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ICT-RELATED INDUSTRY DEVELOPMENT IN UKRAINE IN 2005 - 2013

Report on the recent developments in the Internet economy



<http://delab.uw.edu.pl>

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ABSTRACT

The study focuses on the current state of ICT sector development in the modern economy of Ukraine. The analysis of major economic indicators dynamics and statics is made at the level of national economy, ICT sector and ICT enterprises. The study of ICT enterprises is based on the unique dataset of 6.5 thousands enterprises that belong to the ICT sector according to the Ukrainian KVED¹ classification. The study discusses major indicators of ICT sector development: the share of ICT in total GDP and output, total exports and imports, in total employment, consumer prices, number of business entities. The micro-level indicators describe total revenues and employment growth, fixed and tangible assets development, labour and total factor productivity levels. The comparison between ICT sector indicators and all firms average indicators is drawn. The correction is made to exclude holdings companies from the sample. Attention is paid to the indicators of Internet penetration in retail trade, number of Internet, mobile communication and cable users in the Ukrainian economy. The current Ukrainian government digital economy policy is described as a number of new initiatives (e-government, IT sector business climate improvement, digital skills development) that have been launched as part of vast reforms agenda of Ukraine.

INTRODUCTION

Information and telecommunication technologies are commonly believed to be the base of the modern economy. In developed economies ICT infrastructure and skills development is the main driver of the economic growth. For Central and Eastern European countries digital economy can fill in the existing economic development gaps as it offers vast opportunities for private enterprise which has a lot of unused potential in the region with long history of state domination in the economy. This study will focus on the current trends and issues of digital economy and ICT sector Ukraine: through ICT enterprises, infrastructure and its role in the national economy.

Recently signed Association Agreement with the European Union and large reform agenda of the country promises modernization of the economy and business activity development in the future. Digital economy as the major development trend in the world economy is expected to take a substantial place at this stage of the transformation of Ukraine.

In Section 1, the brief discussion of some theoretical and methodological issues will be presented. The macroeconomic situation with the special focus on the information and communication sector will be briefly covered in the Section 2. The outline of the ICT sector in terms of the digital industry faces and consumers profile will be presented in Section 3. The specific feature of this report is the use of micro-level dataset statistical inference which can shed some light on the microeconomic characteristics of the ICT sector. This is the aim of Section 4. The current government initiatives and digital agenda in Ukraine are described in Section 5. Section 6 describes briefly the current barriers of the development of ICT sector in Ukraine according to experts' opinion. The conclusions are presented in Section 7.

¹ Comparable to NACE Rev. 1 and 2 classification

1. THE CONCEPT OF DIGITAL ECONOMY AND ITS IMPORTANCE FOR THE ECONOMIC AND INDUSTRY DEVELOPMENT

According to OECD Digital or Internet economy is "the full range of our economic, social and cultural activities supported by the Internet and related information and communications technologies". The Internet and ICT technologies are changing the production and consumption sides of modern services and revolutionized the sales and price formation mechanisms of the modern markets (OECD, 2013).

UK Government gives definition of the digital economy as comprising two sectoral groups, 'information and communications technology' and 'digital content' (Nathan, 2012)

According to OECD research agenda report the economic growth is stimulated firstly by 1) infrastructure (telecommunications and sales of computer and communication products), 2) secondly, by the industries directly related to the Internet (retail and wholesale trade, banking, entertainment) and thirdly by the industries not directly related to Internet, including traditional ones.

The following statistics can be used to evaluate the size of ICT-related economy:

REVENUES DATA ON SERVICES, IN PARTICULAR ON INTERNET-RELATED ACTIVITIES, FOR EXAMPLE WITHIN THE "INFORMATION" SECTOR AS THE CATEGORY IN ECONOMIC ACTIVITIES CLASSIFICATION, FOR EXAMPLE INTERNATIONAL CLASSIFICATION ISIC,

E-commerce revenues reported across a large number of industries.

Both approaches will be used in the present study.

The study “Impact of Broadband on the Economy: Research Up to Date and Policy Issues” validated the positive contribution of broadband to job creation in **developed and developing countries**. In particular Germany, Indonesia, Brazil and Chile cases yielded statistically significant positive coefficients. The other cases (e.g. India, and Saudi Arabia) also yielded statistically significant coefficients for the explanatory variable (broadband penetration) with sensible signs – positive when the independent variable is employment and negative when it is unemployment (Katz, 2012).

According to McKenzie Global Institute, Internet accounts for 3.4% of GDP growth across the **large economies** that make up 70% of global GDP (McKenzie, 2011)

A doubling of mobile data use leads to an increase in GDP per capita growth of 0.5 percentage points. For a given level of total mobile penetration, a 10% substitution from 2G to 3G penetration increases GDP per capital growth by 0.15 percentage points (CISCO, 2012)

ICT and Internet are especially important for the **emerging economies**. There is a vast empirical literature how ICT reduces prices and information costs, changes competition in developing markets. For example, Aker (2010) found that in Niger mobile phones reduced search costs by 50 percent compared with personal travel and that mobile phone use increased both traders’ and consumers’ welfare. Traders’ profits increased by 29 percent—not because they traded more product but because they obtained better prices through real-time market research conducted via mobile phone. Another author, R. Jensen, proves that information technologies may improve market performance and increase welfare. In 1997-2001 mobile phone service was introduced throughout Kerala, a state in India with a large fishing industry. Using micro level survey data, R. Jensen shows that the adoption of mobile phones by fishermen and wholesalers was associated with a dramatic reduction in price dispersion, the complete elimination of waste, and near-perfect adherence to the Law of One Price.

G. Aparajita (2010) examined the effect of an innovative initiative launched by a private company in the central Indian state of Madhya Pradesh. From October 2000, it set up 1700 internet kiosks and 45 warehouses that provide wholesale price information and an alternative marketing channel to soybean farmers in the state. The empirical results suggest an immediate and significant increase in the monthly wholesale market price of soybeans after the introduction of kiosk.

2. CURRENT MACROECONOMIC SITUATION AND ICT SECTOR DEVELOPMENT

The macroeconomic situation in Ukraine is characterized by the unstable economic and price dynamics.

Figure 1

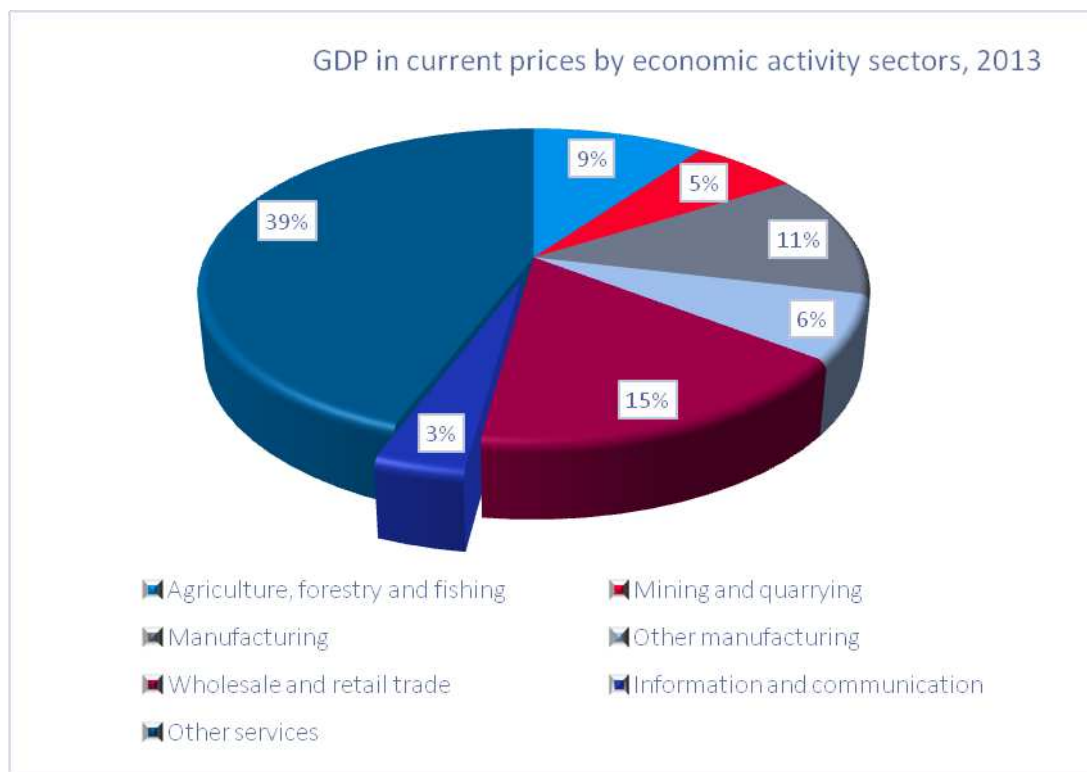


Source: IMF World Economic Outlook Data

The years of stable growth in 2001-2008 seem not to be coming back soon in Ukraine (Figure 1). The world economic and financial crisis of 2008-2009 caused the largest slump in Europe (-15% in 2009). The economic consequences of government policies oppressing private enterprise not related to large-scale business were economic stagnation in 2009-2013. The political crisis that followed the change of the government, loss of capital in combat and the ban on Ukrainian goods in CIS led to decrease in GDP in 2014 (-7%) and 2015 (-9%). The IMF forecast prognoses the economic revival of Ukraine in 2016 and 2017 after the conflict in the East of Ukraine is over and receipt of substantial credit and debt relief from the West. The hope is based on the newly signed EU-Ukraine Association Agreement, which economic part will come into force on the 1st of January 2016. Support is also coming from the international donors.

Ukraine is a service-based economy with the share of services amounting to 75% in the value-added (13% - manufacturing, 12% - agriculture) (WDI, 2015). Though the industries are heavy and produce coal, electric power, ferrous and nonferrous metals, machinery and transport equipment, chemicals, food processing, around of 2/3 of the population are employed in services sector (WDI, 2015).

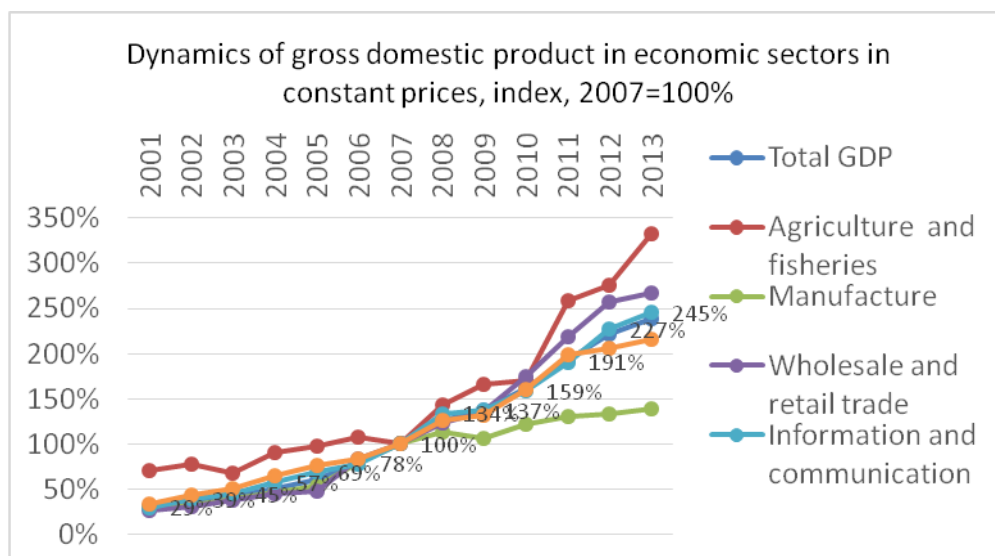
Figure 2



Source: State Committee of Statistics of Ukraine

If we roughly treat ICT industries as economic activities in the sectors from 58 to 62 of NACE Rev. 2 classification (group J), the share of ICT sector in Ukraine's GDP remains quite low – around 3% in 2013 (Figure 2).

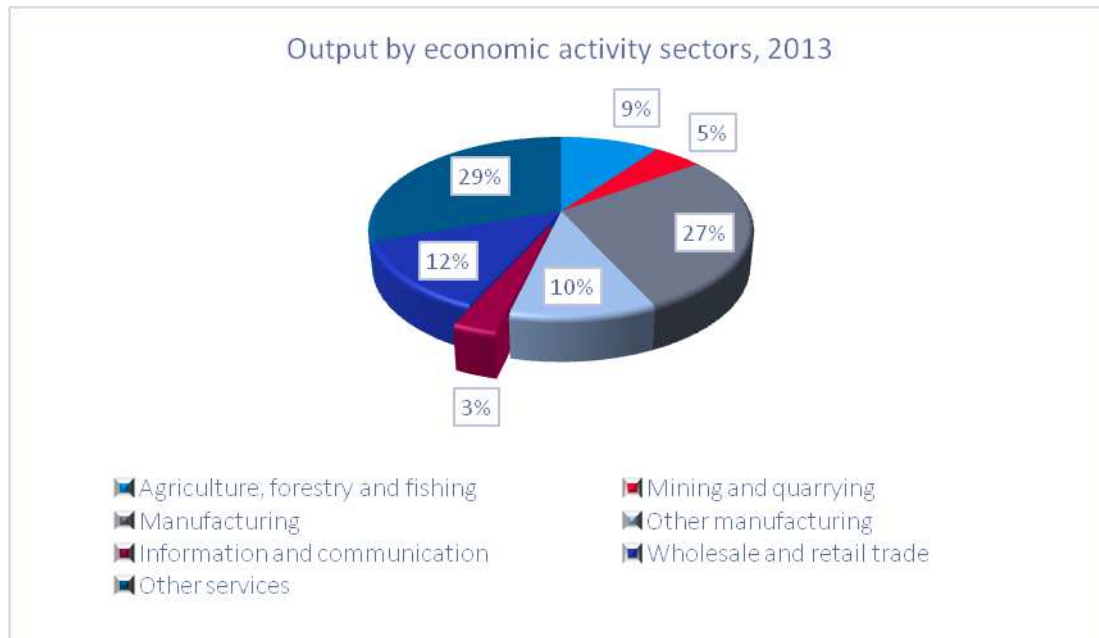
Figure 3



Source: State Committee of Statistics of Ukraine

Looking at the sectoral dynamics of GDP in Ukraine one could see that ICT sector represented by the economic sector J in NACE classification “Information and communication” is growing faster than manufacturing, but slower than traditional agriculture and wholesale trade, transport and communication in 2001-2013 (Figure 3).

