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## The study of using information and communication technology in Hungary and in the 27 countries of the EU

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**Abstract—** The rate of personal computers and workstations in the 27 countries of the EU reached 96 %. The biggest backlog can be observed in the number of enterprises having and maintaining a website. Hungary's rate of 47 % is less than the EU average by 13 % and this rate was enough to overtake only two countries (Latvia and Portugal). In terms of small-sized enterprises having Internet access, Hungary, with 85 % came in last behind Lithuania (86 %) among the surveyed countries. The average penetration rate of intranet in the EU-25 was double than that of Hungary's.

**Keywords—** Internet access, Local Area Network, Intranet, Proportion of using banking and financial services

### I. INTRODUCTION

Numerous well-known theories have emerged out of the intertwining of historical sociology, social philosophy and culture theory, operating with more and more daring categories as information society is advancing. The most comprehensive domain for exploration is designated the “civilisation theory” level. (The “great narrative” – the civilisation theory as context – macro level)

The early literature written about information society by the Japanese Tadao Umesao [7], the Canadian Marshall McLuhan [5] and the American Alvin Toffler [6] took this approach when they studied information society in order to formulate a coherent system. It is undoubtedly the information-based civilisation theory of the Japanese Shumpei Kumon [4] that represents the most daring intellectual quest in the subject.

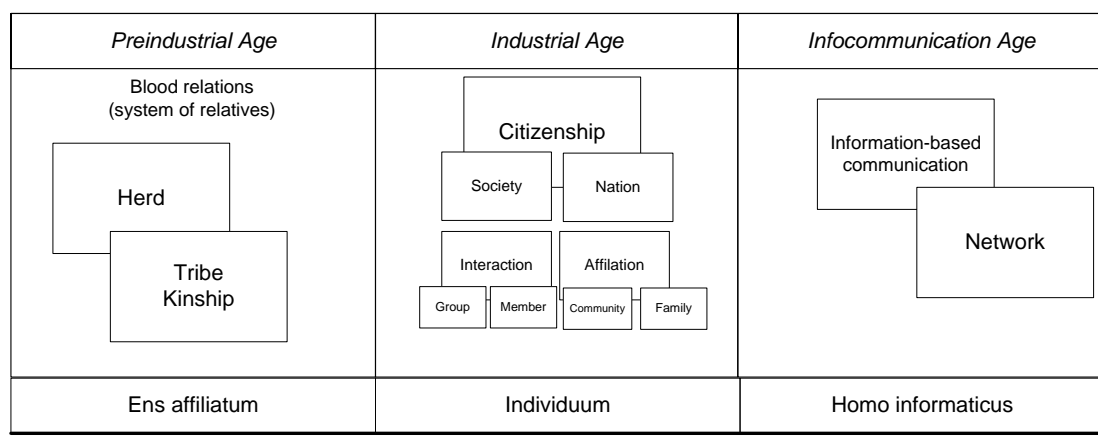


Fig. 1 Connection between civilization ages and the individual [1]

The civilisation theory approach takes the entire discipline of social history as its subject matter: presenting the information society in this context as fundamentally the end product of an intellectual process and not its actual subject. When the time came for the idea of “paradigm change” to be introduced into the public discourse, it was world history and analyses embracing periods of hundreds of years that provided the terminological toolkit to precisely and tangibly describe the depth, dimensions, scale, significance and evolutionary pattern of the ongoing processes. Since it has been accepted that this change is really taking place, the horizon and the time axis have become narrower but the questions posed by authors are those most socially

comprehensive. For example, how do techniques of community organisation and co-ordination replace each other and change? How does the human psyche change? How are mechanisms of economic and political control transformed and what impact does this have on the environment and the relationship between man and nature?

