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INTERNET INFRASTRUCTURE AND ITS USAGE IN POLAND AND OTHER EUROPEAN UNION MEMBER STATES

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One in four of all households in Poland does not have access to the Internet, while in the EU15, the same refers to only one in every six households. In this paper we analyze the Internet infrastructure from both supply (broadband coverage-speed) and demand (usage of Internet by individuals-SMEs) side, as well as the affordability aspect. In particular, we search for biggest gaps of Poland's Internet infrastructure in comparison to other European Union Member States (EU15 and NMS12). Our empirical analysis is based on European Commission's and ITU's databases. Moreover, we provide some recommendations for the government and enterprises exposing the biggest gaps of Poland and emphasizing the beneficial impact of the Next Generation Access networks.

Keywords: Internet Usage, Broadband Coverage, Broadband Speed, Internet Affordability, NGA

1. Introduction

One of the most important aspects for the development of digital market, and the economy as a whole, is effective and fast broadband connection which enables its' users a productive access to the Internet [1]. The main advantage of having fast broadband connection is ability for the user to transfer bigger amount of data at the same time. With the forthcoming Digital Single Market, it is especially crucial for the small and medium enterprises (SMEs) and start-ups to have a connection with the speed of at least 30 Mbps, in order to be able to compete in the international environment.

According to the most recent ITU's database and [10], every third Polish citizen does not use the Internet, while in the EU15 it is only about every sixth person and in NMS12 it is about every fourth citizen (see Figure 1). The ratio of people in Poland not using computer is 3 p.p. higher than those not using the Internet, giving a total of 36%. These ratios are of course highly correlated. This is an important starting point to know the overall situation of Internet infrastructure usage in Poland.

Figure 1. Percentage of people not using Internet (2014) and computer (2013)

To understand better the complexity of Internet infrastructure we present the scheme (Figure 2) of the most commonly used technologies by Internet users. In addition to the scheme we could add 5G technology which is recently being dynamically developed. The main focus in the international discussion on 5G is creating the one single worldwide standard for this technology to avoid problems that occurred with previous technologies (3G and partly 4G).

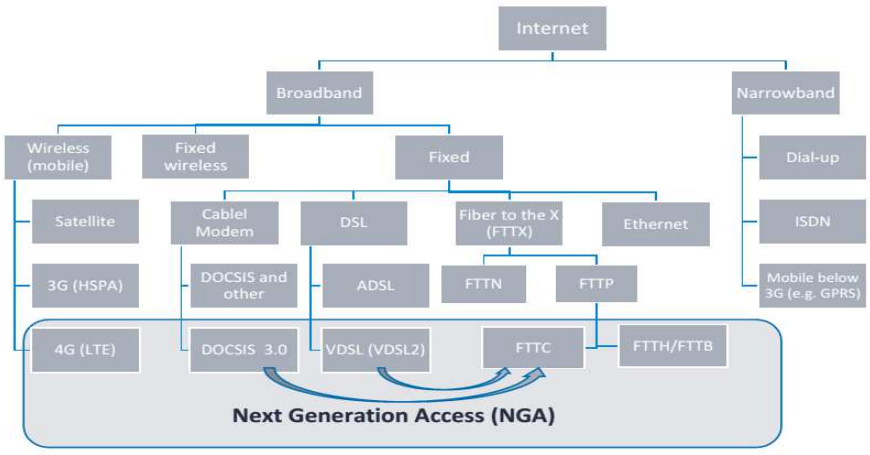

Figure 2. The most common Internet technologies' scheme

In this paper we are going to focus mostly on three most commonly used technologies:

a) DSL (Digital Subscriber Line) – offering slower but more stable speeds
b) Cable modem (TV network) – offering faster but less stable speeds (congested connection during rush hours, "flapping")
c) FTTP – fiber optic cables offer highest speeds without any inconvenience.

Aims, methods and methodology

The aim of this paper is to analyze in a comprehensive way the Internet infrastructure (broadband development) and its usage in Poland in comparison to other European Union states and indicate biggest gaps. More specifically we want to answer what are the Polish biggest gaps from the supply and demand side of Internet infrastructure.

