.028$. The impact of the age group on perceptions was tested by a Kruskal-Wallis nonparametric test.

The most significant barrier that the managers consider is the lack of time to learn outside of work. The second most important barrier is the lack of time to learn alongside other activities at work. The third most significant barrier is the lack of funding for education on the part of respondents. As the least significant barrier was the fear. The vast majority of 99% managers use e-mail or computer network at work. Desktop is used by 21% of respondents, while 79% of managers use the laptop at work. The managers use videoconferencing systems especially when communicating with remote clients from abroad. Videoconferencing systems allow managers to share information with other countries in real time, without having to leave. This type of information and communication technology (ICT) is used by only 11% of managers. Out of smart mobile devices, managers use a smartphone that is used by 64% of respondents, while only 16% of respondents use the tablet. The share

of respondents who adapt and learn to control information and communication technologies is 77%. The remaining 23% were managers who learned to control information and communication technologies with difficulties. The biggest problems for managers when working with ICT is setting the specific user settings for the application, as well as switching to higher versions of applications where user interfaces do not coincide with previous versions. Up to 73% of managers have this option.

The hypothesis that the interest in ICT education depends on the age of the manager has not been confirmed. Managers declared interest in ICT education in all age categories. As a reason they said they needed to be constantly educated in ICT and their main interest were about advanced MS Excel and information systems - business modules. The hypothesis that ICT education depends on the attitude of the employee and does not depend on gender has been confirmed. ICT education has been of great interest to both men and women. Men more preferred foreign language education, English or German. Women would prefer ICT education in their native language.

Only 12% of respondents have a problem downloading and sending files, 4% searching for information and services on the Internet and using e-services. Using e-mail, using common applications and controlling their smartphone, tablet does not cause problems to any of the respondents. 44% of the respondents are trained. Their share is smaller than the proportion of managers who do not attend the training that is 56%. This has two reasons. The first is busyness and overloading of managers. In addition to their time-consuming activities and tasks at work, there is no time to further develop their skills and abilities. The second reason is the number of first-level and middle managers who often use standard office applications such as the Microsoft Office suite for their work. The management often does not feel the need to further educate their managers in ICT because they feel that the knowledge gained would not be used in their work and the company's investment in their education would not return. Up to 74% of respondents educate themselves in their free time. As a result, managers who do not have the opportunity to develop in their work are in fact interested in further development. For the reasons outlined above, however, this education and training goes beyond working hours. As a result of the previous question, up to 92% of managers said that education was done in the form of self-education (Table 1).

Barriers in the training ICT	Mean	Standard deviation
Lack of time to learn	5.02	1.12
Lack of finance	4.85	0.93
The entreprise does not support education	4.33	1.25
Low education offer	4.71	1.16
Low quality of education	3.63	1.02
One – off, non - systemic	3.56	1.41
Unwilling access of a trainer	3.31	1.30
Fear	1.56	1.10

Source: own research and processing

Table 1: The importance of barriers to male managers.

In the following paragraph on the basis of SWOT analysis the conclusion of the most important knowledge of educational system in chosen organizations will be presented. They will be divided into three groups. The group of strenghts, weaknesses, opportunities in the trainings the surveyed organizations shown in the following Tables 2, 3, 4.

Strenghts
Training of new employees
Topics of education
Low costs of the proces of education with the use of spreading knowledge and learning in action

Source: own research and processing

Table 2: SWOT strengths of trainings in the chosen organizations.

Weaknesses
Lack of trainings focused on improvement in the area of ICT
One – off, non - systemic
Absence of coaches in ICT
Too much one – sided lectures

Source: own research and processing

Table 3: SWOT weaknesses of trainings in the chosen organizations.

Opportunities
To increase the expenditures focused on the training in the area of ICT
To organize the trainings of ICT in the foreign language
Better time – planning of the trainings
Introduce a separate educational portal for managers in a particular enterprise with learning materials - elearning

Source: own research and processing

Table 4: SWOT opportunities of trainings in the chosen organizations.

For the purpose of the article, it is not necessary to analyze the factors threatening the company's education system, which should be the last part of each SWOT analysis.

Conclusion

When asked whether managers have some experience with ICT education, 88% already had ICT education. 12% of respondents did not take management training. Among the three most used areas, respondents included advanced MS excel for managers, Visual basic for application. As to the extent to which graduates of ICT education apply the acquired knowledge and skills in the performance of the work and how much the managers estimate the application of the acquired knowledge from this education in practice, respondents averaged 60%. The opinion on the most effective form of education was 51% soft skills education, 23% coaching and almost 27% mentoring. As previously mentioned in our survey it did not confirm the hypothesis that the interest in ICT education depends on the age. Our survey shows that managers of all ages need to use modern digital technologies to maintain the high efficiency and quality of their work.

Information technology has become one of the most important factors in the development of the economy. Using the IT technology helps getting quality and timely information for the success of both large and small organizations. Obtaining knowledge in the field of information and communication technologies has become a necessary condition for the success of managers in all areas of economic activity. Education is a demanding and lengthy process that lasts certain time and the personal attitudes of the trainees. These factors can not be circumvented or omitted. Therefore, it is important to highlight the value of education and possible future benefits for the person concerned. Only 17.1% of ICT training is outside the routine office space. This involves self-learning or knowledge transfer or action learning. The effectiveness of these methods is mainly time saving, but the company should consider the amount of external training where employees would come into contact with other managers from other companies and bring new ideas, suggestions and insights into society, find out how similar situations are addressed in other companies. The fact that foreign languages is an indispensable part of the everyday work of each employee is not clear why it is not done more or more systematically in this direction using some of the new educational methods. Improving the presentation, argumentative knowledge in foreign language communication can be a valuable asset. Our survey was aimed at identifying barriers in the education of ICT managers. An interesting finding is that in the last place and as the smallest barrier the respondents chose the fear of education.