*A. The “small narrative” – development theory as context – the meso level*

There is no doubt that Manuel Castells' [2] applauded trilogy *The Information Age* is the high point in the use of that small narrative genre up to now. The strivings of leading economic researchers, sociologists and political scientists to chart the most important structural principles and transformational logic since the 1960s reaches its zenith with this work. Castells manages to surpass traditional reasoning by offering a compact and multilayered foundation linking economic and political, as well as cultural theory. He has provided so far the most complete empirical embedding (with volumes of data queues) and at the same time created a unified terminological framework by the consistent application of the principle of the “network” for the study of the new set of social phenomena pertaining to the information society. After Castells, no matter how excellent they may be, “single-viewpoint” approaches seem jaded and lacking. Thus, there is a fount of exciting issues below the civilisation theory system level, too.

Dozens of new and fundamental phenomena can be found in the small narrative, their shared feature being that they all operate on a highly abstracted level when discussing issues of transformation in individual social subsystems; the network economy, new social and community phenomena, the generation of the digital era, characteristics of the new means and media environment, the power and communication pattern of the new world order, the rise of cyber science. These issues are related to various prominent “problem groups”; there are the issues pertaining to information inequalities, most often discussed in the form of analyses of the digital divide; there is the complex set of questions related to information literacy, which touches upon important disciplines ranging from pedagogy to psychology; there is the multidisciplinary interpretation of the information games between citizens and authority; as well as the legal and legal-philosophical problems generated by production and consumption of intellectual goods.

In addition to the above, the small narrative responds sensitively to the dynamics and structural transformations in already existing information societies. It addresses questions such as what stages, models and types exist within information society development and what rules it is governed by. What new information does the study of information society produce? How could the new and comprehensive individual “paradigms” be best captured? (For example, by introducing expressions such as ambient intelligence used to denote the universal environment of means and transactions, by a diverse analysis of the “virtual” dimensions of reality, or by exploring the internet phenomenon using a comprehensive and complex social science approach.)

*B. The “mini narrative” – praxis and reflection – micro level*

The vast majority of mini narrative texts are produced in workshops and by authors who explore certain smaller slices of reality that are significant for practical considerations, while typically looking for answers to challenges in their own discipline or having found a location for their discussions in the digital context.

As the means and institutions network built around information and communication technologies – from mobile telephones and internet service providers, information desks at railway stations to libraries and archives – interpenetrates every area as an “application”, every “meeting point” becomes a theme giving rise to a whole range of tasks to be discussed and researched along the lines of fact finding, information proliferation and contextualisation.

The practical aspect of the mini narrative reveals itself in its purest form where direct intervention is a prerequisite for finding new information. In the case of economic players this means product development and innovation. In the public sphere it appears as information strategy, that is, information-conscious political planning as a new practice of social and economic control focusing on issues pertaining to information society. Information strategies or rather programmes aimed at building the information society, added a series of contextual sciences into their own arsenal, and as a result of this freedom of information and information privacy have gained greater importance than before.

## II. STUDYING THE 'MINI NARRATIVE' WITH THE HELP OF SIMPLE INDICATORS

The rate of personal computers and workstations in the 27 countries of the EU reached 96 % in 2010. The lowest penetration rate was found in the case of Romania (82 %), Bulgaria (83 %) and Lithuania (91 %) in the Eurostat database. The largest growth in penetration was experienced in the United Kingdom (16 %), Portugal (13 %) and the Netherlands (5 %) between 2006 and 2010. Hungary, with its rate of 3 %, exceeded the average growth of the EU-25 by 1 %.

It is characteristic to the scale of Internet access that 78 % of the enterprises in Hungary benefit from the opportunities provided by the Internet, which was an increase of 16 % in 2008 compared with the two previous years. The reported net turnover realized through computer networks was 41784.4 billion HUF in 2008, an increase of 7.5 % compared with the two previous years.

With its 80 % rate of Internet access, Hungary lagged behind the EU average by 13 % in 2008. Among the 10 new member states joining the EU in 2007, the average was exceeded by Slovenia (96 %) and The Czech Republic (95 %) and was reached by Slovakia (93 %).