Methods used in this paper are clear and straightforward. We use the two official databases, namely Eurostat comprehensive database [8] and International Telecommunication Union (ITU) database [12]. Using the newest possible data in these databases, we present descriptive statistics as we believe it is the most effective way to answer our research questions.

The methodology chosen for this study is to firstly analyze the broadband (Internet) infrastructure from the supply side i.e. coverage: the rational for this choice is if there was no coverage in the first place, there would not be any usage of Internet. Afterwards, in section 3, we analyze the price of Internet which is a result of the supply and demand side of Internet infrastructure. Then finally, after understanding the supply side including prices of Internet, we can understand the demand side (i.e. Internet usage) easier. In the last section we summarize the paper with most important findings and give some policy recommendations.

2. Broadband supply – coverage

Digital Agenda for Europe has recently met its key objective of providing coverage of broadband (download speed above 2 Mbps) for every citizen of European Union [7]. If we include satellite wireless Internet, the whole EU territory is covered, as this technology is even available at seas. Excluding satellite Internet, broadband covers about 99.4% of EU households [3].

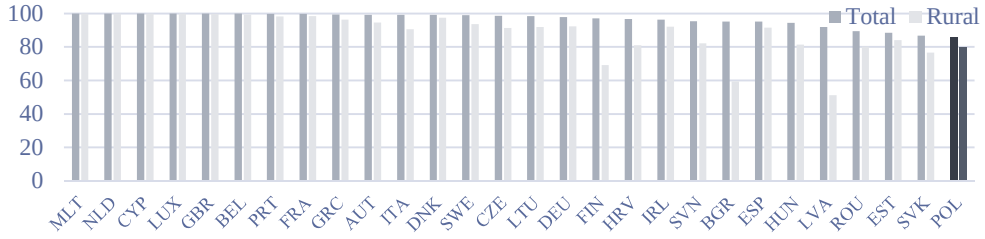

Figure 3. Fixed broadband coverage (2015)

Poland is surprisingly lagging behind all EU countries having 80% rural and 85% total fixed broadband coverage, compared to almost 100% coverage in Malta, Netherlands, Great Britain or Belgium (Fig. 3). The statistics that should rise more concern are presented in Fig. 4 showing the Next Generation Access (NGA) coverage. There is a significant gap between Poland and other EU members in NGA networks coverage, which provide speed of at least 30 Mbps. Considering the future needs of the market, it is highly important to invest in optical fiber cables on which NGA technologies are based.

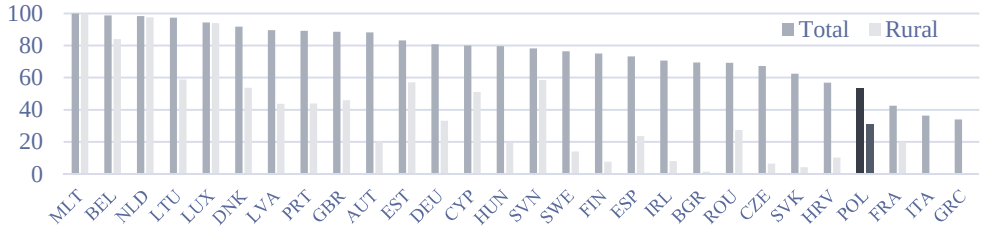

Figure 4. NGA Coverage - VDSL/VDSL2, DOCSIS 3.0, FTTP (2015)

Even though the investment in optical fiber wires is considerably expensive, it should be a priority project for policymakers. We must look not only at the financial profits that can be measured now and mostly are determined by just the profit coming from the subscription to Internet providers. Every citizen and enterprise should have the possibility to access high-speed broadband, as it can significantly improve the efficiency of using the Internet and improve the quality of life in general. Then, if utilized effectively, it is an up-and-coming, and soon can be the only way for effectively developing our economy and catching up with the most prosperous countries and what is more important - competing with them [14].

