

Appendix 2

Review of ICT hardware tools

This document is an appendix to the report, **ICT and social media as drivers of multi-actor innovation in agriculture – barriers, recommendations and potentials**, a report under the SCAR CWG AKIS, Lot 2.

The appendix gives a review of the ICT hardware tools available to actors in the innovation processes at different levels in different parts of the EU. We are interested in finding variation in relation to the availability, usage and capacity of ICT hardware tools across Europe, in order to be able to judge which software tools are relevant (Appendix 1) in which regions of EU. We define hardware here in a broad sense, including both the ICT devices (computers) and the internet connections. We only consider devices with internet connection (PC, tablet computer, smartphone, cell phone), as – in order to have an open and effective communication between actors in the agricultural innovation processes in the EU – it is necessary to have an efficient network structure and hardware tools to support those communication systems. The software programs need support from good internet access or else it will not be relevant for the average farmer to use the ICT platforms and utilize the possibilities of the social and professional platforms.

To establish an overview of the ICT platforms in the EU, we have evaluated recent surveys. From one of the most recent surveys an overview of the distribution of various hardware tools is shown in table 1 below. This survey focuses, among other perspectives, on the relative level of ICT in European countries. Table 1 shows that northern and western Europe have the highest level of use of both farm PC, handheld devices/phones, farm management information systems and internet access.

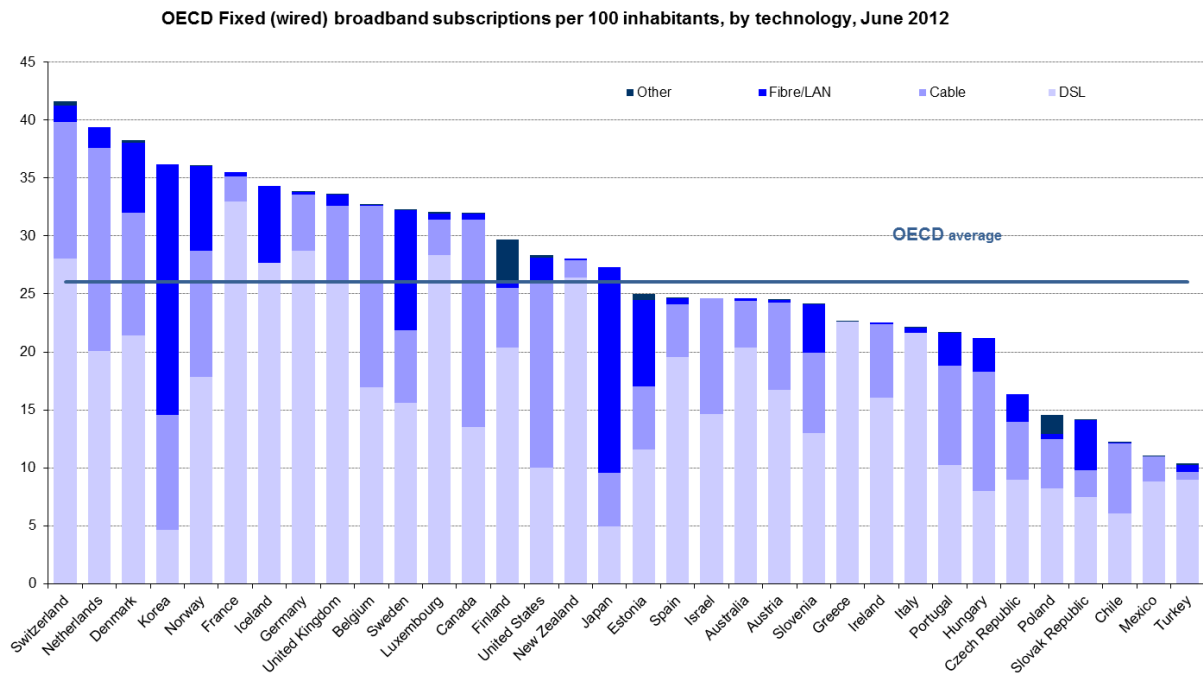
Table 1. Relative level of access to Farm PC, Internet, FMIS (i.e. software to manage the data and information of the farm) and phones/handheld computers in 23 European countries. Excerpt from table 4 in Holster et al. (2012).