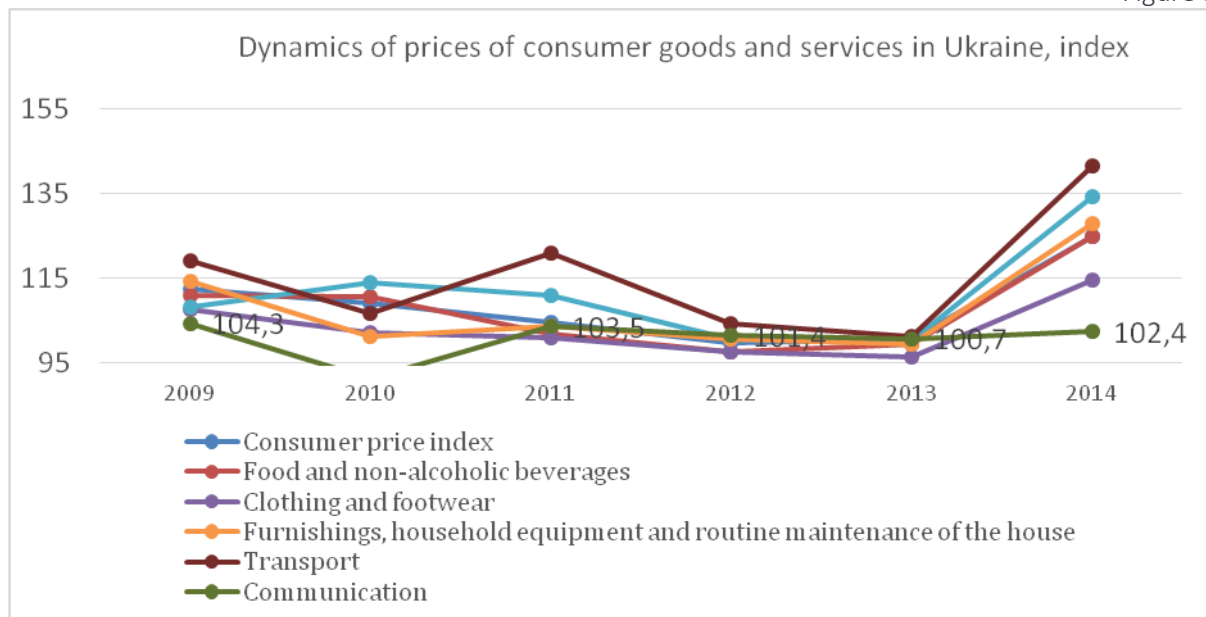
Figure 4



Source: State Committee of Statistics of Ukraine

The ICT sector share in total revenues is comparable to its share in GDP amounting to 2.94% (Figure 4), while major sectors remain agriculture, forestry and fishing, manufacturing, transportation and storage, wholesale and retail trade.

Figure 5



Source: State Committee of Statistics of Ukraine

The prices in the communication sector demonstrate the lowest dynamic among sectors of Ukrainian economy. While general consumer prices grew on average by 25% in 2014, communication prices rose only by 2% (Figure 5).

Ukraine is also an exporter and importer of information and communication services. As with GDP the share of ICT in international trade is small – 2.27% of total exports of goods and services and 0.18% of total imports of goods and services.

Figure 6



Source: State Committee of Statistics of Ukraine

The role of ICT in total services external trade is getting more importance. The export of information services amounts to 15% of the total export of services (Figure 6).

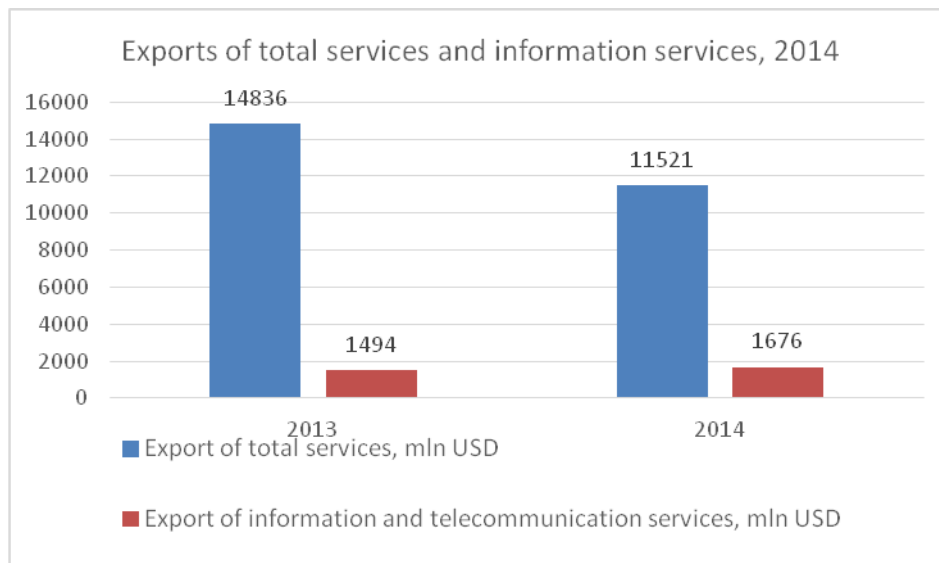
Figure 7



Source: State Committee of Statistics of Ukraine

The import of information services account for 8% of the total imports of Ukraine (Figure 7). Ukraine has a positive balance in trade of information and telecommunication services.

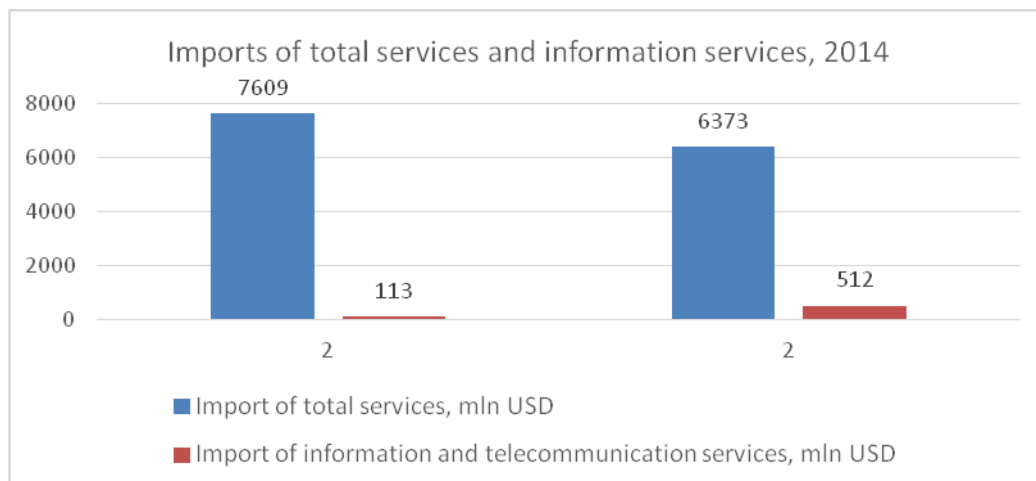
Figure 8



Source: State Committee of Statistics of Ukraine

At the background of the falling exports of total services in 2014, the exports of information, telecommunication and computer services are rising (Figure 8).

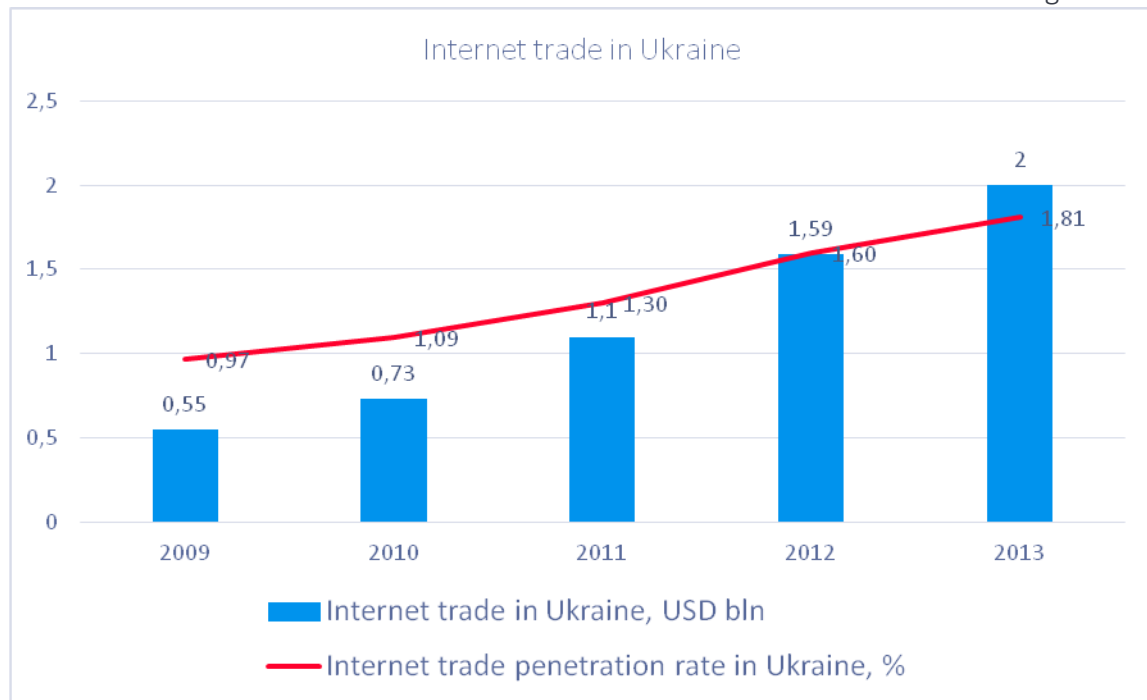
Figure 9



Source: State Committee of Statistics of Ukraine

The imports of information services has also increased from 2013 to 2014, while total imports of services decreased during the years of economic slump and political crisis in Ukraine. In the background of economic stagnation and inflation in the Ukrainian economy information and communication sector contribute to the positive growth and low inflation.

Figure 10



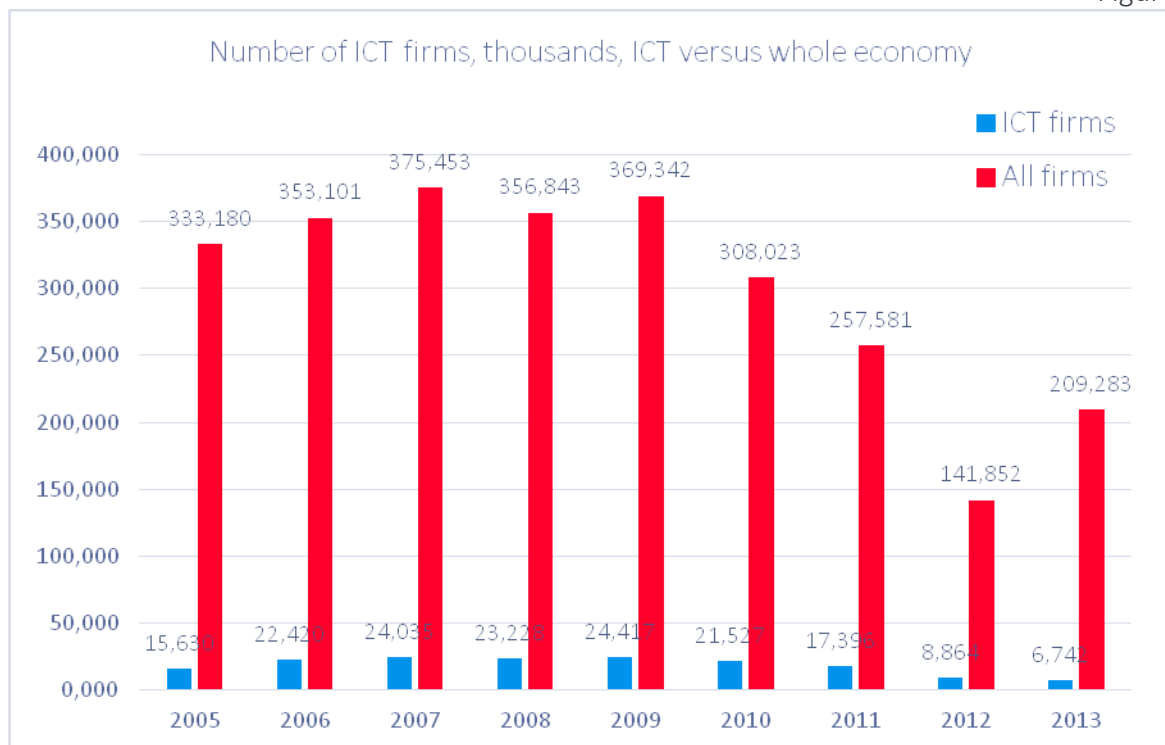
Source: Електронна комерція <http://eb.dep145.org.ua/node/5>

The e-commerce, another diminution of visible Internet economy is only starting to develop in Ukraine. Figure 10 shows the position dynamics of sales on the Internet, but in the background of growing retail sales the penetration rate of E-commerce remained no more than 2% in 2014. In 2013 the total amount of Internet trade in Ukraine was 2.3 bln USD, while in neighboring Poland – 34.7 bln USD (GUS, 2015). Thus the e-commerce penetration rate reveals a gap for catching up to other countries in the region. In 2013 the estimated level of e-commerce penetration rate for Poland accounted for 16% (GUS, 2015).

3. ICT INDUSTRY IN UKRAINE: THE PROFILE OF ENTERPRISES BASED ON MICRO-LEVEL DATA

The ICT-related industry overview is based on the panel micro data of Ukrainian enterprises in the period of 2005 to 2013. The ICTUkraine sample counts 15631 enterprises related to ICT in 2005 and 6742 ICT firms in 2013 (Figure 11). We collected data on the major activity indicators of the enterprises as well as differentiated between enterprises in specific ICT sectors (according to Table A.1 and A.2 in the Annex) and regions of Ukraine. The sample of all firms in Ukraine contains enterprises from all economic sectors from 1 to 99 according to KVED classification. The distribution of enterprises correspond to the structure of the Ukrainian economy in terms of economic activity types. The sample was cleared out of “holding” type enterprises that drag the average above the 90th percentile. The outliers are identified as enterprises with the deviation from the mean in excess of 100 mln UAH and employment less or equal than 3 people.

Figure 11



Source: NovaUkraine sample

There is information on output and major inputs of ICT firms, as well as regional location and economic activity according to the KVED classification. KVED is a national system to classify economic activity and is comparable to European NACE and international ISIC classifications. The KVED classification codes attributed to the enterprises in the ICT sector can be found in Tables 1 and 2. There was a change in classification, so observations for 2005-2012 are classified according to KVED-2005 classification (NACE Rev.1) and 2013 data refers to KVED-2010 classification (NACE Rev.2). The ICT enterprises are selected from the sample of

national companies and hold the KVED classification codes that relate them to the following divisions and groups of NACE rev. 2 classification:

- ICT manufacturing industries: manufacture of electronic components and boards (26.1), manufacture of computers and peripheral equipment (26.2), manufacture of communication equipment (26.3), manufacture of consumer electronics and related media (26.4, 26.8),
- ICT trade industries: wholesale of information and communication equipment (46.5),
- ICT related industries: wired telecommunications activities (61.1), wireless telecommunications activities (61.2), other telecommunication activities (61.3, 61.9), software publishing and IT service activities (division 62, 58.2), data processing, hosting and related activities, web portals (63.1), repair of computers and communication equipment (95.1).

ICTUkraine sample is the subsample of Ukrainian firms sample called NovaUkraina. NovaUkraina data set is the sample of Ukrainian business entities that report balance sheets to the State Statistics of Ukraine. The NovaUkraina sample and ICTUkraine sample can be claimed to be the representative of the Ukrainian economy. NovaUkraina sample which consists of 209283 Ukrainian firms in 2013, while official statistics mentions 1722251 business entities in Ukraine in 2013. The distribution of the enterprises across sectors in both sectors is roughly symmetric. The number of ICT firms (only sector J of NACE Rev. 2) accounts for 6690 firms in 2013 (3.2% of the total) in NovaUkraina sample, while the number of sector J firms in Derzhkomstat statistics is equal to 86377 (5.02% of total).

There are 232429 people out of 6820934 employed in the total economy working for the ICT sector (J group of NACE classification). The share of ICT sector in NovaUkraina sample is thus equal to 3.41%. The Derzhkomstat reports 2980000 people working for ICT sector out of 99651000 (2.99% of the total).

