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Competitiveness Based on Knowledge and Innovation

Possibilities of Increasing Budget Revenues in the Era of Digitalisation and Robotisation

SUMMARY: The article examines the changes in the contents of the term competitiveness, in particular the new requirements evolving due to the rapid technological changes caused by the Fourth Industrial Revolution. Various levels of competitiveness are distinguished, and it is explained how good governance can strengthen the different levels. The article presents the new sources for competitiveness, including resources for the improvement of innovative and human skills. The state of the Hungarian economy in relation to such new resources is also analysed. The effect of global value chains on economic diversification, potential for innovation and the usability of human capital is analysed in detail. The article draws attention to the fact that short value chains increase the vulnerability of the economy and may limit the expansion of budget revenues. Our study also analyses our country's know-how with regard to stepping on the path towards knowledge- and innovation-based competitiveness. It states that Hungary suffers from innovation and knowledge deficit, which inhibits the improvement of competitiveness. As a conclusion, the study emphasises that in order to improve competitiveness, it is important to lengthen value chains, thus increasing the proportion of innovative activities and the number of innovative workplaces. At the same time, economic diversification can also be improved, the new value produced in Hungary will increase and even our exchange ratio in international markets can get better if we compete with our knowledge. To achieve the aforementioned goal, we should increase investment into human capital, as well as improve the effectiveness and efficiency of the use of resources. As the direct and indirect effects of the suggested changes, not only competitiveness, but also the revenues ensuring the expansion of the budget in the future could increase.

KEYWORDS: value chains, knowledge- and innovation-based competition, innovative skills, human capital, digitalisation

JEL CODES: O31, O38

The term “Fourth Industrial Revolution” is often used nowadays. It refers to the fact that currently, a new technological revolution, the fourth in the history of global economy, is taking place, as a result of which productivity is expected to grow. The first industrial revolution started with the introduction of the

steam engine in manufacturing, the second one with the launch of mass production by means of conveyor belts, while the third one with the use of computer technology and automation to control industrial processes. In our age, digitalisation and robotisation constitute the next significant fault-line. These technologies bring about more fundamental changes than before, not only in the industry,

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but in all areas of the economy, as well, even in the society. Future researcher *Leonhard* (2016) writes about exponential and simultaneous mega-changes which will alter not only technology, but society as a whole, as well.

Consequently, it is not enough to talk about the age of Industry 4.0, which still characterises the current Hungarian approach to economic policy. Beyond the spreading of the use of robots, these changes are about the extensive application of computer technology, as well as about the more and more important role of artificial intelligence in the operation of industrial, healthcare and traffic systems. In addition to economic policy, professionals, the educational system and civil society organizations should also prepare society for this situation, so that society can work more efficiently in general and more and more people can take advantage of the changes.

In order to achieve this goal, most importantly, the state of human capital, the current structure of the economy, innovative capacity, as well as the general sensitivity and openness of society to changes should be examined, as the success of joining the process of development depends not only on investments, technological innovation and targeted strategies, but also on the receptiveness, participation and openness of society. Several experts prove the advantages of joining significant changes as fast as possible.

According to *Williams and Vorley* (2017), conscious and active preparation for changes would be the most effective solution, as we would also create a path for development. However, this concept requires entrepreneurial culture, awareness and monitoring of environmental changes, as well as continuous studying. This strategy provides a chance for long-term and sustainable economic growth. On the other hand, if we try to maintain the old industrial structure, adapt to changes in a passive, careful way or take part in the pro-

cess of transformation in a less prepared state, moderate growth will be the best we can expect. If our adaptation is too slow, our economic growth may even come to a standstill. Obviously, the worst solution would be if we relied on the results of the past and the present only, believing that we could take part in the changes through occasional decisions, as well. This would lead to Hungary's staying behind and marginalisation. Choosing the way affects the actual state of the budget, and through it, the available public infrastructural and human investment opportunities and the sustainability of economic results, especially after the exhaustion of EU funds. In the middle of the changes described above, it should be evaluated what factors the Hungarian economy needs to rely on so as to be able to compete. It should also be considered how our country could step on a knowledge- and innovation-based competitive path that enables us to take part successfully in these changes both economically and socially.

Hereunder, we will analyse the possible ways of improving the competitiveness of our country, and examine the current development level of the most important social and economic factors based on which transition to knowledge- and innovation-based competition could be possible. We argue that knowledge- and innovation-based competition would increase budget revenues, thus contributing to the sources of investment required for development.

COMPETITIVENESS: CHANGING VIEWS

In our article, we do not seek to present all definitions of competitiveness, nor do we intend to create a new definition. We will examine two important issues related to competitiveness instead. On the one hand, we will find out if it is justified to consider the so-called soft factors, which are more difficult to

measure, among the causes of competitiveness. On the other hand, we will list the principles on which competition - whether it is among companies or nations - should be based.

Lengyel (2012) draws attention to the complexity of the meaning of competitiveness. He believes that competitiveness is a generic term, referring to the willingness or skill to compete, the ability to gain and retain a position in competition, which is usually indicated by measurable success or the ability to succeed. Competitiveness may also mean the ability to achieve steady economic growth or sustainable development. Due to the broad theoretical background, competitiveness is defined and interpreted in different ways.