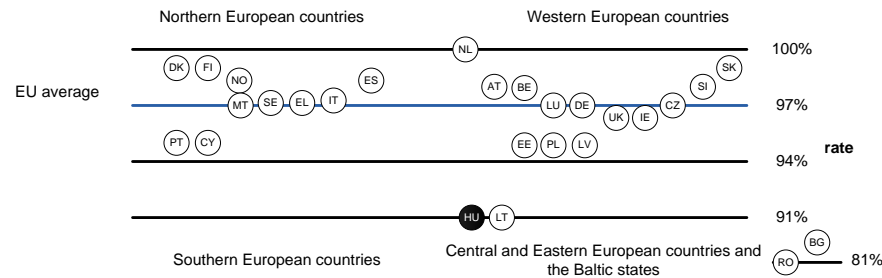


Fig. 2 Proportion of enterprises using personal computers in the 27 surveyed countries in 2010<sup>1</sup> [3]

The biggest backlog can be observed in the number of enterprises having and maintaining a website. Hungary's rate of 47 % is less than the EU average (63 %) by 13 % and this rate was enough to overtake only two countries (Latvia with 39 %, Portugal with 42 %). In Slovakia, the rate of enterprises increased from 47 % in 2006 up to 70 %. A 17 % growth could be observed in the Netherlands, Portugal, Spain and the United Kingdom during this period. The Czech Republic reached a threefold increase compared with the EU average of 5 %, while Hungary could take pride in its 12 % increase.

Based on the first quarter records of Eurostat's dataset in 2008, the penetration of Internet access reached 86 %, which showed an 8 % growth compared to 2007. During this period, the average of EU-25 increased from 89 % to 95 %.

The following countries showed a spectacular growth in this respect: Slovakia (from 71 % to 98 %, Latvia (from 74 % to 86 %), the Netherlands (from 88 % to 99 %) and Portugal (from 77 % to 90%). Based on these data, after leaving three countries behind in 2007, Hungary produced the lowest rate of penetration in 2010.

In terms of Internet access, Hungarian small-sized enterprises were behind the average of the EU-25 by 9 %, while in the case of medium-sized enterprises and corporations the handicap was 3 and 2% in 2010 according to Eurostat.

In terms of small-sized enterprises having Internet access, Hungary, with 85 % came in last behind Lithuania (86 %) among the surveyed countries. Although there was a 10 % increase between 2007 and 2010 (the increase rate in the EU-25 was 6 % during the same period), it was not enough for Hungary to make up lost ground. If we compare the rate of small-sized enterprises having Internet access to those of the 10 new member states, lower levels were recorded only in Romania (63 %) and Bulgaria (70 %).

In terms of medium-sized enterprises having Internet access, Hungary continued to remain at the bottom of the table with its 96 % among the countries joined the EU in 2007 and before. It is worth noting that the rate of increase was 9 % between 2007 and 2010 as compared to the average growth of 2 % in the EU-25.

As regards corporations having Internet access, the penetration rate in Hungary was 98 %, putting the country on the same level as Slovakia, Lithuania, Norway and the newly-admitted Bulgaria.

When studying the penetration of Internet access in the Hungarian 'Manufacturing' sector, it can be stated that it was 8 % below the EU-25 average (94 %) according to Eurostat. The growth rate was 10 % within the studied three-year period. It must also be noted that this pace of growth cannot be regarded as unique, Portugal's penetration rate, for instance, grew from 77 % to 89 % within the same three-year period. Hungary, with its penetration rate of 86 % in the studied economic sector, could overtake only Lithuania (82 %). Even lower development levels could be observed in the newly-admitted Bulgaria (73 %) and Romania (66 %).

Based on the data for 2009, the penetration rate of enterprises having Internet access in the 'Electricity, gas and water supply' sector caught up with the EU average, which stood at 95 %. Those countries being overtaken by Hungary in this sector were Lithuania (93 %), the United Kingdom (93 %), Norway (93 %) and, of course, the two newly-joined countries.

