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Competitiveness of Polish enterprises in relation to the potential of cloud computing

Polish enterprises struggle with a growing number of barriers in their closer or further environment, determining the potential and the rate of their development. The possibility to compete – locally (at the national level), regionally (within the EU), as well as internationally or globally – due to the number of entities from the SME sector, in the cumulative approach, becomes a problem of a macroeconomic nature.

While the external barriers conditioning the scope of development of enterprises, and the world trends in the directions of development are similar or even the same to all entities, those that skilfully construct their own business models have the best chances not only to survive in the difficult times, but also, or even primarily, to effectively compete on the international market. Because, according to the approach that not the strongest but those who are able to easily adapt to changing conditions will survive, the selection of the resources allowing for flexibility and adaptability of the enterprise determines the potential for the development of its competitiveness, also in the context of increasing of the level of innovation.

The solution that allows for achieving such a result is the application of the *cloud computing* model, which is still a relatively new concept of organisation management among the Polish business entities. The purpose of this elaboration is to indicate

the potential of the role of cloud computing in supporting the achievement of competitiveness of Polish enterprises. This will be accomplished by reviewing literature and current market studies, which in the first part of this elaboration are associated only with the essence of the concept of competitiveness, and the issues of competitiveness of Polish enterprises. The second part is focused on the analysis of the role of cloud computing, and determination of the scope of influence of its properties on the possibility to balance the barriers which determine the level of competitiveness of Polish enterprises. The work is conceptual, showing the possible areas of influence of the two phenomena of initially independent meaning and co-existence.

Innovativeness of Poland in relation to other EU countries

Essential definitions of competitiveness include understanding of this concept as [Śliwiński, 2012, p. 34]:

- the ability of an enterprise to generate sustainable growth in the long term and the endeavour to maintain and increase market shares;
- finding of a privileged position in the industry, which would be beneficial to other competitive forces in the industry;
- the ability to build major skills that generate new products which are better than those of the competitors, at a lower cost and faster than the competitors;

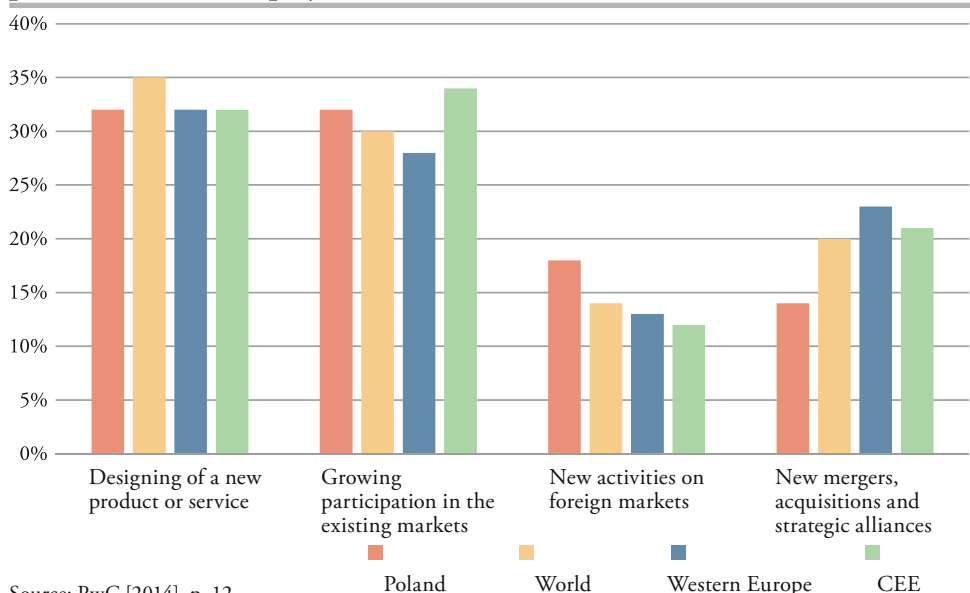
- the ability to design, manufacture and sell goods, which prices, quality and other features are more attractive from the respective features of the goods offered by competitors;
- the ability to efficiently pursue its goals on the market arena of competition;
- the ability to act and survive in a competitive environment;
- the ability to compete by providing, configuring, and using resources.

To sum up, the competitiveness in the broader sense can be understood as the ability to build a sustainable (long-term) advantage, which distinguishes the enterprise from the remaining enterprises in a given branch. As a result of this advantage, the enterprise achieves higher profits than its competitors. The current conditions in the functioning of enterprises dictate a kind of mobilisation of operational activities. Consequently – a larger autonomy of the units at the operating level and the need to build business models in a modular way. This facilitates the adaptability of the organisation to new conditions, and supports its flexibility towards the emerging opportunities, or even gives them the chance to anticipate or create them. Thus,

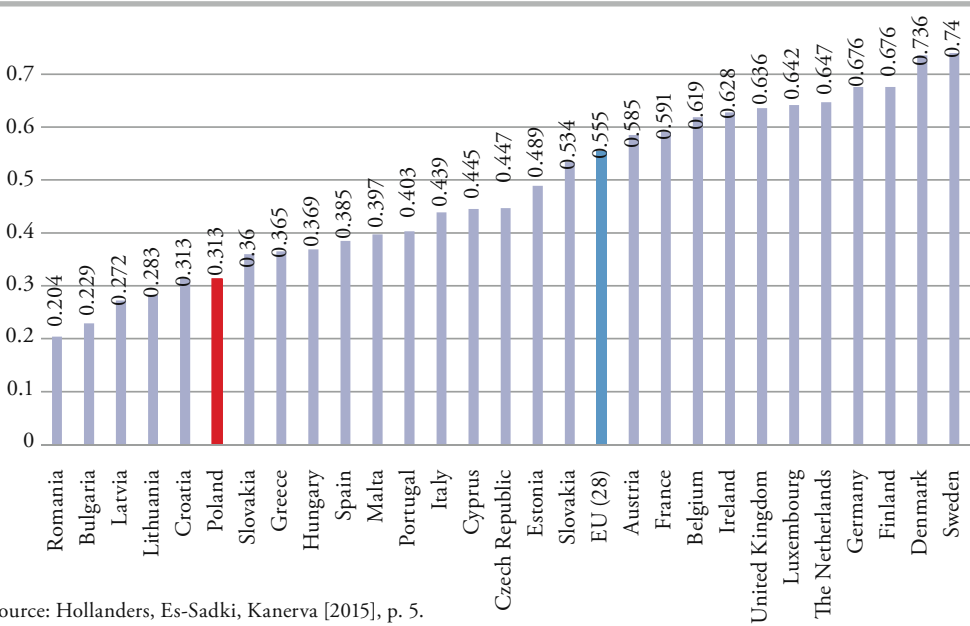
the new conditions for conducting business activities force enterprises to consider the rules applied so far and to try to think in a different way. Such a way can be, for example, a new strategic thinking aiming at the following processes – preparing of the organisation to changes in the systematically created innovation which is destructive to old solutions in the organisation, cooperating of business in the network, or building manifold business models in one organisation [Poniatowska-Jaksch, 2015].

