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Eastern Partnership Countries IT Sector Study

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The article is devoted to the study of the sector of information and communication technologies in the Eastern partnership countries and to the study of factors that affect its development.

Purpose of article – analysis of the main indicators of the information and communication technologies sector in the Eastern partnership countries and global trends, identification of problems and prospects for development.

Material and methods. *The material for the research was the statistical data of the Eastern Partnership countries, publications of specialists in periodicals. The study is also based on the desk research, requests for information and stakeholder information analysis. To carry out the analysis and obtain conclusions and generalizations, the following methods were used: statistical, comparison, analysis and synthesis.*

Findings and their discussion. *Analysis of the study showed that overall Information and Communication Technologies sector volumes and trends of the Eastern partnership countries are evaluated in different reports. Armenia, Ukraine and Belarus measure key Information and Communication Technologies industry indicators regularly, other country reports are also available through Government, consultancy or donor supported projects data. National Statistics Offices have updated the older methodology and harmonized Information and Communication Technologies sector industries definitions to European NACE rev.2 classifications that makes data comparison possible and valid. Other ad-hoc reports methodology varies but allows for the higher level trends comparison. IT services and Software sectors are much larger in US and Europe markets, and telecommunications is largest in Asia. The projected further growth in IT services and Software continues to create favorable conditions for developing respective goods and services in Central And Eastern Europe and Eastern partnership countries.*

Conclusion. *The study showed that integration to global value chains of IT economy is the essential task of national, regional or local IT industries. IT services and Software could contain the greatest potential for development in emerging markets, including Eastern partnership region.*

Developing markets might need additional time to adopt some of the new technologies. The businesses and government in the new emerging markets already start to focus on rapid adoption of new technologies. Thus, Local governments engagement with new technologies could already include "aggressive" smart city initiatives and integrating Information and Communication Technologies with "economic planning". All growth in considered "traditional" IT technology spending will be driven by just four platforms: cloud, mobile, social and data/analytics. At the same time, these growing traditional technologies leverage deployment of the new emerging technologies.

Key words: *Information and Communication Technologies, Eastern Partnership countries, IT industry, IT technology, economic development, local governments, traditional technologies.*

Исследование IT-сектора стран Восточного партнерства

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Статья посвящена исследованию сектора информационно-коммуникационных технологий в странах Восточного партнерства и изучению факторов, влияющих на его развитие.

Цель статьи – анализ основных показателей сектора информационно-коммуникационных технологий в странах Восточного партнерства и глобальных тенденций, выявление проблем и перспектив развития.

Материал и методы. *Материалом для изучения послужили статистические данные стран Восточного партнерства, публикации специалистов в периодических изданиях. Кроме того, использовались кабинетное исследование, запросы на информацию и анализ информации заинтересованных сторон. Для проведения анализа и получения выводов и обобщений применялись следующие методы: статистический, сравнение, анализ и синтез.*

Результаты и их обсуждение. *Исследование показало, что общие объемы и тенденции сектора информационно-коммуникационных технологий в странах Восточного партнерства оцениваются в разных отчетах. Армения, Украина и Беларусь регулярно измеряют ключевые показатели отрасли информационно-коммуникационных технологий, отчеты по другим странам также доступны на основе данных проектов правительства, консультантов или доноров. Национальные статистические управления обновили более старую методологию и согласовали определения отраслей сектора информационно-коммуникационных технологий с европейскими классификациями NACE rev.2, что делает сравнение данных возможным и обоснованным. Методология других специальных отчетов варьируется, но позволяет сравнивать тенден-*

ции более высокого уровня. Сектора IT-услуг и программного обеспечения намного больше на рынках США и Европы, а телекоммуникации являются крупнейшими в Азии. Прогнозируемый дальнейший рост в сфере IT-услуг и программного обеспечения продолжает создавать благоприятные условия для развития соответствующих товаров и услуг в странах Центрально-Восточной Европы и Восточного партнерства.

Заключение. *Исследование выявило, что интеграция в глобальные цепочки создания стоимости IT-экономики является важнейшей задачей национальных, региональных или местных IT-отраслей. IT-услуги и программное обеспечение могут содержать наибольший потенциал для развития на рынках, включая регион Восточного партнерства.*

Развивающимся рынкам может потребоваться дополнительное время для внедрения некоторых новых технологий. Бизнес и правительство на новых развивающихся рынках уже начинают ориентироваться на быстрое внедрение новых технологий. Таким образом, участие местных органов власти в новых технологиях уже может включать «агрессивные» инициативы умного города и интеграцию информационно-коммуникационных технологий с «экономическим планированием». Весь рост расходов на «традиционные» ИТ-технологии будет обусловлен всего четырьмя платформами: облачной, мобильной, социальной и данные / аналитика. В то же время эти растущие традиционные технологии усиливают внедрение новых технологий.