Looking at the penetration rate of Internet access in the 'Construction' sector in 2010, it can be stated that Hungary, with its 86 %, was 8 % below the EU-25 average but it could overtake such countries as Cyprus (78 %), Portugal (80 %) and Romania (74 %). The pace of growth accelerated to more than 9 % between 2007 and 2010. Nevertheless, Hungary produced the same rate of penetration as Belgium did in 2006.

In international comparison, the penetration rate of 87 % in the 'Wholesale and retail trade, repair work' sector showed a very low level of usage in 2010. The EU-25 average was 7 % higher than that of Hungary's. Yet, Hungary's pace of growth was 12 % altogether within the studied three-year period. With the exception of Lithuania, every country having joined the EU before 2007 produced more favourable rates.

<sup>1</sup> DK= Denmark, FI= Finland, SE= Sweden, NO= Norway, LU= Luxembourg, BE= Belgium, NL= The Netherlands, DE= Germany, UK= The United Kingdom, IE= Ireland, AT= Austria, CY= Cyprus, MT= Malta, EL= Greece, ES= Spain, IT= Italy, PT= Portugal, SI= Slovenia, CZ= The Czech Republic, SK= Slovakia, LV= Latvia, PL= Poland, EE= Estonia, HU= Hungary, LT= Lithuania, RO= Romania, BG= Bulgaria.

In the 'Transport, storage and communication' sector a 5 % handicap could be detected compared to the EU-25 average. The Hungarian penetration rate in this sector in 2007 caught up with the EU average in 2007. Apart from the newly-admitted countries, only Lithuania and Cyprus registered lower rates.

In the 'Real estate, renting and business activities' sector the penetration rate of having Internet access (88 %) was 10 % below the EU average. This was the biggest handicap observed among the six studied economic sectors. With this poor result, Hungary dropped to the bottom of the table among the studied countries.

The average penetration rate of intranet in the EU-25 was double than that of Hungary's in 2007. With that penetration rate, Hungary was last in that year. In 2010, the EU average increased to 35% (a very slow, 1 % growth in three years), whilst Hungary reached a 22% rate in terms of enterprises using intranet. This rate caught up to the level registered in The Czech Republic and Germany in 2007 or to the level registered in Romania in 2009.

Internet-based EDI was used by 12% of enterprises in 2008 and 36 % of them in 2010. Non-Internet EDI was used by 9% of enterprises in 2008, whilst this platform was used by 20% of them in 2010.

