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Article

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Russia's experience of foresight implementation in global value chain research

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Abstract

The objective of this paper is to analyse the scope for improving empirical and methodological foundation of global value chain (GVC) research and for making relevant political decisions, primarily through application of foresight methodology based on the latest trend to combine the approaches of global value chain and national innovation system research. The authors choose Russia as an illustrative case of an economy in the changing geopolitical context to review major trends of global value chains' development, specific features of Russia's participation in them, and the necessary steps to increase the quality and efficiency of this participation. Special attention was paid to theoretical, methodological, and empirical tools of GVC research and of making relevant political decisions—which presently are far from being adequate: they need to be supplemented with the new ones to improve the forecasting potential and practical and strategic orientation of the GVC approach. To this end, approaches which would make it possible to research interconnection between global processes and trends with regional and national innovation-based development tendencies become of crucial importance. Application of foresight methodology may significantly contribute to researching the GVC phenomenon, being a major logical step towards creating advanced policy tools to mobilise available resources and coordinate stakeholders' actions to increase Russia's global competitiveness. The paper presents a number of case studies which describe practical application of various foresight methodology components to analyse Russian participation in various GVCs, by the examples of specific product and service groups (fresh fruit and vegetables, car parts, mobile phones, air transport, electronic payment systems). The authors conclude that both full-scale foresight studies and specific components thereof could be applied for the purposes of GVC analysis, strategic planning, and making political decisions.

Keywords: Global value-added chains (GVCs), Trade, Competition, Globalisation, Innovation, Foresight

JEL codes: O14, O25, O31

Background

Global value chains (GVCs) have become a key element of the world economy (OECD 2013a). Developed and developing countries alike participate in them, regardless of technological level and per capita income. This determines the global community's keen interest in understanding the structure of global trade in terms of value added

and value chains and identifying existing and potential opportunities for companies integrating into them, both on the national and industry-specific levels (Kaplinsky 2013).

Being a relatively new but increasingly common phenomenon, GVCs are subjected to in-depth analysis by leading international organisations including the OECD, the UNCTAD, the WTO, and the G20 to identify their potential positive and negative effects on the global economy and economies of particular countries.

At the same time, the work to advance the empirical and methodological foundations of GVC research is also under way (Lundvall et al. 2015; Morrison et al. 2008; Pietrobelli and Rabellotti 2011), which should contribute to increasing heuristic value and reliability of research results, practical importance of relevant R&D, and validity of prepared political recommendations.

The current trends in studies aimed at improving methodological approaches to GVC research include the following:

- Development of the so-called industrialist approach to GVCs, by analysing their effects on more local levels such as specific industries and clusters.
- Realising the need to take into account specific features of regional and national innovation systems (which ultimately became the decisive factor when we adopt the industrialist approach) allows to understand how and why participation in GVCs results (or does not result) in actual company-level changes in particular countries.
- Increasing the forecasting potential of GVC research to enable moving on to the strategic planning level and making political decisions relevant to participation in global value chains.

This paper is an attempt to combine all three current trends in GVC research. The objective is to analyse the scope for improving empirical and methodological foundation of GVC research and for making relevant political decisions, primarily through application of foresight methodology components to certain industries (specific product and service groups) and identifying their innovation aspects and the role of R&D.

To that end, it would be important to analyse the nature and major development trends of this global economy phenomenon, specific features and performance indicators of Russia's participation in GVCs, and the potential and limitations of theoretical, empirical, and methodological foundations of GVC research. The novelty of this work is due to the presented results of applying various foresight methodologies to conduct industry-specific analysis, through case studies of production, export, and marketing of several product and service groups, in advancement of the approach suggested in Kaplinsky (2004) based on the dynamic rent concept in the GVC framework.

Empirical evidence of Russia's participation in GVCs

GVCs are one of the most striking phenomena of the modern global economy, vividly demonstrating the pluses and minuses of increased interdependency between various countries' economies. At the same time, GVCs are, in a way, an answer to global challenges. In the framework of the present-day globalised economy, not just internationally traded end products are important from the job creation and development point of

view but also performance of companies participating in creation of these products. Accordingly, GVCs are frequently seen as an opportunity for developing countries to move up along the value-added "stairway", by creating favourable conditions for international businesses and attracting foreign investments (OECD et al. 2014, 2013).

In the most generalised way, Sturgeon (2001) defined GVCs as a mechanism for adding value during the end product creation process, which comprises various technological production stages, design, and marketing. In a specific global value chain, the OECD (2013b) distinguishes between *forward linkages in GVCs*, which reflect export of raw materials and services which are subsequently imported back as end products (linkages (companies) producing components and parts for more complex products), and *backward linkages in GVCs*, which reflect production and export of end products and services made using imported raw materials and services (advanced manufacturers assembling final products).

During 1995–2009, countries' participation in GVCs grew on average by 5–10 % (OECD 2013b) (Fig. 1). About 40 % of the OECD countries' exports is made up by foreign value added. Since 1995, the biggest increase of participation in global value chains showed South Korea, India, and China (growth of GVC participation index between 10 and 20 %).

The share of services value added embodied in manufacturing exports in the OECD and their partnering countries has on average also increased (OECD and WTO 2013) (Fig. 2). In recent decades, the biggest growth of this indicator demonstrated the EU countries (specifically Germany, the UK, and Italy), India, and the USA. Services value added embodied in manufacturing exports on average amount to 40–50 %. In Russia, the relevant figure remained practically unchanged, at about 30 %.

As previous experience shows (Gereffi and Kaplinsky 2001; Kaplinsky, 2013), in many developing countries, high growth rates are specifically linked with their integration into GVCs, using imported components and materials to develop own production and export.

According to international research, the service sector (intellectual property, logistics, marketing, etc.) creates the biggest share of value added, as opposed to the manufacturing sector (Kaplinsky 2013).

Figure 3 illustrates the typical structure of a common GVC in terms of what roles companies can play therein, how much value added do they create, and how ample is the economic profit they receive given that the higher the value added generated is the bigger the profit is. The highest profit rate shows companies which are the farthest-removed, in temporal terms, from the actual assembly of products, its design, and after-sales service. The most profitable GVC segments with the least number of players

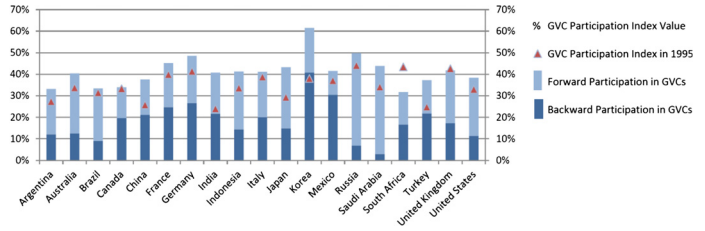

Fig. 1 Countries' GVC participation index, 1995–2009

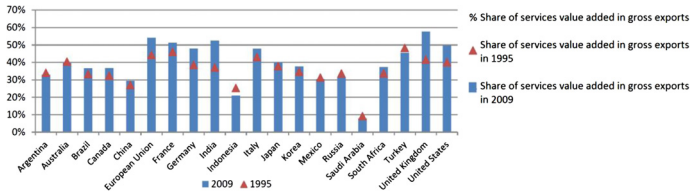

Fig. 2 Services value added embodied in manufacturing exports, across countries, 1995–2009

should be seen as strategic reference points by countries and companies willing to integrate into global value chains.

OECD/WTO TiVA database is closed-source. As of now, it presents calculations based on the 2011 data for a list of indicators showing global trade statistics through a "value-added" perspective. These indicators, for instance, include "foreign value added share of gross exports", "direct domestic value added content of exports", and "re-imported domestic value added content of exports".