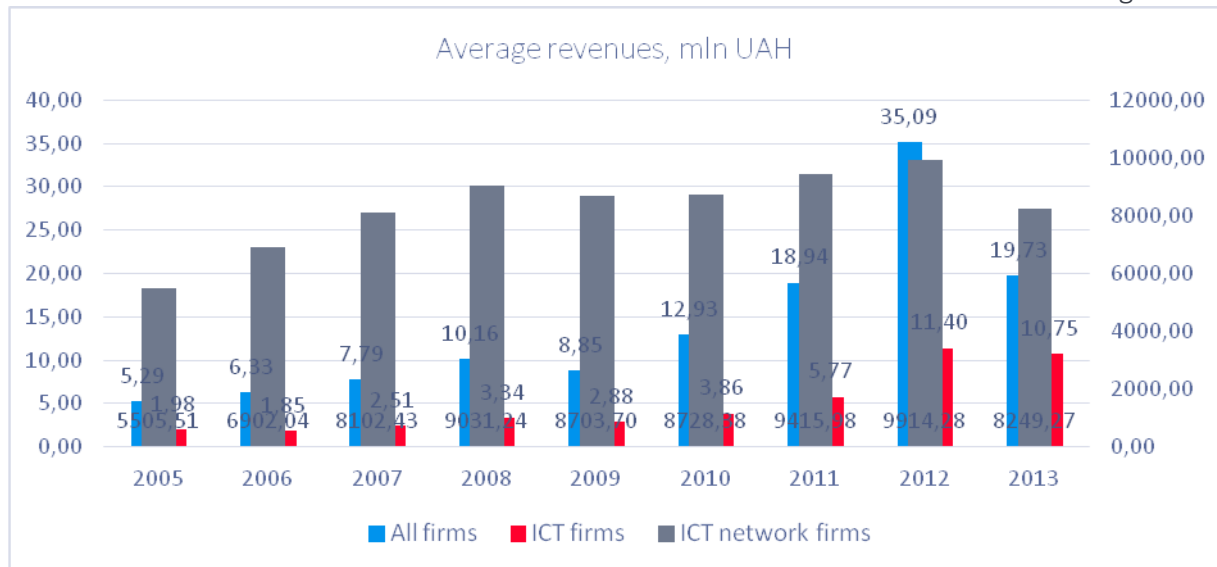
The data comes from several statistical sources. The main source of data is the State Committee of Statistics of Ukraine (<http://www.ukrstat.gov.ua>). The statistical information can be received for the purpose of scientific research. This data reflects the balance and income statement indicators related to fixed assets, total revenues, total labor cost, cost of materials, etc. Data on employment (total number of full-time workers) is received from the employment authorities.

The number of ICT-related enterprises in Ukraine ranges from 15631 in 2005 to 6742 in 2013 (Figure 15). In 2005, among 15630 ICT firms there were 5757 manufacturing firms. In 2013 the sectors from 37 "Sewerage, drainage and sewage treatment" to 99 "Activities of extraterritorial organizations and bodies" are all classified as services sectors, so in our sample for 2013 all ICT firms are classified as services sector enterprises.

The NovaUkraina sample of ICT enterprises of Ukraine contains 4 big network enterprises in telecommunications which dominate the sample in terms of absolute indicators – revenues, employment and fixed assets. These 4 enterprises are old telecommunication giant "Ukrtelekom" and 3 major mobile operators – Kyivstar, MTS (former UMC and prospective Vodafone Ukraine) and Life ☺ Ukraine. Since the above-mentioned outliers skew the averages of the analyzed indicators, it makes sense to analyze Ukraine's ICT enterprises without the 4 big network telecoms and make separate analysis for these 4 ICT giants where it is necessary. So the study deals with 2 subsamples of ICT enterprises called respectively ICT firms and ICT network firms.

Revenues

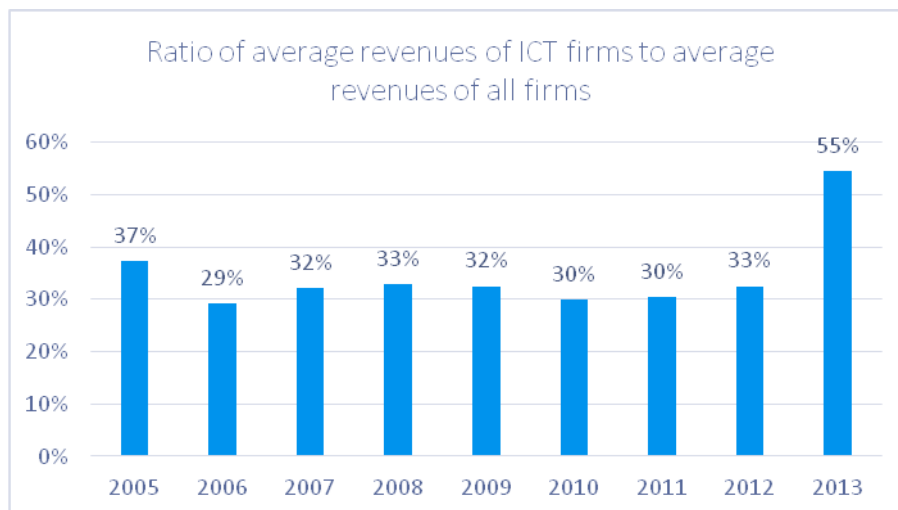
Figure 12



Source: NovaUkraina sample

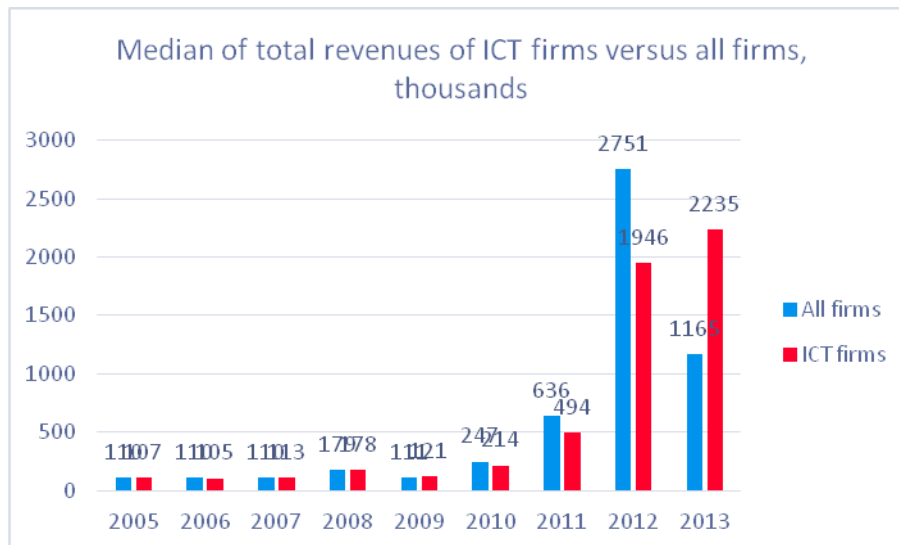
The ICT enterprises demonstrated positive growth of total revenues in line with the total economy in 2005-2012 (Figure 12). Both ICT firms and ICT network companies as well as all firms together experienced drop in total revenues in 2013, but ICT firms – to a lesser extent than two other groups. In comparison to all firms, the ICT firms are getting larger as the ratio of ICT firm average revenue to the average enterprise in the economy increased from 30% in 2006-2012 to 55% in 2013 (Figure 13).

Figure 13



Source: NovaUkraina sample

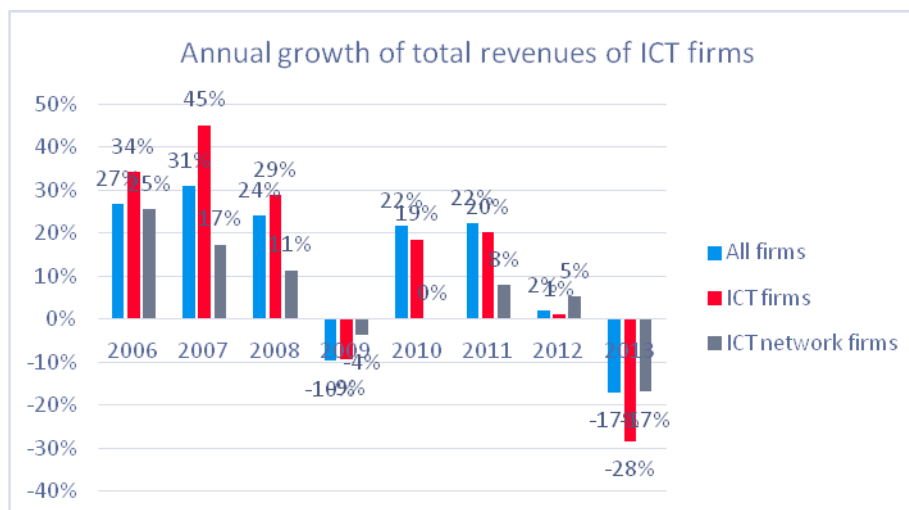
Figure 14



Source: NovaUkraina sample

The median analysis also shows that ICT firm in the middle of the sample has been same in size to Ukrainian firm in the middle of all firms sample in 2005-2009 (Figure 14). In 2010-2012 after the economic and financial crisis the median revenues of ICT firms fell lower than the median revenues of total sample. But in 2013 the middle point ICT firm had 2.235 mln UAH revenues while middle point firm in the economy has 1.165 mln UAH of revenues. The decrease in the median revenues of all Ukrainian firms can be contributed to the economic downturn that started in 2013 and harsh redistribution policies of Yanukovich government in favour of large-scale companies. The position of ICT firms looks more favorable than other manufacturing and services firms in this regard.

Figure 15



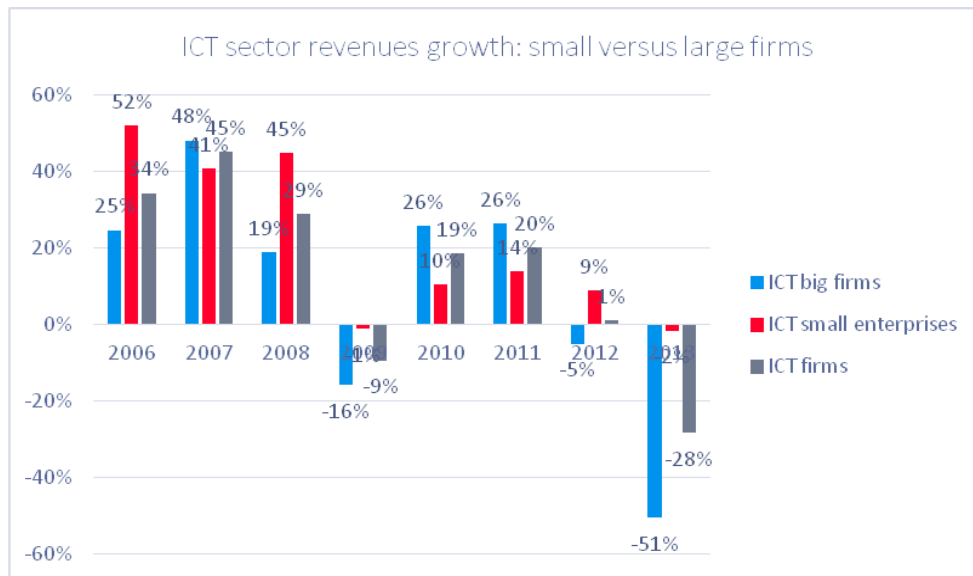
Source: NovaUkraina sample

The ICT firms grew faster than the all sectors together in 2006-2008, but from 2009 the ICT sector performed worse than the whole economy in our sample. In 2013 the revenues of the ICT sector fell by 28% while on average all firms slowed at 17% that year (Figure 15).

What is worth noticing in Figure 15 is that the ICT firms total revenues growth has the same trend as the whole economy suggesting certain interdependence between the sector and all other companies. Strong visual correlation suggests that whole economy dynamics

drives demand for ICT companies products, since the size of the ICT sector relative to the total economy (3% of GDP) is still small for the sector to be the driving force of the economy of Ukraine.

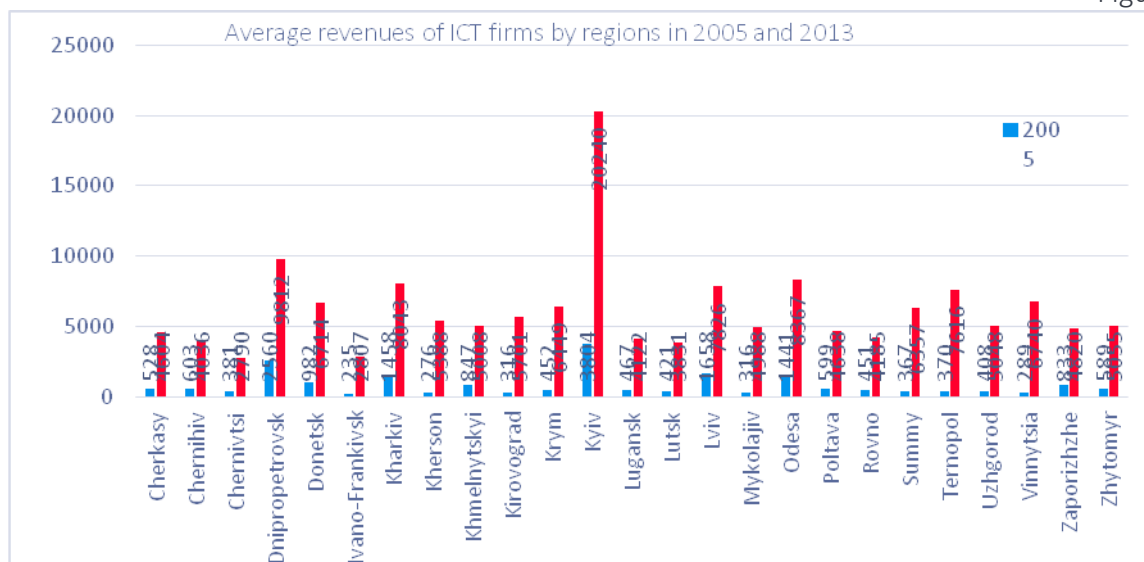
Figure 16



Source: NovaUkraina sample

In 2006-2008 major contributors to the ICT revenues growth have been small enterprises², though big ones have been demonstrating positive dynamics as well (Figure 16). In 2009-2013, the year of crisis and economic instability small ICT firms also look less vulnerable to business conditions as they demonstrate less growth fluctuations.

