Competences of the future as an impulse for innovation in the management of smart organizations

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Abstract
During the times of another revolution started by the omnipresence of the Internet and in the face of new technological challenges faced by companies, i.e. work automation and Internet of Things, businesses cannot remain idle. Changes in the available technologies have a substantial influence on the way of working in an organization and the way of managing knowledge and resources necessary to create and implement innovation which is one of the key elements for building competitive advantage. Next to knowledge, the basis for innovative activities in businesses is formed by skills of the employees which in an smart organization are used in a way which enables continuous expansion of the possibilities of creating the future of the organization.

It is the purpose of the article to demonstrate the demand for competences of the future which affect innovativeness in learning organizations. The article presents the core of innovation and automation as well as the role of competences of the future in the management of learning organizations. Its further part presents results of own studies in the form of a map of competences of the future in production companies on the basis of an analysis of data on demand for skills, individual interviews with mid and higher level representatives, a survey and a group in-depth interview with several dozen biggest employers from Wielkopolska Region.

Key words: innovation, competences of the future, smart organization, learning organization

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1 Introduction
Due to the widespread accessibility of data and information, changes in the management of resources are happening in the economy. Revolutions which at first were connected with steam machines, then with mass production with the use of electricity and automation of production and currently factories with cyber-physical production systems which replace people are changing the way businesses function and the hierarchy of the importance of their resources. Still in the 20th century, the economy was mainly based on machines, commodities, work and energy as business assets necessary to generate goods (Begg et al., 2007; Renzi et al., 2011). At the turn of the 20th and 21st centuries, P. Drucker (1999, p. 149) claimed that “gradually, the profit coming from traditional resources, i.e. work, land and capital, becomes ever lower. Information and knowledge are the only or at least the main producer of wealth”. In the era of a knowledge-based economy, the core of businesses in the creation of value is based on the difficult to measure and economically intangible resources such as human resource, accounting, economic value added, the balanced scorecard or intellectual capital (Bontis et al., 1999; Kunasz, 2006) which are often present in the
form of intangible products. In literature, there are even instances of division of intangible resources into assets and skills (Hall, 1992, p. 136).

The thesis that the scope of effects (profits) generated by the company depends on companies’ variety with respect to their resources and skills is one of the basic assumptions of the resource-based approach. Learning is a source of creation and competition (Mikołajczyk, 2016, p. 14) for every business (Keung, 2013). Currently, in the time of a knowledge-based economy (Makhmutov et al. 2016), basing on the Resource-Based View of the Firm (RVB) it is being proved that contemporary businesses build their competitive advantage in particular on intangible resources, i.e. knowledge, skills and experience (Lado and Wilson, 1994) which make it possible for them to offer their customers a unique value bundle (Kunasz, 2006, p. 39-40). The model published in 1999 by J.A. Johannessen, B. Olsen and J. Olaisen (Johannessen et al., 1999) shows that a clearly defined vision of a business provides guidelines for specifying the areas of knowledge which need to be developed in order to support innovation.

Due to technological changes in the current world, interactive learning, development of knowledge and skills, integration of knowledge and experience gain key importance (Fruin, 1997; Stewart, 1997). Information technologies, including first and foremost solutions in the area of IT systems, gain fundamental importance also in relation to innovations. Machine Learning (ML), including Data Mining, Machine Vision, Computational Statistics and other sub-fields of Artificial Intelligence (AI), in which efforts are explicitly dedicated to the development of algorithms allow cognitive tasks to be automated. The use of new technologies can be successfully used in recruitment and improvement of departments which deal with human resources (Frey and Osborne, 2017). Big data analyses also enable more in-depth analyses and forecasting the demand for student skills and their professional profiles so that to adjust their skills to their first job after graduation.

Going beyond the area of information technology, virtual companies create new business ideas and generate omnipresent demand for incessant innovation. “New product, process, and distribution technologies provide powerful levers for creating competitive value” (Nadler 1999; Meyerding, 2016). Research shows that information systems have a positive influence on corporate innovation, in particular by supporting specialist knowledge in relation to innovation (Bardhan et al. 2013; Joshi et al. 2010; Kane and Alavi 2007; Pavlou and El Sawy 2006) as well as knowledge which comes from the outside (Trantopoulus et al., 2017).

Research proves that innovation management is pointed out to as one of the three most important issues in a business (King and Anderson, 1992). Building competitive advantage and creating new values for the customers might become a value in companies which are created on the basis of knowledge and skills of their employees.