According to *Garelli* (2002), a former executive of the IMD „World Competitiveness Project”, nations should compete in order to increase the standard of living of the population. Later, *Garelli* refers to the fact that the GDP cannot reflect competitiveness accurately, as it cannot measure environmental sustainability, personal security and education level of people or, as *Garelli* formulates, the “soft characteristics” of the standard of living in general.

Related to the above, *Garelli* points out that competitiveness, if only measured by economic indicators, cannot ensure the improvement of the quality of life. Consequently, real competitiveness should strike a balance between economic results and the social achievements of a nation. In this respect, historical and cultural characteristics, traditions and values should be taken into consideration, as well. Later, *Garelli* returns to this question in one of his writings. As he explains, nations compete not only by providing products and services, but also by means of their educational and value systems. A nation’s ability to establish an excellent educational system and improve the knowledge of the labour force is a fundamental factor for competitiveness, as it

allows nations to compete by using their skills instead of being cheap (*Garelli* 2006).

Baily et al. (2013) draw attention to innovation, another essential condition of increasing competitiveness. They introduce the term “innovation capital”, which consists of physical, knowledge and human capital.

Physical capital refers to investments into information and communication tools. Knowledge capital means R&D expenditures, including research carried out at universities. In the case of companies, expenditures related to brands and patents fall into this category. Human capital measures investments into personal or organisational knowledge and skills, as well as expenditures on scientific education and adult education.

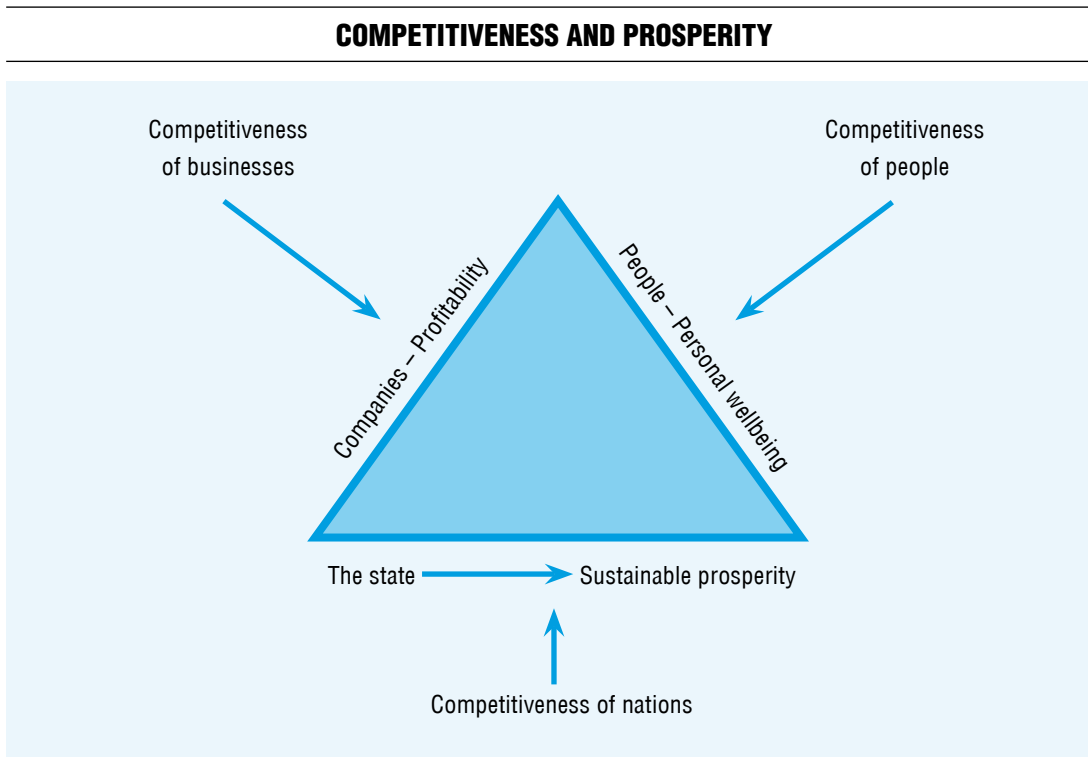
Based on the opinions quoted above, competitiveness can be interpreted at different interactive levels, which strengthen or weaken each other.

Garelli (2006) built up this system as indicated in *Figure 1*.

It is worth emphasising an important relationship according to which sustainable national prosperity requires successful companies and well-prepared people. The examination of various approaches to the definition of competitiveness is important because the different interpretations influence the decisions of economic policymakers in a given country. Certain activities may be regarded as essential for the improvement of competitiveness. On the other hand, what we do to improve competitiveness today will affect economic results and social achievements in the future.

As we mentioned earlier, one of the questions related to interpretation examines the role of the so-called hard, measurable factors and the role of soft factors which are more difficult to measure, when defining competitiveness. It is not easy to draw the borderline between these indicators. Hard indicators are usually defined by processing statistical data

Figure 1



Source: Garelli (2006), P. 14

and using values calculated on the basis of mathematical correlations. Soft indicators are based on qualitative research. In this case, the data are provided by questionnaire surveys, interviews or the examination of focus groups. The data so collected can be and have to be evaluated by using statistical methods.

On the other hand, the analysts of competitiveness often refer to economic values, costs, prices, wages, taxes and contributions when using the term hard factors. Such factors show how cheaply or - in other words - cost-effectively a company can operate within a given country. The situation after the economic crisis is an excellent example for this: the leaders of the EU encouraged the Member States which were the most severely struck by the crisis to cut their production costs below the average of the Eurozone so as to increase their competitiveness. Instead of recommend-

ing them to produce different, better or more modern products, they only suggested producing more cheaply. However, they could have recommended them to innovate and provide new, more modern and “smarter” products and services.