The context of the above assumptions is worth to be considered in reference to the reality of economic circumstances, opportunities that occur, and activities of enterprises undertaken in relation to these circumstances. When analysing the directions and opportunities for the development of enterprises, both in Poland and in the entire world, the largest part of the respondents of the PwC CEO Survey 2014 (approximately 30 percent) searches for them mostly in continuation of the organic growth on the present markets and in innovation [PwC, 2014]. But the prospects for the development on the existing markets are viewed with more confidence by the managers in Poland and in other

Figure 1 **Percentage of respondents seeing the opportunities for development in particular initiatives/projects**



Source: PwC [2014], p. 12.

Figure 2 Innovation capacity of 28 EU countries

Source: Hollanders, Es-Sadki, Kanerva [2015], p. 5.

countries of the Central and Eastern Europe (CEE) compared with the remaining respondents.

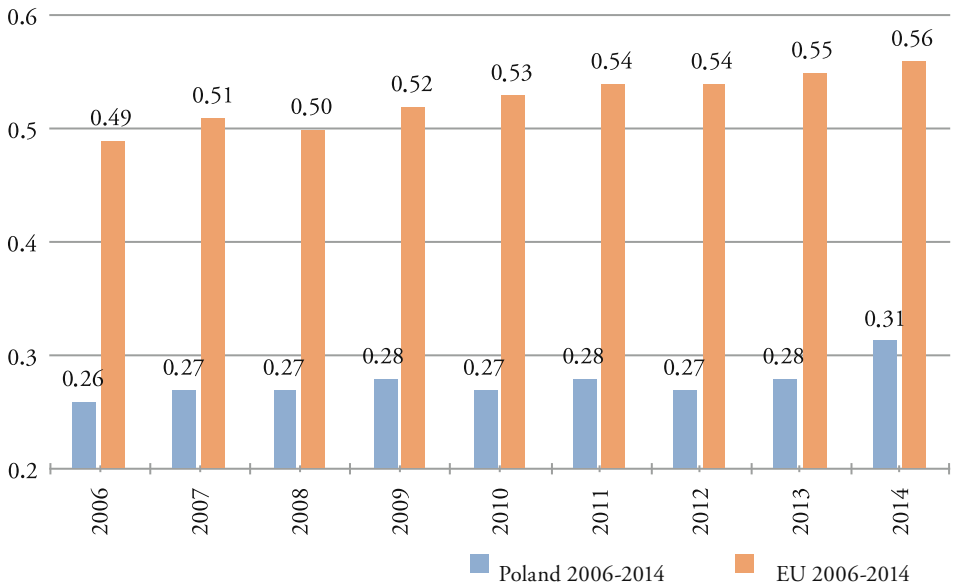
One-third of the surveyed in Poland sees the major development opportunity in innovations (in 2013, this percentage was only 12 percent). Additionally, almost 20 percent of the surveyed Polish companies see development opportunities in new markets, whereas the average world result is 14 percent, and the result for CEE is 12 percent. This result in the case of Poland is also higher than in 2013, when the percentage of Polish managers interested in new foreign markets was 12 percent. On the other hand, Polish managers see slightly fewer opportunities than the world average in the possibility to initiate new mergers and acquisitions. The results of the survey are presented in Figure 1.

At the same time, when exploring the essence of innovation, according to the report *Innovation Union Scoreboard 2015 (IUS)*, Poland found itself among the countries with moderate innovation, reaching the synthetic innovation index of the level of 0.313, i.e. moderate innovators, ahead of Romania (0.204), Bulgaria (0.229), Latvia (0.272) and Lithuania

(0.283) [H. Hollanders, N. Es-Sadki, M. Kanerva, 2015]. In comparison with the result of the previous year, Poland remained in the group of moderate innovators, and additionally moved one place higher, surpassing Lithuania. In the general classification, Sweden maintained the position of the leader. The countries belonging to the fastest developing innovators include: Malta, Latvia and Bulgaria, Ireland, the United Kingdom and Poland. The innovation capacity of the European Union (EU) countries is presented in Figure 2.

The summary innovation index for Poland is 56.4 percent of the average index for the EU countries, which resulted in maintaining the position among the moderate innovators (this group includes countries reaching from 50 to 90 percent of the value of the average index for all countries). The improvement in comparison to the data from the previous IUS report is also noticeable, when the summary innovation index of Poland was 50.4 percent of the average index for 28 EU countries (in the previous years, this index was, respectively: 49 percent (2012), 53 percent (2011), 51 percent (2010), 53 percent (2009 and 2008). The summary indices