Ключевые слова: *информационные и коммуникационные технологии, страны Восточного партнерства, IT-индустрия, IT-технологии, экономическое развитие, местные органы власти, традиционные технологии.*

The development of the Information and Communication Technologies (ICT) sector in the Eastern partnership countries (EaP countries) has been influenced by multifaceted factors that usually could not be limited to common denominators.

However, considering geographical proximity and similar historical legacy, also ongoing joint initiatives and programs fostering connections and experience sharing, certain overall trends could be pointed out. Some of these common characteristics could be attributed to the mostly global nature of the IT sector and necessity to address global needs to ensure high-level of growth. That mainly is considered relevant to software products and services development, IT services outsourcing and nurturing IT startup economy.

Noting that national governments are often leading the efforts in ICT sector development, the more sustainable growth is made possible through private sector uptake that is also influenced by the global trends. Certain regional and country specific landscape has been already established, and the article shall make effort to take its snapshot outlining opportunities for willing local governments to put forward more pro-active initiatives that could leverage IT enabled economic development at the local level.

The growth of the IT sector and its influence on the economies and societies during the last several decades have been reflected in the emerged global surveys. International organizations often teamed up with universities and think-tanks have developed indicator systems that provide a methodological ground to comparing individual economies and regions. With different focal points around IT, innovation or competitiveness, these instruments consolidate the data, opinion surveys and analysis from different sources and thus could be considered mostly reliable tools, especially in the medium term historical perspective.

Regional surveys, targeting the subject of the current article – Eastern Partnership Countries, add more insights and common trends, that could be found useful for developing common platforms, sharing best practices and investing in cross-border cooperation. The regional dimension is mostly covered by the EU Initiatives, and the reports under Harmonisation of Digital Markets project is the main source of comparative information and benchmarking results against EU baselines.

National surveys often provide further details that are relevant for the national policy makers or businesses willing to invest in the IT economy. With exception of national statistical yearbooks, they lack coherence with other regional reports or documents and methodological uniformity could not be guaranteed. However, these reports could provide more recent and relevant data, cases and trends that are collected locally and seen through the preference lenses of the report authors or national stakeholders.

At the same time Regional and Global survey results provide common methodology and historical data that could help better understand the tendencies and trends influencing the EaP countries as a whole. Regional and Global surveys data could also encourage national stakeholders to support Local Governments by matching their initiatives with infrastructure or human capital development programs.

Not only reports and policies, but programs like European initiatives of Smart solutions for Cities and Local Governments aiming at promoting growth hubs beyond capitals could also serve examples that would support national growth and cohesion by reducing regional inequalities in EaP countries.

The overall objective of the survey is to conduct market analysis of the IT sector in the EaP region.

Material and methods. The material for the research was the statistical data of the Eastern Partnership countries, publications of specialists in periodicals. The study is also based on the desk research, requests for information and stakeholder information analysis.

To carry out the analysis and obtain conclusions and generalizations, the following methods were used: statistical, comparison, analysis and synthesis.

Findings and their discussion. The worldwide IT industry turnover is projected to reach 5 trillion USD in 2019. United States is the largest tech market in the world accounting for 31% of total, followed by Asia with 26% and Europe with 19%. Central and Eastern Europe Region accounts for 3%. Middle East and Africa with 5%, Latin America 6% and Pacific with 7%.

The consolidated regional share of traditional ICT sectors is presented in picture 1.

The figure shows that IT services and Software sectors are much larger in US and Europe markets, and Telecom is largest in Asia that could be partially explained by large population of the continent and almost universal mobile penetration. Hardware is largest in Asia due to leading production capacity of China and other countries. The projected further growth in IT services and Software continues to create favorable conditions for developing respective goods and services in CEE and EaP countries, delivered mainly through digital means.

The overall development trends analysis presented by IDC gives the following distribution of the global market between the five major IT sector categories. On top of four known sub-sectors of Hardware, Software, IT services and Telecom -considered traditional ICT, the fifth diverse category contain Emerging Technologies.

Current leading sector is Telecom, followed by Hardware and Services, Software accounts for 10% and Emerging Technologies – for 17% (picture 2).

These new emerging technologies are predicted to drive a dramatic acceleration in industry growth. Those include:

– Internet of Things IoT;
– Robotics;
– AR/VR (Augmented and Virtual Reality);
– AI (Artificial Intelligence);
– 3D printing.