Country	Farm PC	Internet access	FMIS Farm Mgt Info System	Phones/ Handheld
Belgium	High	High	Average	High
Bulgaria	Low	Low	Low	-
Czech Rep.	High	High	High	Low
Denmark	High	High	Average	High
Estonia	High	High	Average	-
Finland	High	High	High	High
France	High	Average	Average	High
Germany	High	High	Average	High
Greece	Low	Low	Low	Average
Hungary	Average	Average	Low	Low
Ireland	Average	Average	Average	Average
Italy	Average	Average	Average	High
Latvia	Low	High	Low	-
Netherlands	High	High	High	High
Poland	Average	Average	Average	-
Portugal	Low	Average	Low	Average
Romania	Low	Low	Low	Low
Slovakia	High	Average	Low	Low
Slovenia	Low	Low	Low	Low
Spain	High	Average	Average	High
Sweden	High	High	Average	High
United K.	High	Average	Average	Low
Switzerland	High	Average	Average	Low

EU in general is characterized by a high level of ICT hardware with a broad range of computers and with high-speed internet coverage of most of the country area (OECD, 2012). A high proportion of the

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inhabitants have internet access, as shown in Figure 1 (wired) and 2 (wireless) below, but there are differences between countries and regional differences within the individual countries.



Source: OECD

Figure 1: OECD fixed broadband subscriptions per 100 inhabitants (OECD, 2012).

The most efficient internet connection is achieved with a fixed broadband subscription, but it is a large investment for a country to build a fine-mesh network of fibre cables. Figure 1 shows that in Europe fixed broadband connections are generally more used in northern and western countries and less in southern and eastern countries.

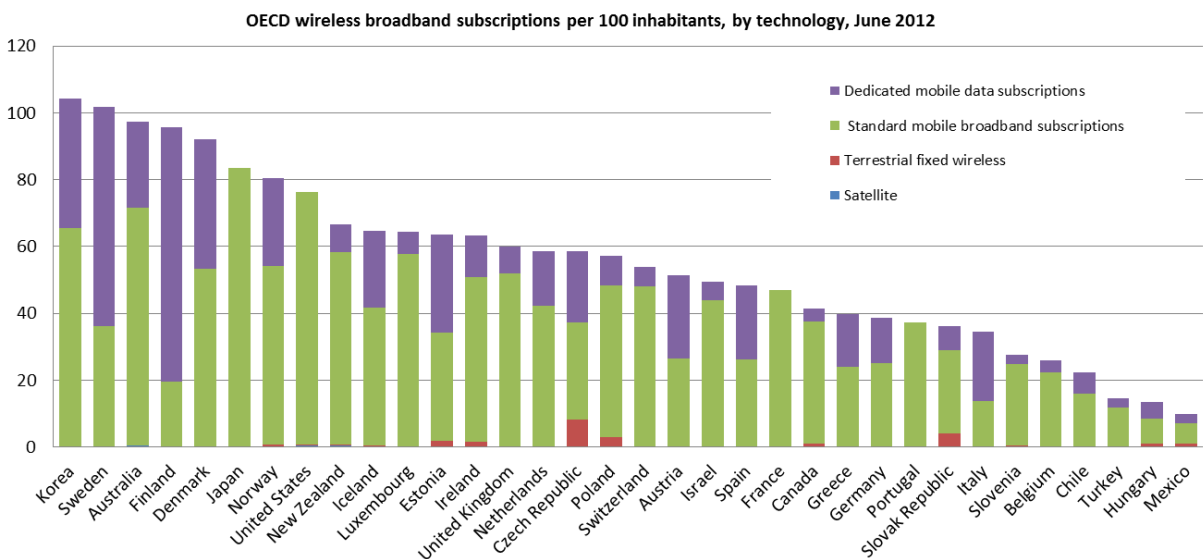


Figure 2: OECD wireless broadband subscriptions per 100 inhabitants (OECD, 2012).

It could be expected that countries with a low proportion of fixed broadband subscriptions, maybe due to low availability or high price of subscription, would compensate with a high proportion of wireless subscriptions. This is the case for some countries, e.g. Australia, Ireland and the Czech Republic, as shown in Figure 2. For other countries, e.g. Germany and Belgium, the opposite applies - they have relatively many fixed subscriptions compared to wireless. For most European countries, however, it is the same pattern; the northern and western countries have a high proportion of both wired and wireless broadband subscriptions, while the southern and eastern countries have a relatively low proportion.