Figure 3 Summary innovation index for Poland and the EU in the years 2006-2014



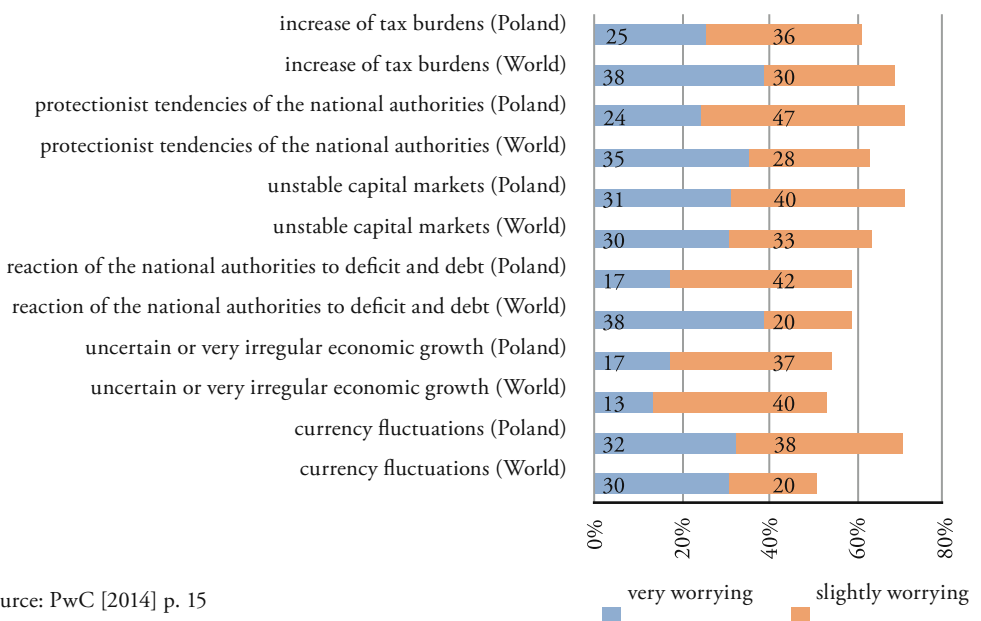
Source: Hollanders, Es-Sadki, Kanerva [2015], p. 5.

for the EU countries in the years 2006-2014 show a clear upward trend. Poland presents itself here as relatively stable with a minimal growth trend. The situation is presented in Figure 3.

Taking into account most indices, Poland is below the average of the EU countries. Its weak points include: share of foreign, non-EU PhD students, the number of patent applications in the scope of social changes/challenges, expenditures

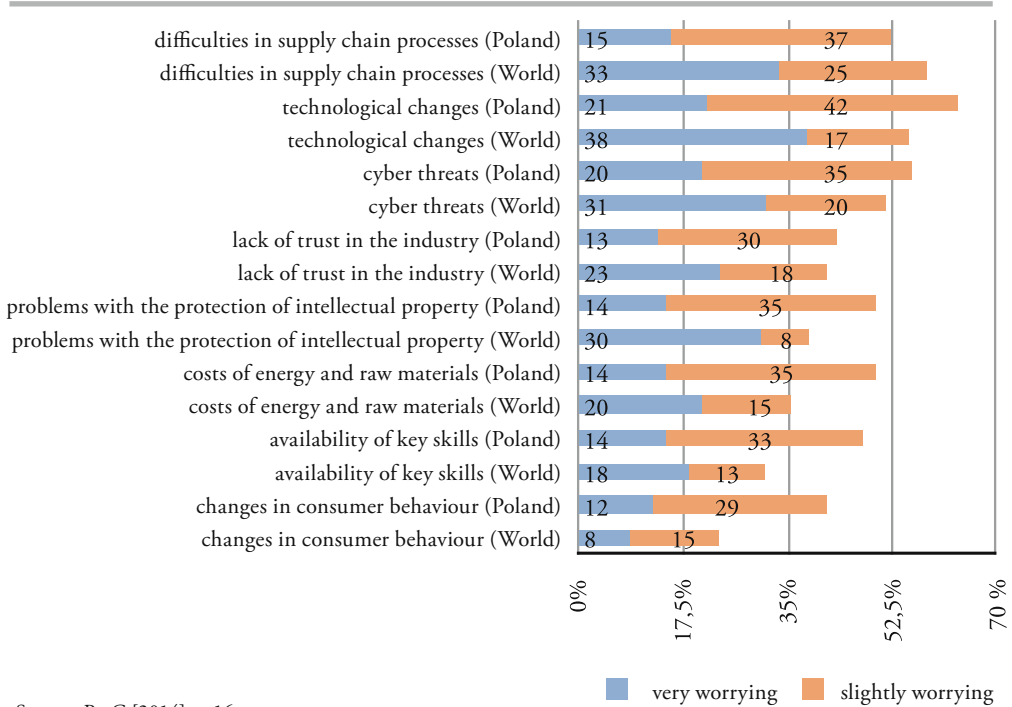
for research and development incurred by business, income on licences and patents sold abroad, newly awarded PhD degrees. In turn, the strengths (above the average for the 28 EU countries) are: expenditures on innovation which do not include the expenditures on research and development, percent of population with a complete tertiary education and the share of young people with at least secondary education. A high growth rate has been

Figure 4 Economic and political threats to the development of enterprises



Source: PwC [2014] p. 15

Figure 5 Business threats to the development of enterprises



Source: PwC [2014] p. 16.

observed in the case of the indices: community designs, community trademarks, spending on the research and development in the sector of enterprises and the share of population with a complete tertiary education.

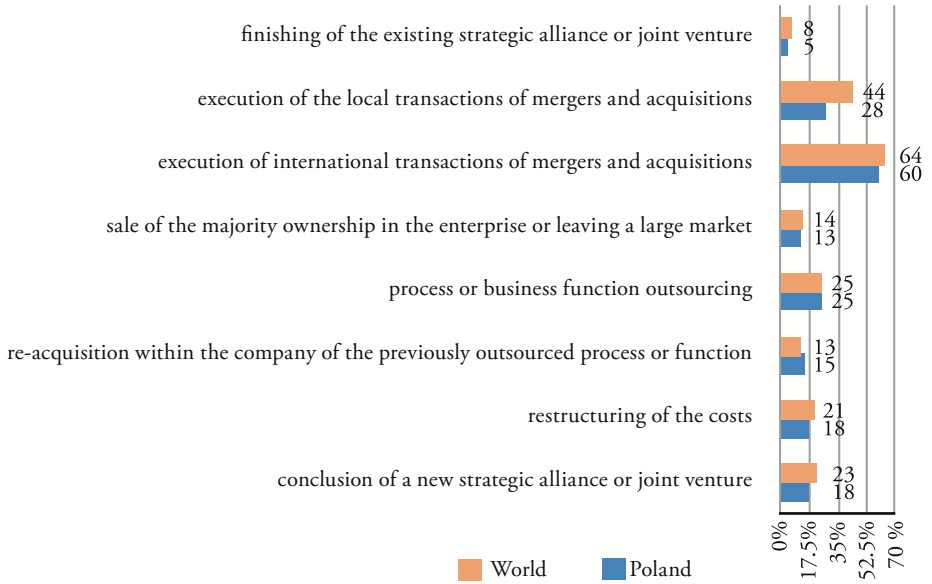
Whereas the negative growth rate has been recorded in the scope of: cooperation of innovative SMEs with other entities, internal innovation of SME sector, share of sales of innovative products, innovative activity: product, process, marketing and organisational, and newly awarded PhD titles [Hollanders, Es-Sadki, Kanerva, 2015].