The global IT industry annual growth rate in the period of 2009–2018 was in the stable range between 3% to 5% and is predicted to be at 4% level in 2019.

According to CompTIA Industry Outlook predictions the Emerging Technologies could account to 50% of the overall IT sector revenue growth in the period of 2017–2022, exceeding 2x–3x fold the GDP growth, with other ICT sectors also growing on a slower rate, in line with the projected GDP growth ((picture 3) [2].

According to CompTIA, international trade remains a backbone of global technology market and "many countries eagerly import and export technology products and services from trade partners, enjoying the benefits of consumption and economic value creation".

Thus integration to global value chains of IT economy is the essential task of national, regional or local IT industries. With Telecom markets and Hardware being dependent on Global trends and Multi-National Corporations, IT services and Software could contain the greatest potential for development in emerging markets, including EaP region.

Developing markets might need additional time to adopt some of the new technologies. At the same time the businesses and government in the new emerging markets already start to focus on rapid adoption of new technologies. Thus, Local governments engagement with new technologies could already include "aggressive smart city initiatives and integrating ICT with economic planning".

The IDC predicts that all growth in considered "traditional" IT technology spending will be driven by just four platforms: cloud, mobile, social and big data/analytics. At the same time, these growing traditional technologies leverage deployment of the new emerging technologies.

IoT holds the largest share of 1 trillion current market of the emerging technologies – 85% in 2017, distantly followed by Robotics with 14%, and AR/VR, Robotics and AI only at 1–2% – but still generating 10 B $ globally. Other growing technologies include SaaS (Software as a Service), Big Data/Analytics, Enterprise Social Software, New Generation Security.

EaP regions international trade data analysis was performed based on the UN Comtrade database consolidated data and its derivative ICT subgroups provided by UNCTAD [3].

Considering the importance of tradable IT services and products, the UNICTAD provides consolidated data for ICT sector exports and imports for individual countries, regions and country groups.

The chart below shows the volumes and percentage of ICT goods and services in total trade for EaP countries in five categories:

1. Computers and peripheral equipment.
2. Communication equipment.
3. Consumer electronic equipment.
4. Electronic components.
5. Miscellaneous.

It contains bilateral exports, imports, re-exports and re-imports of information and communication technology (ICT) goods aggregated at the ICT goods category level (picture 4).

Ukraine is by far a regional leader in the ICT goods production and trade volumes with 404 million $ in 2016, followed by Belarus with 205 million USD. Georgia is distant 3rd with

15,2 million USD, and other countries volumes were not exceeding 6 million USD.

At the same time, share of ICT goods as percentage of total trade of EaP countries ranges in a comparable, small interval, as seen from the chart 5 below.

ICT sectors in individual EaP countries. Overall ICT sector volumes and trends of the EaP countries are evaluated in different reports. Armenia, Ukraine and Belarus measure key ICT industry indicators regularly, other country reports are also available through Government, consultancy or donor supported projects data. National Statistics Offices have mostly updated the older methodology and harmonized ICT sector industries definitions to European NACE rev.2 classifications that makes data comparison possible and valid. Other ad-hoc reports methodology varies but allows for the higher level trends comparison.

Armenian IT sector turnover is growing steadily capitalizing on the constant growth of companies and IT workforce. During the period from 2010 through 2018, the ICT industry's average annual growth rate amounted to 25,6 percent. In 2018 the total turnover of ICT sector reached 922,3 million USD from 765,2 million USD in 2017 [4]. About 800 companies operated in the sector in 2018. The number of IT workforce in 2018 was 19500, with over 15200 among them- IT technical specialists, and the rest-managing and business personnel.

In Azerbaijan IT sector is second most profitable and second largest recipient of foreign FDI after oil and gas industry. The government investment invested in IT development over 2 billion USD that has contributed to ICT expansion, connectivity and infrastructure growth and more skilled workforce. In 2017 total output of ICT sector has grown from 899 million USD to 978 Million USD or 1,5% of GDP. The number of workers employed in ICT sector is 25600.

In Georgia ICT sector also grows, with telecom sub-sector accounting to half of the turnover. Output of ICT sector has grown from 496 million USD in 2016 to 556 million in 2017, but it grew slightly slower that GDP declining from 3,9% in 2016 to 3,8% in 2017. The number of employees in the sector has grown from 19700 in 2016 to 21400 in 2017, representing about 3% of total workforce [5].