Though the majority of trade economists has awarded it a critical acclaim stressing that value-added global trade statistics has a high heuristic value, the major drawback of such data is the lack of analytical capacity for any statistical speculations based on such data only need to be complemented by in-depth case study analysis.

Russia's GVC participation index (its most recent value is 51.8) (OECD and WTO 2013) shows that the country's overall involvement in GVCs is quite high (the 25th place out of 57) (OECD and WTO 2013) but the nature of its participation in global value chains remains very much limited to raw materials (Fig. 4).

Russia's participation in backward linkages in GVCs (exporting end products and services made with participation of foreign contractors and middlemen) is much lower than the OECD countries' (OECD 2013b). The relevant index value for 2009 was 6.9—the second lowest result (OECD and WTO 2013) after Saudi Arabia's.

A specific feature of Russia's participation in GVCs (see Fig. 5) is that this participation, especially in mining and metallurgy, chemical industry, wholesale and retail trade, transport, and telecommunications, is 86 % forward-oriented (i.e. other countries use Russian exports as raw materials or components for their own production) (OECD n.d.). The share of oil and gas in Russian exports reaches 70 % ("Commodity Composition of Russian Exports Into All Countries, January-December, 2014" 2015 (in

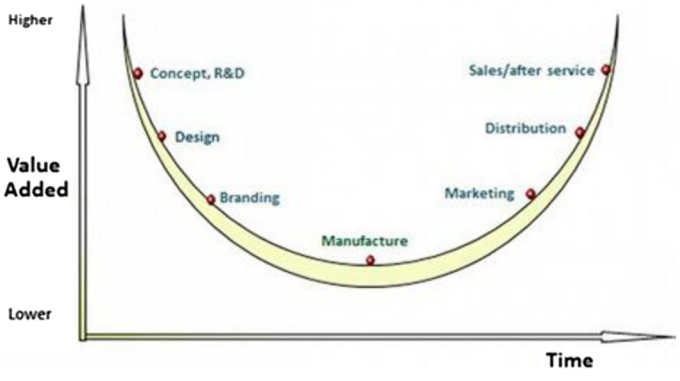

Fig. 3 Economic profit distribution across different business functions in GVC

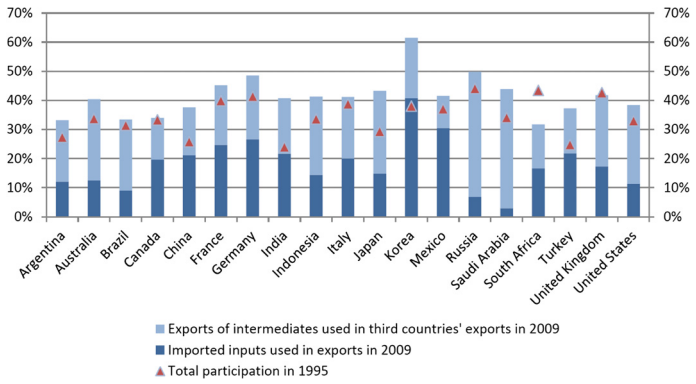

Fig. 4 Countries' GVC participation index and import/export ratio

Russian). This specialisation hinders creation of high value added in GVCs. The resources exported by Russian companies return into the Russian economy as imported end products with appropriate mark-up, which is further increased by the existing tariffs and non-tariff trade restrictions. At the same time, the share of Russian value added in these imported products is higher than the foreign-generated component.

Thus, Russia's current position in GVCs does not allow to gain all possible long-term benefits from this participation. At the same time, however difficult the current geopolitical situation may be, and however pessimistic Russian short-term economic development forecasts may look, it seems important to suggest certain steps which could potentially contribute to making better use of the country's existing competitive advantages and increasing efficiency of its participation in GVCs in terms of minimising possible risks and maximising the advantages of being a part of global value chains (for more on risks and benefits associated with Russia's participation in GVCs, see Meshkova and Moiseichev 2015 (in Russian)), including definition of "windows of opportunity"—the sectors where Russia can secure leading positions in backward linkages in a foreseeable future, and thus obtain the necessary competitive advantages.

Historical evolution of the GVC literature's methodology

Emphasising the heuristic value of GVC research in his "21 for 21" OECD transformation proposal (Gurría 2015), the OECD Secretary-General Angel Gurría has underscored that such research has allowed the OECD to "decode the trade genome" and such work should be continued with its results being put into real trade negotiations' practice.

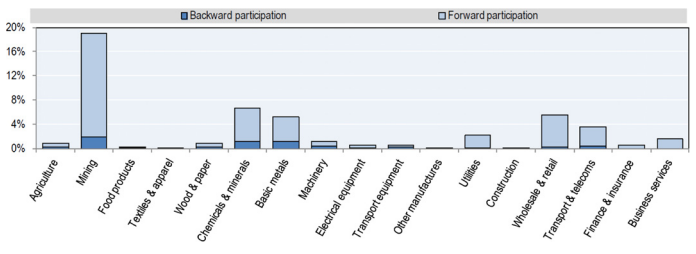

Fig. 5 Russian industries' participation in GVCs

The actual value-added chain concept was first proposed in the 1960s–1970s. Currently, there are two main distinct "schools" of thought (Morrison et al. 2008) regarding this subject area—*the internationalist* and *the industrialist*.

The first approach is represented by the US researchers and first of all by Gary Gereffi, professor of sociology and director of the Center on Globalization, Governance & Competitiveness at Duke University (Gereffi 1999; Gereffi and Kaplinsky 2001; Kaplinsky 2004), and also by several European scientists such as Raphael Kaplinsky, professor of international development at the Department of Policy and Practice at The Open University (Essex, UK) (Kaplinski 2002, 2004), and Peter Gibbon, researcher at the Danish Institute for International Studies (Gibbon 2001, 2003).

The industrialist approach is represented by researchers at the Institute of Development Studies of the University of Sussex (Humphrey et al. 2000; Humphrey and Schmitz 2002).

Internationalists conduct analysis mostly on the macro level (in the context of analysis units and the scale of proposed recommendations), while industrialists adhere to the micro level, analysing the more local experience of specific industries and clusters. However, this subdivision is quite notional since the presented approaches rather supplement each other—which among other things is confirmed by the emergence of a number of joint publications by representatives of both schools (Gereffi et al. 2001, 2005).

Empirical foundation of GVC research is provided by two international databases, Trade in Value-Added (TiVA) and World Input-Output Database (WIOD). TiVA was created jointly by the OECD and the WTO (OECD and WTO, 2013). It allows to look at the current international trade under a new perspective and move on from analysing export and import flows of products and services to a more holistic research of GVCs at the core of international goods and services flows. The current version of the TiVA database is its third edition (June 2015) which contains both the traditional external economic activity indicators and a whole range on innovation indicators describing national economies in terms of their participation in GVCs. TiVA contains data on 57 economies including all members of the OECD and Brazil, China, India, Indonesia, Russia, and South Africa, covering the period between 1995 and 2011 broken down into 18 sectors.

The system for forecasting countries' participation in global value chains is based on the WIOD designed at the University of Groningen (Timmer et al. 2012; WIOD Data n.d.). Its core elements are country-specific input-output tables (WIOD). The database includes data for 27 EU member states and the Union's 13 largest trade partners, for 1995–2011. The WIOD is made up of national and international inter-industrial tables and tables describing particular resources and their consumption.