Those who emphasise the importance of soft factors draw attention to the fact that producing the existing products is not enough, as it forces a company or a country to enter a more and more relentless price-cost competition. Therefore, countries are recommended to provide different products and services in a different way. Therefore, they also stress, for example, the importance of improving the operational efficiency of the institutional system, as well as strengthening the business climate, innovative skills and confidence level. Each factor can be interpreted at the level of companies or the national economy, but there is interac-

tion between different levels. For example, if the majority of companies compete by offering low wages and manufacturing a large quantity of average products, the national economy will also compete by cutting costs. If innovative companies competing with their know-how and creativity are in majority, the nation also competes with its knowledge. Of course, it is not a one-way relationship. Skills which lay the foundation for governmental decisions have an influence on what kind of companies can exist in a country and the establishment of the conditions of knowledge- and innovation-based competition. The priorities of economic policy and the operation of the national innovation and education system also play a key role in this process. If we intend to improve competitiveness, it is not enough to improve the macro indicators, as, on the one hand, the change of macro indicators is affected by a lot of factors which are difficult to measure, and, on the other hand, the results of the economy should be reflected by social development and the improvement of human welfare, as these factors also influence the change of macro indicators in the long run. The aforementioned idea raises the following question: what should we compete with?

Nowadays, we often hear the argument that low costs and low prices lead to success in competition on the market. This type of competition is called price- and cost-based competition. Price- and cost-based competitiveness is emphasised for a simple methodological reason: prices and costs are easier to measure than soft skills, such as innovativeness. At the same time, *Benkovskis and Wörz* (2013), researchers from the European Central Bank, prove on the basis of their research findings that none of the examined industrialised or developing countries are able to increase their market share by setting low prices in competition. On the contrary, their success on the market was due to factors independent from prices.

In another analysis based on corporate case studies, *Kowall* (2015) points out that competitiveness in foreign markets largely depends on quality and the innovative content. Low prices improve chances in the market only minimally.

Competitiveness is often mentioned in connection with productivity, that is the ratio of expenditures to results. Productivity is typically measured by new value added per employee or time unit. At corporate level, the profit per unit wage cost is also frequently measured. These values are easy to measure, as well. They generally suggest that employees should work more and faster during a given unit of time for productivity to increase. But it is obvious that innovation, which can either refer to the production of a product or service with more know-how or of higher quality, or to work that is better organised or carried out with more modern work equipment, leads to much better results. Taking the aforementioned factors into account, we can talk about *multifactor productivity*. This is the indicator that should really be mentioned in connection with competitiveness. It is a fact, however, that the direct effect of such factors on results is not easy to quantify.

Veugelers (2017) proves that the slow pace of multifactor productivity growth undermines the competitiveness of the EU. However, multifactor productivity does not improve due to weak innovation performance. It is indicated by the fact that in the 28 Member States of the EU, R&D expenditure as a percentage of the GDP stagnated at a value of 2 per cent between 2000 and 2014. Meanwhile, despite starting from a lower value, based on the data of the OECD, China managed to reach 2.1 per cent compared with the average 2 per cent R&D expenditure to GDP ratio in the 28 EU Member States in 2015. The average in OECD countries was 2.4 per cent. The USA, Japan, Korea spent more on research &

development during the whole period. For example, Korea spent 4.2 per cent of its GDP on research & development in 2015. In the case of G20 countries with a strong economy, this value is the highest, which partly explains why the pace of technological development, which is an essential condition for productivity and competitiveness, is faster in the above-mentioned countries than in the EU.

In the light of the above, the conclusion can be drawn that competitive advantages can be achieved by minimising costs in the short term, but distinguishing factors, such as good quality, novelty and innovativeness, contribute to the improvement of competitiveness in the long run. Furthermore, more innovative products and services of higher quality can be sold at a higher price.

After having accepted the conclusion above, we should call upon economic policymakers to encourage the strengthening of the innovativeness of the economy and the increase of the percentage of innovative companies and activities within the economic structure.

VALUE CHAINS AND ECONOMIC STRUCTURE

A value chain is the series of a company's activities, from the idea of providing a product or service to placing it on the market, including after sale customer service and customer relations. Global companies divide such value chains into phases, which are moved into places where work can be completed cheaply, but in good quality and reliably. In the individual phases, the created new values differ, therefore employees are paid different wages. *Figure 2* shows the simplified version of the value chain.