By analysing the external macroeconomic conditions, shaping the behaviour of entrepreneurs and their competitive position, a factor arousing most concern among the Polish companies in 2014 was the potential instability of the currency exchange rates, which was indicated as a threat by 68 percent of managers. Whereas in the world, the most worrying are three interrelated potential phenomena, i.e. approximately 70 percent of the

surveyed still fear uncertain economic growth, reaction of governments to deficits and debt in public finance, and the possible increase of tax burdens related to it [PwC, 2014]. Figure 4 shows the economic and political threats to the development of enterprises.

The threats of the so-called business nature, that is in the close environment of the company, raise concern of approximately 45 percent of the surveyed in Poland and in the world, whereas the threats of macroeconomic nature are of concern to about 60 percent of the respondents. The main concern of Polish managers is mostly related to the changes of consumer behaviour (58 percent). The second potential threat recognised in Poland is the concern about the availability of key skills (55 percent). As in the previous years, Polish managers express their slight concern, in comparison to the world results, about the potential difficulties in the scope of the supply chain. Moreover, the concern is clearly lower when it comes to technological threats, and the threats of IT nature [PwC, 2014]. Figure 5 presents the

Figure 6 Restructuring operations of the enterprises against the emerging threats



Source: PwC [2014] p. 17.

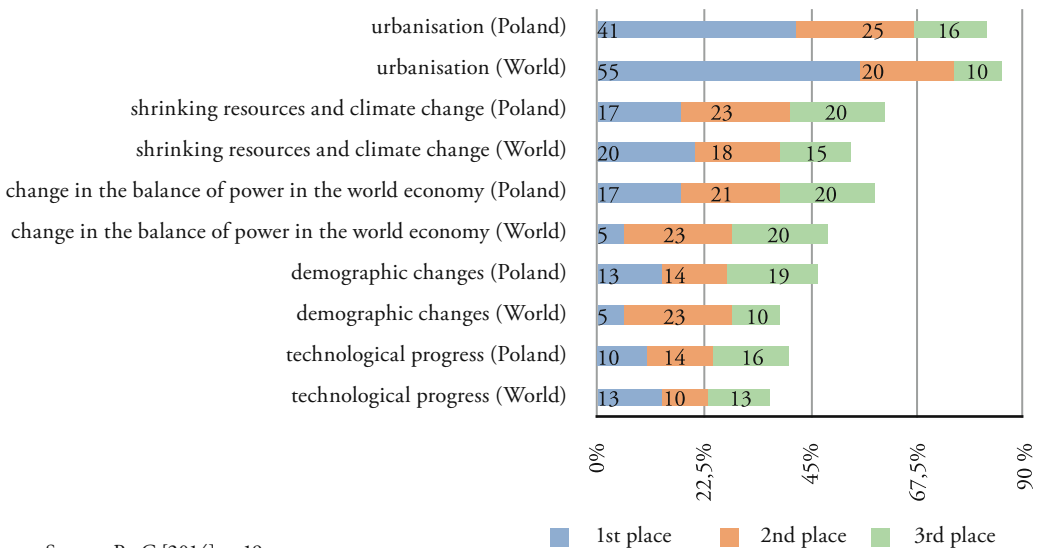
business threats to the development of enterprises identified by the respondents.

At the same time, despite the expected improvement of the situation, among the entrepreneurs, there is still a strong pressure on the restructuring operations leading to increasing competitiveness. The structure of the restructuring operations planned for 2014 did not significantly change in relation to the year 2013. Both Polish companies (60 percent

of responses) as well as foreign (64 percent of responses) mainly planned to implement programmes for restructuring of the costs. Among the operations planned for the year 2014 in Poland, relatively popular was also *outsourcing* of business functions (25 percent of indications). Other activities were not so much popular (Figure 6) [PwC, 2014].

According to the respondents, the factor that will mostly determine business strategies is technological progress. It is

Figure 7 Long-term trends with the greatest impact on conducting business



Source: PwC [2014] p. 19

in the group of the three most important factors in 80% of the surveyed, of which in Poland, more than a half (55 percent) believes that this will be the dominant factor. At the same time, as indicated earlier, it does not raise any concern, which may prove the high quality of their own ability to adapt to the changing technological environment. Next, the respondents indicated demographical changes and the change in the balance of power in the world economy (Figure 7).