Moldova ICT sector has been developing steadily since 2009. Its main focus is IT services that also have been one of the major drivers for Moldova's economic growth. The fast raise of IT industry is linked to outsourcing services. IT accounted for 5,7% of Moldova GDP in 2017 decreasing from steady 5,9% in previous years, but increasing in overall volume from 476 million in 2016 to 551 million USD in 2017. The number of employees in IT sector has grown from 19000 in 2016 to 20200 in 2017. Its IT services market has the estimated value of $154,40 million with $120,90 million originating from exported IT services.

Belarus IT sector has been experiencing stable growth during the last decade. Computer and IT services is the third largest service sector in the country, following transport and construction services, and share of IT services is second in total exports. The IT sector accounts to 5,1% of GDP.

The ICT sector output has grown from 2976 million in 2016 USD to 3563 million USD in 2017. The High Technology Park has contributed to total IT services exports with more than 1 billion USD. Foreign Investments in the sector accounted for 509 million USD. The total workforce employed in ICT sector has grown from 85400 in 2016 to 92200 in 2017 [6]. IT professionals count in the High-Technology Park resident companies is estimated at more than 30000. The number of IT sector organizations has grown from 2,700 in 2016 to 3120 in 2017.

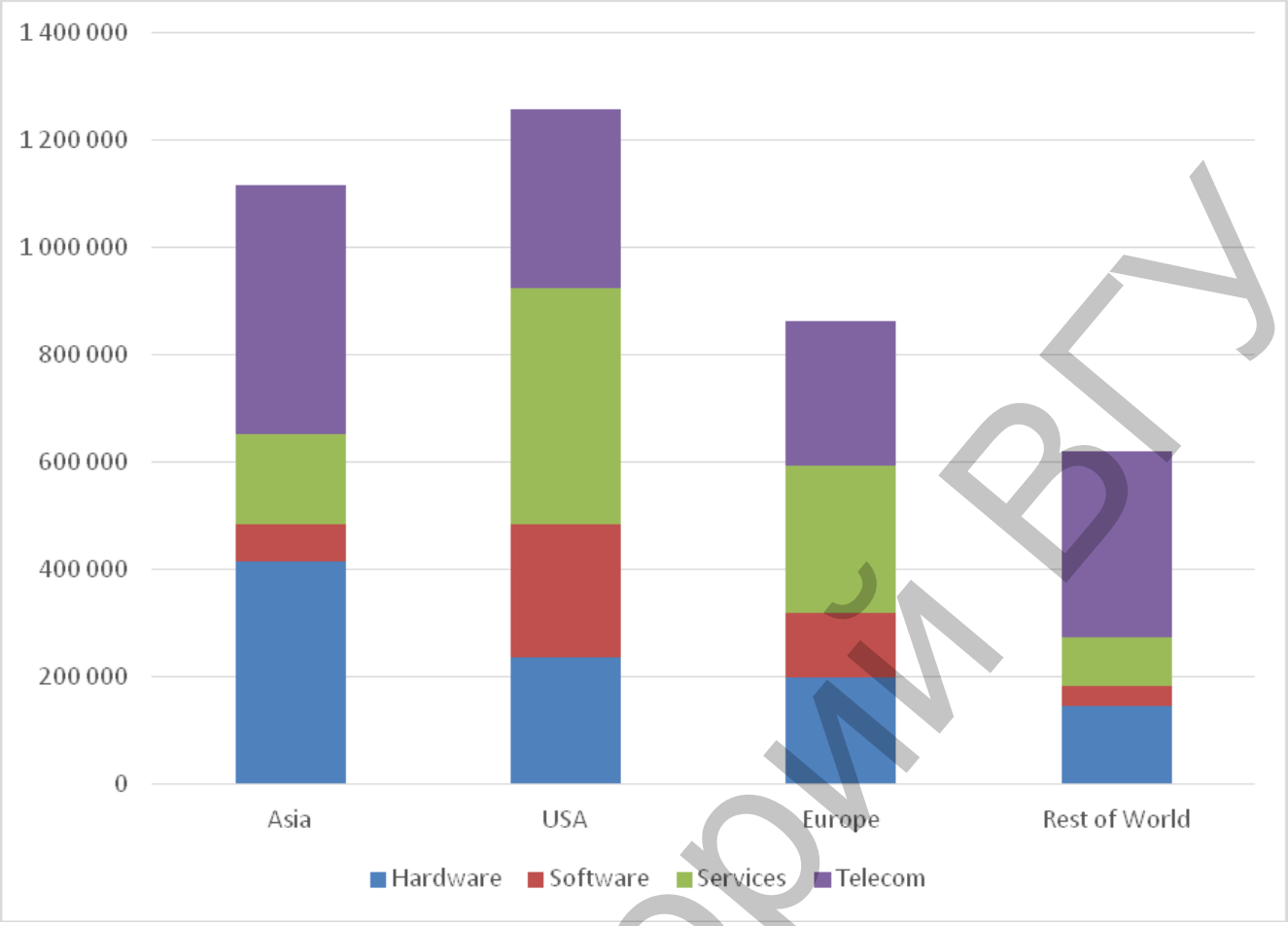
Ukraine is the leading country in the region by size and outputs of IT market and by number of IT professionals. Its fast growing IT services exports sector is estimated currently at 4 billion USD. The overall production of ICT sector output has grown from 6773 million USD in 2016 to 8059 million USD in 2017. That accounted to 7,12% of GDP. There are about 4000 tech companies, and about 185000 professionals in ICT sector, with about 160000 estimated number of developers.