Figure 17



Source: NovaUkraina sample

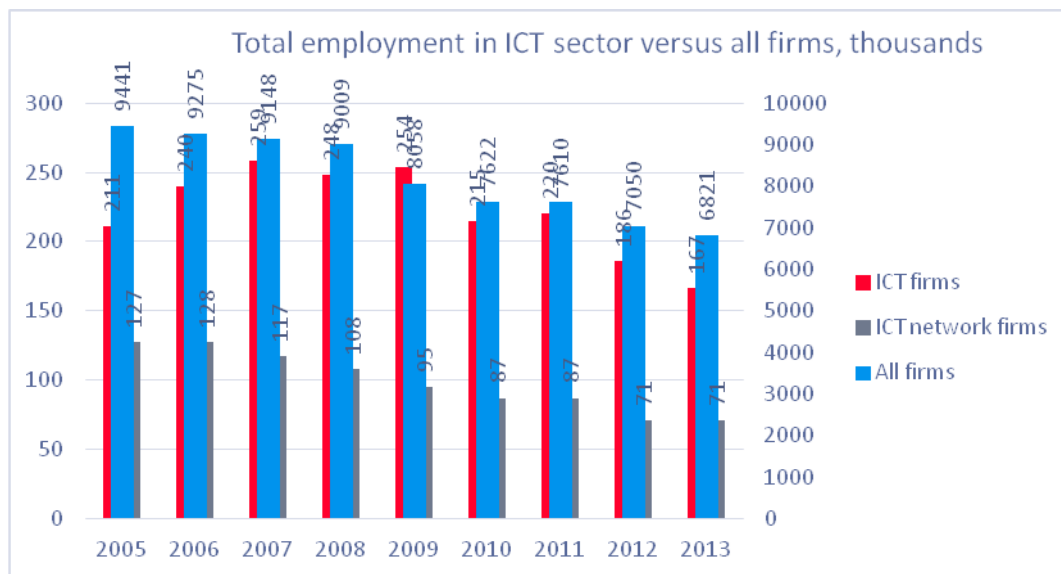
² The small enterprise is characterized by the average number of employees not exceeding 50 persons over the year, and total revenues from sales of goods (works, services) for the same period not exceeding the equivalent of 500000 euros at the average UAH/Euro rate of the National Bank of Ukraine.

Kyiv and Kyiv oblast is most income earning region among Ukrainian oblasts even without counting 4 big ICT network firms. Dnipropetrovsk, Odesa, Lviv and Kharkiv, major economic centres in the regions, are following the capital in this regard (Figure 17).

The increase in average revenues has taken place in all regions with no exceptions but to a different extent. The largest increase in the revenues was identified in Vinnytsia, Ternopol, Kherson, Mykolajiv, Krym, Ivano-Frankivsk.

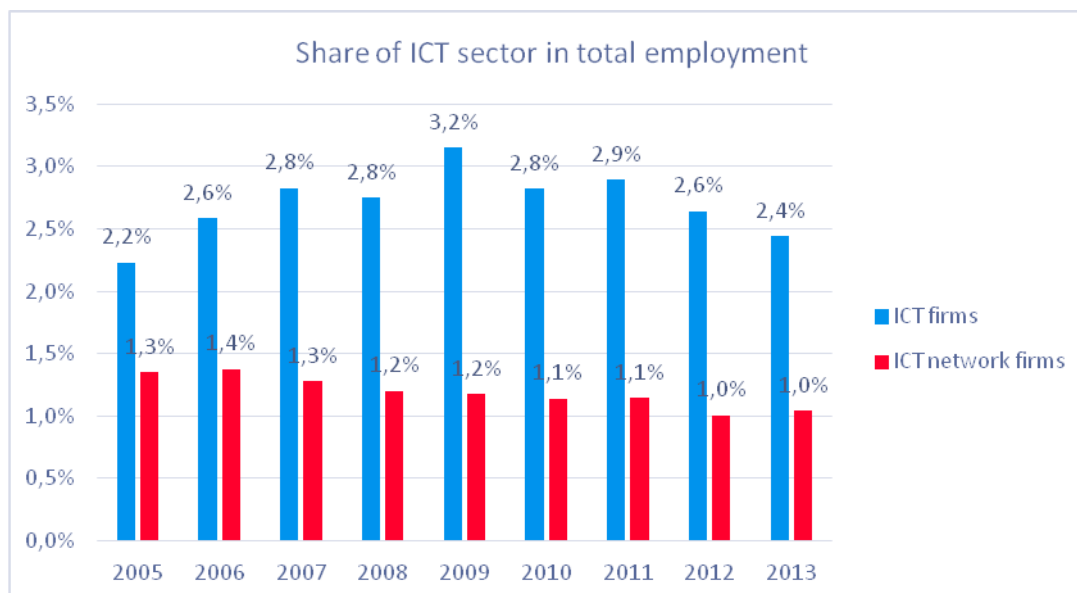
Employment

Figure 18



Source: NovaUkraina sample

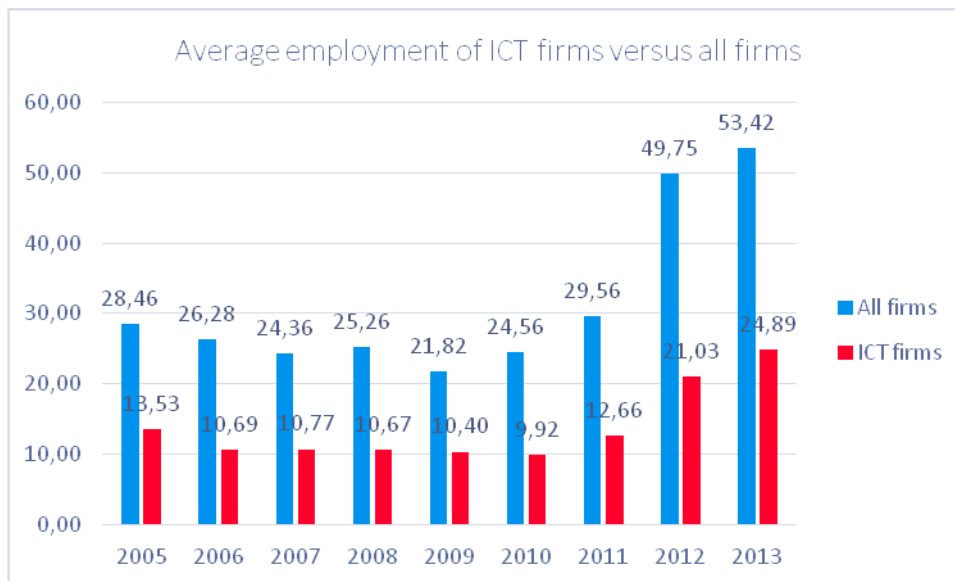
Figure 19



Source: NovaUkraina sample

The total employment of full-time personal in ICT sector had increased from 2005 to 2009 and decreased after (Figure 18), the share of ICT firms with or without ICT network firms had been rising until 2009 but has had a downward trend since then (Figure 19).

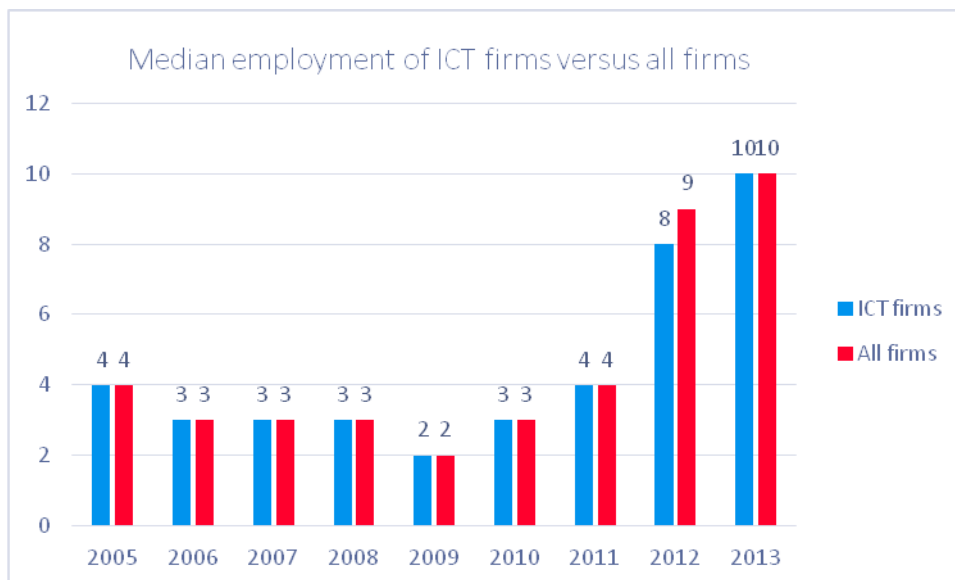
Figure 20



Source: NovaUkraina sample

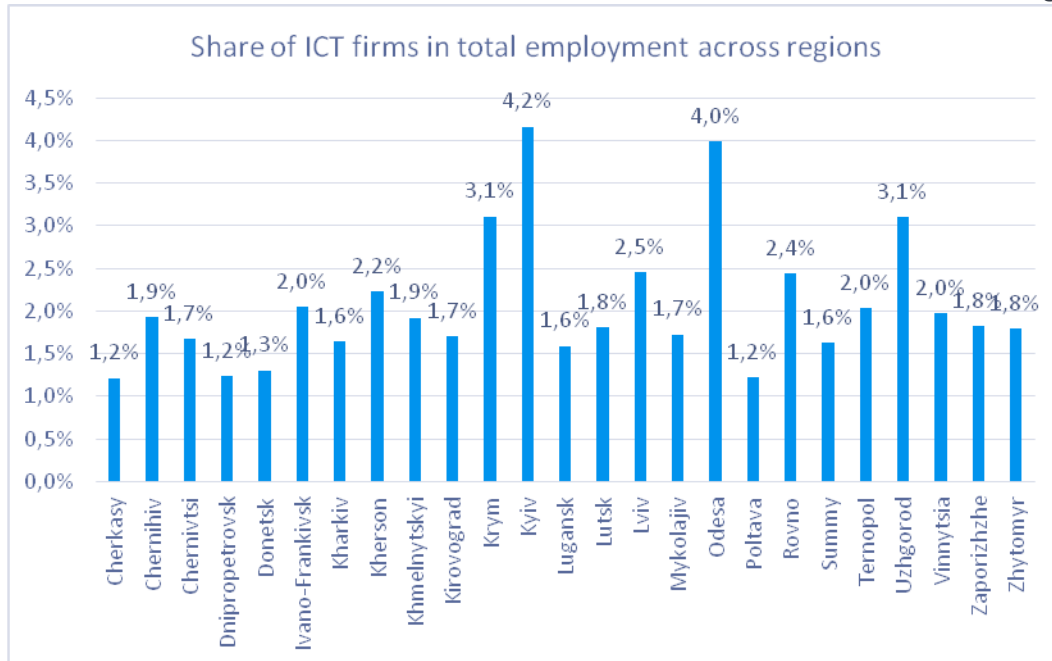
An average ICT firm (without ICT network firms) is smaller than an average firm in the economy (Figure 20). In general, the ICT sectors are following the trend of increasing of the scale as other Ukrainian enterprises do. But the median size of the ICT firm in terms of employment is the same as the median of all firms in the economy suggesting that the scale of ICT sector is similar to that of the average firm in the total economy (Figure 21).

Figure 21



Source: NovaUkraina sample

Figure 22

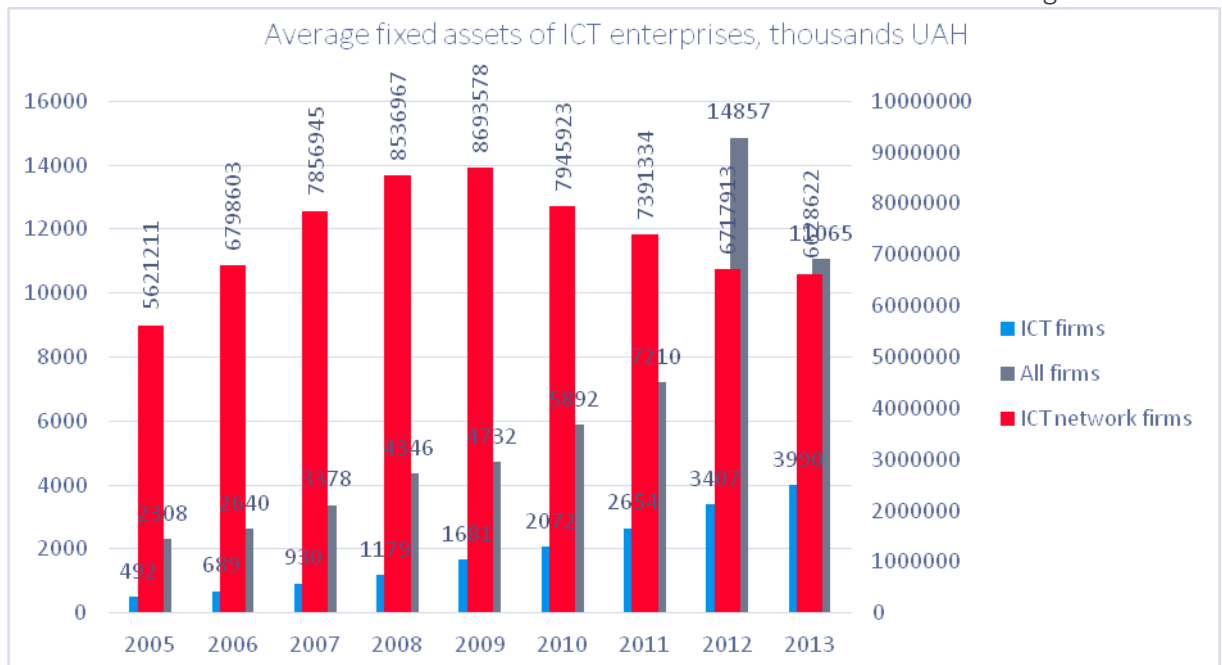


Source: NovaUkraina sample

In terms of employment, the ICT-related economy is concentrated in Kyiv and Kyiv oblast, as well in Dnipropetrovsk, Kharkiv, Lviv, Odessa in absolute terms, but ICT industry workers create the biggest cluster in Kyiv, Krym, Lviv, Odessa, Rovno, Uzhgorod (Figure 22).

Fixed and intangible assets

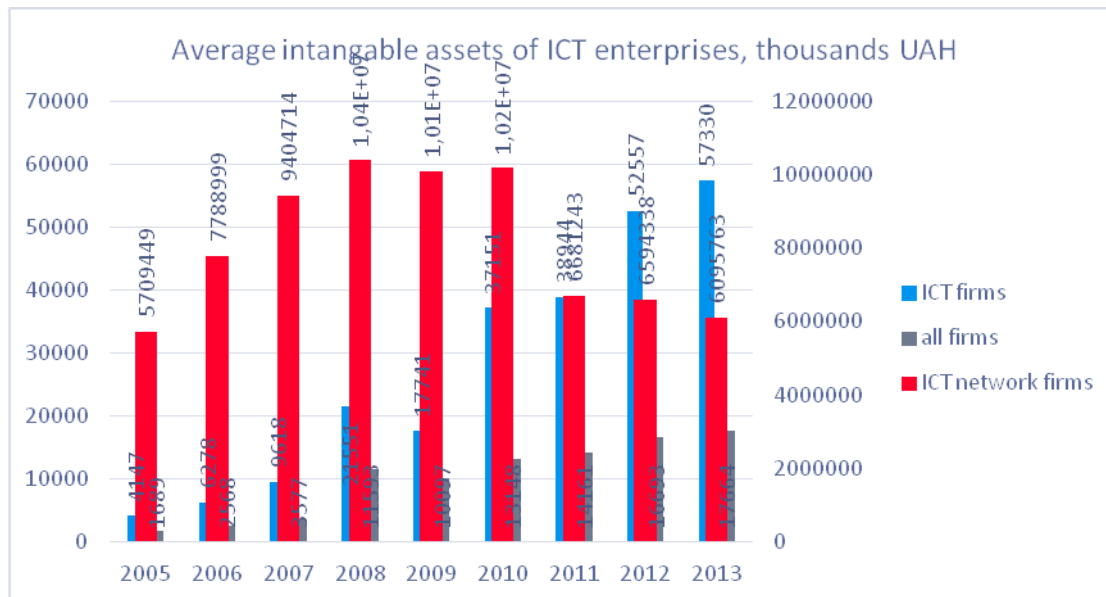
Figure 23



Source: NovaUkraina sample

Another important characteristic of the sector is the volume of the fixed assets, including intangible assets, which consist of unfinished construction, property, long-term financial assets and receivables. ICT enterprises have on average lower level of fixed assets than an average firm in the economy of Ukraine (see Figure 23).