We can also see a significant gap in terms of NGA coverage in rural areas. It may result from the fact that there is a little demand for high speed Internet in majority of these areas, so the investments are not profitable. In one project in rural areas, TP S.A. and UKE built a brand new fiber network but it has been only

utilized by about 10-15% of the households [13]. This example shows how important is not only the *broadband mapping* [5] but also acknowledging the society about the benefits of access to the high speed Internet, which will be discussed in the further part of the article.

2.1. Fixed broadband coverage by type of technology (including NGA)

According to Figure 5, coverage of FTTP technology in Poland is on extremely low level. Surprising fact is that a lot of NMS12 countries, in particular Baltic States and Poland's southern neighbors like Slovakia and Slovenia, have already invested in fiber optic cables. This should be a positive incentive for Polish policymakers to do the same in order not to lose a competitive advantage right from the start.

When it comes to cable modem and xDSL technologies, the situation is slightly better for Poland in comparison with other EU countries. But the further development of these technologies would be based on fiber optic technology anyway. Fiber cables are remarkably enhancing a quality of connection and, as a matter of fact, currently there is no better alternative for fiber.

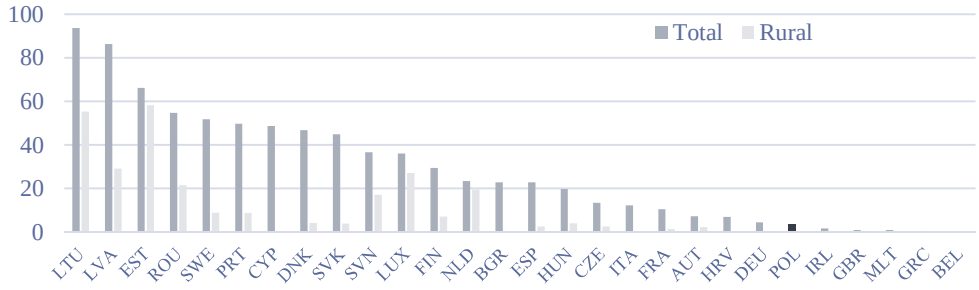

Figure 5. FTTP coverage (2014)

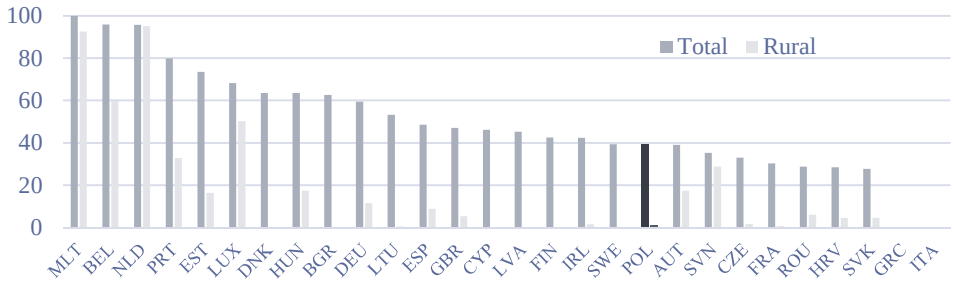

Figure 6. Cable modem coverage (2014)

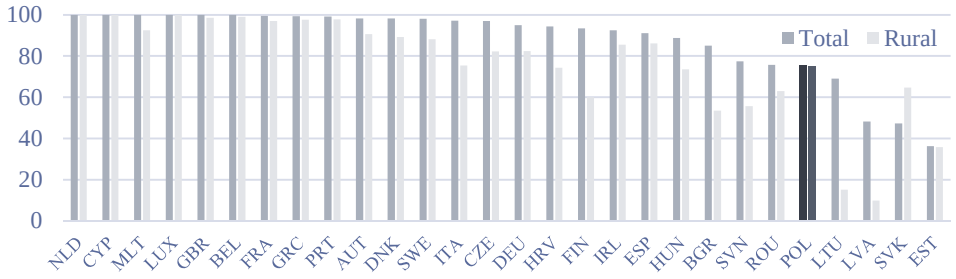

Figure 7. xDSL coverage (2014)

2.2. Fixed broadband coverage by speed

European Commission's Digital Agenda for Europe 2014-2020 implies that by 2020 everybody should be able to have access to high speed broadband with at least 30 Mbps download speed, and half of the Europe should be covered by broadband with at least 100 Mbps download speed [2]. As for now, almost every citizen in European Union is enabled to have an access to Internet with at least 2 Mbps download speed, but Poland is one of worst broadband-covered country in Europe.