The figure 6 provides ICT industry output of EaP countries in 2017.

The overall output of EaP region countries ICT sectors is estimated at 14,63 Billion USD that is about 0,3% of total global ICT market value in 2017. However, as indicated above, for ICT services exports (that is mostly outsourcing), the region's share in global market is 3-times higher with 0,94%.

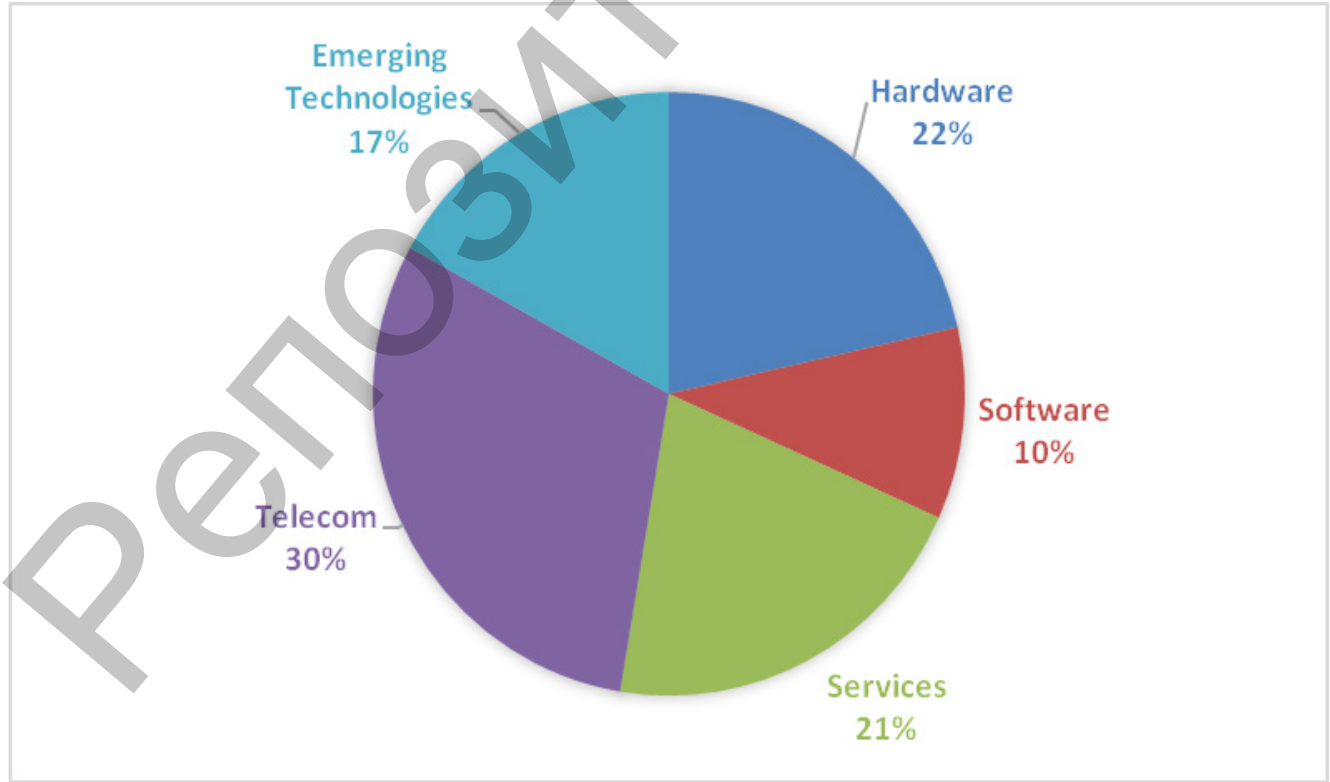
While in volumes Ukraine ICT output is a clear frontrunner, per capita calculation gives a different distribution putting Belarus and Armenia in leading positions with ICT industry output per capita exceeding 300$. Georgia, Moldova, and Ukraine reside in a lower range corridor from 150$ to 200$, and Azerbaijan has slightly about 100$ per capita value of IT industry output.