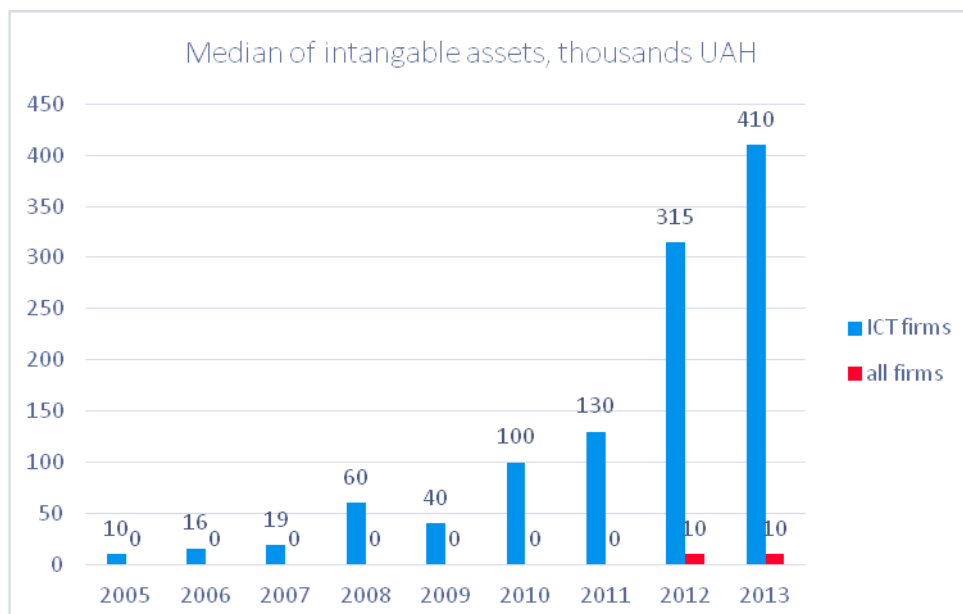
Figure 24



Source: NovaUkraina sample

The component of fixed assets related to research, development and innovation is called intangible assets. Intangible assets consist of trademarks, firm names, copyright on music, video and text, franchise, licenses, construction rights, patents and goodwill. In 2005-2013, the ICT firms had on average higher level of intangible assets in comparison to an average firm in the Ukrainian economy. The data for intangible assets is available for big enterprises only, so the results are relevant for big firms (over 50 employees or 200 000 EUR of revenues). The ICT network firms used to have bigger intangibles assets than an average firm in the economy as well but network companies are just bigger than others (Figure 24). This tells us that ICT enterprises concentrate intangible assets of the economy.

Figure 25

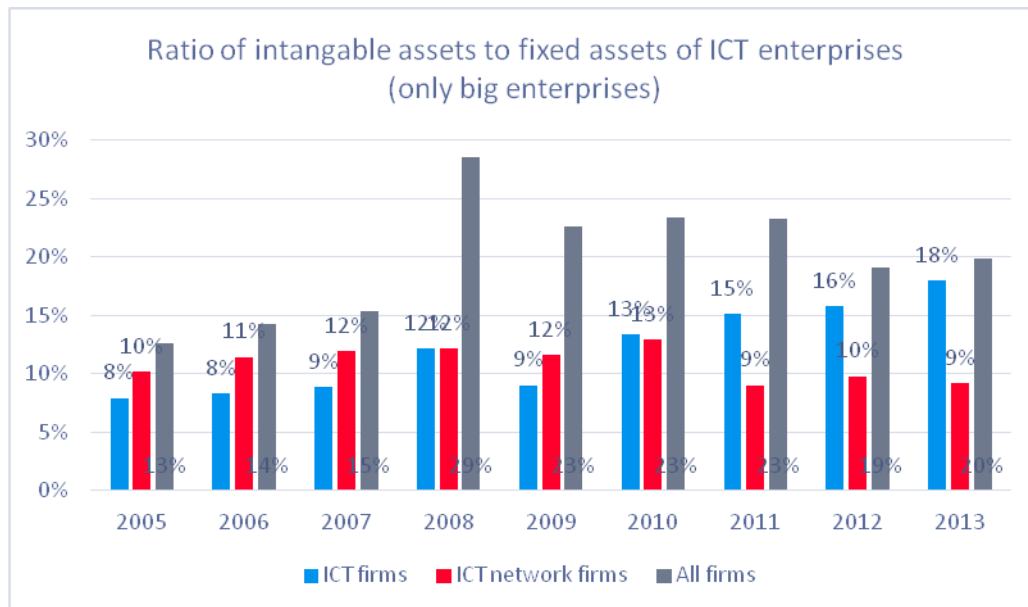


Source: NovaUkraina sample

The median of intangible assets of ICT was growing in 2005-2013. In 2005 the medium point ICT firm had 10 thousands UAH of intangible assets on the balance sheet, in 2013 – 410 thousands

UAH (41 times more). That proves the role of ICT firms as having larger scale of innovation and development activities in economy of Ukraine (Figure 25). The role of intangible assets is also increasing as the ratio of intangible to fixed assets was gradually rising in Ukraine in 2005-2013 (Figure 26). Although in 2005 only 8% of the fixed assets were in the form of intangible assets, yet in 2013 the share reached already 18%.

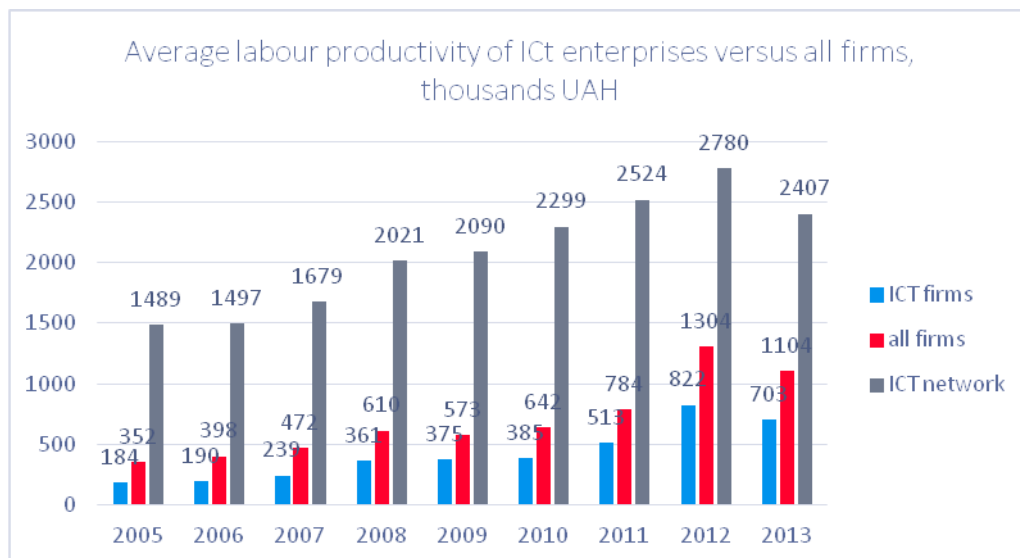
Figure 26



Source: NovaUkraina sample

Productivity

Figure 27

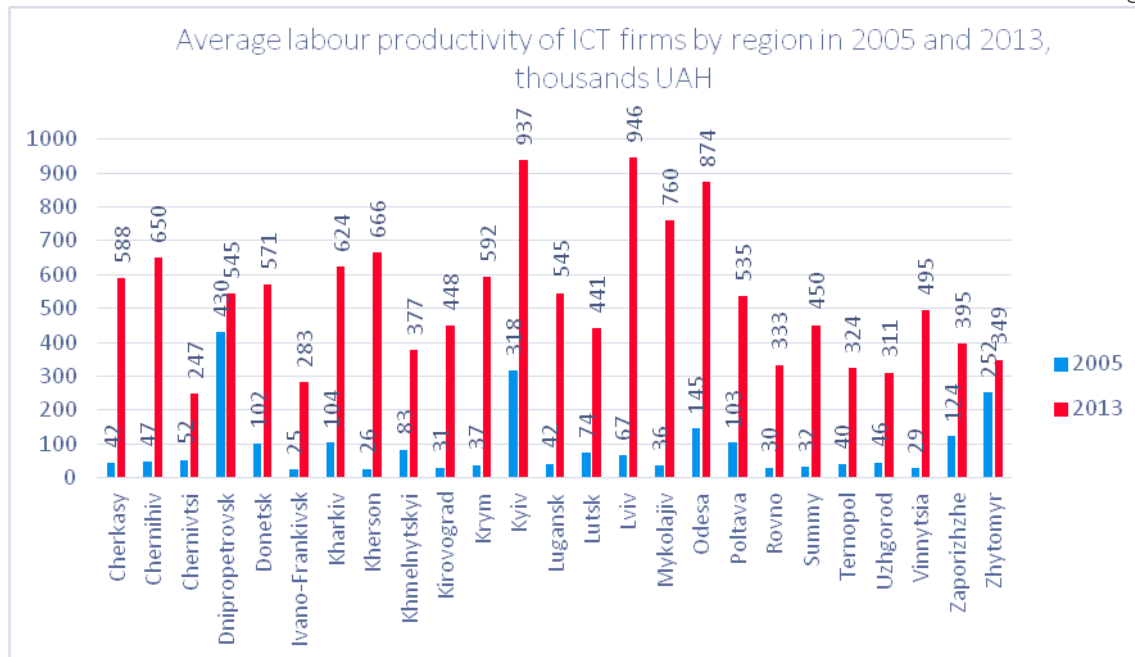


Source: NovaUkraina sample

The productivity of the firms in the sector is the indicator which allows to follow the economic efficiency in the ICT sector. The labour productivity is calculated as total revenues per number of full-time employees. Total factor productivity is the part of the output growth that cannot be accounted for by the growth of the primary factors of production, i.e. capital and labor.

The labour productivity of ICT enterprises is lower than productivity of all firms (Figure 27). There is a positive tendency in the indicator in line with the whole economy trend in 2005-2012 years, though productivity fell in 2013.

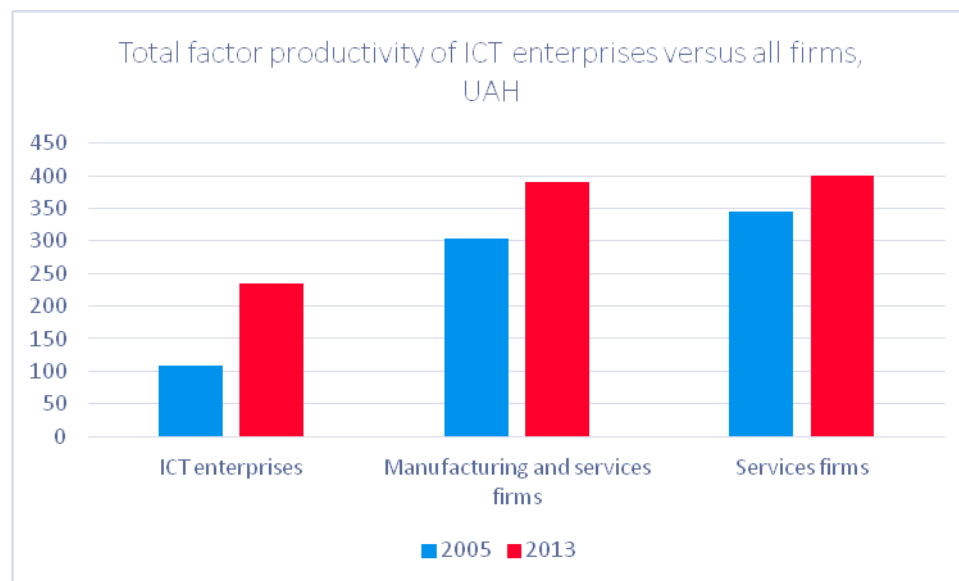
Figure 28



Source: NovaUkraina sample

The largest labour productivity of ICT firms (without network firms) is characteristic of Kyiv, Lviv, Mykolajiv and Odesa. Interestingly, Kyiv does not lead in terms of labour productivity among the regions of Ukraine, Lviv does (Figure 28).

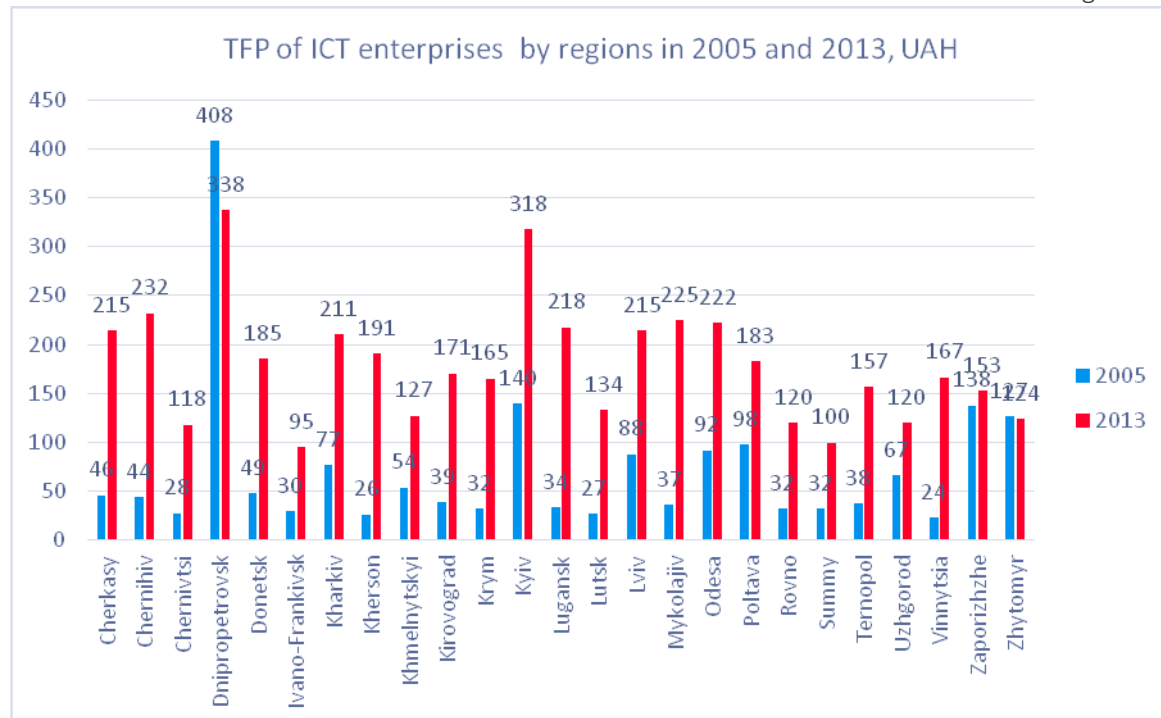
Figure 29



Source: NovaUkraina sample

The total factor productivity value (calculated according to Levinsohn-Petrin procedure) of the ICT together with network firms is presented in Figure 29. TFP of ICT enterprises (ICT firms and ICT network firms together) remained below of TFP of manufacturing and services firms, but the gap narrowed from 2005 to 2013.