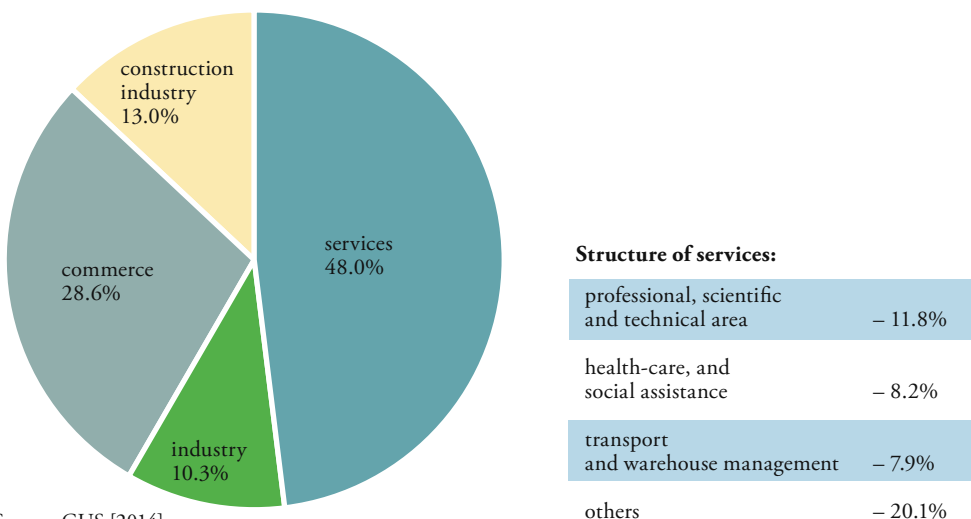
At the same time, the research on the international competitiveness of the Polish enterprises showed that the competitive potential of the Polish enterprises is lower than the potential of the average competitor from the European Union [Gorynia, 2002, 2005]. Other studies show that the primary competitive advantage of the Polish enterprises on the foreign markets was a low price, and the structure of export is characterised by low-processed goods, and natural resources, whereas the strategy of internationalisation focuses on the cost leadership [Pierścionek, Jurek-Stepień, 2006].

Tools and strategies of competition of the Polish enterprises

Micro, small and medium-sized enterprises (SME) constitute 99.8 percent of

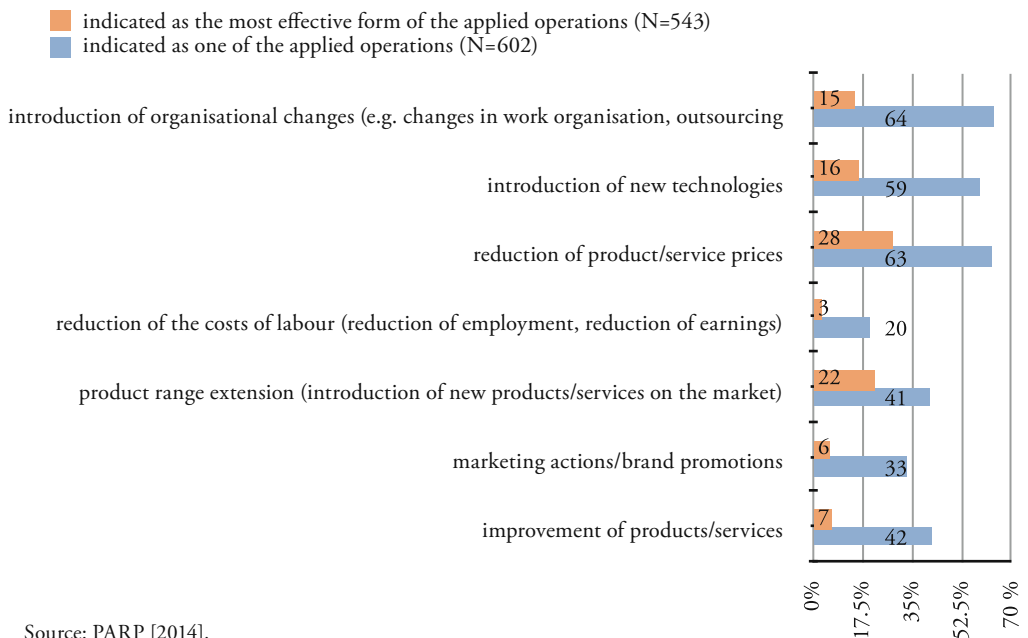
enterprises in the EU. Identical structure applies in Poland. The entities of the SME sector constitute the vast majority among 1.79 million of all operating companies. But in comparison with the EU average, the SME sector in Poland is dominated more by the micro-enterprises, the share of which in the total number of companies is 95.8 percent (in the EU – 92.5 percent). The share of small companies in the population of SMEs in Poland (3.2 percent) is nearly half the size of the EU average (6.2 percent), while the share of the medium-sized entities in the structure of SMEs is close to the EU average (0.9 percent – Poland, 1.0 percent – EU) [PARP, 2014, p. 18]. In the case of branch structure of the Polish small and medium-sized enterprises, which is presented in Figure 8, SMEs more often provide services (48 percent), pursue commercial activity (28.6 percent), and operate in the construction industry (13 percent), less frequently pursue industrial activity (10.3 percent). On the other hand, large companies mostly engage themselves in the industrial activity (52.3 percent) and are less frequently than SMEs present in services (29.4 percent), commerce (13.2 percent) and construction (5.1 percent). In the industry, large companies operate mainly in such sections as industrial processing, whereas

Figure 8 Structure of SMEs in Poland according to the primary area of activity



Source: GUS [2014].

Figure 9 Operations undertaken by enterprises to face competition vs. the most effective operations



Source: PARP [2014].

in services in administration and support (8.2 percent), and in transport and warehouse management (6.2 percent). When it comes to the sector of services, the Polish SMEs operate mainly in professional, scientific and technical areas (11.8 percent), transport and warehouse management (7.9 percent), and health care and social assistance (8.2 percent) [GUS, 2014].

In the context of the above considerations and the presented results of research, it is worth considering which strategies are undertaken by enterprises to face competition. In the Panel of the Polish Enterprises of PARP, entrepreneurs were asked about all actions that they undertook within the last six months to respond to competition as well as which of the actions undertaken have proven to be most effective. More than 60 percent of the surveyed companies indicated improving of products (goods and/or services) or extending their offer. But the entrepreneurs found that the most effective strategy was to introduce new products/services on the market (28 percent of the surveyed companies). The second most effective strategy was reduction of prices

– this strategy is used by approximately 40% of the companies, where 1/5 considered it most effective in 2014. Reduction of the costs of labour, although used by 1/5 of the surveyed companies, was found by the entrepreneurs to be the least effective method to compete. What is interesting is also the statement that marketing efforts aimed at dealing with competition is undertaken by almost 60 percent of the companies, but only 15 percent found this strategy the most effective [PARP, 2014]. Figure 9 shows the structure of responses of entrepreneurs.