Consequently, it is important which phases of the value chain are moved into a given country. The fact that, for example, the assem-

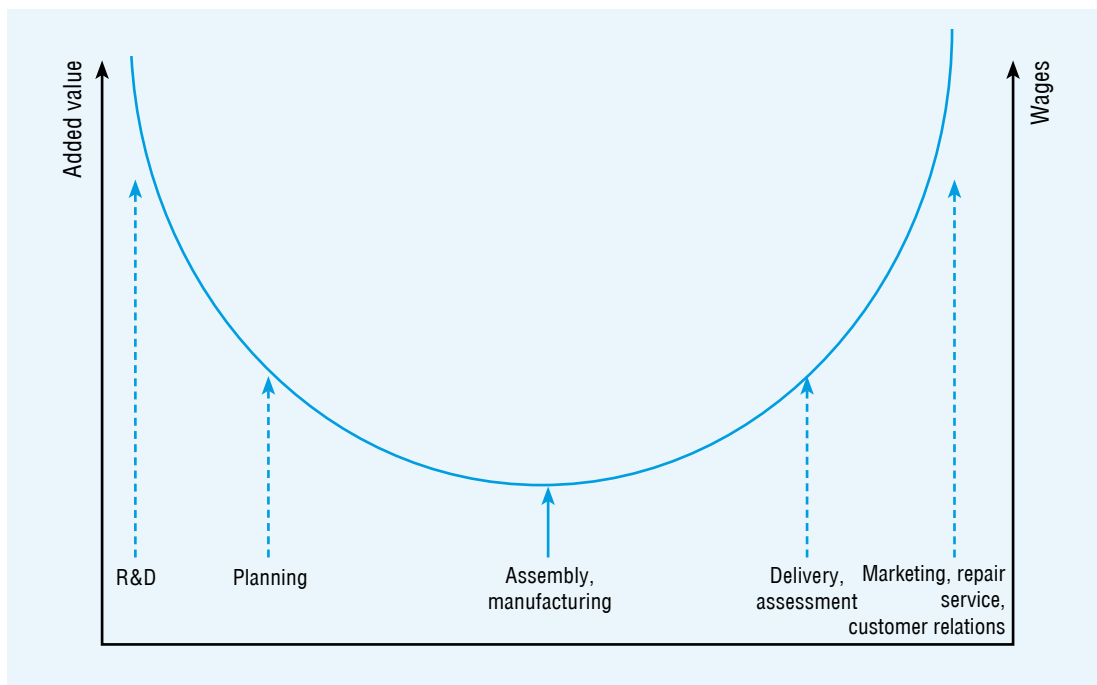
bly activity, which creates the lowest added value, is dominant in a country significantly affects what the competition of the country will be based on.

In this case, competition is fundamentally based on cost effectiveness and low wages, which does not allow the economy to move towards knowledge- and innovation-based competitiveness. Neither is it possible to fully utilise the skills of people, which can be considered as a waste of resources, therefore it decreases competitiveness. Furthermore, the dominance of value chain phases with lower added value does not enable the exploitation of intangible or less tangible factors, such as creativity, which would result in considerable improvement in competitiveness in the long run. Assembly operations are centrally organised tasks to be completed according to a perfect timetable and schedule, therefore the employees have no opportunity to express their own opinion or come up with new ideas or solutions.

The length of value chains in an economy significantly affects the extent of value creation and, as a result, the budgetary situation. As *Figure 2* shows, the most new values along the value chain are created in the initial and the closing phases, while the lowest value is expected to be created in the middle of the chain, in the manufacturing phase. Companies have moved the manufacturing and production phase of the value chains to Hungary recently, which has a significant effect on wages. The figures mentioned by *György and Oláh (2017)* support the previous claim: the 52.7 per cent average wage share of the Visegrád countries in 2016 is considerably lower than the 63.3 per cent EU average. As for Hungary, a 6.8 percentage drop was recorded between 1995 and 2016, projected for the whole of the economy, which is considerable compared to the Central European average. The recent data by Eurostat (Eurostat, 2017) also warn that

Figure 2

CHANGE IN ADDED VALUE AND WAGES ALONG THE VALUE CHAIN



Source: OECD (2013) based on Figure 7.2., own editing

the assembly activity of value chains has become too widespread.

In addition to its influence on wages, assembly work also affects know-how, as it does not require high-level knowledge or creativity. If employees are not urged to take part in trainings of their own accord, their creativity and entrepreneurial spirit fade. It will be difficult to employ such employees in a digitised, robotised corporate environment. In this respect, it is worth mentioning OECD's recent analysis (OECD 2017), according to which employment below the employees' skill-level is the second highest at Hungarian workplaces after Greece; that is, employees would be able to complete more sophisticated or creative tasks than those included in their job description. Consequently, the length of value chains affects not only the structure of the economy, but also the level of innovation. The length of

value chains affects budget revenues primarily through wages, but it also has an influence on the dominance of innovative companies and activities within the economic structure, which also has budgetary consequences. Innovative businesses creating high added value can make higher profit, from which the budget is expected to receive higher taxes. Based on the JÁJ (2017) research, on average 27 per cent of the whole value chain is present in the industry. Other values are added to the value-creating process from imported materials, subassemblies and technologies. In the field of services, the values are higher. It is on average 40–45 per cent in the whole economy. However, in developed EU countries, this value is over 50 per cent. *Elms and Low* (2013) also point out that other phases of the value chain, apart from the assembly phase, rather belong to services than to manufacturing, therefore

the added value is higher. Such services typically include development, planning, innovation, market and financial activities.

Hence, competitiveness can be improved by diversifying the structure of the economy in terms of its sectors and the extent and character of added value as well as the percentage of innovative companies. At the same time, it means that the percentage of more complex, unique and special products and services should be increased within the economic structure. Instead of cutting costs, the role of knowledge and innovation should be increased in competition.