Statistical measurement of trade based on value added and participation in GVCs certainly provides very useful data and allows to better understand the phenomenon of global value creation. However, so far, this data is not sufficiently reliable, detailed, or up-to-date to be applied in decision-making—e.g. development of trade or industrial policies. Also, value chains are global while the existing databases cannot yet be considered as such (i.e. also "global") since they almost completely lack coverage of certain regions, that is, the only CIS/EAEU country represented in the OECD/WTO TiVA database is Russia, and even for it the available data is just projected statistics from the last inter-industry balance for 1995 ("Inter-industry balance of production and distribution of products and services" n.d.; "Off to the database" 2010 (in Russian). It is a major

methodological flaw, especially keeping in mind that compared with 1995, we are currently living in a totally different domestic and international economic reality. Thus, we need further advancements in the methodology of GVC approach to complement the statistics available and reach out for the deeper insights.

From the methodology point of view, the approach suggested in Kaplinsky (2004) for studying industry-specific GVC aspects is the most suitable one to be complemented by a toolkit Foresight studies offer. It is based on the dynamic rent concept: production, export, and marketing of several product groups including fresh fruit and vegetables, canned fruit, footwear, and car parts were used as case studies.

For each of these products, the value chain segments were structured; major past, present, and future sources of economic rent were analysed; and the main consequences for production activities were estimated. Interestingly, this early model already includes a forecasting element—an attempt to project the structure of economic rent sources into the future.

The analysis yet was limited to specific product groups and did not cover the service sector. At the same time, as it was already noted, the service sector (financial, transportation, logistics, etc. services) ensures countries' most efficient participation in backward GVC linkages (Lundvall et al. 2015).

Another drawback of this early approach is the linear understanding of value-added creation. In reality, interactions within GVCs are usually network in nature (Lundvall et al. 2015). This is particularly obvious for the service sector.

Generally, excessive attention to specific case studies (not always supported by reliable empirical data) is often criticised, since it a priori introduces a significant element of subjectivity (Malerba and Nelson 2011; Milberg and Winkler 2011; Wood 2001). At the same time, it is the case study analysis that allows to operationalise research in this field to the maximum possible extent, at least while we lack up-to-date inter-industry data.

A serious concern about GVC research methodology applied by scientists specialising in innovation, innovation systems, and innovation-based economy theory (Ernst and Kim 2002; Pietrobelli and Rabellotti 2011) is insufficient attention to the local context of the clusters subjected to analysis and to specific features of national institutions and their activities aimed at improving companies' positions in GVCs.

The counter criticism by proponents of the GVC approach is insufficient attention to the nature of management, interaction, and power and influence distribution between various players inside a specific innovation system (Gereffi et al. 2005; Sturgeon 2001).

A number of researchers (Lundvall et al. 2015) are proposing to overcome the theoretical divide between the different schools of thought, to arrive to a compromise and join forces to come up with a radically new theoretical approach, free from known flaws of the existing theories and with a potential to obtain a deeper understanding of the GVC phenomenon. The existing methodological foundation of GVC research must be supplemented with advanced tools offering a better forecasting potential, more practically and strategically oriented. Approaches which allow to study interconnections between global processes and national-level innovation-based development trends, taking into account institutional specifics of the innovation systems, may be critically important for advancing GVC research and increasing its practical relevance.

Accordingly, application of Foresight methodology can become an important step towards implementation of these proposals and make a significant contribution to GVC

research being a major logical step to develop advanced national policy tools to mobilise available resources and coordinate stakeholders' actions to increase specific countries' global competitiveness.

For instance, one major idea Foresight researchers have managed to reveal in terms of GVC participation is that a country does not need to spend all efforts to penetrate present GVCs when it is possible to apply Foresight in order to create new markets and claim best positions there though a risky business it is (Chulok 2014). One can find such an example in a new ambitious strategy of Russia called National technology initiative ("National technology initiative of Russia" 2015).

Results

Agriculture: fresh fruit and vegetables

Description of the value chain and Russia's current position therein

GVCs in fresh fruit and vegetables trade include the following segments: seed farming, growing, processing and packaging of the crops, export, and retail. Nominally, Russia participates in all these segments, but in seed farming and export, the country's participation is much weaker than in other segments.

The most profitable segment of the global fresh fruit and vegetables production chain is seed farming: the volume of the global fruit and vegetable seeds market exceeds 6 billion USD. By 2018, it is expected to reach 13 billion USD, showing 28 % annual growth ("Russia seed industry outlook to 2018 - Cost-effective non-hybrid seeds to drive market growth," n.d.).

Global trends

Major global agricultural trends, including growing fresh fruit and vegetables, comprise increased international competition in seed farming; development of genetic engineering; more active international cooperation in food safety, dealing with famine and insufficient availability of food in the least developed countries; and consumer preferences in developed countries shifting in favour of environmentally safe, organic farm-grown food products.

Major challenges and threats

Though Russia is traditionally considered a country with developed agricultural sector, so far, it has been using the potential of the fresh fruit and vegetables GVC insufficiently, with practically no participation in selection, seed farming, and development of new products. And this sector of the economy is crucially important in the national security context. Barriers hindering the country's efficient participation in this GVC include (formal) shortage of free land for use as experimental and practice grounds and lack of necessary support to Russian R&D in the seed farming area, to small and medium agricultural producers, etc. If Russia implements appropriate "horizontal" and industrial regulation initiatives, it could make a radical breakthrough in relevant GVCs.

Windows of opportunity and the role of R&D

Moving on to better positions in "agrarian" GVCs is relevant for Russia from the import substitution point of view, to develop the potential of the domestic agricultural products market. The import limitations for agricultural products introduced by Russia in the summer of 2014 as a response became a driver of transformation of relevant

GVCs with Russian participation. Now, we are witnessing retailers' re-orientation towards domestic producers and suppliers form Latin America, Turkey, Iran, China, and Vietnam, instead of the EU and the USA. This will directly affect future prospects of the industry and the national economy as a whole. A practical government policy objective should be providing access to major markets to as many domestic and international producers as possible, to restore the market volume diminished by the exit of the Western partners, while maintaining high quality of agricultural products and affordability of the population prices. A long-term solution of this problem requires a viable and fair (from the distribution of economic rent point of view) value chain, open to participation of small and medium producers alongside big players.

The role of R&D in agriculture is connected with developing genetically modified products and fertilisers in line with environmental and food safety requirements. The main window of opportunity for Russia is to advance seed farming, enter international markets, and support import substitution by rebuilding the lost S&T basis.

Necessary political initiatives

The strategic goal of Russian industrial policy for the fresh fruit and vegetables sector should be supporting seed farming companies. Science and education policy initiatives are primarily required for that. Russian seed farming industry needs to rebuild the research and human resource basis which had been lost during the years of restructuring. Also, important are tools for improving business climate and attracting investments. Finally, it is important to implement high-precision industrial-level regulation mechanisms to help seed farmers access external and domestic markets.

Russia's possible prospective position in the value chain

In the future, it would be optimal for Russia to participate in these GVCs on the basis of having strong positions in seed farming and retail. Other links will not provide the same profit rate, but they also should be supported out of the national food security considerations.

Transportation services: air transport

Description of the value chain and Russia's current position therein

Aviation industry has a highly developed network of GVCs linked with both aircraft design and construction and with air transportation services.

The air transport GVC includes five major segments: the IT layer, retail (travel agencies), airlines, aircraft construction, and ground infrastructure (airports).

The latter are the most influential players in these GVCs, which for a long time attracted the attention of industrial organisation researchers (DiLorenzo 1996; Vasigh et al. 2014, 2013; Zhang and Round 2011).