Additionally, in the analysed research results, generally, the introduction of new technologies or organisational changes in enterprises relatively rarely was recognised by entrepreneurs as the most effective method of dealing with competition, although they used it quite widely: more than 1/3 of the enterprises introduced new technology, in comparison with more than 40 percent, which introduced organisational innovations.

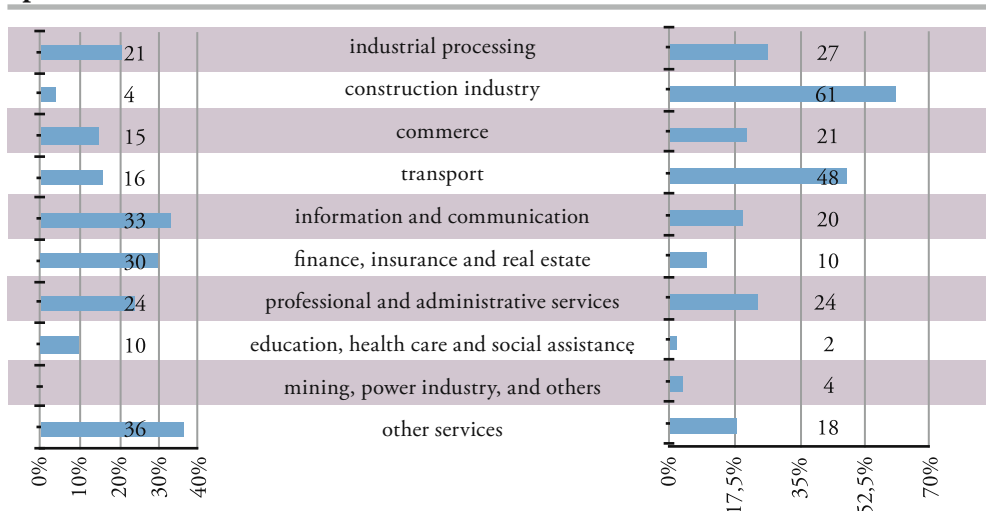
The examined enterprises targeted at two alternative strategies of building competitiveness – on the one hand, those were

the activities focused on lowering of costs (of labour or product/service prices), and on the other – the strategies based on the innovative approach (consisting in improving of products/services or introducing new technologies). These differences are particularly visible when examined by industry. The companies from the construction (61 percent) and transport (48 percent) industry most often indicated the reduction of costs of labour or product/service prices as the most effective methods of dealing with competition. For comparison, in the finance, insurance and real estate sector, these strategies were indicated as the most effective by only every tenth respondent. In the case of activities aiming at building competitiveness by improving products/services or introducing new technologies, the ICT sector stood out – 33 percent of the enterprises from this industry found innovation as the most efficient weapon to fight competition, further was finance and insurance sector (30 percent), and professional/administrative services (24 percent). In turn, the transport and construction industries, much less frequently indicated improving products/services or introducing new technologies (4 and 15 percent, respectively in the industry) [PARP, 2014]. The

results of the division of the significance of the reduction of costs and innovations as the activities supporting competitiveness is presented in Figure 10.

In achieving the competitive advantage, an important role is undoubtedly played by the structure of resources compiled for the achievement of the set objectives. Enterprises have material, non-material resources, as well as their combinations at their disposal. The competitiveness of an enterprise is thus a resultant of the ability to select such resources that would directly create or support the development of the strengths of the organisation, while their importance in this understanding is of the same value. When analysing the resources that directly support achieving of the competitive advantage (on the local and international market), in one of the studies, Polish entrepreneurs pointed mostly to the specialist knowledge, key competencies of the company and modern technology. Further, the industry expertise supporting the sales system and marketing efforts and reputation of the enterprise and customer relations were indicated. It is worth noting that the cited study involved enterprises with outstanding growth [Śliwiński, 2012, p. 54]. The ranking of the importance of resources

Figure 10 **Percentage of companies in the industry, which recognise innovation (left graph) or reduction of costs (right graph) as the most effective competitive operations**



Source: PARP [2014]

Figure 11 **Significance of resources in shaping of the competitive advantage**

Source: Śliwiński [2012], p. 54.

determining the level of competitiveness of an enterprise is illustrated in Figure 11.

Threats and opportunities to competitiveness and the properties of cloud computing

The cited research on the tools and strategies to compete, and on the most important areas in terms of activities undertaken by enterprises in Poland, and possible directions of development in relation to the occurring opportunities indicate several basic aspects.

Enterprises understand the meaning of introducing changes by extending the scope of their current offer, or introducing innovation, and the need to limit costs in achieving stable competitive advantages. At the same time, when indicating the sources that determine the need to change, they recognise both those that occur outside the organisation, as well as the internal factors limiting their adaptability or flexibility.

In response to these aspects, it is worth to highlight the potential in the application of solutions using *cloud computing*. *Cloud computing* is a model allowing for access via the Internet to a shared set of computing resources (e.g. networks, ser-

vers, mass storages, applications, and services); they are configurable, available “on demand”, can be quickly allocated, and released with a minimal interaction of the service user, allowing for a flexible increase or decrease of resources depending on the current need [Mell, Grance, 2009].

The main features of the cloud computing model include [Nowicka, 2011]:

Scalability, or the possibility to dynamically allocate and release the resources depending on the current needs (demand), without having to maintain own infrastructure, as is the case in the traditional model, where the entity is the owner of the assets. This situation allows for more flexibility of the operation of the enterprise. Ensuring that supply meets demand eliminates incurring unnecessary costs associated with overestimation or underestimation of the needs of the customer. Therefore, it has an impact on the reduction of the level of the risk of occurrence of lost opportunities and costs associated with wrong forecasts of demand and planning of the needs of the enterprise.

The infrastructure is shared – many customers jointly use the physical infra-

structure, technological platform or applications.

Data processing time in this model is reduced, as it can be done simultaneously on an almost unlimited number of servers located around the world (and the choice of the allocation of such infrastructure may be determined by the level of costs, for example, of energy). This solution reduces the time of response to changes, having its role in the decision about the level of service provided to the customer of the business entity.