To sum up our ideas so far, we can claim that steady economic success largely depends on the emphasis we put on innovation as well as on knowledge- and innovation-based competition. In order to achieve this goal, the percentage of innovative companies has to be increased within the structure of the economy. It is also required that global companies move high added value creating phases of their value chains to Hungary. The factors above are essential if our country intends to join digitalisation successfully. As several research institutes, e.g. McKinsey (McKinsey & Co, 2017), warn, they are also important, because robotisation and digitalisation will eliminate assembly jobs in the first place. Below, based on Hungarian and international analyses, we will examine how well-prepared Hungary is for knowledge- and innovation-based competition and the exploitation of opportunities provided by the digital revolution.

HUNGARY'S PREPAREDNESS FOR KNOWLEDGE- AND INNOVATION-BASED COMPETITION

As we mentioned earlier, a nation's innovativeness is indicated by the percentage of its innovative companies and the amount

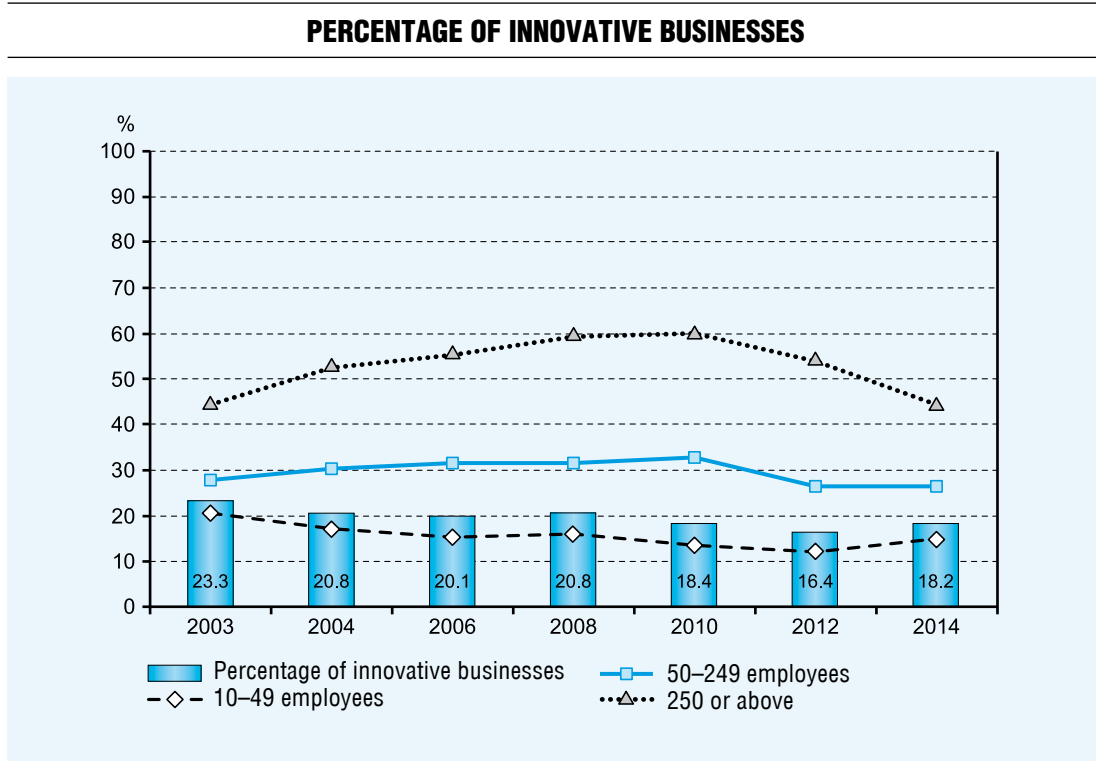
of money it intends to spend on research & development. *Figure 3* shows the change in the percentage of innovative businesses between 2003 and 2014 by company size. In addition to companies implementing product and technological innovations, the Hungarian Central Statistical Office classifies even those that innovate procedures, marketing, organisation or management into the category of innovative businesses. Based on the figure, the percentage of innovative businesses fluctuates between 18.2 per cent and 23.3 per cent. However, according to the figures by Eurostat, this value was 36.8 per cent in the EU, in 2014. Among the V4 countries, the Czech Republic and Slovakia were ranked higher than Hungary (35.7 per cent and 20.3%). In the developed countries of the EU, this rate exceeds 40%.

It is also worthwhile noting that the percentage of innovative businesses has slightly increased among small-sized companies, while it has dropped among medium-sized or big companies. The reason for this is probably that among small companies, the percentage of knowledge-based service providers, including IT, technical design and consultancy firms has grown. Among larger companies and their medium-sized suppliers, the percentage of companies dealing with typical assembly has increased.

Another important aspect is how much money a country spends on research & development.

According to the preliminary data from October 2017 by the Hungarian Central Statistical Office, Hungary spent 1.22 per cent of its GDP on R&D in 2016. It is a 10.0 per cent fall compared with 1.36 per cent in 2015. The R&D expenditures by both private and public research institutes dropped by 7.9 per cent. In the case of university research institute, this figure was 16.1 per cent. The R&D expenditure of research & development cen-

Figure 3



Source: JÁJ 2017: Good State and Governance Report, 2017 National University of Public Service (based on data by the Hungarian Central Statistical Office)

ties in higher education has been continuously decreasing since 2011. From HUF 67,924 million per year in 2011, it has dropped to HUF 47,611 million in 2016, which is a 30 per cent reduction. It should be mentioned that among the “EU 2020” targets Hungary undertook to reach a 1.8 per cent R&D to GDP ratio by 2020, which seems to be very far at the moment. At the same time, it is also remarkable that the planned average value in the EU is 3 per cent. compared to which Hungary set a much lower value. It is also worth noticing that the number of institutes and researchers has been falling as well (Hungarian Central Statistical Office, 2017).