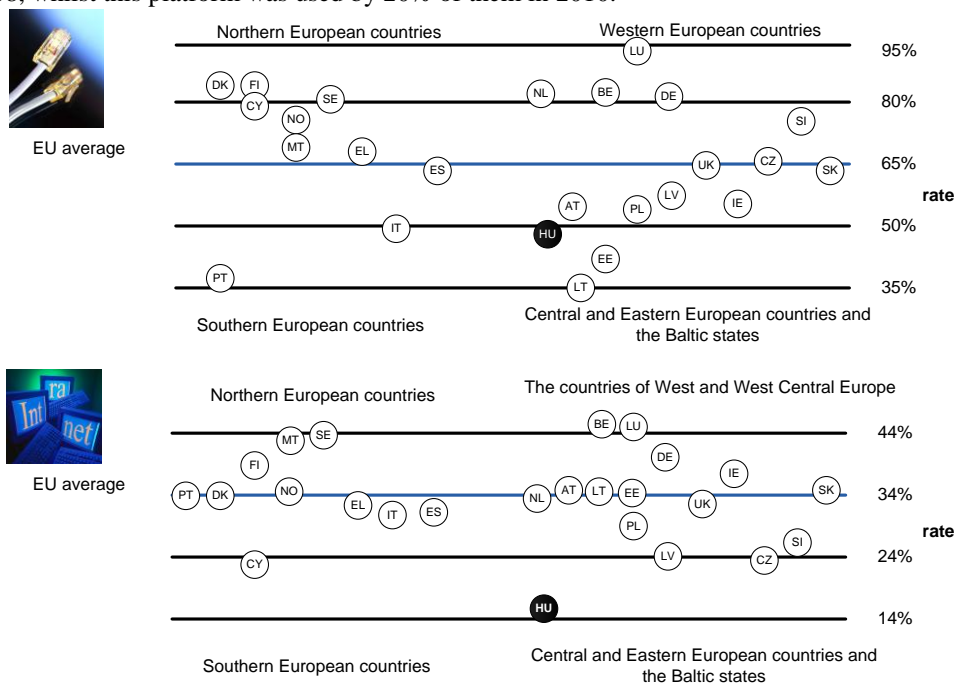


Fig. 3 Proportion of using Local Area Network (LAN) and Intranet by business organizations in the EU countries in 2008 [3]

If we take a look at the penetration of Local Area Networks in international comparison, it can be observed that the rate among small-sized enterprises was nearly half of the EU-25 average, and the handicap was 11% in the case of medium-sized enterprises in 2008. The penetration of Intranet shows an even gloomier picture as Hungary held the last position in terms of small- and medium-sized enterprises among the 24 surveyed countries (24 member states without France, Norway included).

Extranet was used by more than one-fifth of corporations, one-tenth of medium-sized and 4% of small-sized enterprises; it was only used by nearly 2% of microenterprises. The 4-% rate of small-sized enterprises was 10% less than the average of the EU. Among the newly-admitted countries the penetration rate regarding this company size was 13% in Romania and 2% in Bulgaria. Naturally, this rate was significantly higher in the case of the existing member states. The penetration rate observed among medium-sized enterprises was almost one-third of the EU average, which stood at 29% in 2010. This figure is the same as that of Lithuania in 2007 and Portugal in 2008. The usage of extranet in corporations in Hungary was 27% less than the EU average, which stood at 48%. That is the poorest result among the surveyed countries.

In international comparison, the 47 % penetration rate of using Local Area Networks was 14 % lower than the EU-25 average, with this result, Hungary held the last position among the 24 surveyed countries. The result was even more unflattering in the case of using extranet: its penetration rate in Hungary was less than third of the EU average (14% and 4%) in 2010. Only Lithuania was overtaken by Hungary among the surveyed countries with this figure. In the 'Manufacturing' sector, the rate of using intranet was 33% in the EU and 19% in Hungary. With this figure, Hungary held the last but one position, overtaking only Cyprus (13%).

The 'Electricity, gas and water supply' sector showed better results than the national average in each and every studied parameter. The penetration rate was over 90% in the usage of personal computers, mobile phones and e-mails. It was over 80% in the usage of Local Area Networks. In the case of using Wireless Local Area Networks, this sector reached a penetration rate of 17%, which was the highest compared to all the other sectors. The use of intranet was above 49%, 27 % higher than the

national average in 2010. With this rate, Hungary managed to overtake Estonia (38%), Lithuania (19%) and was at the same level as the Czech Republic (49%). The use of extranet was 19%, being three times higher than the national average in Hungary in 2010. This figure was higher than that of Lithuania (15%), Estonia (13%) and Cyprus (13%).

In the 'Construction' sector, the penetration of personal computers was 87%, 2.5 % lower than the national average in 2008. The use of mobile phones was 89%, allowing this sector to hold the 9th position among the 13 surveyed sectors in the same year. The penetration of using Local Area Networks was 8 % lower than the national average. The penetration of Wireless Local Area Networks and Wide Area Networks was below 6%. The combined penetration rate of intranet and extranet slightly exceeded 17% (16.1% and 1%). The use of intranet was 4 % less than the EU average in 2010. This rate was higher than in Spain (12%), Cyprus (8%), the Netherlands (14%) and Slovenia (10%). (It can be explained by the fact that the use of extranet is more widespread in the aforementioned countries as the system integration reached a higher level there.) The use of e-mails was around the average with 74%.