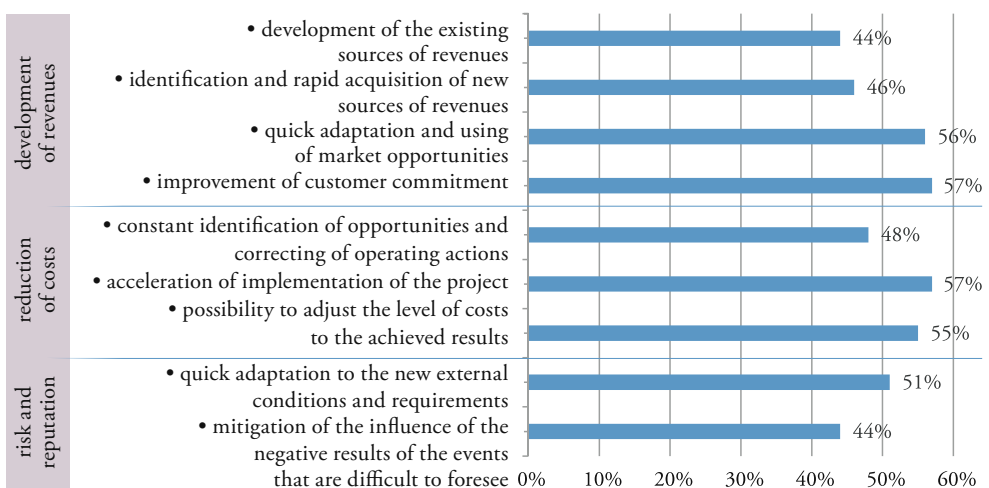
- The services are available when they are needed (on demand) in the units depending on the service – a unit can be a user, an amount of transferred data, a transaction, or a combination of these values.
- The level of payment depends on the actually used computing power, bandwidth of the internet connection, and the disk space. This reduces, or even eliminates, the need for investment in IT infrastructure, incurring expenditures on training employees, or licenses for the new software.
- The service is available via the Internet or private networks and standard network devices. Thus, it can be used all over the world, 24 hours a day.

- It is possible to use the service individually, so that the users can install and configure the software on their own.

The features of *cloud computing* have been recognised as the tools supporting conducting the business activities in a competitive manner by the enterprises around the world, with the most geographically active area of location of business entities applying these solutions in the United States. In view of the gradual taking over from Western entrepreneurs of new solutions applied in the strategic management and competing, it is worth for the model of *cloud computing* to be more familiar to Polish managers not only in the theoretical and cognitive but also in practical context. For this reason, it is worth to analyse such implementations in terms of expectations and objectives assigned to this solution, as well as the actual influence on the areas of enterprise management, in the context of the previously mentioned aspects of competition, faced by Polish entrepreneurs.

Figure 12 presents the expectations regarding the role of *cloud computing* in achieving of different objectives of the organisation, divided into three categories: increase of income, reduction of costs, risk and reputation.

Figure 12 **Expectations regarding the impact of cloud computing on the competitiveness of an enterprise**



and risk and reputation, shaping the competitiveness of the enterprise.

Among the most important expectations related to the limiting of the costs with the application of cloud computing, the respondents of the cited research pointed most of all to the possibility to accelerate the implementation of projects and to adjust the level of expenditure to the level of actually achieved results, whereas in the category of income growth, the most important expectations concerning the effects of the use of the properties of *cloud computing* was the possibility to deepen the customer relations and the possibility to quickly adapt business activities to the emerging market opportunities in its surrounding.

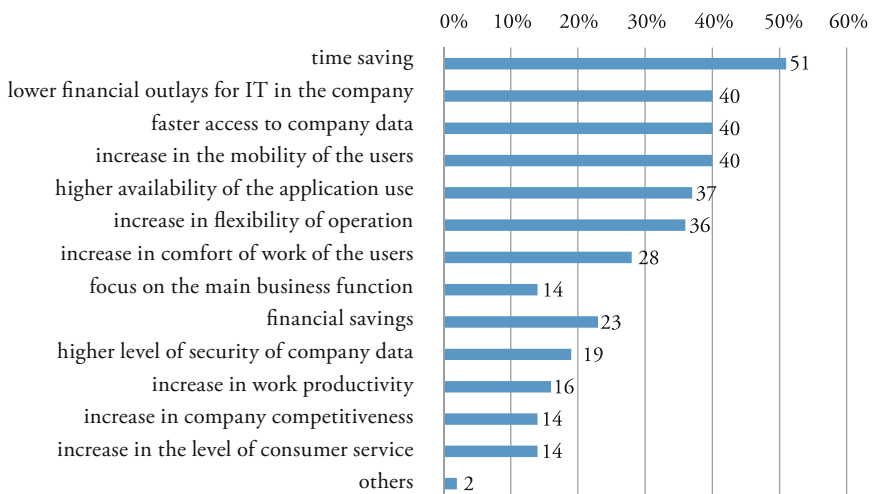
A short adaptation time was also the expectation indicated in the category of limiting the business risk, and of the quality of company’s reputation.

It is worth to note the opinions of Polish entrepreneurs on the expectations related to implementation of the solutions in the model of cloud computing. In the study conducted by means of an on-line survey in the third quarter of the year 2014, among 326 companies functioning on the Polish market with the Internet access, and an electronic e-mail account,

the majority of respondents agree with the claims that cloud computing is a rapidly developing technology (79 percent), and allows companies to flexibly use the IT tools (76 percent) and that it increases the possibilities to act, and to develop companies (65 percent). Additionally, almost half of the respondents think that cloud computing allows the companies to obtain financial savings (45 percent). Moreover, 65 percent of the respondents declared that they used the solutions based on cloud computing. The most popular applications in the service model were electronic mail (38 percent) and storage (archiving, backup) of data (36 percent). From the declarations of the representatives of the companies participating in the survey, it transpires that using the applications in the *cloud computing* model contributes to achieving real benefits, such as time saving (51 percent of the companies using this solution); lower financial outlays on IT in the company (40 percent); faster access to company data (40 percent); increase in the mobility of the users (40 percent) [Kapera, 2014]. The results are presented in Figure 13.