Poland is also lagging behind other EU countries in terms of coverage of both fast (30 Mbps) and ultra-fast (100 Mbps) broadband, with only 45% and 30% households covered respectively. It is important to enable citizens an access to such high-speed broadband connections, especially if we can see that other EU countries (at similar level of economic development) were able to do so.

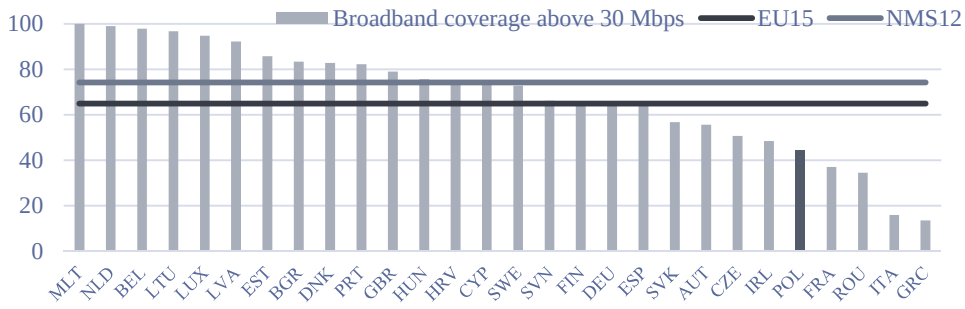

Figure 8. Fixed broadband coverage above 30Mbps (2014)

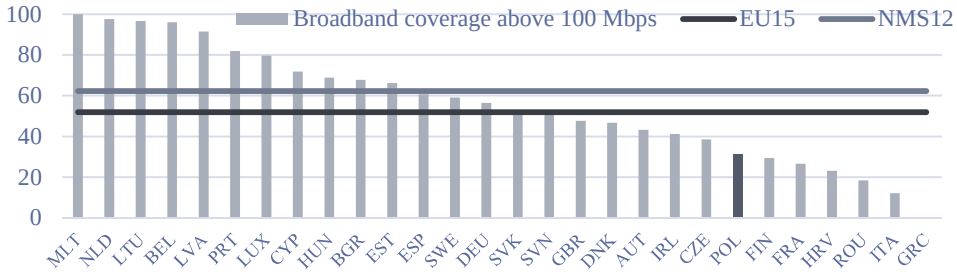

Figure 9. Fixed broadband coverage above 100 Mbps (2014)

3. Broadband affordability – prices

There is a positive development in terms of prices of the high speed Internet. Since the last couple of years, we are witnessing a decrease in prices with simultaneous increase in speed, offered by ISPs [4]. Affordable broadband connectivity to the internet is at the basis of modern society enabling the society to use and contribute economic and social benefits [11].

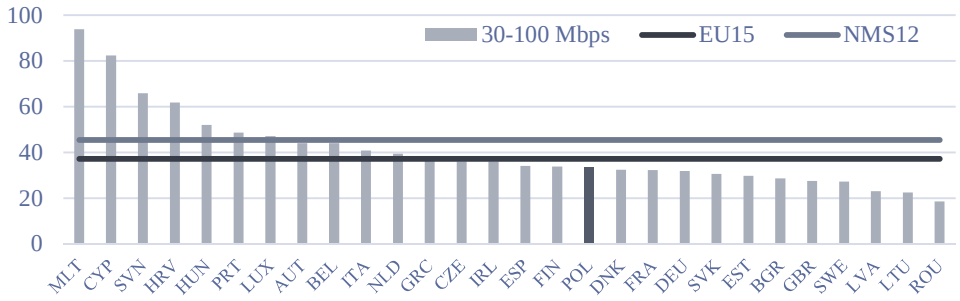

Figure 10. Median prices of the Internet with offered speed between 30-100 Mbps, measured as EUR/PPP (2014)

Median price of the 30-100 Mbps Internet, measured as purchasing power parity (EUR), is on the affordable level in Poland. Actually, the median offer of the Internet with speed between 30 -100 Mbps in Poland is lower than the median offer of the Internet with speed 12-30 Mbps. This may result from the fact, that the leading ISPs rarely offer speeds below 30 Mbps and for the smaller providers, offers from 12-30 Mbps range are the most expensive ones.