Similarly to the 'Electricity, gas and water supply' sector, a higher penetration rate was measured than the national average in every surveyed parameter in the 'Wholesale and retail trade; repair work' sector. The use of personal computers was 93% and the use of mobile phones was 92% in 2008. The penetration rate of using Local Area Networks was 55%, the 4th highest rate among the other economic sectors. In terms of the penetration of Local Area Networks, this sector in Hungary was only the 18th among the 24 surveyed countries. Every tenth enterprise operating in this sector used Wireless Local Area Networks. The penetration of Wide Area Networks was 14%, while the penetration rate of intranet stood at 24%. The penetration of extranet was considerably low, only 7% in 2010. The penetration of extranet was one-third of the EU average, while the same figure was 60% in the case of intranet. Three in four enterprises used e-mail in this sector.

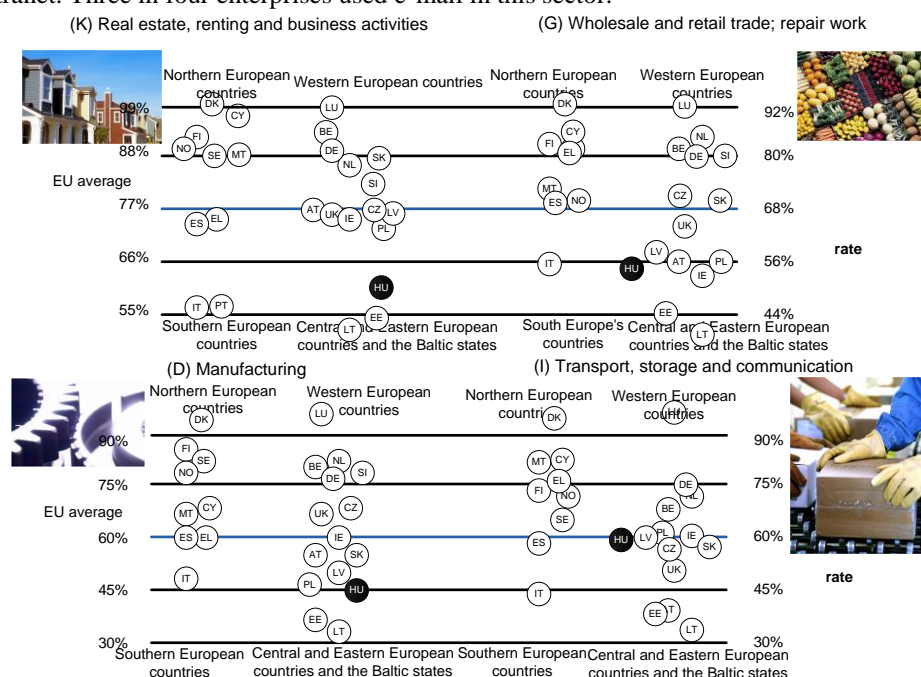


Fig. 4 Proportion of using Local Area Network by economic sectors in certain EU countries in 2008 [3]

In terms of using ICT devices, the 'Hotels and restaurants' sector produced a worse result in every studied parameter compared to the national average. The penetration rate of Local Area Networks was remarkably low with its 30%. The use of e-mail was only 55% (by far the worst figure among the surveyed economic sectors). The penetration rate of mobile phones was last but one with 78% among the surveyed sectors. The penetration of Wide Area Networks was only 2.7%, showing the lowest rate among the other sectors.

In the 'Transport, storage and communication' sector the use of mobile phones and personal computers showed a penetration rate above 90% in 2008. The use of mobile phones was particularly high with 99%, producing the highest figure compared to the other sectors. The penetration of Local Area networks was also high with 60%. It could be observed that there was no rate below the national average in this sector. In terms of Local Area Networks, the sector's position was quite favourable even in international comparison, as it reached the EU average. In terms of using intranet, this sector produced the lowest rate among the surveyed countries in 2008 [Figure 34]. The penetration rate of using intranet in the EU was 32%, 6 % higher than that of Hungary in 2010. With this figure, Hungary could overtake only Lithuania last year.