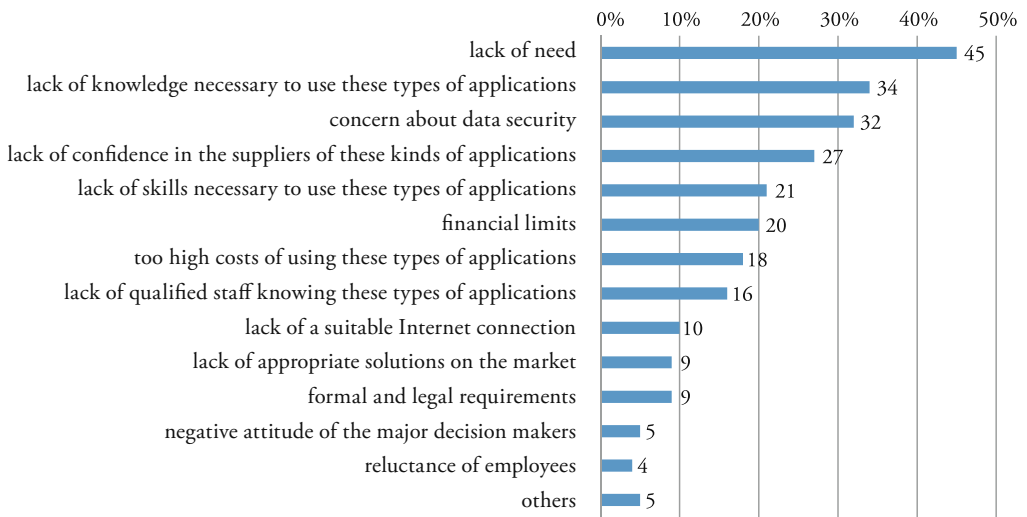
At the same time, the respondents pointed to the risks associated with the use of cloud computing. The main concerns were related to security of company

Figure 13 Benefits of using the solutions of *cloud computing*



Source: Kapera [2014], p. 35.

Rysunek 14 Reasons for which the companies did not use the solutions of cloud computing



Source: Kapera [2014], p. 35.

data (50 percent), confidentiality of company data (48 percent), and the lack of control over company data (45 percent). On the other hand, almost half of the respondents think that storing data on external servers is safer than storing everything on company computers (47 percent) and disagrees with the claim that using the applications in the service model is associated with a high risk (42 percent).

Simultaneously, the enterprises that did not use the solutions in a cloud so far indicate various reasons for this state of affairs. However, this group is dominated mostly by the indications on the lack of the need (45 percent), lack of knowledge necessary to use these types of applications (34 percent), and the concern about safety and confidentiality of company data (32 percent). [Kapera, 2014]. The details associated with this research area is illustrated in Figure 14.

Whereas the “lack of need” and “lack of knowledge” are probably due to access to information and the analysis of the needs in relation to the potential of their realisation in the cloud computing model, the argument related to the concern about security of data is often raised, also in other studies, as the main barrier to implementation of cloud computing.

In response to this situation, we can cite a more detailed study on the information security in enterprises. It was conducted in 2011 by the PwC company, at a global scale, on a sample group of 9,600 senior managers. One of the analysed areas was the influence of application of cloud computing on the business security: 54 percent of the respondents found that the security of information improved due to the transition to cloud computing, 23 percent indicated that the level has dropped, and 18 percent – that it has not changed [PwC, 2012, p. 24].

At the same time, it is worth pointing out to the factors supporting further dissemination of the application of solutions in *cloud computing*, which mostly include such phenomena as: the increase of the importance of on-line advertising; development of the mobile market and the increase in the number of users of the mobile internet; ongoing development of e-business (all functions within the conducted business activity, including mostly e-commerce); increasing number of startups, new ventures, projects, the need to introduce innovations and novelties in real time; increasing importance of social media, as the channel of personalised

interaction with the customer, also the widespread use of *crowdsourcing*.

Undoubtedly, an important role in the dissemination of this solution is played by market analyses conducted by scientific centres investigating the role of this solution in company management. One of the examples can be drawing of the attention to the role of SaaS model in implementation of the ERP system in the enterprise [Dziembek, 2014]. But some of available analyses are very general, and constitute a kind of collection of information about the essence and definitions of cloud computing [Dziembek, 2016], and some, despite of the adopted wide subject included in the title of the analysis, are concerned with niche solutions of a relatively occasional application and influence on the management of an economic entity [Lipiski, 2013]. It is worth to search for guidelines that are inspirational and deal with application as well, which is the main role of the authors of this type of publications.

Conclusion

The cited collection of the research results related to the conditions of competitiveness of Polish enterprises, together with the analysis of the activities undertaken by them, shows two main areas being the point of reference to the actions of the contemporary entrepreneurs. They include the reduction of costs, and stimulation of the level of innovation.

Both of these areas can be effectively supported by the application of *cloud computing* model, without a simultane-

ous need to make a choice of a *trade-off* type. Cloud computing gives the entrepreneurs the possibility to simultaneously limit the costs, and to stimulate their activities related to the selected direction of development of innovations (product, organisational, process, and others). It is worth pointing out that the application of cloud computing has both a direct influence on the level and structure of costs in the company (related to the IT infrastructure), as well as an indirect influence, for example, related to shortening of the time of introducing new solutions on the market, making decisions, or limiting the costs of the projects, limiting spending on business travels, maintaining office or warehouse infrastructure, etc. Similarly, in the context of innovation, application of cloud computing fosters the introduction of changes and the increase of compatibility of enterprises in relation to new customer needs, and the manners of communication with them and using new sales channels.

Innovation and limiting of costs can be also considered as goals of an enterprise of a timeless nature. Thus, regardless of the current macroeconomic conditions, enterprises will strive to achieve maximum flexibility and adaptability, which stimulate the creation of competitive advantages resulting from the right of priority. It is worth for the Polish enterprises to use such an opportunity to build a stable, long-term competitive advantage, offered by the *cloud computing* model.

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