No. 2 | February 2016

ZEW policy brief

by Irene Bertschek and Jörg Ohnemus – Centre for European Economic Research (ZEW)

Europe's Digital Future: Focus on Key Priorities

Introduction

Potential Effects of Digital Transformation

Customised products and services, flexible working arrangements, productivity growth, and increasing prosperity – these are just some of the advantages promised by a digitised and connected economy. Business managers and politicians are keen to reap the potential benefits of the digital transformation. Such a transformation of the economy, however, is a complex task which goes hand in hand with a significant number of challenges. Digital transformation brings about changes in production and innovation processes, in markets and working environments, and also has societal implications. In particular, there are widespread fears that the increased use of machines and robots for tasks previously completed by humans shall result in job losses.

European Digital Agenda

Actors at both European and national levels have launched numerous agendas, initiatives and directives in order to support the digital transformation. The Digital Agenda, part of the Europe 2020 Strategy consists of seven pillars (EU Commission, 2016a): i) Digital Single Market, ii) Interoperability & Standards, iii) Trust & Security, iv) Fast and ultra-fast Internet access, v) Research and innovation, vi) Enhancing digital literacy, skills and inclusion, vii) ICT-enabled benefits for EU society. These seven pillars comprise 132 actions ranging from simplifying Pan-European licensing for online works (action 1), to investing in High-Performance Computing (action 132).

Key Messages

Despite the fact that there are currently numerous actions and initiatives relevant to the digital transformation, evidence from previous phases of digitisation and successful case studies suggests that actors from policy, economy and societal partners should focus their efforts on only a couple of measures, implementing these with high priority:

- Accelerate investment in fast and ultra-fast broadband infrastructure.
- Accelerate the implementation of a legal (Europe wide) framework with clear data protection rules.
- Do not lose sight of the importance of the service sector in European countries.
- Do not lose sight of the fact that comprehensive digitisation might not be appropriate for all companies.
- Foster investment in qualification and training of employees.

Germany's Digital Agenda

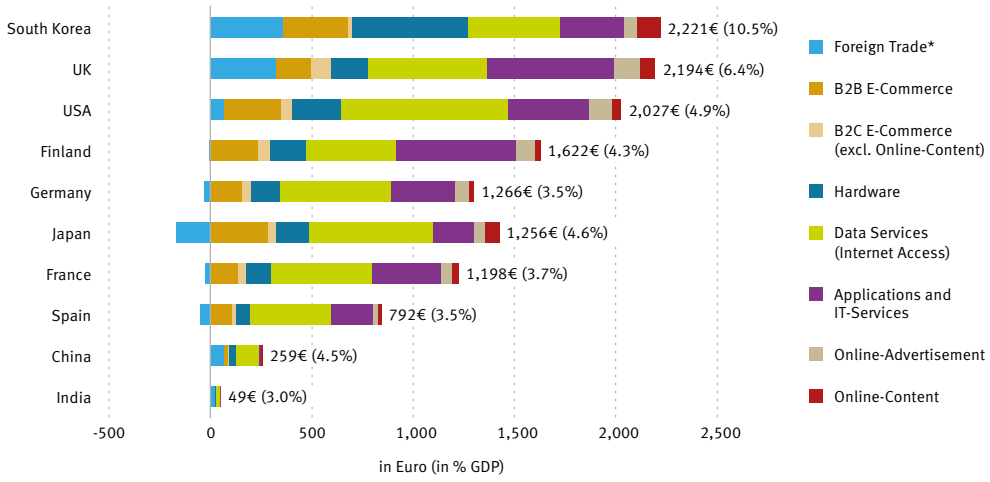
In addition, national governments have set up their own Digital Agendas. The measures included in Germany's Agenda, for example, cover seven fields: i) digital infrastructures, ii) digital economy and digital work place, iii) innovative public administration, iv) shaping digital environments in society, v) education, research, science, culture and media, vi) building security, protection and trust within society and the economy, vii) European and international dimensions of the Digital Agenda. These seven fields comprise 33 actions. In addition, the platform "Industrie 4.0" specifically addresses the digitisation and connectivity of the industrial sector. Relevant stakeholders from policy, unions and the economy, are working to develop a reference architecture for cyberphysical systems (often called the Internet of Things), for data security solutions and concepts for the adequate qualification of employees. Small and medium-sized firms (SMEs), which are lagging behind larger firms in respect to digital transformation, shall be supported via several recently established competence centres providing best practices. The newly founded "Labs Network Industrie 4.0" (2015) also offers a network of testbeds informing SMEs about the possibilities of digitisation.