The trend is illustrated by *Figure 4*, regarding the year 2005 as 100%.

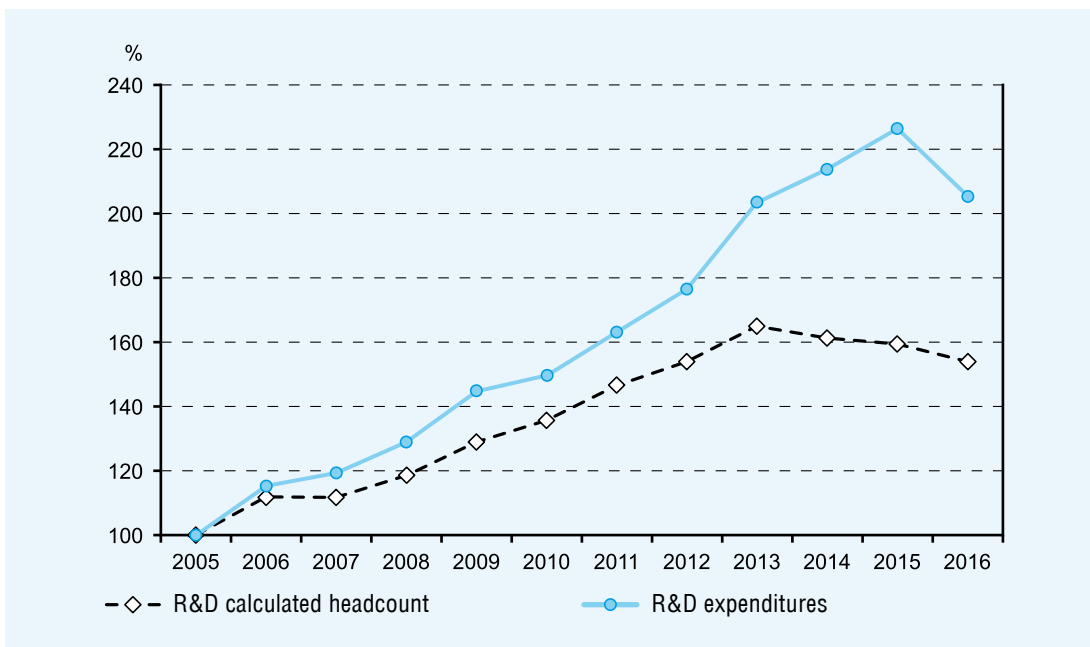
It is also worth examining Hungary’s position regarding the ratio of R&D expenditure

to the GDP and the number of employees working in R&D in international comparison. It is illustrated in *Figure 5*.

Figure 5 indicates that in the most competitive countries – Denmark, Switzerland, Germany and Austria – the percentage of R&D expenditure and of people employed in R&D is extremely high. Obviously, these countries compete by means of knowledge and innovation. At the same time, the Czech Republic has the best figures among the V4 countries. In comparison, Hungary spends little on research & development. As we have seen, the figures even deteriorated in 2016. But this refers only to the ratio of direct R&D expenditure to the GDP. However, the country spends more on R&D. According to the OECD (2016), out of 39 countries examined in 2014, Hungary was the 6th regarding the

Figure 4

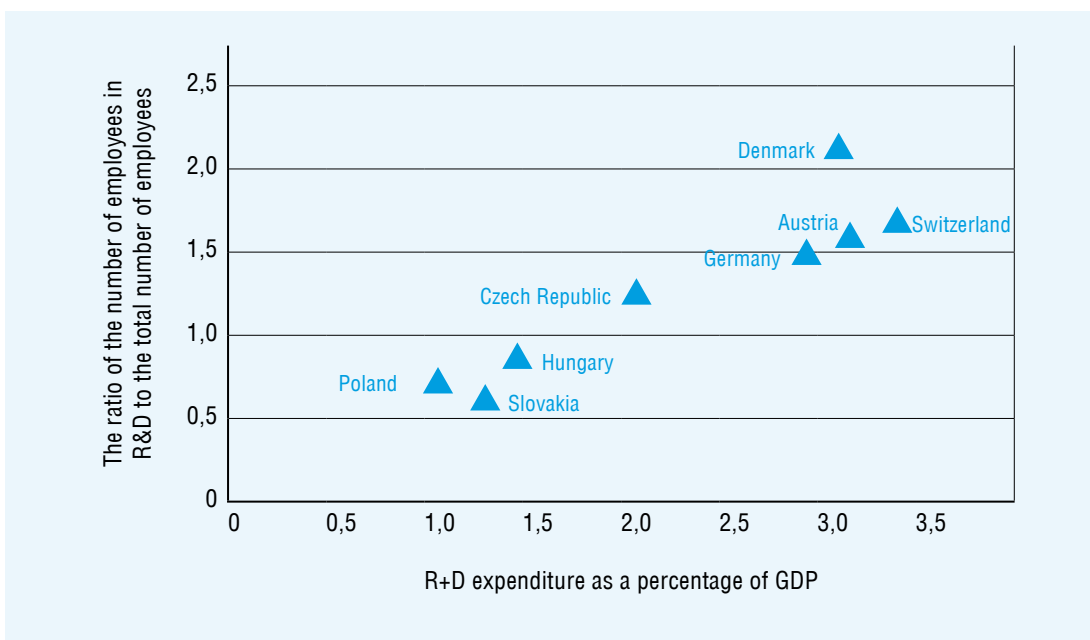
CHANGE IN R&D HEADCOUNT AND R&D EXPENDITURES (IN 2005: 100%)



Source: HCSO (Statistical Reflections, 13 July 2017, Figure1)

Figure 5

PERCENTAGE OF RESEARCHERS AND R&D EXPENDITURE (2015)



Note: Hungarian data from 2016: 0.82 and 1.22.