Currently, Russia participates in all segments of the chain, but Russian aviation's integration into the global logistics is hindered by several problems: lack of market-based industry regulation mechanisms, which results in increased tariffs for air transportation; international logistical standards for electronic registration and tracking of air cargo shipments have not yet been adopted; etc.

Global trends

Aircraft construction and air transport are key industries for countries' economic development and their logistical systems. Aircraft construction is also a research-intensive industry—a donor of innovative technological solutions to other industries, creating a multiplication effect for the whole national economy.

Aviation GVCs are large-scale and complex. Relevant global trends include increasing international competition; growing passenger and freight traffic; and more active international cooperation through establishment of passenger and cargo transportation alliances. Another major global trend is rapid modernisation of aircraft fleets and "internetisation" of booking and tracking services. In most countries, the share of regional and local air transportation is growing.

Major challenges and threats

Key challenges to Russian participants of these GVCs are ticket prices' high dependency on fuel price and high price elasticity of demand. Another issue is shortage of aircraft crew personnel due to high costs of training pilots. In the current situation, this may result in losses for all participants of the value chain—which has actually happened in 2015 when the Russian Central Bank introduced floating rouble exchange rate. This led to the rouble losing more than half of its value (Gajdaev 2014 (in Russian)) so carriers' leasing costs exceeded the acceptable level resulting in mass bankruptcies of companies ("Nothing personal" 2015; "Russian Airlines Reducing Prices" 2015 (in Russian)).

Russian domestic air transport market is particularly difficult, with low profit margins ("Low-cost. Saga. Eclipse" 2015; "Nothing Personal" 2015; "Russian Airlines Reducing Prices" 2015). To ensure the citizens have freedom of movement, the government has to subsidise unprofitable flights to remote isolated Russian areas ("Constitution of the Russian Federation" 1993, sec. 27; "Flight of Subsidies" 2015 (in Russian)). International market provides higher returns, but the competition there is tougher.

Windows of opportunity and the role of R&D

Windows of opportunity for Russian participation in aviation GVCs are connected with making use of the country's competitive advantages in cargo transportation and with growing market for regional and local flights. Both these areas in Russia are not yet as popular as they are abroad, but the niches are gradually being filled (RBC.research 2015; "Russia's air transport companies to get ahead of RZD in passengers numbers" 2015; "Russia's cargo air transport market is growing" 2015).

The role of R&D inter alia includes optimising computer systems for booking tickets, introducing a unified cargo registration standard, personalisation of services, and upgrading aircrafts. Finally, innovations contributing to reducing airlines' (and the industry's as a whole) costs and increasing revenues are also important.

Necessary political initiatives

Russian companies' medium-term prospects in the air transportation services market (and first of all, the carriers') seem to be rather vague. In the next 5–10 years, they will be affected by such negative factors as volatile exchange rate and continuing international political instability. Probably, they will not be able to survive the next few years without government support.

In order to ensure such state support, the Government of Russia has put forward a plan of primary measures to maintain the economic and social stability in 2015 ("Plan of primary measures to maintain the economic and social stability in 2015" 2015), where one can find certain measures to support the air transport market. For instance, consecutive decline of VAT (up to 0 %) for inner air flights is planned, also an increase in subsidising transport organisations to preserve the network of flights to far and remote regions of Russia, development of a programme to support the aircraft's leasing for regional flights, and dissemination of practice to co-finance regional flights not only from local budgets but also from the budget of airport owners, airlines, and investors ("Minutes of the meeting of the Government Commission for Economic Development and Integration, chaired by First Deputy Prime Minister of the Russian Federation I.I. Shuvalov" 2015).

As to the ground infrastructure segment, its efficiency must be increased through traditional antimonopoly policies. For example, investment requirements to lessees, operators, and owners of fuel supply facilities (as members of an infrastructural monopoly) should be approved, and tender procedures for handing airports' ground infrastructure over to operators and investors should be developed. Methodology for government price (tariff) regulation should be adopted for storage and wing fuelling services in the scope of implementing investment programmes. Regarding trade policy, duty-free import of aviation fuel should be allowed for the next 5 years.

The aircraft construction segment also plays an important role. Russia has potential here, but the production model is vertically integrated and largely depends on exports—which makes it vulnerable to political and economic shocks (e.g. financial shocks, technological sanctions).

Thus, import substitution policy is also relevant in this industry. Own R&D and manufacturing potential must be developed (especially regarding critical technologies), and external partners should be diversified. In the long term, this would allow to partially move on to using Russian-made aircrafts, thus protecting lessees from currency-related shocks and contributing to accomplishing the national security objectives.

Finally, development of IT services and travel integrators would contribute to growth of air transportation services market. Russian R&D results in computer systems for optimising aircraft fleets, flight destinations, and ticket prices could become a factor of success, as well as IT designs for improving online booking systems and introducing a unified cargo registration standard.

Development of human capital should play an important role, including providing an adequate supply of pilots for the civil aviation based on forecasted volumes of passenger and cargo traffic; implementing a programme to subsidise retraining and upgrading of flight crews; and developing the system of official statistical monitoring of aviation personnel in line with the ICAO recommendations and experience of countries with the lowest accident rates.

Important industry-level measures among other things include adoption of international e-freight and e-cargo standards for electronic registration and tracking of cargos and harmonising freight services provided by different modes of transport.

Finally, Russia should actively and in a logical way participate in international transport institutions such as International Transport Forum (ITF) and the OECD/ITF Joint Transport Research Committee, Russia-EU Transport Dialogue, Northern Dimension Partnership in transport and logistics area, and International Civil Aviation Organisation.

Russia's possible prospective position in the value chain

To generate maximum possible rent in aviation GVCs, Russia needs an advanced system of modern airports, a competitive aircraft construction industry, and initiatives to promote regional and local air transportation services.

Electronics: mobile phones and smartphones

Description of the value chain and Russia's current position therein

For the mobile phones and smartphones market, the main GVC segments are product development (R&D) both in terms of hardware and software, production and assembling, packaging, export, and retail.

Globally, Russia's participation in these GVCs is weak. The production segment of this GVC is mainly located in East Asia, while research-intensive segments are controlled by Western and Japanese companies.

A new publication by Kaplinsky (2013) describes how value added is created in the course of an Apple iPhone production.

As Fig. 6 shows, the value added created by China is much lower than other countries'. Even the USA supply to China more components (in value terms) than the value added China creates by assembling the end product. Other countries' contribution to the final value added is much higher than the Chinese one. At the same time, Chinese export statistics count all previously created value added, so China's export would be much higher than other countries'. Meanwhile, the USA generates the highest profits from this GVC, by adding a retail mark-up of 64 %. The product retails at 500 USD while its actual production cost is just 179 USD.

Russian companies participate in such GVCs in a number of different ways: very few of them act as coordinators (the best example is Yota), while the vast majority buy standard ready-made "dummies" in Asia and concentrate on marketing and sales. There are also retailers who sell products made by foreign companies.

Global trends

Relevant major global trends include ubiquitous growth of production level and increased international competition, arrival of new players to the market, coupled with increased international cooperation in production, and relocation of production facilities into South-East Asian countries. An important trend is ever-changing consumer requirements and preferences (e.g. growing demand for smartphones), high rate of the industry products' moral obsolescence, and rapid transformation of end product markets due to technological and behavioural changes.

Major challenges and threats

Russia is barely present in most of the foreign markets, in effect limiting its interests to the CIS zone. Most of the Russian participants of these GVCs simply sell foreign-made products on the Russian market adding an appropriate mark-up. Russian companies' market share is insignificantly small compared with the global market.