Figure 30



Source: NovaUkraina sample

Dnipropetrovsk is the leading region in terms of total factor productivity of ICT firms, though that is the region where TFP decreased from 2005 to 2013. Strong regions in terms of TFP level are Kyiv, Chernihiv, Odesa, Mykolajiv and Lviv (Figure 30). The sectoral values for TFP is presented in tables A.3 and A.4 for 2013 and 2005 years respectively. In 2013 the largest total factor productivity was identified for sectors “Wholesale trade of computers”, “Publishing of journals”, “Television broadcasting”, “Publishing of books” and “Publishing of newspapers”. In 2005 the TFP was the largest in the sector “Wholesale trade of radio goods”.

The market concentration measured by Herfindahl-Hirschman index [14] was calculated for the 4-digit sectors of the ICT-related sectors in Ukraine and the results are presented in Table 6 for data in 2005 and in Table 5 to describe the situation in 2013.

The level of concentration depends on the level of aggregation. In 2005 the ICT-related markets did not demonstrate significant level of concentration of firms. Only publishing of sound recordings and repair of equipment for broadcasting and retransmission gear was estimated to have high level of concentration in the subsector. In 2013 the high concentration was characteristic of the telecommunication sector, management of the computer equipment, repair of computers and peripheral equipment. But the change in the aggregation level induced by the transfer of the KVED classification system from KVED-2005 (NACE Rev.1) to KVED-2010 (NACE Rev. 2) may be accountable for that.

4. THE FACES OF DIGITAL ECONOMY: INDUSTRY AND CONSUMERS

ICT companies

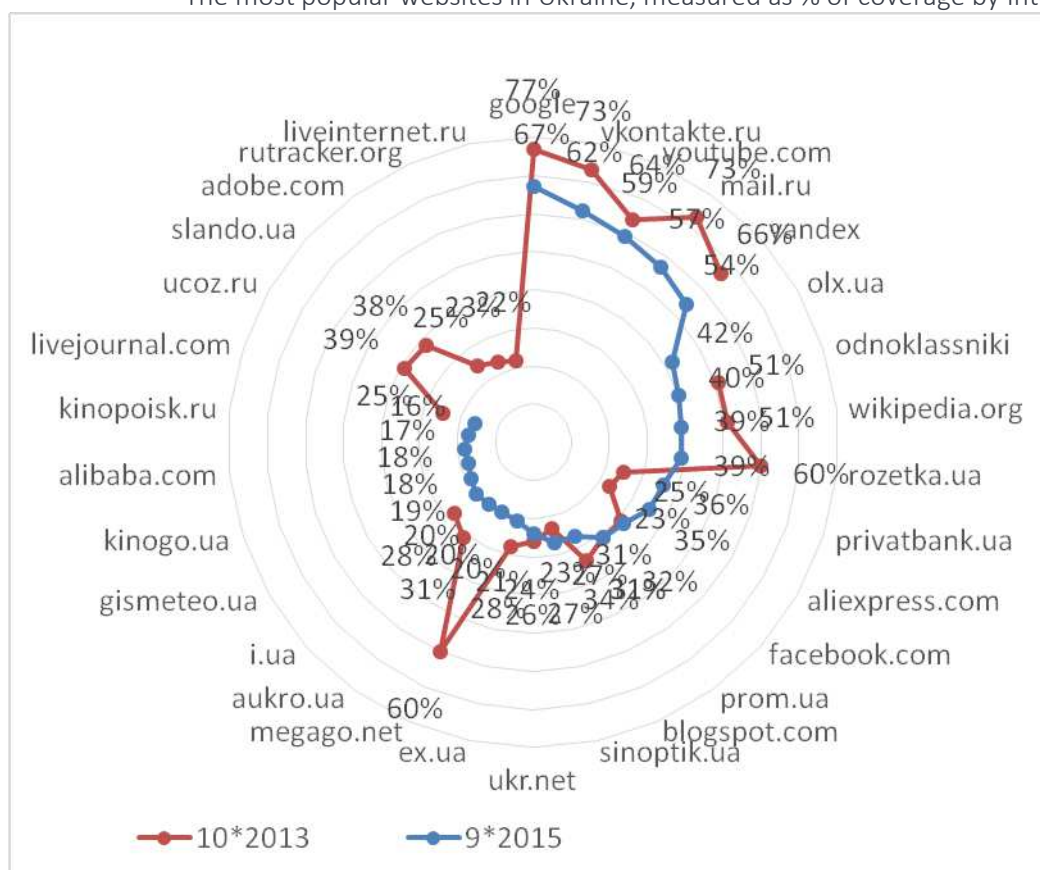
The major software development companies in Ukraine are usually affiliates of foreign software producing multinationals or local outsourcing companies. Among biggest ones one could mention ISS - Information Software System, Miratech, Luxoft, Softline, Global IT solutions, Sigma Software Group, TEAM International.

Major business association promoting the interests of digital economy sphere are IT Ukraine Association (<http://itukraine.org.ua>), Ukrainian High-Tech Initiative. Association of Ukrainian IT Outsourcing companies (<http://hi-tech.org.ua>), Ukrainian Internet Association (<http://www.inau.org.ua/>).

Biggest telecommunication companies are Vodapfone (former MTS Ukraine), Kyivstar and Life:) Ukraine (mobile operators), Golden Telecom, PEOPLEnet, Utel (Ukraine) – mobile Internet and wholesale communication providers, Ukrtelecom – old state system communication services company.

Figure 31

The most popular websites in Ukraine, measured as % of coverage by Internet audience



Source: Opinion Media Database. Дослідження інтернет-аудиторії України
http://www.inau.org.ua/analytics_vuq.phtml

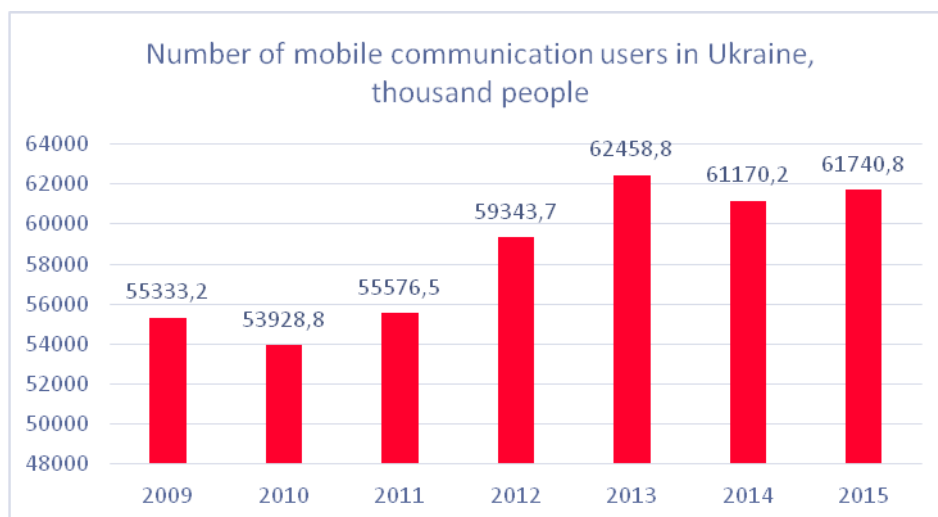
The major Internet platforms in Ukraine stay pretty stable in terms of Internet audience attention (Figure 31). Google and Yandex are the major search engines, Vkontakte.ru, Mail.ru, Odnoklassniki.ru, facebook.com are major communication and social interaction sites. The sales online are primarily concentrated on olx.ua (trade in real estate, services, furniture), privatbank.ua (commercial services), aliexpress.com, prom.ua, rozetka.ua, aukro.ua (clothing, electronics, industrials goods). Ukr.net, i.ua, livejournal.com are major news and opinion sites. The last 2 years have been characterized by the decrease of the share of American (google.com and youtube.com) companies and Russian (Vkontakte.ru, mail.ru, yandex.ru) websites to the advantage of Ukrainian and Chinese platforms.

The international rankings of Ukraine's ICT sector development shed some light on the complex aspects of the ICT development gap. According to Boston Consulting Group, Ukraine ranks 39th in the rating of e-friction (Sweden – 1st place, Estonia – 20th place, Poland -29th place). Ukraine scored better on the information component of E-friction which are the obstacles to rip the benefits out of the Internet economy. Information component describes availability of content in local language, commitment to Internet openness, etc. (Boston, 2014). The low score relates to industry-related e-friction – shortages of capital and skilled labour. Infrastructure, payment systems and data security are also the areas where improvement is necessary to further reduce e-friction.

In WEF Global Information Report Ukraine ranks 71 in 2015, scoring relatively high on affordability, digital infrastructure and skills, but relatively low on business and government usage and economic impact (WEF, 2015).

According to the Association 'IT Ukraine' report, Ukraine entered the top five countries in the world with the largest number of certified IT professionals, taking the 4th place after the U.S., India and Russia. Today the number of certified professionals in the field of information technologies in Ukraine is about 25 000 people, though the total number of IT professionals in Ukraine according to various estimates ranges from 200 000 to 215 000 people Annually about 15000 graduates in the IT sector graduate Ukrainian universities. The number of IT professionals in Ukraine continues to grow annually, and it is expected that by 2015 this number will reach 315,000 people (IT Ukraine, 2015).

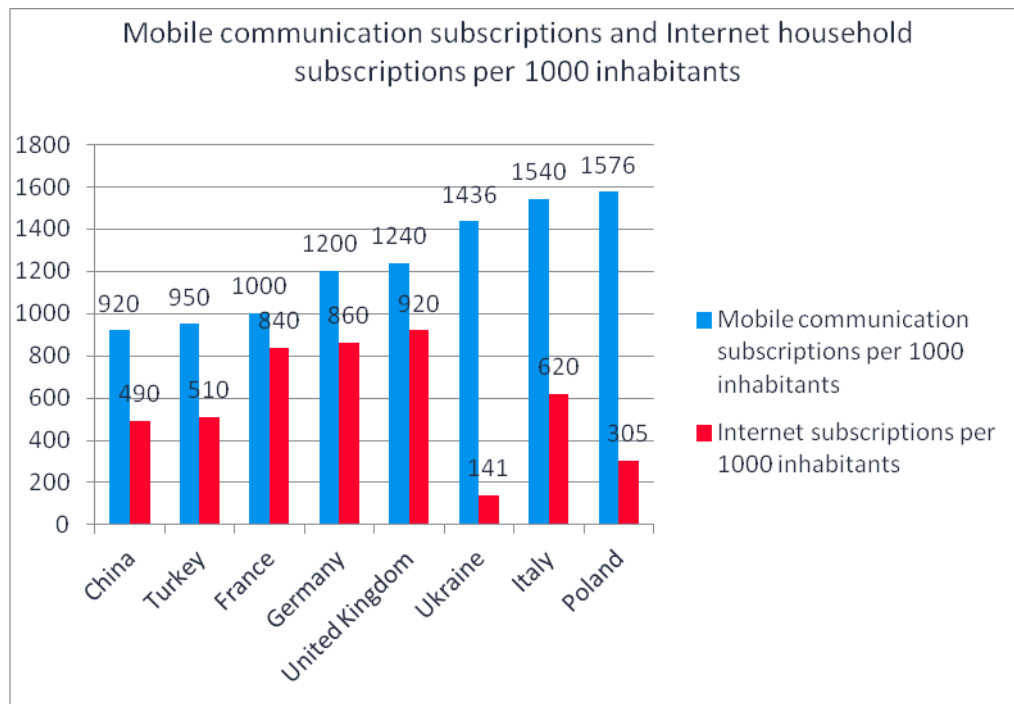
Figure 32



Source: DKS Information Society (2015)

There are 61.741 mln users of mobile communication in Ukraine as of the 1st of July, 2015. The number of mobile communication users has been increasing with the stagnation periods in 2010 and 2014 (Figure 32).

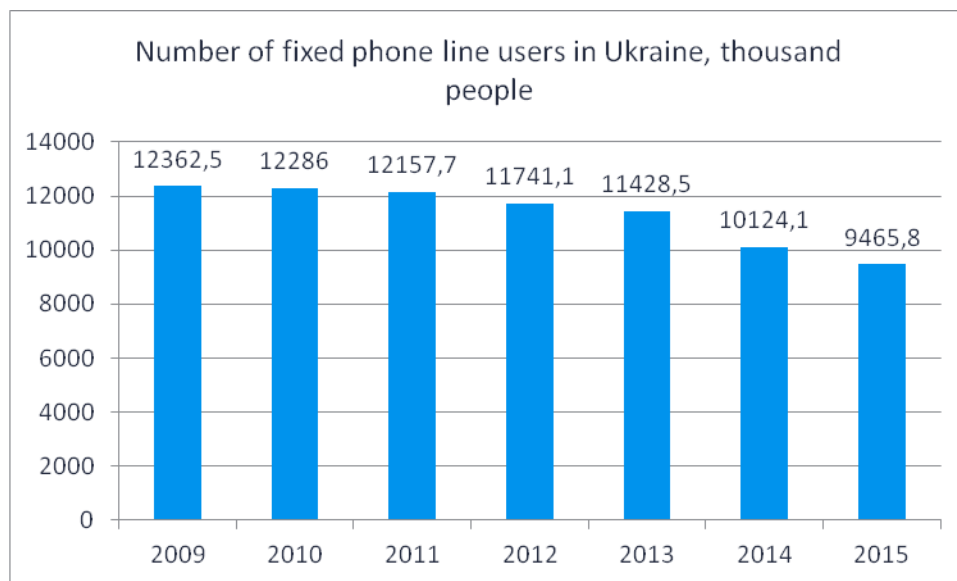
Figure 33



Source: DKS Information Society (2015), SBA Information society (2015), MGP

The mobile phones usage is similar to the level of Poland: 1576 mobile phone users per 1000 inhabitants, in Ukraine – 1436, in Germany (1200 in 2014) (Figure 33).

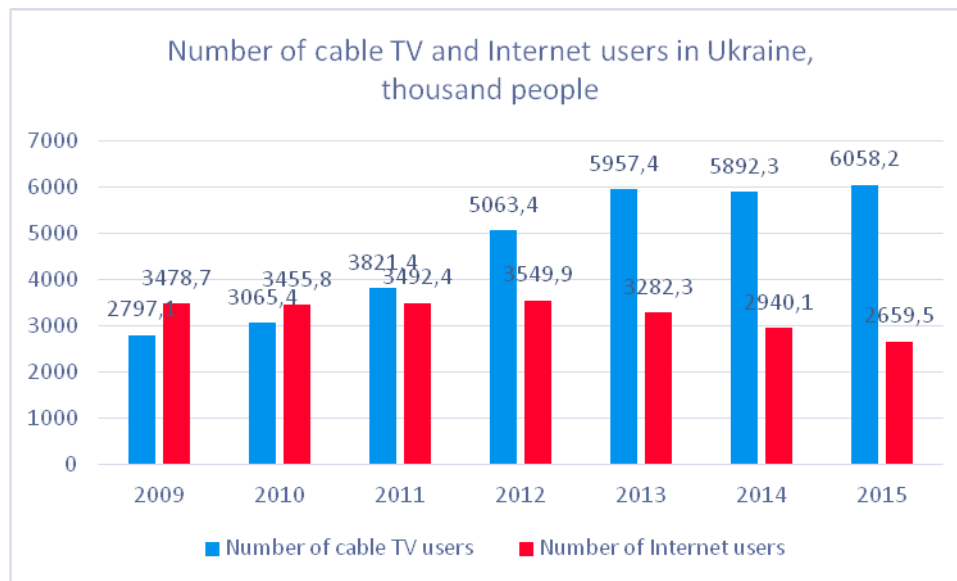
Figure 34



Source: DKS Information Society (2015)

There are 520 users of fixed phone lines per 1000 inhabitants as of 1st of July, 2015 (Figure 34). The quantity of fixed lines has been decreasing from 2009 to 2015 due to fixed line substitution by mobile communication. The fixed line penetration rate is quite high in Ukraine (520 subscribers per 1000 inhabitants, in Germany – 570 and in France – 600 (SDA Information Society, 2015).