Source: Own editing based on the data issued by the Hungarian Central Statistical Office and Eurostat

ratio of direct or indirect public expenditures to the GDP. When calculating this value, in addition to the ratio of R&D expenditures to GDP, tax allowances as well as amounts transferred to companies in the form of purchasing “innovative products and services” in the framework of public procurement procedures were considered, as well.

The figure above indicates that apart from direct expenditures, the state provides considerable subsidy to companies to conduct research & development. It should be mentioned that the OECD did not take into account amounts from EU grants allocated to R&D activity. On the other hand, when examining the results of innovation, it can be observed that Sweden, Finland or Denmark are significantly ahead of us in this respect, despite the fact that their total R&D expenditure to GDP is considerably lower than the Hungarian figure. It raises the question whether expenditures on innovation are effectively and efficiently used in Hungary or whether the operation of the national innovation system is efficient in general or not. In other words, the effectiveness of innovation cannot be judged only on the basis of the ratio of research & development expenditures to the GDP in a country. It has two reasons. On the one hand, innovation is more than research & development. On the other hand, the amount of costs (input) is not enough to determine the outcome. The input to outcome (effect) ratio measures the effectiveness and efficiency of the use of resources. Effectiveness refers to well-set goals, while efficiency means that these goals are archived in a well-organised, well-managed and cost efficient way. Let us examine Hungary’s achievements in the field of innovation.

Based on the recent figures from 2017 in a study by the European Innovation Scoreboard (2017), Hungary is a moderately innovative country. We are the 6th worst country on the list of the 28 EU Member States. We marked a

drop of 2 places compared with 2016. Sweden, Denmark and Finland are on the top of the list. Only Romania, Bulgaria, Croatia, Poland and Latvia are below us. The Czech Republic is ranked 13th. Slovakia is two places above us.

As far as sub-areas are concerned, our worst position is in HR (26th place), which is due to the low percentage of people taking part in higher education and adult education. Our second worst position (24th place) is due to the low percentage of innovative firms. The existence of this problem has been proven by the findings of domestic research, as well, as *Figure 3* shows.

Based on the global innovation index by *Dutta et al.* (2017), Hungary is ranked 39th, the Czech Republic 24th, Poland 38th and Slovakia 34th out of 127 countries regarding innovativeness, which means that we are the last among the V4 countries. In 2016, Hungary was still ranked 33rd. Researchers determine the position of a country on the basis of complex examinations and the measurement of various indicators. This analysis also points out that the percentage of people taking part in adult education is low (85th place) and the cooperation between education and the business sector is not good enough (place 99th). Nor does poor market competition stimulate innovation appropriately (120th place).

Based on the analyses, as far as competitiveness is concerned, in addition to R&D expenditures, Hungary’s weaknesses lie in the so-called soft indicators, that is, innovativeness and the characteristics of human capital. At the same time, more and more analyses, including the recent OECD (2016), draw attention to the fact that innovativeness and the quality of human capital have become the main source of economic growth and the improvement of competitiveness in the midst of changes caused by the Fourth Industrial Revolution. Since, on the one hand, digitalisation and robotisation eliminate jobs, but on the other

hand, they create new workplaces. However, these workplaces will require different skills, mainly more knowledge, creativity, problem identification and problem solving skills. In the light of the above, it is a strategic issue to significantly and continuously increase the knowledge level. In order to achieve this goal, three types of learning can be distinguished: formal learning at school, taking part in adult education while working and informal learning. Hungary has weaknesses in all three areas. We are lagging behind other countries the most in the field of adult education. Based on the data by Eurostat, 6.3 per cent of people from the age group 25–64 took part in adult education in Hungary, in 2016. This is the 8th worst value in the EU. The EU 28 average was 10.8 per cent. but this value was 14.9 per cent in Austria and about 30 per cent in the most competitive Scandinavian countries.

In Hungary, regional differences should be considered, as well. The lowest value was measured in Northern Hungary (4.2 per cent. and in Western Transdanubia (4.6 per cent). The latter figure is especially thought-provoking, as Western Transdanubia is a developed region with several large companies.

Of course, it is hard to find direct relationship between R&D expenditures and effects increasing economic performance. Neither can this relationship be clearly measured in the case of businesses. For example, *Bessant and Tidd* (2011) draw attention to the fact that innovation does not primarily depend on money, but rather on “intellectual state”, motivation, entrepreneurial skills and a clear vision of the future. Such characteristics clearly belong to the soft factors of competitiveness related to human capital. Therefore, it is crucial to increase investments related to human capital, as investments into the development of the knowledge level are likely to have a positive effect on innovative skills and the strengthening of entrepreneurial culture,

even if there is no direct relationship between knowledge level and the level of economic innovativeness.