The EU average rate was 16% in the case of using extranet; the Hungarian average was only 7% in this sector. This was the lowest rate measured among the surveyed countries.



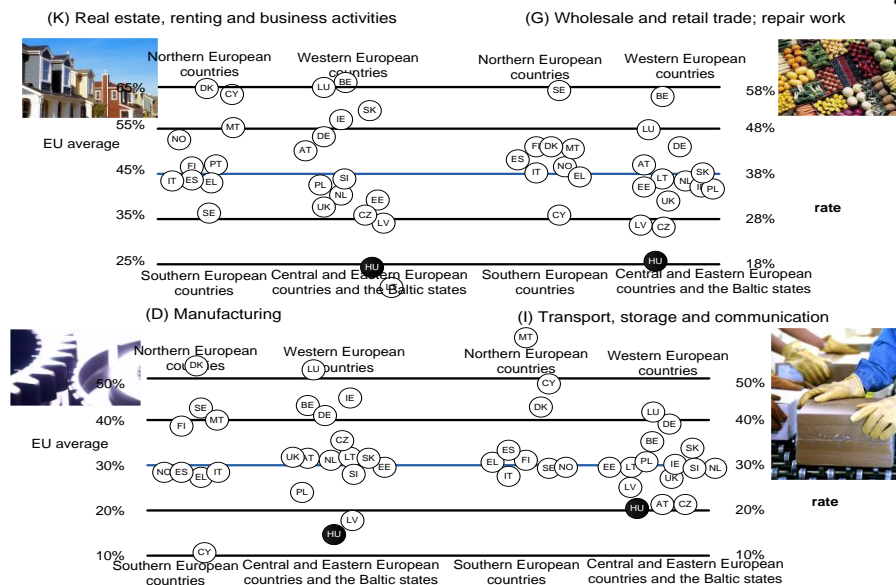


Fig. 5 Proportion of using Intranet by certain economic sectors in the EU countries in 2008 [3]

### III. THE STUDY OF UTILIZING INFORMATION AND COMMUNICATION TECHNOLOGY

The analysis of the purposes of using the Internet belongs to the qualitative indicators of the development. The number of enterprises having Internet access is only a rough indicator of an otherwise dynamic growth; we can obtain a more detailed picture by reviewing what the Internet is exactly used for.

Analysing Internet usage preferences, it can be stated that the ranking of the most important purposes in using the Internet did not change essentially compared to the ranking in 2005. Enterprises using the Internet were mainly online for searching for information (96-98%) and sending and receiving e-mail (91-98%). The access to education and training materials increased year by year (17% in 2005 and 43% in 2010), as well as the role of advertising and marketing (40% in 2005 and 64% in 2010). A spectacularly dynamic increase could be observed in using banking and financial services (46% in 2006 and 64% in 2010). Market tracking became more important for enterprises as it increased by 14% (40% in 2006 and 54% in 2010).

The role of buying and selling products and services was also significant (28% in 2008 and 49% in 2010). The access to after sales services attracted considerably less enterprises to the Internet (13% in 2008 and 25% in 2010). Based on these figures, it is clear that beside searching for information and sending and receiving electronic letters, other activities were becoming more significant on the Internet. In international comparison, the penetration rate of after sales services was 33% in the EU in 2010. In some northern countries (Sweden, Iceland and Norway), the same figure reached 70%. The penetration rate was more or less the same as Hungary's in the following countries: Austria, Latvia, Poland and Romania. The Czech Republic, Germany and Denmark produced rates around 50%.

The average penetration rate of using banking and financial services in the EU was nearly 80% [Figure 41]. Countries showing the highest rates were Denmark (93%), Slovenia (92%), Finland (91%) and Sweden (90%). Rates below 70% were observed in Hungary and in the newly-admitted countries, Romania (42%) and Bulgaria (44%).