Figure 3 shows some significant differences in the advertised speed of the available fixed broadband connections in different countries. Again, there is a tendency that the speed correlates with the country's level of economy, i.e. highest speed in the northern and western countries of Europe. Portugal and Bulgaria are remarkable exceptions to this rule in the high end. Likewise, Ireland and Germany are exceptions in the low end of the scale.

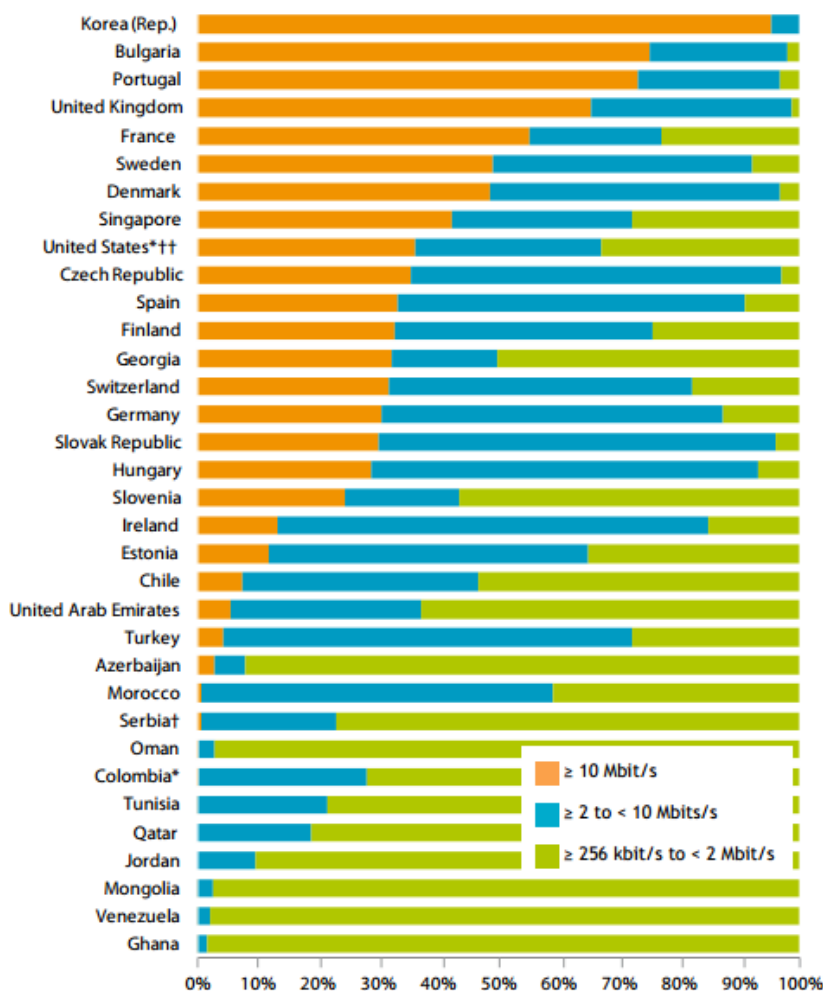


Figure 3. The advertised speed of broadband connections in various countries (ITU, 2011).

Generally, it is a problem for farmers in all countries that the development of the internet infrastructure is happening primarily in the most densely populated areas. Therefore the access to internet, as well as the speed of the available internet, is generally better in urban than in rural areas. In 2011, 90 % of the world's population lived in areas with coverage of 2G (GSM), while 45 % also had 3G (UMTS) coverage (ITU, 2011). Many rural areas only have 2G mobile coverage and unstable connections.

Lack of investment in high speed broadband and low competition between broadband providers in rural areas is a well-known problem for farmers in most EU-countries. The problem is most likely not going to be solved in the near future due to severe reductions in the EU Budget for 2014-2020 as regards investments in high speed broadband in rural areas. According to The Guardian, 11 February 2013 “Broadband campaigners say EU budget cuts hammered out last week will kill high-speed connections needed by rural homes and businesses, after it emerged the budget for rural broadband – seen as vital to creating new businesses – has been cut by €8.2bn (£7bn) to just €1bn...”