This brief summary of initiatives indicates that numerous efforts are being made to support societies and economies as they progress into a digital world. The question remains, however, as to whether all of these efforts are together suited to the achievement of Europe's common goal, or whether we are in fact becoming lost in a complex jungle of agendas, initiatives and directives.

Several Ways to Measure the Digitisation and its Progress

In order to obtain reliable figures, many attempts have been made to measure levels and progress of digitisation. At the European level, for example, the Digital Agenda Scoreboard measures the progress of the European Digital Economy and Society (EU Commission, 2016b). The Digital Economy and Society Index (DESI) addresses five dimensions of digitisation in 28 European countries. These dimensions include connectivity, human capital, use of internet, integration of digital technology, and digital public services. According to DESI 2015, Denmark is the most digitised country, whilst Romania is the least digitised.

International comparison of the Internet Economy, per capita turnover and share of GDP, 2014



* Finland, Germany, Japan, France and Spain show a negative balance of trade in the relevant field.
Source: Graumann et al. (2015), calculations by ZEW.

Global DIGITAL Performance Index comparing 10 leading business locations

Another approach is being taken as part of the Monitoring Report DIGITAL Economy being conducted by the Centre for European Economic Research (ZEW) in collaboration with TNS Infratest on behalf of the German Federal Ministry for Economic Affairs and Energy (Graumann et al., 2015). The so-called Global DIGITAL Performance Index compares 10 leading digital business locations around the world, including the US, China and South Korea. It determines the capacity of the ICT sector and the Internet economy on the basis of market strength, technical infrastructure, basic economic conditions, and the use of digital technologies, products and services. In contrast to other indices, it therefore takes the market into account as one of three sub-indices. Overall, 48 core indicators are compared across 10 countries. According to the index, the US is the top digital business location, not only because of the sheer size and purchasing power of the US market, but also because of the traditionally strong US ICT sector. India ranks in tenth place.

The market sub-index of the Global DIGITAL Performance Index also covers the so-called internet economy, measuring all turnover made by and over the internet (see figure). Top rankings, as published in the latest Monitoring Report, have been attributed to South Korea and the United Kingdom. In 2014, internet-based goods and services generated a turnover per capita of EUR 2,221 in South Korea, EUR 2,194 in Great Britain, and EUR 2,027 in the US. Germany follows in fifth place with a turnover per capita of EUR 1,266.

What We Know from Previous Digitisation Phases

Little is known about the economic impact of the digital transformation

Information and communication technologies (ICT) are the source of digitisation. They are widely recognised as so-called general purpose technologies, i.e. they are characterised by rapid technological progress and a high degree of diffusion throughout all economic sectors, they thus enable users to become innovative and develop new products and services based on ICT (Bresnahan and Trajtenberg 1995). Recent technological advances have been achieved thanks to the rapid increase in computing and storing capacities, the progress in broadband infrastructure, the availability of huge data sets and the possibility of analysing this data using intelligent algorithms (see for example Bertschek et al., 2015). Very little is yet known, however, about the impacts of using the new applications made possible by this rapid technological change such as cloud computing, big data analytics, social media, or new working models, for example. Evidence-based knowledge has, however, be gained from the productivity increases seen in the 1990s and 2000s as a result of the computerisation of workplaces or the use of enterprise software. Similarly, we have seen that investment in technology should be accompanied by investment in intangible assets such as organisational capital and human capital (see for instance Bresnahan et al., 2002, for a micro-level analysis and Chen et al., 2015, for a macro-level analysis). Our expectations regarding the prospects of the current phase of digital transformation are based on these past experiences, and on case studies of successful digitisation projects.

One main challenge arising from the digital transformation is the widespread fear that the automation of tasks will result in job losses. There are several forecasts, based on the study by Frey and Osborne (2013), which predict the number of jobs which may be lost due to digitisation. Analyses following a task-based approach show that the risk of job losses is much lower if we assume that task compositions may change within occupations whilst not necessarily rendering the occupations themselves obsolete (see for instance Bonin et al., 2015).

Conclusions

Support of Digital Transformation Should Concentrate on a Couple of Measures

Despite the fact that there are currently numerous actions and initiatives relevant to the digital transformation, evidence from previous phases of digitisation and successful case studies, suggests that actors from policy, economy and societal partners should focus their efforts on only a couple of measures, implementing these with high priority.

Connectivity is crucial for the current stage of digital transformation. Fast and ultra-fast,as well as reliable broadband infrastructures are an essential prerequisite for digitalisation and increased connectivity. 15 actions of the European Digital Agenda are aimed at ensuring that by 2020, all citizens have a 30 Mbps internet connection and that at least 50 per cent of European households are able to subscribe to internet connections above 100 Mbps. Given that they set the groundwork for the digitisation of the economy as a whole, these targets should receive the highest priority.