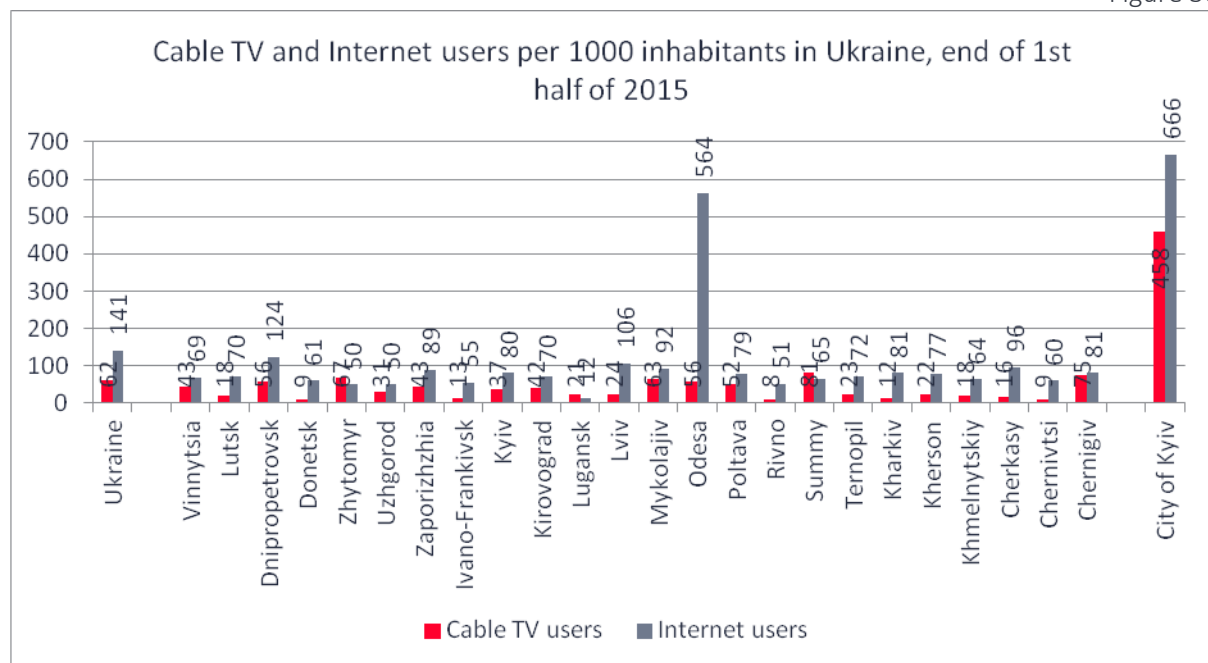
Figure 35



Source: DKS Information Society (2015)

The Internet users number have been steadily growing in Ukraine in 2009-2015 while the number of cable users have been gradually decreasing (Figure 35).

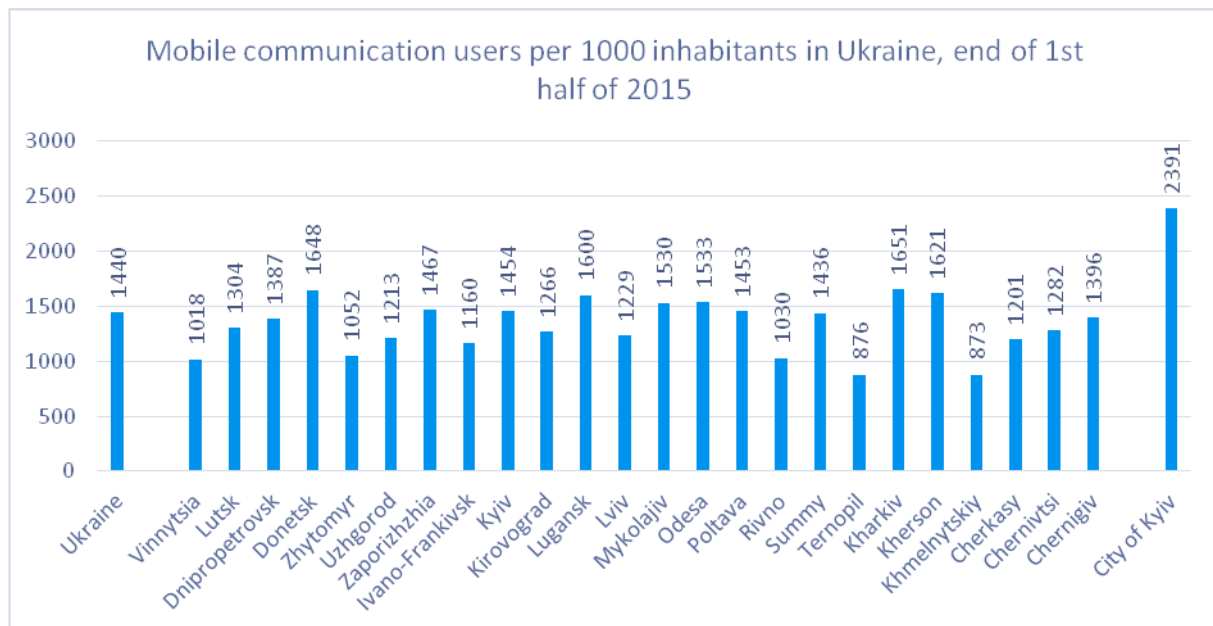
Figure 36



Source: The current state and development of Ukraine's communication for the 1st half of 2015. State Committee of Statistics of Ukraine

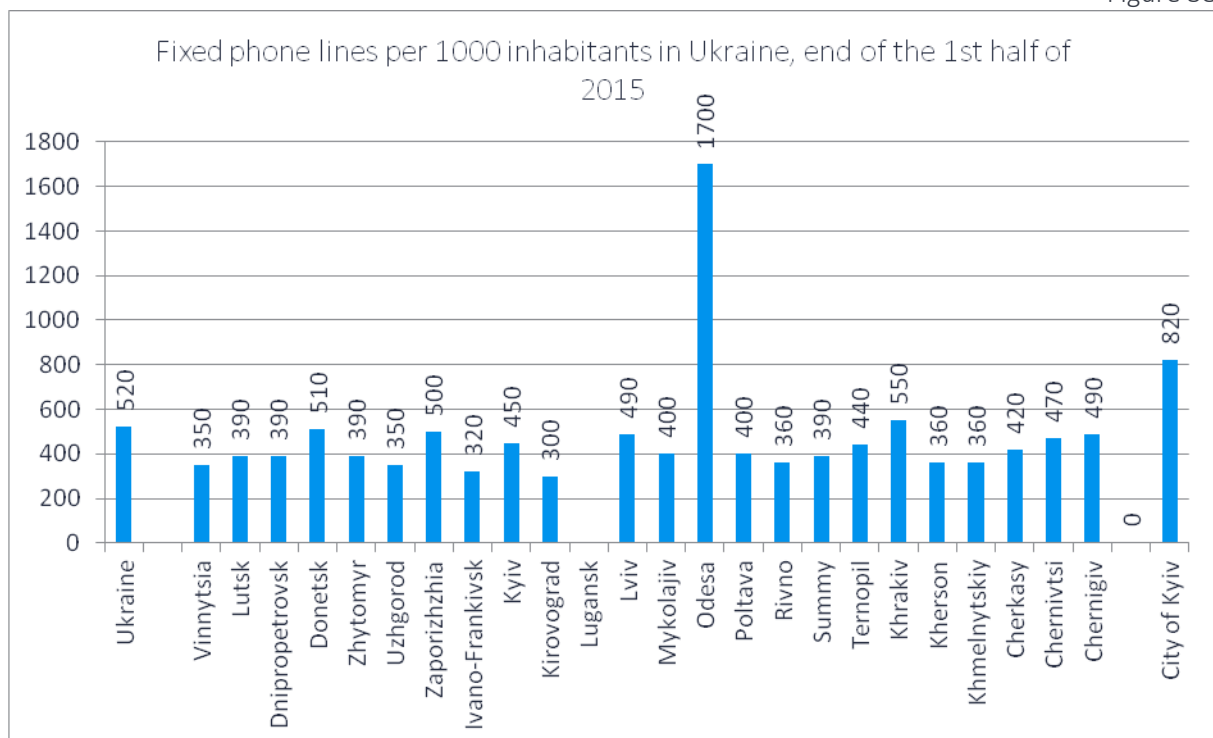
At the same time, the number of users of cable TV and Internet in Ukraine - 62 and 141 users per thousand people respectively – suggests the access to communication is not sufficient for digital advance of economy (Figure 36). In the first half of 2015 there were 6.058 mln users of Internet in Ukraine. In relative terms Ukraine with 141 users of Internet in comparison to 305 users in Poland and 860 users per 1000 inhabitants in Germany (Figure 33) still needs to develop access of population to the Internet.

Figure 37



Source: The current state and development of Ukraine's communication for the 1st half of 2015. State Committee of Statistics of Ukraine

Figure 38



Source: The current state and development of Ukraine's communication for the 1st half of 2015. State Committee of Statistics of Ukraine

The ICT market infrastructure is moderately developed with large regional imbalances: mostly mobile and digital services users are located in the city of Kyiv and other biggest regional centers - Dnipropetrovsk, Lviv, Kharkiv and Odesa region (Figures 37 and 38).

According to the National Commission for the State Regulation of Communications and Informatization of Ukraine, broadband Internet penetration rate accounted for 35% in 2012 (5.97 million of the 16.9 million households). The households constitute 5.97 million (about 90%) of the 6.7

million total number of subscribers of broadband communication (both home and work) (Vorobiyenko, 2013).

Though there is a positive dynamics of Internet and mobile communication usage, the low penetration rates and regional imbalances in digital infrastructure suggest the need for further digital infrastructure development.

5. UKRAINE'S GOVERNMENT POLICIES IN DIGITAL ECONOMY

The reforming of the digital sector is receiving a lot of attention of policymakers in Ukraine nowadays. One of the priorities is the development of government electronic services and infrastructure to stimulate private digital initiatives development. In 2014 the national project "Digital Ukraine" was launched under the auspices of the President of Ukraine. The ultimate goal is to remove legislative barrier for the development of ICT technologies in the government sector, to provide digital services to households and businesses and to create e-government. Another direction is related to stimulation of business activities in digital sectors by eliminating impediments to electronic business growth and creating better business conditions for start-ups and ICT sectors firms.

Besides the developed strategy there have been some key appointments in the government. The good sign to strategy implementation in the future is that business representatives went to the government to lead the digital agenda in economic and administrative reforms. Ex-chief of Microsoft Ukraine Dmitry Shimkiv was appointed Deputy Head of the Presidential administration in July 2014. Shortly afterwards, in August 2014 he announced the list of 14 priority areas to be reformed in the tech sector, including simplifying access to permits and licenses, opening a catalogue of applications for registering intellectual property rights, permitting Ukrainian nationals to open companies and bank accounts abroad without a license from the National Bank of Ukraine, etc.

In January, 2015 Jaanika Merilo, the former Estonian "business angel", became an advisor to the Minister for Economic Development and Trade. Her goal is to promote technological companies advance, to attract foreign capital and enhance digital development of Ukraine. The expert chooses the tactics of building the change in a particular region. In June she started cooperation with the Mayor of Lviv, Andriy Sadoviy. The major output of the team is to focus digital initiative in Lviv region and to see the results and to learn from them. The center of the digital initiative is the creation of electronic government in Lviv. There are some obvious starting projects in this direction. In October 2015 the electronic patient's file system was introduced in the army hospital of Lviv. Also the portal "Personal Lviv Inhabitant Cabinet" (<https://egov.city-adm.lviv.ua/SitePages/Home.aspx>) with the Bank ID identification concept was launched. Now the city inhabitants can book a certain range of the government services on this page. The private players willingly contributed to the initiative Privatbank, the major system bank in Ukraine, and Kyivstar, biggest (by turnover) mobile operator in the country, took /has taken? an active part in this project.

Another institution to deal with digital economy advance is the Department of Digital Economy established on April 1, 2015. The former head of the telecommunications company "Ukrainian High Technologies» (Freshtel) Lena Minich heads the newly created Department of the Digital Economy of the Ministry of Economic Development and Trade of Ukraine. The aim of this division is to deal with the development of broadband Internet access, standardization, security and confidence in the digital and electronic services, e-government, developing training standards of civil servants on digital technology, support and development of investment in innovation and start-up, development of electronic commerce and other IT programs.

The third direction of the modern digital agenda is to create a better legislative framework for digital business. This is a tedious task to pass the laws through the coalition parliament in Ukraine. Nonetheless one of the important steps have already been taken. On September 25, 2015 the adopted by the Parliament law “On E-commerce” was signed by the President and came into force. The law aims to regulate trade with the use of ICT technologies and bring it in line with the European standards of the Internet commerce.

One of the recent initiatives in infrastructure development is the tender on 3G licenses. On 23 February the National Commission for State Regulation of Communications and Informatization named companies that will receive the licenses for communication in UMTS standard 3G. Life:) Ukraine became the winner of the first lot, with MTS-Ukraine and Kyivstar as the second and third forerunners respectively (UA Crisis Media Centre, 2015).

E-government project

The appointments of Dmitry Shimkiv and Jaanika Merilo mark the start of the modern initiative of the electronic government in Ukraine. Except for the episodes of e-government creation at the regional level, there are initiatives that will lay the ground for national e-government development.

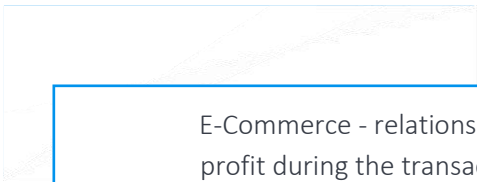
The important steps have been undertaken in expanding the openness of government transactions. In April 2014, the state portal of open data (data.gov.ua) was established. In April 2015, the Parliament adopted the law about Open data (#2171) and in July 2015 another important law on open public procurement (#2078a) was signed. After the Parliament passed the law on open state tenders in February 2015, the electronic portal with open data on public procurement Prozorro was set up (prozorro.org).

In September 2015 the Ministry of Justice started a couple of initiatives to provide governments services on-line – for example the receipt of information on private property registration and civil status acts registration. Now every citizen can inquire whether it is possible to obtain government service online or whether the electronization of a service is under construction - <https://igov.org.ua/>

Important issue is the online open data publication on government procurement and expenses - edata.gov.ua.

In July 2015, the project of electronic petitions was signed by the president with the first electronic petition receiving 25000 signatures.

These initiatives may seem modest, but after the long years of silence in the government – public dialogue in Ukraine, these are ice-breaking activities. One should mention the role of international donor in financial support of e-government in Ukraine – from Soros fund “Vidrodzhennya” to European Bank for Reconstruction and Development.



E-Commerce - relations aimed at making profit during the transactions to acquire, change or terminate civil rights and obligations undertaken remotely using information and telecommunication systems, resulting in counterparts rights and responsibilities of material nature as the result of the relationship.