The first part of the article presents a review of literature with respect to technological changes which influence development of skills in employees and their influence on the competences of the future in the context of a learning organization. Its further part presents the results of studies on the demand for skills on the basis of own studies.
2 Research results
2.1 Research methods
The map of competences of the future was developed on the basis of 4 research stages. The first one was based on quantity studies and concerned an analysis of data developed in IT tool system.zawodowcy.org which had been designed and implemented by the Poznań University of Technology team. The concept of the IT tool as well as the whole system was created at the Poznań University of Technology in the years 2009-2012 as part of innovative project. It was the objective of the project to identify the needs of the Wielkopolska labour market with the use of an IT tool which makes it possible to collect information about competence-related needs and make it available to businesses, schools, students and other entities which might be interested in competences on the labour market in Wielkopolska.

The second stage of the studies was based on quality research and included individual interviews in key production companies located in separate districts of Wielkopolska. The choice of the sample at this stage was non-probabilistic, purposeful (arbitrary) and did not require representativeness of the study since it strived at identifying the problems and facts connected with competences on the Wielkopolska labour market. The individual interviews were conducted between March and October 2016 with 74 people from 40 key businesses which employ at least 150 people (the average personnel in the studied companies being over 600 people), seated in one of the 19 districts of Wielkopolska (overall number of districts in Wielkopolska: 31) and 3 towns with district rights (overall number of towns with district rights in Wielkopolska: 4).

The following stages of the study, i.e. stage 3 and 4 were closely connected. They involved mid and high level employees of the organizational structure of the business in charge of vocational education and/or human resources who at the same time understand the problem of process automation and changes in relation to required competences on the labour market. Stage 4 - the group in-depth interview was carried out on 17 November 2016. It was attended by 9 out of 10 companies which took part in stage 3 studies. In total, the group in-depth interview was attended by 17 people from the mid and high level in the organizational structure of the businesses. The entrepreneurs represented companies which employ 150 to 6900 staff (the average number of employees in the company being 1450). The results of the studies made it possible to demonstrate the demand for competences of the future which affect innovativeness in learning organizations.

2.2 Results of stage 1 studies – system.zawodowcy.org
Stage 1 was carried out on the basis of data from the authors’ IT tool system.zawodowcy.org which enables exchange of information about competence-related needs. Figure 1 presents six selected skills which are part of personal and social competences - results of stage 1 studies. It is a group of skills searched for by employers, regardless of the sector they represent or the size of the business. Moreover, the chart presents the level of command of a given skill expected by the employers - the relatively low level of command of given skills might be a topic for a debate, however it must be remembered that the analyzed offers were addressed to students and graduates of upper-secondary vocational schools (the Millennials generation).
2.3 Results of stage 2 studies – individual interviews in businesses

On the basis of the results of the quality studies carried out in stage two, i.e. individual interviews in 40 businesses, the authors created a diamond of key challenges connected with the current situation on the Wielkopolska labour market and needs indicated by entrepreneurs from the region which, if implemented in Wielkopolska, could contribute to solving selected employment problems and keeping young employees in the company. The results of that analysis in the form of a “diamond of challenges and needs” of entrepreneurs from Wielkopolska have been presented on Figure 2.

Finding a skilled worker is one of the key and most frequent problems in businesses. However, young employees do not lack in skills and competences alone. The “I want to” attitude is also rare but required by entrepreneurs. Young people’s high demands in relation to the skills and competences they offer are another important challenge faced by businesses. Therefore, there is the need to redefine currently existing motivational systems in the company and create new ones which would function efficiently in a knowledge-based economy, especially in the aspect of new generation Y’s functioning on the labour market. There is also the necessity to get to know the needs and motivations of young workers so that they could be effectively encouraged to work and stay in the company. The list of all the challenges and needs indicated by employers has been presented on Figure 2.
2.4 Results of stage 3 studies – survey questionnaire

The conclusions from stage 1 and 2 were forwarded to selected companies which were willing to cooperate and discuss the demand for future competences. Stage 3 and 4 were case studies on the example of 10 selected businesses. Stage 3 included survey studies with the goal of finding an answer to issues connected with innovativeness and the resultant required competences of the future which will be necessary to follow the business’ strategy. On the basis of those results it was concluded that:

- 80% of the businesses employ workers whose departure might cause an outflow of knowledge and consequently no possibilities of developing the company robustly,
- 70% of production companies claim that technical competences are not more important than social competences (e.g. communicativeness, negotiations, team management) to innovativeness of the organization,
- 100% of the businesses claim that a goal which is clearly defined by the company encourages employees to learn,
- 100% of the companies claim that the company’s cooperation with a university is necessary in the area of innovativeness,
- 100% of the companies plan to implement process innovations in the nearest future, 90% want to implement organizational innovations and 70% plan to introduce product innovations,
- 70% of the employees improve their skills during courses or trainings at least once a quarter.
- 70% of companies which took part in the study can see the influence of automation on the volume of employment in the company and the same number of them plan to implement process automation in their organizations.
2.5 Results of stage 4 studies – the map of competences of the future

The last stage of the studies focused on creating a map of competences of the future during the in-depth group interview. The results of that part of the studies have been presented on Figure 3. The Figure presents currently required competences as specified by the employers, those to be required in a relatively short-period, i.e. 1-6 years and those to be required in a more distant future (6-12 years). Each competence was given importance assuming that 1 means a competence which is useful to a very minor degree and 6 means a necessary competence.