(<http://www.guardian.co.uk/technology/2013/feb/11/broadband-budget-cut-rural-connection-billion-euro>). However, as of 31 May 2013, the EU budget has not yet been approved by the European Parliament and the Council, so it is uncertain if or how much the budget for ICT infrastructure in rural areas will be cut.

The limited and slow internet access in rural areas is one of the major barriers to the development of an open and free communication environment. This factor should be of national or regional concern when planning to build a stronger environment for the exchange of knowledge and communication.

When trying to create a stronger ICT platform in order to develop the agricultural sector, specific attention should be given to the potential problems arising from barriers and physical restrictions; examples of these are sparse population, great distances, and technical limits (Lehmann et al., 2012). Another barrier is the economic factor; as shown in Figure 4, the price of broadband connection varies significantly - from country to country, and within each country due to price differences between broadband providers and differences in broadband speed. The span between the minimum and maximum price is surprisingly large.

Broadband prices per megabits per second of advertised speed, Sept. 2011 - USD PPP

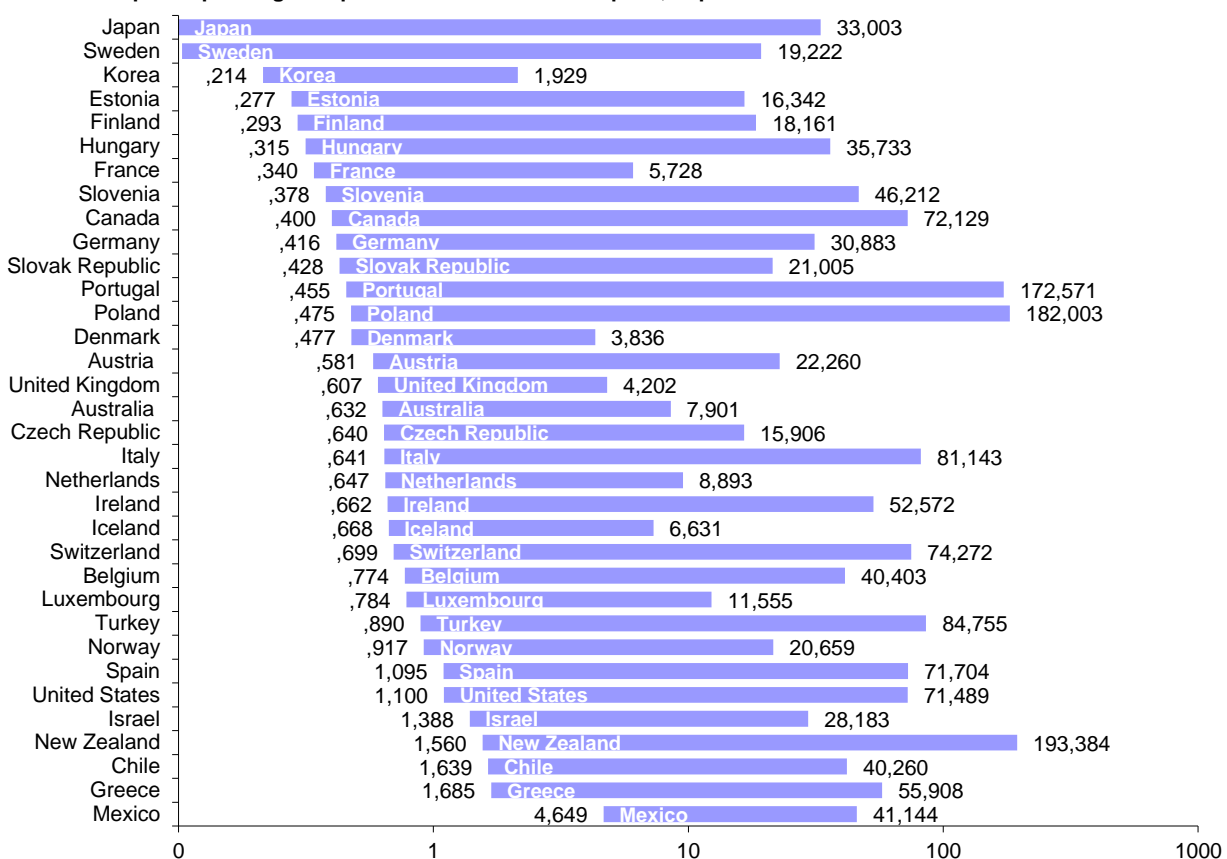


Figure 4. Min and max broadband prices per megabits per second, expressed in purchasing power parity (PPP) in US dollars (OECD, 2012).