(Article 3. Law of Ukraine “On E-commerce”)

6. THE OPPORTUNITIES AND BARRIERS OF ICT-BASED ECONOMY DEVELOPMENT

The international experience provides an unconditional evidence on the fact that substantial development and improvement of the society's well-being takes place in the countries which have recognized the use of innovations, technologies and evolvement of a "digital economy" as the essence of their development.

Identification of innovations and information and communication technologies in Ukraine as the key national strategies will provide for the so-called "digital leap" phenomenon. Reforming can and must mean "digitizing", and digital technologies do not represent a piece but the essence of multiple modern reforms. Replacing physical processes by digital ones is all but the only way to implement reforms quickly and at a low cost. In other words, if a reform does not result in an increased number of PC users and IP addresses, such reform should be considered as failed in the contemporary world of technologies and the Internet.

Building an innovative and "digital" economy and the country in general will create a strong internal market, primarily the ICT market, innovations market, etc. This will keep a huge human capital from migration and provide hundreds of specialists with jobs.

According to Thomas Myrup Kristensen, Director of Facebook, Policy Nordics, CEE & Russia, and Viktor Galasyuk, the President of the Ukrainian Association for Innovation Development the most important directions for reforms are the following:

1. Intellectual property piracy must be overcome.
2. Development should be planned by leaps (not gradually) to quickly reach the higher proportion of Internet-related products in GDP than in the EU (6-8%).
3. It is necessary to penetrate niches in the value chains where products generating higher margin are manufactured.
4. Penetration of the Internet, including the mobile one, must be maximized.
5. It is the IT sector where investors should be attracted to make it a priority.
6. "Training" in the high tech sector with the help of IT outsourcing is required. (Forum Kyiv, 2015a)

One of such "points of growth" in Ukraine might be hi-tech industry. The country has a big chance of making a breakthrough, if it chooses digital economy as one of its main priorities. But Ukraine's progress in hi-tech is hampered by the lack of innovative infrastructure. Furthermore, Ukrainian society lags behind in digital skills and shows low level of trust in e-government services, Ukrainian science is orientated at the raw material economy, and there is almost no venture financing. All these problems hamper the development of hi-tech product companies, while successful Ukrainian IT companies are focused on IT outsourcing, but not the end products (Forum Kyiv, 2015b).

"Unfortunately, Ukraine lags behind in many aspects of IT. Although there are a lot of qualified software developers in Ukraine, outsourcing only creates good jobs, but doesn't lead to innovation breakthrough. Moreover, the country hasn't got great success stories like Skype in Estonia or ICQ in Israel. Even the number of Ukrainian IT professionals is not so high." — says Jaanika Merilo, Managing Director of the Ukrainian Venture Capital Association (UVCA) at Kiev International Economic Forum. "However, I believe that IT industry has enough potential to ensure economic growth and create a new economy in Ukraine. Even reaching 7% GDP for IT means hundreds of thousands of new well-paid jobs. But in order to accomplish this, the state should make the development of exportable innovative solutions one of the key priorities and continuously cultivate relevant ecosystem." (Forbes, 2015)

7. CONCLUSIONS

The ICT sector contributing 3% to the GDP of Ukraine (2014) is still not the driving force of the economy. The growth of ICT sector products is still lower than wholesale trade and agriculture sectors growth. The share of telecommunications and information is only 15% in the total services exports and 8% in the services imports of the country.

The study uses the micro-level data on enterprises in ICT sector of Ukraine which are related to THE ICT sector according to KVED classification. First, ICT firms sample is divided into two subsamples – ICT firms and ICT network firms, or 4 big network telecommunication companies – Ukrtelekom, Kyivstar, Vodafone Ukraine and Life ☺ Ukraine. The sample was also cleared out of holding companies which have less than 4 employees and more than 2 bln UAH of total revenues. As a result here are 6742 ICT firms in the Ukrainian economy in 2013 according to micro-data sample under NovaUkraina name. Most of them operate in the sectors “Wired telecommunication”, “Television broadcasting”, “Computer programming”, “Data-processing on web site”, “Web portals”.

The ICT firms demonstrated positive growth of total revenues and employment in 2005-2008. The positive trend was broken by the economic and financial crisis of 2008-2009. The positive dynamics restored, but ICT firms have had difficulties reaching the pre-crisis level as new challenges of political instability in 2013-2014 and military conflict in 2014-2015 played their part. Major contributors to the growth of indicators are small ICT enterprises with employment less than 50 people and annual return less than 500000 euro. In general, the dynamics of the sector follow the trend of the total Ukrainian economy, suggesting strong interlinkages between the ICT sector and the national economy.

Structurally Ukrainian ICT enterprises differ from all other firms. They have on average lower total revenues, full-time employment level and value of fixed assets than other firms. The median indicators of ICT firms versus all firms are suggesting stronger position of ICT firms in the Ukrainian economy. First, there was a sign in 2013 than ICT firms can perform better than other firms in the economy as the ratio of revenues in the sector toward average revenues in the economy increased. But the question still remains if this trend can be sustained in the future. Secondly, the median of total revenues of ICT firms have been rising in 2005-2013 and overcame the revenues of median national company. Thirdly, median employment of ICT firms are at the comparable level of median number of employees of total economy.

What gives the ground to say that ICT firms can become the driving force of the economy is the fact that they have on average higher intangible assets than other firms. This indicator is increasing in time. As intangible assets represent the patents, trademarks, copyrights and other intellectual property and results of research activity, the potential that ICT firms accumulates in this regard make them stand out among other sectors.

The ICT markets usually demonstrate low level of concentration and market power in the subsectors. Also the price increase dynamics for the information and communication services are slower than for all other sectors. It brings us to the conclusion that this sector generates substantial consumer surpluses in the country for clients in other Ukrainian industries and private clients. The spillover effect of ICT firms should be considered together with the direct contribution to the national economy.

Kyiv, the capital, dominates in terms of revenues, employment and concentration of ICT personnel even in case large network telecommunication companies head-quartered in Kyiv are excluded. But in terms of labour productivity and total factor productivity other regions are strong, for example, Lviv, Odesa and Dnipropetrovsk.

Productivity of the ICT firms, both productivity of labour and total factor productivity, is still lower than in services and manufacturing sectors. One of the reasons could be still lower scale of ICT

business in Ukraine. Another reason might be the cost of capital which is on average higher for the ICT firms. Since ICT companies are smaller in scale and operate in low concentration markets it makes credit access more problematic for them in traditionally dominated by banking finance Ukrainian economy. Moreover, ICT firms stay aside large government procurement schemes that constitute a major gain for vertically integrated financial groups dominating the major manufacturing and traditional industries in the country. Thirdly, ICT business is predominantly an outsourcing type of international business, thus profitability and efficiency is influenced by transfer pricing.

The brief study of infrastructure for the Internet economy suggests significant gaps to fill in. While the number of IT specialists is quite significant in the country, the use of means of communication is still lower than in the neighboring Poland. There are about 25000 certified professionals in the field of information technologies in Ukraine, the total number of IT professionals in Ukraine according to various estimates ranges from 200 000 to 215 000 people. While the ICT industry might not have substantial experts and about force bottlenecks, the general public digital access is not sufficient. Ukraine has lower indicators than neighboring Poland. In 2015, in Ukraine there are 1436 mobile phone users per 1000 inhabitants and 140 users of Internet per 1000 inhabitants. The penetration rate of broadband Internet is only 35%.

Since the new government came to power in Ukraine in October 2014 one of the priorities has been to enhance digital economy in Ukraine, create e-government and to increase the use of information and communication technologies in social sphere. The key appointments from business sphere and several digital projects under way in Ukraine is the clear sign that policy goals and implementation are in place. The international donors are eager to support the digital infrastructure development as it is believed to be the key to the country's prospective economic success. This gives the ground to suppose that in the future the ICT-related development of the country will be improved and the ICT will play a larger part in the economic growth of the country.

The major barriers to be overcome are poor innovative infrastructure, intellectual property rights violations, lags in digital skills, low level of trust in e-government services, absence of venture financing. All these problems hamper the development of hi-tech product companies and development of Internet penetration into national economy and businesses.

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9. ANNEX

Table A.1

ICT-related enterprises in Ukraine according to KVED-2005 classification, valid for 2005-2012 years of NovaUkraine sample³

KVED-2005	Activity description	Number of enterprises
22110	Book publishing	638
22120	Newspapers publishing	1 342
22130	Publishing of journals and periodicals	529
22140	Sound recording	15
22150	Other publishing	402
22220	Printing	2 453
30022	Installation of computers and other information processing equipment	290
32202	Repair of equipment for broadcasting and retransmission gear	88
51432	Wholesale trade of radio goods	385
52749	Repair of other personal items and household goods	128
64200	Communication	1 610
72100	Consultations on informatization	557
72300	Data processing	247
72400	Databases operations	822
72502	Maintenance and repair of computer equipment	719
74400	Advertising	3 447
92110	Film production	236
92120	Film distribution	117
92130	Film demonstration	267
92200	Radio and TV broadcasting	1 305
92400	Publishing agencies	34

Source: NovaUkraine sample

Table A.2

ICT-related enterprises in Ukraine according to KVED-2010 classification, valid for 2013 year of NovaUkraine sample⁴

KVED-2010	Activity description	Number of enterprises
4651	Wholesale of computers, computer peripheral equipment and software	29
4652	Wholesale of electronic and telecommunications	13

³ICT sector subgroup identification is available for these enterprises

⁴ICT sector subgroup identification is available for these enterprises

	equipment	
5811	Publishing of books	23
5813	Publishing of newspapers	48
5814	Publishing of journals and periodicals	26
5819	Other publishing activities	16
5829	Publication of other software	6
5911	Production of films and videos, television programs	15
5913	Distribution of films and videos, television programs	4
5914	Demonstration of films	23
5920	Publishing of sound recordings	1
6010	Broadcasting	64
6020	Television broadcasting	54
6110	Wired telecommunications	93
6120	Wireless telecommunications	33
6130	Satellite telecommunications	2
6190	Other telecommunications	8
6201	Computer programming	62
6202	Consultancy on informatization	37
6203	Management of the computer equipment	2
6209	Other activities in information technology and computer systems	11
6311	Data processing on web sites and related activities	191
6312	Web portals	272
6391	News agencies	1
6399	Provision of other information services	16
9511	Repair of computers and peripheral equipment	5
9512	Repair of communication equipment	5

Source: NovaUkraina sample

Table A.3
Average TFP by sectors, 2013

4 digit code	Description	Average TFP
4651	Wholesale of computers, computer peripheral equipment and software	1080.24
4652	Wholesale of electronic and telecommunications equipment	7345.23
5811	Publishing of books	803.39
5813	Publishing of newspapers	702.43
5814	Publishing of journals and periodicals	1078.90
5819	Other publishing activities	614.82
5829	Publication of other software	301.67
5911	Production of films and videos, television programs	236.26

5913	Distribution of films and videos, television programs	165.74
5914	Demonstration of films	170.84
5920	Publishing of sound recordings	9.14
6010	Broadcasting	390.45
6020	Television broadcasting	1400.85
6110	Wired telecommunications	329.12
6120	Wireless telecommunications	419.72
6130	Satellite telecommunications	274.46
6190	Other telecommunications	471.68
6201	Computer programming	139.14
6202	Consultancy on informatization	376.72
6203	Management of the computer equipment	0.00
6209	Other activities in information technology and computer systems	554.42
6311	Data processing on Web sites and related activities	290.94
6312	Web portals	147.97
6391	News agencies	494.99
6399	Provision of other information services	39.20
9511	Repair of computers and peripheral equipment	184.96
9512	Repair of communication equipment	124.03

Source: NovaUkraine sample

Table A.4
Average TFP by sectors, 2005

4 digit KVED-2005	Description	AverageTFP
2211	Book publishing	177.86
2212	Newspapers publishing	178.65
2213	Publishing of journals and periodicals	206.80
2214	Sound recording	135.99
2215	Other publishing	139.34
2222	Printing	164.05
3002	Installation of computers and other information processing equipment	37.51
3220	Repair of equipment for broadcasting and retransmission gear	38.51
5143	Wholesale trade of radio goods	2171.79
5274	Repair of other personal items and household goods	0.00
6420	Communication	270.72
7210	Consultations on informatization	0.00
7230	Data processing	0.00
7240	Databases operations	0.00
7250	Maintenance and repair of computer equipment	0.00
7440	Advertising	0.00
9211	Film production	181.13

9212	Film distribution	107.62
9213	Film demonstration	40.69
9220	Radio and TV broadcasting	78.48
9240	Publishing agencies	53.88

Source: NovaUkraina sample

Table A.5

The level of concentration in ICT-related sectors in Ukraine in 2013

Activity	4-digit KVED- 2010	Number of enterprises	HHI	Level of concentration
Wholesale of computers, computer peripheral equipment and software	4651	29	1366.69	moderate
Wholesale of electronic and telecommunications equipment	4652	13	2815.96	high
Publishing of books	5811	23	1132.43	low
Publishing of newspapers	5813	48	578.83	low
Publishing of journals and periodicals	5814	26	1357.07	low
Other publishing activities	5819	16	1761.79	moderate
Publication of other software	5829	6	2164.89	moderate
Production of films and videos, television programs	5911	15	5388.48	high
Distribution of films and videos, television programs	5913	4	8063.69	high
Demonstration of films	5914	23	1276.64	low
Publishing of sound recordings	5920	1	10000.00	high
Broadcasting	6010	6	1459.77	low
Television broadcasting	6020	54	828.93	low
Wired telecommunications	6110	59	3766.27	high
Wireless telecommunications	6120	17	3378.81	high
Satellite telecommunications	6130	2	9851.91	high
Other telecommunications	6190	8	4656.36	high
Computer programming	6201	62	605.65	low
Consultancy on informatization	6202	37	1362.16	low
Management of the computer equipment	6203	2	6882.58	high
Other activities in information technology and computer systems	6209	11	3423.69	high
Data processing on Web sites and related activities	6311	46	518.67	low
Web portals	6312	272	131.13	low
News agencies	6391	1	10000.00	high
Provision of other information services	6399	16	1622.98	moderate
Repair of computers and peripheral equipment	9511	5	6222.93	high

Repair of communication equipment	9512	5	3590.35	high
Total		6,742		

Source: NovaUkraina sample

Table A.6

The level of concentration in ICT-related sectors in Ukraine in 2005

	KVED	Number of enterprises	HHI	Level of concentration
Book publishing	22110	638	217	low
Newspapers publishing	22120	1,342	1405	low
Publishing of journals and periodicals	22130	529	977	low
Sound recording	22140	15	3978	high
Other publishing	22150	402	775	low
Printing	22220	2,453	198	low
Installation of computers and other information processing equipment	30022	290	842	low
Repair of equipment for broadcasting and retransmission gear	32202	88	4411	high
Wholesale trade of radio goods	51432	385	415	low
Repair of other personal items and household goods	52749	128	2247	moderate
Communication	64200	1,610	1893	moderate
Consultations on informatization	72100	557	1235	moderate
Data processing	72300	247	343	low
Databases operations	72400	822	1088	low
Maintenance and repair of computer equipment	72502	719	149	low
Advertising	74400	3,447	623	low
Film production	92110	236	723	low
Film distribution	92120	117	1711	moderate
Film demonstration	92130	267	446	low
Radio and TV broadcasting	92200	1,305	1130	moderate
Publishing agencies	92400	34	2422	moderate
Total		15,631		low

Source: NovaUkraina sample