Conclusion. Thus integration to global value chains of IT economy is the essential task of national, regional or local IT industries. With Telecom markets and Hardware being dependent on Global trends and Multi National Corporations, IT services and Software could contain the greatest potential for development in emerging markets, including EaP region.



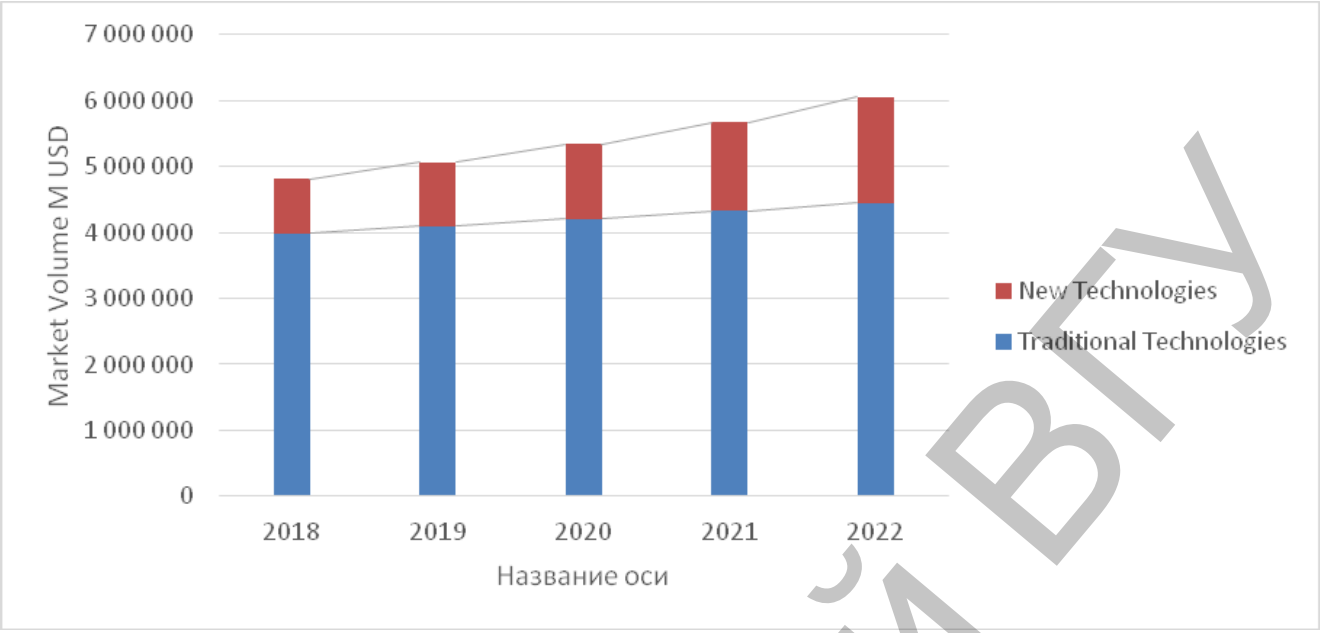
Picture 1 – **Regional Share of ICT markets in 2017, million USD**

Source: [1].