It is likely, though not supported by the available data, that the lower broadband prices are mainly available in urban areas, where the competition between multiple internet access suppliers is largest. In Denmark the internet access supplier, Skyline, specialised in providing high speed broadband to rural areas, but unfortunately the company went bankrupt in 2012 leaving farmers and other rural companies in severe problems (Hansen, 2013a). No other company has wanted to fill the gap afterwards, and thus the result has been slower connections at higher prices in rural areas.

An opposite example is the local Danish electricity companies, who are responsible for the regional electricity grids. In many rural areas these companies have provided fibre cables for high speed internet connection to all households. This investment is paid by the joined households due to collective savings in the electricity companies. However, the business case is not balanced; earnings are not reasonable/sufficient when delivering high speed fibre compared to the costs of providing fibre cables to every household in the rural areas. The question might be whether society is willing to support the procurement of internet access in rural areas with a view to the fact that ICT is part of the basis for modern living. In addition, there is a wish to maintain a population of a reasonable size in the rural districts and to support those who work and live in secluded areas to maintain agricultural production at a professional level.

The mobile phone is probably the most used communication platform among European farmers and extension workers. To people being out of office most of the work day, a mobile phone is crucial. With the technological development of more and more advanced smartphones and other portable devices the phone also gradually becomes the internet portal for the farmer. A recent survey in Denmark (Hansen, 2013b) (Table 2) shows that less than 2% of the farmers in Denmark work without a mobile phone. From 2012 to 2013 the proportion of farmers using a smartphone has increased from 17% to 37% (Hansen, 2013b).

Table 2. The work mobile of farmers in Denmark (Hansen, 2013b).

Mobile type	Number	Percentage
Conventional	3755	61.2 %
Android	1442	23.5 %
iPhone	581	9.5 %
Windows	238	3.9 %
No mobile	115	1.9 %
Total	6131	100.0 %

The examples show us that there are major barriers (internet access in rural districts, high speed mobile networks to smaller populations, economy, stability and habits etc.) which might prevent the establishment of an efficient ICT platform for communication and free exchange of knowledge in the agricultural sector. In particular, there is an economic problem regarding high prices in south and east Europe, and lower prices in the northern part of Europe. The price of internet access is negatively correlated to national income. But if society and/or government invests in the broadband structure, it will be possible to establish a platform of high quality and thus having the foundation to develop improved communication and knowledge transfer. The biggest need for a stronger internet and mobile structure is seen in the countries with the lowest national income. Therefore, the goal might be to choose the right tools in the different countries. In some countries of eastern and southern Europe it might be SMS and mobile phone systems that are most likely to be successful. While in the north and west there are better reasons for choosing ICT systems based on internet and more broadband demanding services.

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In conclusion: This review shows that even though European countries are among the countries with the highest frequency of both wired and wireless broadband internet subscriptions, there are distinct differences between the countries. Likewise, the available speed and price of internet communication vary between countries. The pattern is the same: the northern and western countries in general have more, faster and cheaper internet connections than the southern and eastern countries. This is a potential barrier to the network communication between agricultural actors in the latter regions.

The price of ICT hardware is continuously decreasing while the capacity, portability and user friendliness are increasing. The change from monolithic to networked computers also reduces the demand for processing power and storage on the client side; the storage and processing is done on internet servers/in the cloud. Therefore, ICT hardware is not a technical barrier to the agricultural actors. It may be an economical barrier to some actors with low income, and a mental barrier to others (mainly older or technophobic farmers).

It is important to be aware of the fact that many rural areas have no access to wired broadband and must rely on relatively slow and often unstable mobile connections. Today the majority of European farmers have mobile phones and more and more of these are smartphones. The availability of rugged computers and smartphones that can resist the tough environment of a farm is also increasing. However, the low bandwidth may be a barrier in many rural areas of Europe.

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