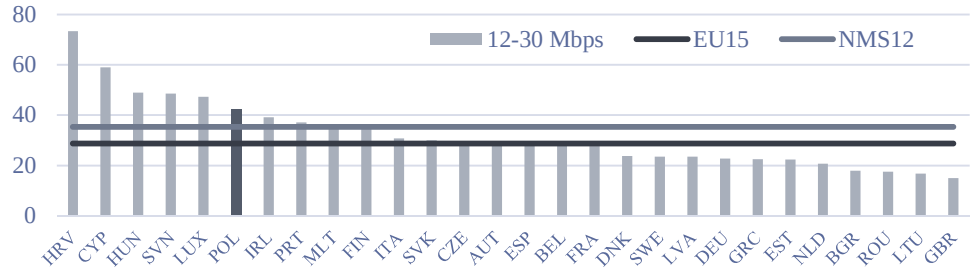

Figure 11. Median prices of the Internet with offered speed between 12-30 Mbps, measured as EUR/PPP (2014)

4. Broadband demand - access

After examining the supply side of broadband, it is worth taking a look at the actual demand for such service. Demand is measured with number of subscriptions as a percentage of total country's population. Generally, take-up of the high speed broadband across EU members still remains on a low level, but it is expected to continue to increase, considering growing number of demand-stimulating services.

4.1. Fixed broadband penetration

It is essential to understand, that nowadays the growth of the economy very much depends on the country's activity in utilizing new technologies. It is then quite disheartening that despite all the comforts of various online services, people are not interested in exploring it through the high-speed access, what unfortunately might be a big opportunity cost for the whole economy.

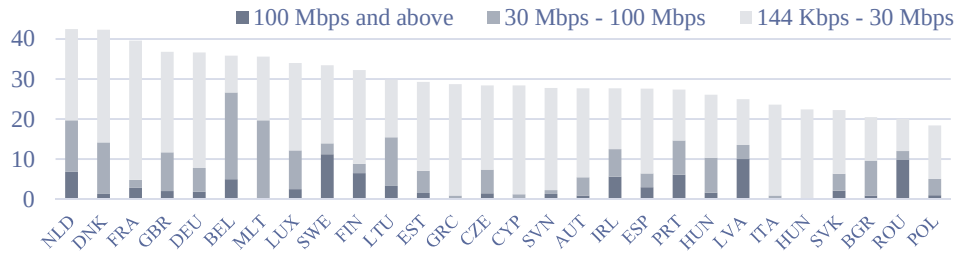

Figure 12. Penetration of the Internet broke down by speed, measured as subscriptions per 100 people (2015)

Poland's penetration of broadband is only at 18% level in terms of total number of subscriptions (which also include enterprises, institutions etc.) relatively

to country's population. Broadband take-up of at least 30 Mbps download speed is only at the 5% level in Poland, while penetration of the 100 Mbps Internet equals to only 1% of total population.

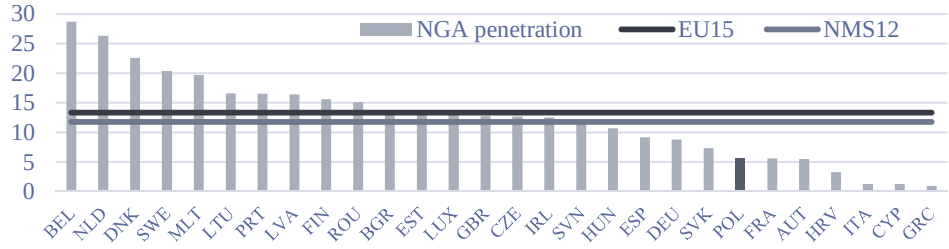

Figure 13. NGA Penetration, measured as subscriptions per 100 people (2015)

European market is mainly dominated by DSL technology. Cable modem, which has almost completely been upgraded to DOCSIS 3.0 standard (NGA), is steadily gaining its market share. Significant market share of FTTP networks can be observed, seemingly, in the countries which have the highest coverage of this technology.