The main challenge is rapid technological improvement of gadgets and their quick moral obsolescence. Another important issue is critically growing technological leadership of countries possessing key ("closing") technologies which will allow them to keep on improving their products and creating new technologies—thus closing such opportunities to countries who, because of various reasons (patent limitations, lack of

personnel, R&D potential and relevant infrastructure, technological sanctions, etc.), do not have access to such technologies.

Accordingly, Russia should concentrate its efforts on developing its S&T basis to be able to quickly follow any promising trend. And the political scope should be wide, not limited to any particular specialisation area.

Windows of opportunity and the role of R&D

The most profitable and promising for Russian players should be the design and R&D segments. On the CIS, Eastern European, and neighbouring countries' markets, Russian companies potentially could compete with foreign brands in the medium and high price ranges.

Obviously, the market for mobile phones, smartphones, and new communication devices which will replace the former in the coming decades will be developing extremely rapidly and with high profit margins. Therefore, Russian companies must start entering new markets now, securing strategic positions there.

Necessary political initiatives

Since the largest proportion of the economic rent in these GVCs is created in the R&D and marketing segments, making adequate use of the windows of opportunity first of all requires to have the right kind of personnel and pursue appropriate education, S&T, and innovation policies.

As regards education, engineering professions should be promoted, and young people are to be encouraged to acquire professions in IT, design, and engineering. Higher education organisations which train people in the above professions must receive government support including extra free places for students, efficient mechanisms to promote academic mobility of students and researchers, and recruiting recognised foreign experts to get access to cutting-edge technologies and the most advanced R&D results in the ICT area.

Creating adequate forward-oriented S&T results should become a major government policy priority. Particularly important is developing Russian designers' skills in automated component design, new multimedia technologies, etc. (Gokhberg L.M. (Ed.) 2014 (in Russian)).

Providing support to innovative industrial clusters through investment policy should also be seen as an important objective, since it would contribute to adopting a broad approach to ICT development (OECD Digital Economy Outlook 2015 2015).

No specialised or industry-specific measures are required in this area: if development of mobile telecommunication devices would be seen in the context of initiatives aimed at developing "digital" economy, after a while, the technological gap between Russian and foreign developers would diminish.

Russia's possible prospective position in the value chain

The high profitability of the above GVC segments with time will decrease, since existing technologies would gradually become more accessible. The main role will be played by the so-called disruptive innovations which create new markets and eliminate the existing ones. Therefore, no market forecast can yet be considered to be sufficiently reliable. However, long-term scientific future analysis, including through application of foresight methodology, and appropriate strategic planning are indeed required. Keeping in mind the available forward-oriented R&D results and the high level of human capital, Russia can increase its presence in research-intensive and highly profitable segments of these GVCs (design, R&D, sales).

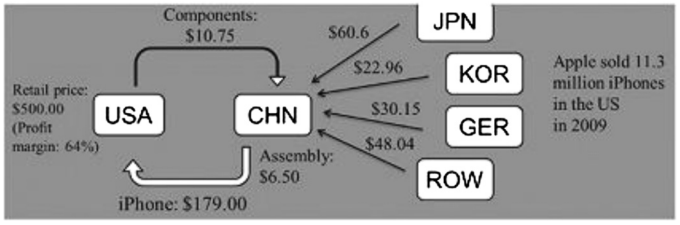

Fig. 6 The Apple iPhone GVC

Automobile production: car parts

Description of the value chain and Russia's current position therein

The main segments in the global car parts value chain are design, production, and sales. The production segment is a modular system (platform) for designing, manufacturing, and assembling. Factories performing the most technologically advanced operations (such as pressing, making engines, transmissions, and electronic components) are located closer to the company's headquarters, while assembly plants are positioned closer to the markets. Design and sales account for the biggest share of economic rent, while industrial production creates only a relatively small proportion of the value added. The design segment in Russia is practically undeveloped, while other segments are developing in the framework of the global transnational corporations.

Global trends

Globally, the design and sales segments are concentrated in the hands of a few international corporations who own major production facilities in developing countries. This market is becoming increasingly oligopolistic, with the number of independent car parts manufacturers getting ever smaller: they become dependent on the market giants, enter into joint ventures or strategic alliances with them, and some of the local producers become wholly owned subsidiaries of foreign corporations.

The same is happening in Russia: domestic producers are getting involved in international cooperation processes, integrating into large, successful GVCs and losing their independence in the process.

According to leading international experts, the car parts industry does not offer good opportunities for improving one's positions in GVCs (Gereffi et al. 2005; Humphrey and Schmitz 2002; Kaplinsky 2004).

Major challenges and threats

In the current situation, and in the foreseeable future, no Russian automobile manufacturer, all other conditions being equal, will be able to build a competitive global value chain. And that being so, the Russian automobile industry is doomed to lag behind, develop in a "catch-up" way, and suffer further reduction of profit margins.

Russian producers do have competencies in car parts manufacturing, but cannot match foreign companies in design and sales segments, which require significant intellectual resources and innovations. Russian labour is more expensive and less skilled than in the Asia-Pacific region.

Thus, Russian automobile industry has to integrate into the processes of industrial production cooperation with more powerful international partners, which will lead to further decline of the industry: Russian producers are given the role of assemblers, while the most profitable segments—design and sales—remain under control of the global giants, so the bulk of the profits goes abroad. In the future, it will continue to make Russian manufacturers increasingly worse off, making them ever more reliant on the global market situation and hindering their development.

A similar situation is noted in many developing countries; experts recommend them not to waste public resources supporting domestic producers in GVCs but invest in other industries offering opportunities to secure higher economic rent (Humphrey et al. 2000).

This recommendation is largely relevant to Russia too, but automobile production remains a strategic industry and requires maintaining and developing the S&T and manufacturing basis. This objective cannot be accomplished just by providing subsidies.

Windows of opportunity and the role of R&D

In the short to medium term, car parts production in Russia will follow the inertial development scenario, with foreign presence gradually growing and economic rent gradually diminishing. In 40–50 years' time, this scenario will lead to a dead end.

However, by the middle of the century (or sooner), new prospects will open for the Russian automobile industry. These are primarily connected with emergence of alternatives to the present-day internal combustion car (electric cars, fuel cell cars, compressed air cars, hydrogen cars, etc.).

The role of R&D is also linked to development of the "smart cities" concept. The approach which suggests abandoning personal cars altogether in favour of efficient, high-speed, environmentally neutral, safe, and cheap public transport in the megalopolises of the world is becoming increasingly popular ("Lecture by Michael Blinkin "Mobility of the future: the objective tendencies and naive delusion. Thinking about how people will move around the city and to the world in the middle of the XXI century"" n.d.), including appropriate modern tools and business models (car sharing, etc.).

Necessary political initiatives

There's a probability that by the middle of the current century, urban population will become much less enthusiastic about owning a personal car. This prospect looks quite attractive to Russia: when it comes to cargo and public transport, Russian producers can do better than those oriented towards the personal consumption segment.

Still, keeping in mind today's realities of Russian participation in "car" GVCs, employment policy and labour legislation seem to be important (trade unions, workers' rights), which could artificially increase the rent created in the assembly segment, though this would have a negative effect on the prices.

Generally, technologies and innovations must be developed, the future of the automobile industry "foreseen" through application of foresight methodology, and personnel trained—i.e. resources should be invested in what will replace the present-day car.

Development of public transport systems in large cities combined with diminishing role of the private car can serve as a reference point for government policy development.