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References

[1] Adeosun, O. O., Adeosun, T. H. and Adetunde, I. A. (2009) "Strategic application of information and communication technology for effective service delivery in banking industry", *Journal of Social Sciences*, Vol. 5, No. 1, pp. 47-51. ISSN 0362-3319.

[2] Bresnahan, T., Brynjolfsson, E. and Hitt, L. M. (2002) "Information technology workplace organisation and demand for skilled labour: firm level evidence", *Quarterly Journal of Economics*, Vol. 117, No. 1, pp. 339-76. ISSN 0033-5533.

[3] Cohen, S. and Georgilla, R. (2006) "E-Commerce Investments from an SME perspective: Costs, Benefits and Processes", *The Electronic Journal Information Systems Evaluation*, Vol. 9, No. 2, pp. 45 - 56. ISSN 1566-6379.

[4] Dor, D. and Elovici, Y. (2016) "A model of the information security investment decision-making process", *Computers & Security*, November 2016, Vol. 63, pp. 1-13. ISSN 0167-4048.

[5] Erumban, A. A. and Jong, S. B. (2006) "Cross-country differences in ICT adoption: A consequence of Culture?", *Journal of World Business*, Vol. 41, No. 4, pp. 302-314. ISSN 1090-9516.

[6] Fink, D. and Disterer, G. (2006) "International case studies: to what extent is ICT infused into the operations of SMEs", *Journal of Enterprise Information*, Vol. 19, No. 7, pp. 608-624. ISSN 1741-0398.

[7] Fulantelli, G. and Allegra, M. (2003) "Small company attitude towards ICT based solutions: Some key-elements to improve it", *Educational Technology and Society*, Vol. 6, No. 1. ISSN 1436-4522.

[8] Hennyeyová, K. and Depeš, P. (2010) "Analysis of the exploitation of information and communication technologies in the agri-food sector companies", *Agricultural Economics*, Vol. 56, Vol. 9, pp. 403-408. ISSN 0139-570.

[9] Hennyeyová, K., Tóthová, D. and Hamášová, K. (2013) "Actual situation of risk analysis in enterprises of agrosector in Slovakia", 8*th International Conference on Applied Business Research* (ICABR). Brno, pp. 238-244. ISBN 978-0-620-55419-0.

[10] Jarolímek, J. and Vaněk, J. (2003) "The intensity and quality of Internet usage in the agriculture sector and possibilities of its further development", *Plant, Soil and Environment*, Vol. 49, No. 11, November 2003, pp. 525-529. ISSN 1214-1178.

[11] Johnson, L., Levine, A., Smith, R. and Stone, S. (2010) "The Horizon Report – 2010 Edition", Austin, Texas: The New Media Consortium. [Online]. Available: http://files.eric.ed.gov/fulltext/ED510220.pdf [Accessed: 19 Oct 2017].

[12] Jones, P., Beynon-Davies, P. and Muir, E. (2003) "E-business barriers to growth within the SME sector", Journal of Systems and Information Technology, Vol. 7, No. 2, pp. 1 – 25. ISSN 1328-7265.

[13] Ongori, H. (2009) "Role of information communication technologies adoption in SMES: evidence from Botswana", *Research Journal of Information Technology*, Vol. 1, No. 2, pp. 79-85. ISSN 18157432.

[14] Ongori, H. and Migiro, S. O. (2010) "Information and Communication technology adoption: a literature review", *Journal of Chinese Entrepreneurship*, Vol. 2, No. 1, pp. 93-104. ISSN 1756-1396.

[15] Pavic, S., Koh, S. C. L. Simpson., M. and Padmore, J. (2007) "Could e-business create a competitive advantage in UK SMEs?", *Benchmarking: An International Journal*, Vol. 14, No. 3. pp. 320-351. ISSN 1463-5771.

[16] Stočes, M., Vaněk, J., Masner, J. and Pavlík, J. (2016) "Internet of Things (IoT) in Agriculture - Selected Aspects", *AGRIS on-line Papers in Economics and Informatics*, Vol. 8, No. 1, pp. 83 - 88. ISSN 1804-1930. DOI 10.7160/aol.2016.080108.

[17] Stubna, J., Hostovecky, M. and Tothova, D. (2014) "Documentary Movies as a Motivation in Science Subjects", 1*2th IEEE International Conference on Emerging eLearning Technologies and Applications* (ICETA), Slovakia, pp. 169-174. ISBN 978-1-4799-7740-6.

[18] Šilerová, E., Hennyeyová, K., Vogeltanzova, T. and Junek, P. (2015) "ICT Influence on Supporting Agribusiness Development", *Scientific Conference on Agrarian Perspectives - Global and European Challenges for Food Production, Agribusiness and the Rural Economy*, Sep 16-18, 2015, Prague: Czech University of Life Sciences Prague, pp. 425-432. ISBN 978-80-213-2581-4.

[19] Šilerová, E., Pechrová, M. and Hennyeyová, K. (2016) "Utilization of cloud computing in Agricultural Holdings", *Scientific Conference on Agrarian Perspectives - Global and European Challenges for Food Production, Agribusiness and the Rural Economy*, Sep 14-16, 2016, Prague: Czech University of Life Sciences Prague, pp. 358-364. ISSN 2464-4781.

[20] Šimek, P., Vaněk, J. and Jarolímek, J. (2008) "Information and communication technologies and multifunctional agri-food systems in the Czech Republic", *Plant, Soil and Environment*, Vol. 54, No. 12, December 2008, pp. 547-551. ISSN 1214-1178.