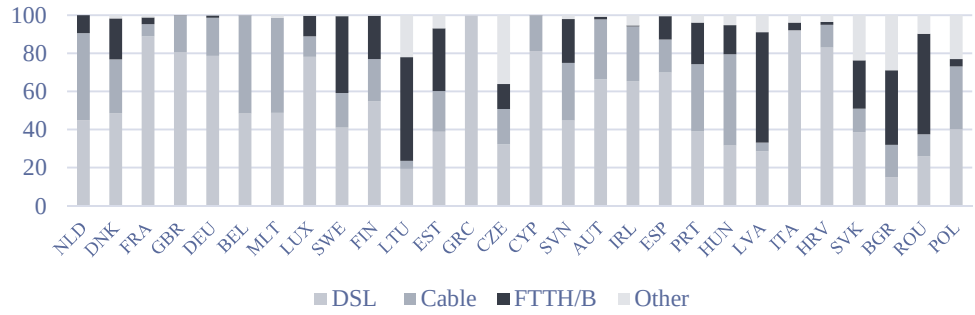

Figure 14. Market Share by technology (2015)

4.2. Use of the Internet by individuals

Up to every fourth Polish household declares not having an access to the Internet, while in EU15 it is, on average, only every sixth. Those households which have broadband access prefer a fixed type of connection, to which mobile broadband is rather complementary. In terms of mobile technologies' usage, every third EU15 household declares this type of Internet access, in Poland and NMS12 every fourth. Mobile broadband is predicted to develop rapidly in the near future according to many authors [9].

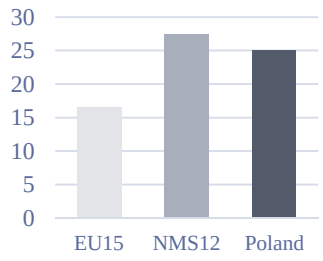

Figure 15. Households without access to the Internet (2014)

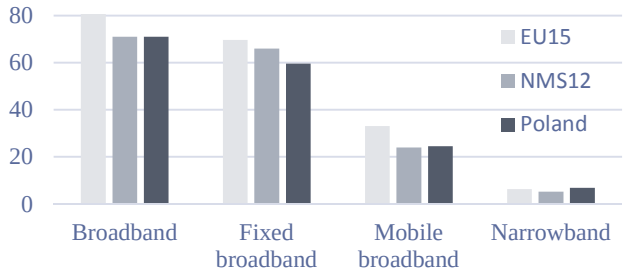

Figure 16. Households with Internet access by technology (2014)

The most common reasons for not having an access to the Internet were a lack of need for the Internet and a lack of sufficient skills. This is line with findings by the European Commission [6]. It is important to understand the real benefits coming from Internet usage, which can be encouraging to obtain, not so challenging skills. The biggest benefit of high speed Internet usage is an ability to transfer big amount of data at the same time. This refers not only to actual downloading or uploading a file, but especially it includes regular online activities which require more and more data transmission.

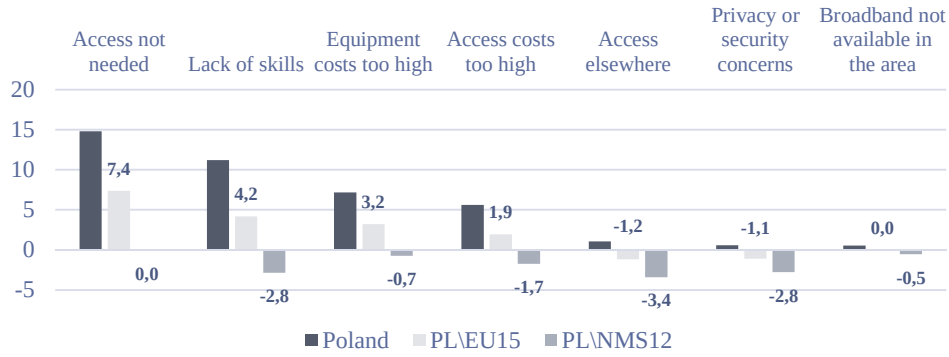

Figure 17. Reasons for not having Internet access (2014)