Russia's possible prospective position in the value chain

Despite the possible prospects in remote future, we have to agree with Humphrey et al. (2000) and recognise that car parts manufacturing has no potential in terms of promoting Russian companies' integration into these GVCs, all other conditions being equal. Its reliance on subsidies will be growing, while the human potential will diminish. Only a radical transformation of the market and of consumer preferences may save the day, but this hardly seems likely in the foreseeable future.

Financial services: electronic payment systems

Description of the value chain and Russia's current position therein

GVCs in financial services cannot be presented as a common sequence of links, like in production. In this industry, value chains are rather based on the network principle, and certain operational phases are even completed automatically. An example of such network approach in banking—dividing banks' activities between specialised centres located in different countries—provides UniCredit ("UniCredit Group - Institutional website of the financial Group" n.d.): its offices in Ireland specialise in asset management, German ones—in investment banking services, Austrian ones—in mortgage credits, Turkish ones—in bank cards and related services, etc. (Backer and Miroudot 2014).

Russian financial services market has emerged comparatively recently, but it has a large potential. This market is very diverse, offering the same range of services as any developed foreign market does. Apart from international companies, Russian ones are also present, and their number is growing all the time. There is also a growth trend for cashless online payments: internet banking, e-money, and the nonbank credit organisations' segment are actively growing.

Global trends

The electronic payment systems (EPS) industry is among the fastest growing ones. The biggest payment systems are Visa, MasterCard, American Express, Diners Club, UnionPay (China), and JCB (Japan). The Chinese UnionPay shows the highest growth rate: since 2010, it remains the leader in terms of the number of issued cards, though its share of the Russian market is insignificant. Major global EPS trends include growing competition, development of non-banking financial services, and development of e-commerce.

Major challenges and threats

Risks and threats to development of the Russian EPS sector include the Russian banking sector's reliance on foreign payment systems; entry of new foreign payment systems in the Russian market; and the still insufficient competitiveness of the Russian financial services sector. The political component is also important. For example, the following large Russian banks were subjected to foreign sanctions: Gazprom Bank, VEB, Sberbank, VTB Bank, Moscow Bank, Rosselkhozbank, and Vnesheconombank ("EU sanctions against Russia over Ukraine crisis" n.d.; "Russia and Ukraine Sanctions, Department of the Treasury" n.d.). The sanctions limit the

banks' activities in a number of countries which hinders Russia's efficient participation in relevant GVCs.

Windows of opportunity and the role of R&D

At the same time, the sanctions gave an impulse to creation of the national payment card system (NPCS) to process transactions made with international payment systems' cards in Russia; the NPCS clearing centre was launched on 31 March 2015.

To increase the benefits of Russian participation in financial services GVCs, more attention should be paid to the e-commerce market and the NPCS: developing them opens a real window of opportunity to Russia since it will make the Russian economy more independent and potentially could lead to transforming the NPCS into an international payment system—like the Chinese UnionPay was transformed into one (among other things, it could be achieved by making use of the integration potential with the CIS and EEU countries).

Necessary political initiatives

Initiatives to improve Russia's positions in "financial" GVCs include further promotion of the NPCS, increasing its efficiency and reliability, and gradually upgrading it to the level of similar international payment systems; increasing efficiency of the government supervision and control systems (primarily the Central Bank's ones) over Russian banks' activities; and further implementation of policies aimed at strengthening the banking sector and improving the relevant legislation, among other things taking into account international standards and practices.

In the field of education, the Russian population's financial literacy should be improved.

Specific recommendations for the industry also include development of the legislation and human resources and stepping up R&D to promote development of information technologies for the sector and find the best ways to conduct transactions and protect data.

Also important is Russia's participation, jointly with partners, in the new international financial initiatives such as the New BRICS Development Bank, Asian Infrastructure Investment Bank, and the envisaged Shanghai Cooperation Organisation's Development Bank.

Russia's possible prospective position in the value chain

Prospective security of the Russian financial market must be ensured, by creating Russian equivalents of international EPS, making them internationally competitive, and taking leading positions in the new international financial organisations.

Discussion

Though only the basic Foresight elements were introduced into the analysis, they provide a much broader perspective in terms of hidden factors of influence and different policy areas to support the desired results of country's participation in the given GVCs.

For further advancement on the subject, a more in-depth analysis is needed as regards the influence of national innovation institutions on certain GVCs or clusters

with respect to what is happening to them in terms of technological transformations and their respective final goods' business cycles.

Despite the fact that it would take a lot of time and effort to carry out such analysis in respect of several industries, it would be more practical to concentrate solely on a certain cluster representing a single GVC, thus providing a bright example how the combined approach works. Given that a number of strategic initiatives are being realised nowadays in Russia, the time is short to support them with the novel approach and see whether it can be a success.

Conclusions

Despite the fact that the existing approaches of the GVC theory supplement each other, the classic theoretical foundation of GVC research cannot be described as faultless and is currently being developed, inter alia by the contributions of the innovation-based economy school representatives.

The empirical and methodological foundation of GVC research is being developed to increase the reliability of research results and their forecasting value, to propose more valid political recommendations, and to improve strategic planning.

The methodology applied represents early attempt to present evidence of how the approaches of GVCs and innovation systems research can be combined to reap the benefits of these theories while avoiding their inherent limitations.

The presented model takes into account the importance of national institutions for innovation in GVCs. The application of Foresight methodology expands the forecasting possibilities of the analysis and adds dynamism to this rather static model.

All this allows to increase the accuracy of the strategic planning of countries' participation in GVCs and improves the relevance of the policy advice produced compared to the existing models.

Methods

The analysis conducted was based on the model of dynamic allocation of rents originally demonstrated in Kaplinsky (2004), which was supplemented by elements of Foresight analysis to develop sectoral and horizontal policy recommendations to increase the effectiveness of participation of Russian companies in the corresponding GVCs. Thus, two product groups were selected for analysis as illustrative cases, also used in Kaplinsky's model to preserve the logic of the approach's evolution, that is, fresh fruit and vegetables and car parts. Additionally, the analysis covered the following product and service groups: mobile phones, air transport (transportation services), and electronic payment systems (financial services). The choice of these products/services was among other things determined by their direct connection with Russia's priority S&T areas (Gokhberg 2014; "Long-Term Russian S&T Foresight Until 2030" n.d. (in Russian): biotechnology (fresh fruit and vegetables), ICT (mobile phones, electronic payment systems), and air transport (transport and space systems).These cases partly coincide with the new markets, roadmaps for which are being constructed in the framework of NTI ("National technology initiative of Russia" 2015), including AeroNet, AutoNet, and FoodNet. The current and prospective (forecasted) GVC structure was identified for these case studies in relevant industries, together with Russia's current and prospective places in the value chains. Foresight methodology was applied to envisage possible