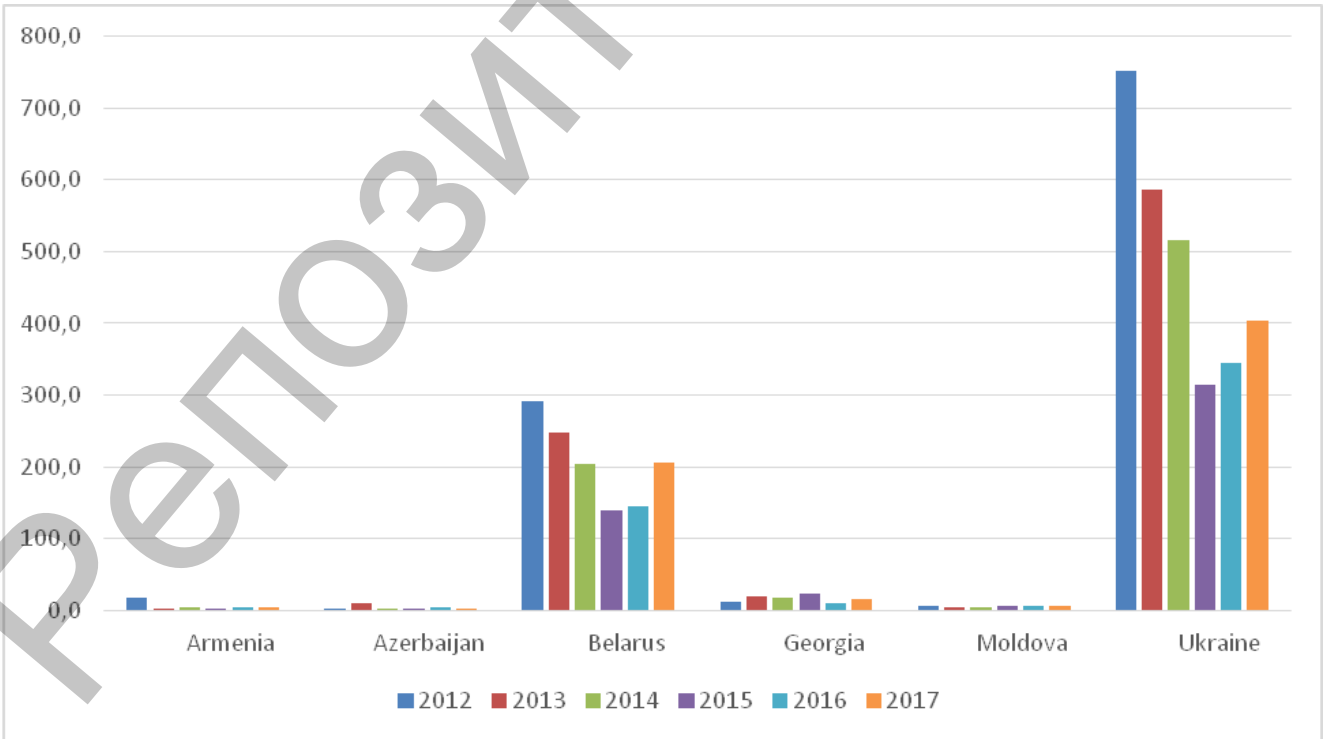


Picture 2 – **Global IT Market in 2017, %**

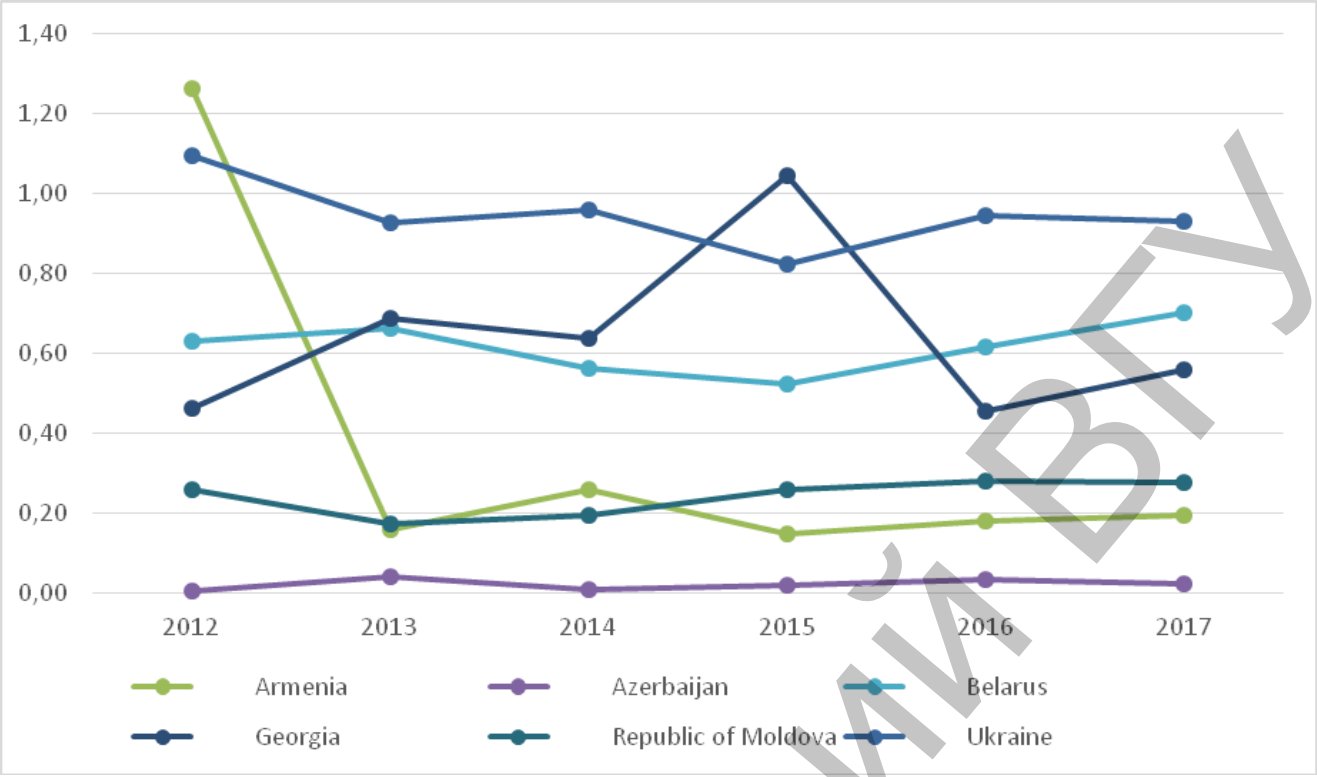
Source: [1].