4.3. Internet take-up by Small and Medium Enterprises (SMEs)

The forthcoming Digital Single Market [7] should be a stimulating factor for Polish enterprises to prepare for it by taking up a high-speed broadband connection. It is crucial for SMEs to be able to compete within the Digital Single Market and this would be possible only due to the fast connections. The sooner the

preparation is going to be conducted, the bigger competitive advantage Polish SMEs would be able to gain over their European counterparts.

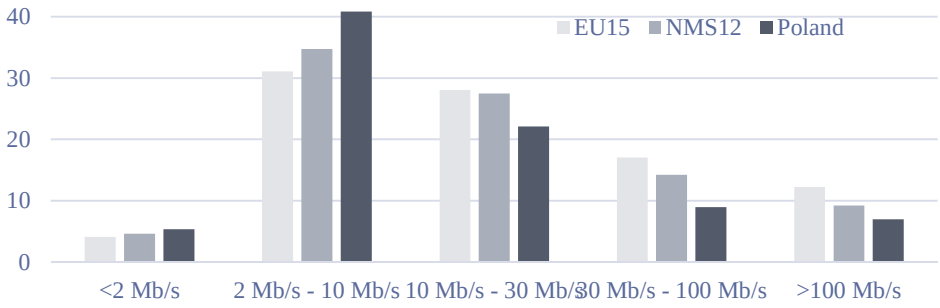

Figure 18. SMEs' Internet penetration by connection speed (2014)

The results from our study show that Polish SMEs are mostly using relatively low-speed broadband connections (2 Mbps-10 Mbps). This low-speed Internet broadband is becoming less and less popular overall, and we see that other EU SMEs have more adopted high-speed broadband. So as for now, Polish SMEs have an advantage in using slower connections which does not seem to be proper way for further development. This is also important for start-ups who should also consider taking up high-speed Internet, in order to be able compete with rapidly evolving economy due to developing Digital Single Market.

5. Summary and recommendations

We find that Poland is lagging behind other European Union countries in terms of broadband connectivity, especially when it comes to new technologies (Next Generation Access). Considering Internet supply in Poland, broadband coverage of NGA technologies, which are going to be a standard very soon, is at the forth lowest level in EU. FTTP technology, on which NGA is mainly based, covers only every thirtieth household in Poland compared to every forth in EU15 countries. It obviously translates to poor Poland's result in terms of coverage broke down by download speed. Only less than a half of the Polish households are enabled to access Internet with download speed of 30 Mbps, while in most European countries it is already two thirds of households.

A positive finding is the affordability of broadband in Poland. Prices of high-speed Internet in Poland are relatively low, also in terms of purchasing power parity. This has a significant impact for the current and future development of both the supply and demand side of the Internet economy.

From the demand side, we show that the demand for broadband in Poland, despite its' low prices, is one of the lowest compared to other EU countries. Polish citizens who are not using the Internet mainly explain it by no need for such service or lack of sufficient skills. Based on the results of our study we conclude that Polish small and medium enterprises are not utilizing the potential of high-speed Internet as well. Majority of Polish SMEs are still using Internet with downloading speed of between 2-10 Mbps, while in other EU countries enterprises tend to take advantage of higher speeds more frequently.

To overcome those deficits, collaboration among the whole community (government, enterprises and all citizens) would be essential. Government's duty is to initiate the whole process of modernization. It is important to do it as soon as possible in order not to stay behind other well-prospering countries and to start building a strong position on a global market. Public authorities should support and manage investments in the fiber technology by for example, broadband mapping. It is also very important to present the society benefits which are coming from utilizing high-speed Internet. Therefore, broadband users' role (both enterprises and citizens) is to explore the digital market and help to stimulate and fuel the Polish economy. Thus, enterprises ought to actively develop new services in order to encourage consumers to utilize the potential of new digital solutions.

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