OUR DIGITAL PREPAREDNESS

Due to the fast pace of digitalisation, the increasing demand for digital knowledge raises the question whether Hungary is well-prepared enough in this field. According to World Digital Competitiveness Report (2017), a study by IMD, Hungary was ranked 46th out of the 63 countries examined, and 23th among EU Member States. Based on the set of indicators considered, Hungary’s worst position was the 55th place in preparedness for the future. According to another analysis, the Europe’s Digital Progress Report (2017), Hungary was ranked 21st regarding digital preparedness among EU Members States, in 2017. The study emphasises that Hungary is among the poorly performing countries. Our performance is below the EU average in particular in the areas of knowledge, the spread of digital technologies and digital public services.

According to a study by *Chakravorti and Chaturvedi* (2017), regarding digital preparedness, Hungary is the 32nd out of the 60 examined countries. Norway, Sweden and Switzerland are on the top of the list. Slovakia is one, Poland is three places below us, while the Czech Republic is five places above us in the ranking. Of course, these figures reflect only the current situation. Researches examine the pace of development in the long run (2008–2015), as well. It is called “momentum”. As for the momentum value, Hungary is the 50th. The ranking indicating the pace of development is led by China. Poland (12th place) and the Czech Republic (29th place) are ahead of us, but Slovakia is behind us (58th place).

What conclusions can be drawn on the basis of our different places? Firstly, that Hun-

gary is not performing well regarding results in the areas of innovation, education-training and digitalisation even among the V4 countries. We have few innovative companies, few people work in R&D. Moreover, there has been a slight decrease in these figures recently. Our human capital, which plays a key role in competitiveness, is not strong enough. Especially, the percentage of people taking part in adult education is very low. In other words, Hungary suffers from innovation and knowledge deficit. Regarding the future, this could be dangerous, as without improving our innovation performance and strengthening the knowledge level of our human capital, we will not be able to successfully join the fast-changing processes of digitalisation and robotisation and step on the new path of knowledge- and innovation-based competitiveness. But increasing the country's budget revenues and maintaining permanent budgetary balance depend on the further improvement of our competitiveness. Therefore, it is essential to increase economic diversification by lengthening value chains, improve innovation results and the knowledge level of our human capital, as well as to make significant investments into innovation and knowledge. The effectiveness and efficiency of investments need to be improved, as well. It is difficult to quantify the direct effects of different changes on the expansion of budget revenues. Obviously, such effects exist and if we could activate them, the improvement of economic competitiveness and higher economic growth would be reflected in the rise of budgetary revenues. The correlations are illustrated in *Table 1*.

SUMMARY AND CONCLUSIONS

The all-time economic policy should aim to continuously improve the socio-economic performance of a nation-state. During significant

changes, it is especially important to push socio-economic processes into the right direction by taking appropriate economic policy measures.

The rapid technological changes of our age, digitalisation and robotisation require the redefinition of our priorities in the field of economic policy, with special regard to the methods with which we could improve our competitiveness to ensure sustainable socio-economic results. As we pointed out in our article, in spite of the fact that competitiveness is difficult to interpret, it is obvious that the different levels of competitiveness need to be improved. In the first place, companies have to improve the competitiveness of businesses. The state can support them by creating an entrepreneur-friendly business environment. On the other hand, the state has major tasks in the area of improving national and individual competitiveness. The aforementioned responsibilities of the state can be summarised as follows: transition from cost-based (cheap resource-based) competition to knowledge and innovation-based competition, which could also ensure the increase in the percentage of products and services representing high added value and knowledge within the export structure. As a result, the exchange ratio and the position of the budget would also improve. As part of the set of instruments, the lengthening of value chains should be encouraged and the stimulation of innovation should be emphasised. The effect of expenditures on the aforementioned goals should be manifested in the growth of the number of innovative companies and the percentage of employees working in innovative workplaces. Consequently, the economy would shift towards innovative activities, which would increase the multifactor productivity indicator we often mentioned in our article and improve the position of the country's budget. Perhaps the most important task is to prepare the economy and the society

Table 1

POSSIBLE EFFECTS OF THE SUGGESTED CHANGES WHICH INCREASE BUDGET REVENUE

Suggested changes	Effects						
	Direct			Indirect	Other changes influencing the budget through the improvement of competitiveness		
	Corporate income tax	Contribution	Personal income tax	Increasing VAT revenues	Increasing economic diversification	Increasing level of innovation	Increasing level of knowledge
Longer value chains and the resulting increase in wages	+	+	+	+	+	+	+
Decreasing innovation deficit	+				+	+	+
Strengthening human capital (better use of knowledge, knowledge acquisition)		+	+	+		+	+
More efficient utilisation of innovative resources					+	+	+

Source: own editing

for the changes caused by digitalisation and robotisation in a conscious and planned manner. As important components of this activity, mass retraining programmes, which are needed because of the elimination of workplaces, should be controlled, the creation of jobs requiring new and different knowledge and skills should be encouraged while establishing the necessary human capital and reaching the required level of knowledge should play a key role. Simultaneously, the knowledge level of

the population should be rapidly increased by improving the quality and availability of education and training, as Hungary will otherwise not be able to join the Fourth Industrial Revolution characterised by a rapidly changing technological environment by stepping on the path of knowledge- and innovation-based competition. Ultimately, this is how the continuous availability of the budget resources required for sustainable economic and social development can be ensured.

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