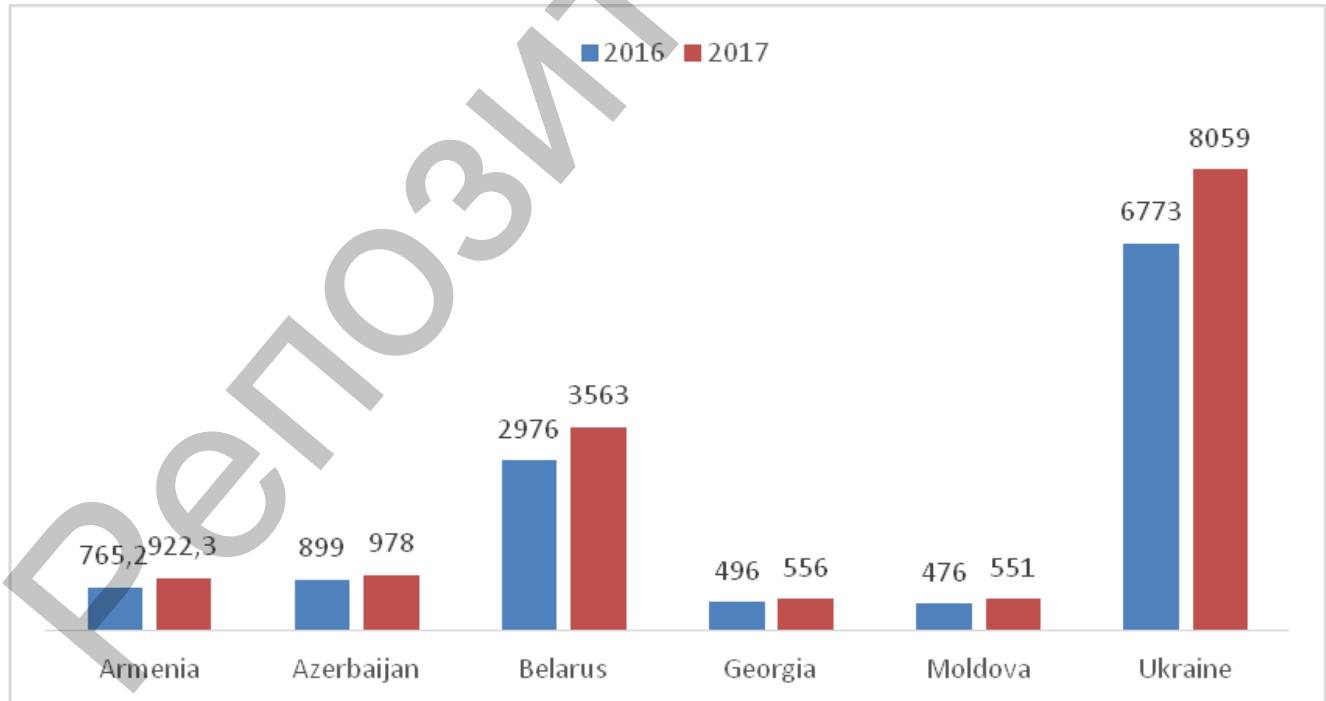
Picture 3 – **Growth Projection for Global ICT Spending, million USD**
Source: [2].



Picture 4 – **Bilateral trade flows by ICT goods categories, annual million USD**
Source: compiled by the author.



Picture 5 – **Share of ICT goods as percentage of total trade**
Source: compiled by the author.



Picture 6 – **ICT industry output of EaP Countries, M$**
Source: compiled by the author.

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