The significance and the occurrence of market tracking has been declining in the EU year after year. The average rate of this activity was 49% in the EU-25, which was less by 4% than in 2008. The highest rates were shown by Slovenia (73%), Slovakia (70%) and Sweden (70%). According to my assumption, ICT with its devices is shifted from primary information extraction to information service. (It can be proven by the growth of penetration.) This could also be explained by the fact that in several countries such as Belgium, Bulgaria, The Czech Republic and Spain higher or lower penetration rates could be experienced instead of a monotonical decrease.

Although the access to education and training materials was not measured by the EU, the penetration of e-learning, which means web-based distance education using by ICT devices, is well-documented. This activity was quite rare among Hungarian enterprises with a rate of 16% in 2010, which was 6% less than the average of the EU.

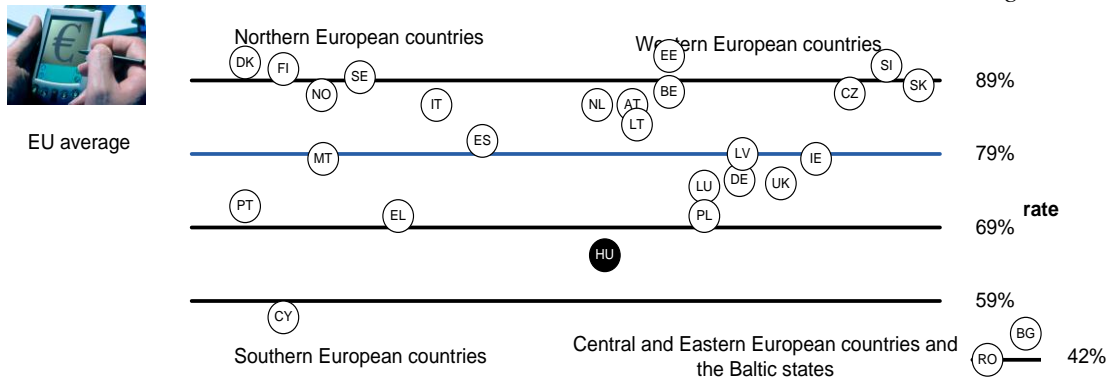


Fig. 6 Proportion of using banking and financial services in certain EU countries in 2010 [3]

In international comparison, the penetration rate shown by 'Manufacturing' (81%) was 10% less than the EU-25 average. With this result, the Hungarian 'Manufacturing' sector held the 18th position among the surveyed 24 countries.

The 'Wholesale and retail trade; repair work' sector became last but one with 80% compared to the other surveyed countries. 'Real estate, renting and business activities' with its 80% showed a rate 14% less than the EU-25 average, taking the last position among the surveyed countries.

#### IV. CONCLUSIONS

The rate of personal computers and workstations in the 27 countries of the EU reached 96 %. The lowest penetration rate was found in the case of Romania (82 %), Bulgaria (83 %) and Lithuania (91 %) in the Eurostat database. The biggest backlog can be observed in the number of enterprises having and maintaining a website. Hungary's rate of 47 % is less than the EU average (63 %) by 13 % and this rate was enough to overtake only two countries (Latvia with 39 %, Portugal with 42 %). In Slovakia, the rate of enterprises increased from 47 % in 2006 up to 70 %. A 17 % growth could be observed in the Netherlands, Portugal, Spain and the United Kingdom during this period. The Czech Republic reached a threefold increase compared with the EU average of 5 %, while Hungary could take pride in its 12 % increase. In terms of small-sized enterprises having Internet access, Hungary, with 85 % came in last behind Lithuania (86 %) among the surveyed countries. Although there was a 10 % increase between 2007 and 2010 (the increase rate in the EU-25 was 6 % during the same period), it was not enough for Hungary to make up lost ground. If we compare the rate of small-sized enterprises having Internet access to those of the 10 new member states, lower levels were recorded only in Romania (63 %) and Bulgaria (70 %). The average penetration rate of intranet in the EU-25 was double than that of Hungary's.

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