changes in the GVC structure within the planning horizon (10– 15 years, i.e. until 2025), with the accent on analytical tools enabling to determine the factors affecting changes in the structure of the value chain segments, sources and distribution of profits within them, and Russia's opportunities to secure more favourable positions. The basic model of Kaplinsky was extended by introducing therein the classical elements of Foresight methodology, that is, global and local technological and economic-social trends influencing the development of the given GVC; major challenges and threats affecting GVCs in specific industries; windows of opportunity to penetrate certain GVC segments that offer the biggest economic potential or to create new markets inside the emerging GVCs; and the role of R&D embodied in how it allows to accumulate new technological, marketing, and management designs and knowledge to support integration into GVCs and obtain the biggest possible benefits from participation in them. Finally, R. Kaplinsky's model was augmented with a set of political initiatives to be implemented, primarily by the government, to support the country's progress in global chain and secure the best possible rent. In addition, based on recommendations by international organisations (OECD et al. 2013; OECD, WTO, World Bank Group 2014), the so-called horizontal and industrial/sectoral initiatives were identified for each product and service group. Having analysed successful international experience of certain countries' participation in GVCs, the OECD and a number of other international institutions concluded that implementing the whole set of horizontal political initiatives (aimed at developing infrastructure and communications, improving business climate, financial sphere, R&D and innovations, and education and employment systems, increasing macroeconomic stability, etc.) is crucially important for ensuring success of GVC participation strategies. Implementing more specialised industry/sector-specific measures can serve as an important enhancement of horizontal initiatives but cannot replace them. Adopting purely sectoral approach (e.g. tariff-based and other trade restrictions, subsidies, requirements to export activities, and restrictions on foreign investments) at best can provide only a short-term positive effect for a specific industry (and more often, only for a limited number of companies) but cannot ensure a positive cumulative effect for the whole economy. Analysed among "horizontal" measures were the necessary steps the government should make to create adequate macroeconomic conditions; for public administration; for development of human capital (education and employment); for support of R&D and innovation; for trade policy; for investment policy and improvement of business climate; and for development of external economic relations and participation in international economic integration. Highlighting S&T and innovation policy among the "horizontal" initiatives allowed to take into account recommendations of the innovation-based economy school (Cooke 2001; Etzkowitz and Leydesdorff 2000; Lundvall et al. 2015; Pietrobelli and Rabellotti 2011) concerning the need to identify interconnections between participation in GVCs and specific features of national innovation systems. Studying international approaches to GVC participation, the authors attempted to apply certain elements of foresight methodology to conduct industry-specific analysis of several case studies in line with the approach previously used by R. Kaplinsky. Detailed results are presented in Appendix 1. Brief results in the text form are presented after this section.

Appendix 1

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis

Industry/sector Product/service group	Current state of the GVC		Factors affecting changes in the structure of the value chain's segments, sources and distribution of profits in the chain, and opportunities for Russia taking a more favourable position in the chains	Horizontal and industry-specific political initiatives required to promote Rus sia's position in the GVC	Prospective state of the GVC (planning horizon until 2025)	
	Value chain segments (top down) and Russia's current place in them	Current main source of economic rent			Prospective main source of economic rent	Value chain segments (top down) and Russia's prospective place in them
Agriculture Fresh fruit and vegetables	Seed farming	Seed selection and new product development	Trends Increased international competition in seed farming Development of genetic engineering More active international cooperation in food safety, and dealing with insufficient availability of food in the least developed countries Consumer preferences in developed countries shifting in favour of environmentally safe, organic, farm-grown food (eco, bio, etc.) including fruit and vegetables	Horizontal measures Investment policy and improving business climate Promoting healthy competition Availability of affordable long-term loans Availability of land for agricultural use	Seed selection and new product development	Seed selection (Russia)
	Growing (ubiquitous)	Coordinating GVC efficiency				Growing (ubiquitous)

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis *(Continued)*

Crop processing				
Export		Challenges and threats Further reduction of exporters', producers', and retail networks' profits Russia's growing reliance on imported seeds	Trade policy Among other things, countering illegal re-export of embargoed food products into Russia from neighbouring countries, through application of customs procedures, technological regulation, etc.	Crop processing Export
Retail (Russia)	Retail network	Global climate change Development of genetically modified products industry: profits vs. ethics Producers' growing reliance on subsidies, growing shortages on the domestic market (e.g. introduction of Russian counter sanctions on the EU agricultural products in 2014) Increased competition of retail networks and major producers for leadership in the GVC	Public administration Continuous implementation of the Food Security Doctrine approved by the presidential decree in 2010 and the National Programme for Development of Agriculture and Regulation of Agricultural Products, Raw Materials, and Food Markets for 2013–2020 Systemic policy to support the agricultural sector	Retail

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis *(Continued)*

Radical change of Russia's agricultural trading partners	Development of a targeted programme to support small farmers; removal of administrative barriers hindering numerous small farmers' access to Russian and international markets
Need to replenish the domestic market niches which have appeared after the sanctions, while preventing inflation on the consumer market and preserving high food quality standards	
	Human capital development policy
Windows of opportunity	
Companies' integration into the seed selection and new product segments where economic rent is expected to grow	Availability of skilled personnel (according to agricultural businessmen, Russia desperately lacks skilled personnel capable of applying advanced technologies and introducing advanced business processes in the sector)
Development of Russian seed farming and seed engineering	Availability of rural infrastructure to provide at least a minimum level of comforts
Role of R&D	
Mainly connected with developing genetically modified products and fertilisers in line with environmental and food safety requirements	S&T and innovation policy
	Supporting initiatives in the agricultural sector, assisting with commercialisation of innovations

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis *(Continued)*

				Organisation of S&T events for young researchers and inventors Industry-specific initiatives: Maintaining healthy competition under the import substitution policy: providing broad market access to as many Russian and international agricultural producers as possible, including small and medium ones, to ensure adequate supply of agricultural products on the Russian market, and meet consumer demand and preferences Availability of land for agricultural use, simplifying administrative procedures for buying land for agricultural purposes, reducing land prices Availability of affordable long-term loans.		
Transportation services Air transport	Aircraft construction (weak Russian participation)	Leasing	Trends Increasing international competition, growing markets, growing passenger and freight traffic, especially in	Horizontal measures: Investment policy and improving business climate Introducing investment requirements to lessees,	Leasing Airport services (capital	Aircraft construction (Russia)

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis *(Continued)*

		developing countries	operators, and owners of fuel supply facilities (as members of an infrastructural monopoly). Development of tender procedures for handing airports' ground infrastructure over to operators and investors, and requirements to operators' investment programmes as grounds for establishing tariffs	repairs, current maintenance)	
Airports (Russia)	Airport services (capital repairs, current maintenance)	More active international cooperation through establishment of passenger and cargo transportation alliances			
		Decrease of real ticket costs			Airports (Russia)
		Growing share of regional and local trafficVolatile economic rent	Approving methodology for government price (tariff) regulation for storage and wing fuelling services in the scope of implementing i nvestment programmes		
		Challenges and threats			Airlines (Russia)
Airlines (Russia)		Ticket prices' high dependency on fuel price, susceptibility to risks of sharp price increases and reduced demand	Russian trade policy	Advertising	
			Duty-free import of aviation fuel for the next 5 years		IT services (Russia)
		Currency-related, political, and other risks			
IT services (Russia)		Negative return on investments	Public administration		
			Continuous implementation of the national programme "Development of the transport system" and the Russian Transport Strategy until 2030		
		Shortage of pilots, high costs of pilots' training and upgrading			Travel integrators (Russia)
		Loss of air freight market share	Human capital development policyDevelopment of roadmap to provide adequate supply of flight crew		

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis *(Continued)*

	Windows of opportunity	personnel for civil aviation, based on forecasted volumes of passenger and freight traffic
Travel integrators (Russia)	Development of Russian aircraft construction industry, application of competitive advantages in the air freight services segment	Implementing a programme to subsidise retraining and upgrading of flight crews
	Role of R&D	Developing the system of official statistical monitoring of aviation personnel numbers, to support forecasting their dynamics taking into account changes in the structure and size of the aircraft fleet
	Optimising computer systems for booking tickets, introducing a unified cargo registration standard, personalisation of services, upgrading aircrafts	Updating educational solutions for training flight crews, including length of training, in line with the ICAO recommendations and experience of countries with the lowest accident rates
		S&T and innovation policy
		Applying innovations which would help to reduce aviation companies' and the whole industry's costs and increase profits (e.g. activities of the Civil Aviation Innovation Centrehttp://www.c-ca.ru/ru/company.html)
		Approving methodology for assessing the state of airports'