- **Accelerate investment in fast and ultra-fast broadband infrastructure.**

A lack of trust in data security is the most significant obstacle to the use of services such as cloud computing (ZEW IKT-Report 2015). The importance of this issue is highlighted by 17 actions of the European Digital Agenda which are aimed at increasing trust and security. In December 2015, the Council, the European Parliament and the Commission agreed in trilogue negotiations on the General Data Protection Regulation. The resulting text will enter into force in spring 2016, and will be applicable as of spring 2018. Although this agreement represents an important milestone, the delay between the conception of the regulation and its application in European Member States is too long. In the rapidly developing digital environment, an acceleration of decision-making processes and faster implementation of agreements is necessary to foster digitisation.

- **Accelerate the implementation of a legal (Europe wide) framework with clear data protection rules.**

Many European countries, and in particular Germany, are very much focused on the “Industrie 4.0” and the digitisation of the industrial sector. Although a number of European countries still have relatively strong industrial sectors, we should not forget that most economic activity now takes place in the service sector.

- **Do not lose sight of the importance of the service sector in European countries.**

All companies should embrace the prospects and challenges related to digitisation. It should not be forgotten, however, that for some firms it does not make sense to implement a completely digitised and connected value chain. Each firm should therefore thoroughly weight costs and benefits before investing in digitisation projects.

- **Do not lose sight of the fact that comprehensive digitisation might not be appropriate for all companies.**

Investment in qualification measures and training programmes is crucial. Qualification efforts should not only focus on developing new occupations, but also on adapting the task composition of existing occupations. The tasks involved in software programming, for example, as well as analysing and interpreting data will become increasingly important. In addition, the changes

in working environments brought about by digitisation also mean that skills in using new digital media, in handling privacy issues, organisational skills and self-discipline are also becoming more and more important.

- **Foster investment in qualification and training of employees.**

References

Bertschek, I. (2015), Industrie 4.0 – Kein Spiel für Einzelkämpfer, ifo Schnelldienst 10/2015 – 68. Jahrgang, 3-5.

Bertschek, I., Niebel, T. und J. Ohnemus (2015), Auswirkungen der Digitalisierung auf die zukünftigen Arbeitsmärkte, Expertise conducted on behalf of Economix, Mannheim.

Bonin, H., Terry, G. und U. Zierahn (2015), Übertragung der Studie von Frey/Osborne (2013) auf Deutschland, Expertise No. 57 on behalf of the Federal Ministry of Labour and Social Affairs, Mannheim.

Bresnahan, T.F. und M. Trajtenberg (1995), General Purpose Technologies "Engines of Growth"?, Journal of Econometrics, 65(1), 83–108.

Chen, W., Niebel, T. and M. Saam (2015), Are Intangibles More Productive in ICT-Intensive Industries? Evidence from EU Countries, forthcoming in Telecommunications Policy.

EU Commission (2016a), Europe 2020 Strategy, http://ec.europa.eu/digital-agenda/en/digital-agenda-europe-2020-strategy

EU Commission (2016b), Digital Agenda Scoreboard, http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard

Frey, C. and M.A. Osborne (2013), The Future of Employment: How Susceptible are Jobs to Computerization?, University of Oxford, Oxford.

Graumann, S., Bertschek, I., Weber, T., Speich, A. Ohnemus, J., Rammer, C., Niebel, T. Schulte, P., Weinzierl, M., Winkler, V., Zieger, B. and R. Armbruster (2015), Monitoring-Report. Wirtschaft DIGITAL 2015, Bundesministerium für Wirtschaft und Energie, Berlin.

Labs Network Industrie 4.0 (2015), http://lni40.de/en/

The Federal Government (2014), The Digital Agenda 2014 – 2017, Berlin.

ZEW IKT-Report 2015, Mannheim.

Further Information

Contact

Prof. Dr. Irene Bertschek, Head of Research Department "Information and Communication Technologies", email: bertschek@zew.de, phone:- +49-621-1235-178

Dr. Jörg Ohnemus, Deputy Head of Research Department "Information and Communication Technologies", email: ohnemus@zew.de, phone:- +49-621-1235-354

Website

http://www.zew.de/en/forschung/informations-und-kommunikationstechnologien/

ZEW
Zentrum für Europäische Wirtschaftsforschung GmbH
Centre for European Economic Research

ZEW policy brief series

Publisher: Centre for European Economic Research (ZEW), Mannheim
L 7, 1 · 68161 Mannheim · P.O. Box 10 34 43 · 68034 Mannheim · Germany · Internet: www.zew.de · www.zew.eu
President: Prof. Dr. Clemens Fuest · Director of Business and Administration: Thomas Kohl

Editorial responsibility: Prof. Dr. Clemens Fuest