The analysis of the data leads to the following conclusions as to the opinions of the studied businesses:
1. The need for analytical skills with respect to data analysis, 3D designing or interdisciplinarity will be growing.
2. The role of social competences and soft skills will also be increasing in the future. They include emotional intelligence, group management, creativity or prioritization.
3. New skills will also appear. They include driving flying vehicles (e.g. drones) as well as teleportation.
4. Technical knowledge and the “I want to” attitude will still be required at a similar level.
5. Due to automation and access to new technologies, the demand for employee mobility will decrease in favor of remote work and the ability to work in virtual teams.

Sometimes, representatives of the companies understood the notion of skills in very wide terms, including phenomena which are not skills into that category. Teleportation might be an example. It was listed as a skill when in fact it is not a skill. Some of the predictions of the employees of the studied companies might be debatable. Teleportation might be useful in 12 years but will it be possible?
3 Conclusion
Scientific literature more and more often encompasses the issue of competences of the future in reference to planning organizational activities (Davies et.al., 2011; World Economic Forum, 2016; UK Commission for Employment and Skills, 2014). However, so far no studies pointing out to the demand for given competences in relation to two changeables, i.e. time and importance of competences, have been offered. According to the analyses of data from system.zawodowcy.org, on the basis of individual interviews in businesses as well as surveys and the group interview, it can be concluded that employers are looking for intangible resources, which also include soft skills. They are important from the point of view of the businesses and their role will grow with each year (Bodell, 2014).

Modern communication technologies, social media such as Facebook or Twitter are very popular among young members of the society (Pellegrino and Hilton, 2012) and will be driving out the necessity of talking in person (Meister and Willyerd, 2010) as it can be seen already now. The lack of effectively functioning communication between the business and its employees might become one of the causes of the challenges faced by businesses (stage 2 of the studies) and thus the lack of correctly functioning motivational systems for young generation staff. On the one hand, there is the need to get to know the needs of generation Y members (stage 2 of the studies; Myers and Sadaghiani, 2010), and on the other hand to try and make the incentive systems existing in the business more flexible (stage 2 of the studies; Meister et. al., 2010).

Based on the studies and individual interviews in the businesses, it can be noticed that learning organizations have a big desire to learn from one another. They have the desire and the willingness to share their problems and attempt to jointly find systemic solutions which could be implemented
in the region. Referring to stage 3 studies - a clearly defined goal of the organization can directly contribute to learning of the employees and thus the organization as well. It also helps in solving the challenges faced by businesses in a turbulent environment. When businesses have proper intangible resources which in the era of a knowledge-based economy are necessary to complete tasks and reach objectives they can be more effective in ideation of innovative ideas, their completion and implementation and consequently they can improve their competitiveness on the regional as well as the global market.

Incentive systems should take into account the needs of the employees of the company as well as the desire to develop, particularly on the part of workers representing the Millenial generation, paying attention to the company’s future demand for intangible resources such as competences of the future. The results of stage 4 studies of businesses from Wielkopolska confirm earlier analyses in the area of competences of the future and develop them a little bit. The key competences of the future include: analysis of data and drawing conclusions from them, remote work and creative problem solving (stage 4 of the studies, Davies, 2011; UK Commission of Employment and Skills, 2014; Meister, 2010). As an important element, entrepreneurs from Wielkopolska have also added the “I want to - I am committed, I will gladly join the work” attitude, i.e. the proactive approach of an employee who wants to develop their skills, face new challenges and cooperate in a team.

The work achieved the objective of the study, i.e. indication of the demand for competences of the future which influence innovativeness in learning organizations. The presented results of the studies can be used in the practical area of businesses as proactive activities of the staff which enable improvement of their knowledge and skills and thus learning of the whole organization and then as a stimulation for creating innovations improving the competitiveness of businesses on the market. Implementation of the results of the studies can be used to design training systems which can also be treated as preventive activities of the business minimizing the lack of access to intangible resources in the future. On the one hand, they are a multiyear effect of work connected with studying businesses’ demand for skills and competences looked for by employers and the competence potential of the employees and on the other hand they point out to many aspects which create the development of company management. Systemic solutions which support studies of the labour market, stimulation of new solutions, analysis of links between development of the organization (including smart organizations in particular), competitiveness and human resources management constitute one of the key factors for development and effective reaching of objectives in separate institutions as well as the whole economy.

References