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis *(Continued)*

		runway surfaces in line with the international ASTM standard Participation in international economic integrationMore active and logical Russian participation in international transport institutions such as International Transport Forum (ITF) and the OECD/ITF Joint Transport Research Committee, Russia-EU Transport Dialogue, Northern Dimension Partnership in transport and logistics area, the WTO, International Civil Aviation Organisation (ICAO), Inland Transport Committee of the United Nations Economic Commission for Europe, the EEU Industry-specific initiatives: Ratification of the Montreal Convention (MC-99), on changing the terms of carriers' liabilityAdoption of international e-Freight and e-Cargo standards for electronic registration and tracking of cargos, to make better use of Russia's transit potential and support the country's integration into the global transport system Adopting advanced airfreight registration

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis *(Continued)*

				standards for the entire logistical services market		
				Joining forces to implement unified electronic cargo registration standards for all modes of transport		
				Harmonising paperwork associated with freight services provided by different modes of transport		
				Promoting independent suppliers and low-cost carriers		
Electronics Mobile phones	Product development (almost none)	Development of new technologies (operating systems, etc.)	Trends Increased international competition in the production segment due to technological development and arrival of new market players	Horizontal measures: Human capital development policy	Development of new technologies (operating systems, etc.)	Product development (Russia)
				Promoting engineering professions, encouraging young people to acquire professions in IT, design and engineering		
			International cooperation in production, relocation of production facilities into South-East Asian countries	Providing government support to higher education organisations which train people in the above professions, including extra free places for students		Production Packaging
	Production		Growing demand for smartphones Challenges and threats			Export
			Reduced profits of manufacturers due to increased competition			

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis *(Continued)*

Packaging (Russia)		Increased production costs due to growing wages Development of personnel and the R&D basis Competition between retailers and major brand-name manufacturers for market domination	Introducing efficient mechanisms to promote academic mobility of students and researchers while preventing "brain drain"; recruiting recognised foreign experts	Retail (Russia)
Export		Windows of opportunity Companies' integration into mobile phones production Selling R&D results to leading manufacturers	S&T and innovation policy Promoting Russian companies' activities to create and protect intellectual property Providing them comprehensive support in the licensing and patenting areas	
Retail (Russia)	Retail networks	Role of R&D Mainly connected with improving phones' properties, and the materials they are made of	Participation in international economic integration Development of international cooperation in the BRICS and EEU frameworks and with other emerging economies; gradual liberalisation of trade policy, simplification of customs and administrative procedures Industry-specific initiatives: Organisation of international	

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis *(Continued)*

				events, fairs, fora, conferences, etc. on relevant subjects, accompanied by appropriate PR activities		
Automobile production	Raw materials processing		Trends	Horizontal measures: Macroeconomic policy		Raw materials processing
Car parts	Design	Design	High level of production became common. Production is becoming increasingly global.	Further extension of the localisation programme to cover car parts manufacturers; development of cluster initiatives in line with the Russian Federation Automobile Industry Development Strategy Until 2020 (ON APPROVAL OF THE RUSSIAN FEDERATION AUTOMOBILE INDUSTRY DEVELOPMENT STRATEGY UNTIL 2020. Executive order of the RF Ministry of Industry and Trade of 23.04.10 319. Predprinimatelskoye Pravo, n.d. (in Russian))	Design	Design (Russia)
	Pressing	Harmonious functioning of the value chain	Rent is shifting to more protected segments of the chain. Gradual oligopolisation of the global market. Concentration of economic rent in intangible assets inside specific segments (design, application of new production technologies, brands, marketing).			Pressing
			Challenges and threats			
			Increased competition in the low-technology segments of the chain, negatively affecting market situation.			
	Assembly	Partially from pressing, partially from assembly				
			Windows of opportunity			
		Supplier's trademark	Changing consumption structure in the transport sector: reduced role of personal transport and growing importance of public transport	Investment policy and improving business climate		Assembly
				Promoting investments into key segments of the		

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis *(Continued)*

	Role of R&D	value chain such as R&D and design, by providing tax incentives		Export
Export	The role of S&T and innovation factor will grow due to increasing profit rate in the design segment	Promoting joint R&D and design programmes		
		Russian trade policy		
(Car parts user) (Russia)		Stronger export orientation; promoting use of Russian raw materials through adoption of mechanisms limiting their import		
		Human capital development policy		
Retail (Russia)		Training high-technology professionals, implementing upgrading programmes based on on-the-job training at foreign companies	Supplier's trade mark	Retail (Russia)
		S&T and innovation policy		
		Orientation towards medium- and long-term demand: development of fuel supply technologies for multiphase injection Diesels, minimising toxic emissions, all-wheel-drive vehicles, alternative fuels, unmanned vehicles, etc.		
		Industry-specific initiatives:		
		Development of efficient		

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis *(Continued)*

				and competitive public transport systems for cities; application of advanced business models to reduce demand for personal cars		
Financial services Electronic payment systems	Establishing administrative centre	Banks' rent for using payment systems	Trends Growing international competition: payment systems previously limited to national markets are becoming international Development of e-commerce Development of non-banking financial services	Horizontal measures: Macroeconomic policy Deeper integration of the NPCS into the Russian economy. Improving political climate and Russia's positions in the world	Banks' rent for using payment systems Rent for conducting transactions	Establishing administrative centre (Russia) Establishing processing centre
	Establishing processing centre	Rent for conducting transactions	Challenges and threats Russian banking sector's reliance on foreign payment systems Entry of new foreign payment systems in the Russian market Reduced competitiveness of the Russian financial services sector	Investment policy and improving business climate Promoting investments to develop key segments of this chain Human capital development policy		Establishing client base (issuing banks, equalising banks)
	Establishing client base (issuing banks, equalising banks)		Growing popularity of unofficial payment systems External shocks such as political sanctions and global volatility Windows of opportunity Creation of the national	Initiatives to improve financial literacy of the population S&T and innovation policy Further strengthening of the intellectual property		

Table 1 Dynamic distribution of GVC economic profits by product/service groups: current state and prognosis *(Continued)*

	payment system to make the industry more independent	system and relevant law enforcement practices in line with the relevant challenges; development of ICT	Transaction services (Russia)
Transaction services	Development of online transactions, generating more profits for companies	Participation in international economic integration	
	Development of the financial sector makes Russia more attractive to foreign investors	Participation, jointly with strategic partners, in the new international financial initiatives such as the New BRICS Development Bank, Asian Infrastructure Investment Bank, and the envisaged Shanghai Cooperation Organisation's Development Bank.	
	Transforming the NPCS into an international payment system		
	Role of R&D	Industry-specific initiatives:	
	Mainly connected with information technologies, to make transactions safer and improve data protection	Increasing efficiency of the government supervision and control systems (primarily the Central Bank's ones) over Russian banks' activities; further implementation of policies aimed at strengthening the banking sector and improving the relevant legislation, among other things taking into account international standards and practices Promoting development of information technologies	

Competing interests
The authors declare that they have no competing interests.

Authors' contributions
TM made substantial contributions to the conception and design of the study, helped draft the manuscript and revised it critically for important intellectual content, and gave the final approval of the version to be published. EM made substantial contributions to the conception and design of the study, drafted the manuscript, and was accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Both authors read and approved the final manuscript.

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