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ASSESSING THE DEGREE OF INVOLVEMENT OF KAZAKHSTANI INDUSTRIES IN GLOBAL VALUE CHAINS

The economy structure, availability of resources and production capacities generally define the involvement of country's goods in global production chains. This research aims to evaluate the degree of global value chain (GVC) involvement for Kazakhstani industries for understanding the country's integration into the global economy and its competitiveness in international markets.

The evaluation of the involvement of Kazakhstani goods in GVCs incorporates widely acknowledged indicators of forward and backward integrations introduced by World Bank experts. This analysis delves into the causal relationships within the demand model, providing insights into the intricacies of Kazakhstani goods' integration into production chains. The results revealed that Kazakhstan's participation in GVCs is predominantly driven by forward participation. The peak of GVC involvement occurred during 2004-2008, with total participation exceeding 45%, particularly in sectors like mining, energy production, rubber and plastic products, and base metals. While the role of the country as a global provider of commodity sector goods has been long discussed in literature, results of this study defined the industries with relatively higher degree of backward integration. Certain sectors including rubber and plastic products, computer and electronic equipment, transport equipment, and textiles, exhibit higher backward participation rates (30.3%, 25.5%, 24.3%, and 26% respectively) compared to forward participation. This suggests a significant reliance on imported components, emphasizing a notable proportion of the cost structure for exports in these sectors. The base metals sector stands out with a participation rate exceeding 40%, indicating a notable position in the global value chain. The practical significance of the work relates to the defining industries that can be backward integrated to GVC.

While the study discussed Kazakhstan's position in GVC and explored opportunities for defining high-end production, it underscores the need for further in-depth research to assess the potential for integrating Kazakhstan into GVC as a manufacturing site.

Key words: global value chains, international markets, trade policy, forward and backward integration, trade indicators

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Қазақстандық салалардың жаһандық құн тізбектеріне қатысу дәрежесін бағалау

Экономика құрылымы, ресурстардың және өндірістік қуаттардың қолжетімділігі жалпы алғанда ел тауарларының әлемдік өндіріс тізбегіне қатысуын анықтайды. Бұл зерттеу елдің жаһандық экономикаға интеграциясын және оның халықаралық нарықтардағы бәсекеге қабілеттілігін түсіну үшін қазақстандық өндірістердің жаһандық құн тізбегіне (GVC) қатысу дәрежесін бағалайды.

Қазақстандық тауарлардың GVC-ге қатысуын бағалау Дүниежүзілік банк сарапшылары енгізген ілгері және кері интеграциялардың кеңінен танылған көрсеткіштерін қамтиды. Бұл талдау қазақстандық тауарлардың өндіріс тізбегіндегі рөліне түсінік бере отырып, сұраныс моделі шеңберіндегі себепті байланыстарды зерттейді. Нәтижелер Қазақстанның GVC-ге қатысуы негізінен ілгері интеграцияға негізделгенін көрсетті. GVC-ге қатысудың шыңы 2004-2008 жылдар аралығында болды, жалпы қатысуы 45%-дан асты, әсіресе тау-кен өнеркәсібі, энергетикалық өндіріс, резеңке және пластмасса бұйымдары және қымбат емес металдар сияқты

салаларда. Әдебиеттерде елдің шикізат сектор тауарларының жаһандық жеткізушісі ретіндегі рөлі ұзақ уақыт бойы талқыланып келе жатқанымен, осы зерттеу нәтижелері кері интеграцияның салыстырмалы түрде жоғары дәрежесі бар салаларды анықтады. Кейбір секторлар, соның ішінде резеңке және пластмасса бұйымдары, компьютерлік және электронды жабдықтар, көлік жабдықтары мен тоқыма бұйымдары кері интеграцияның ілгері интеграциямен салыстырғанда жоғары көрсеткіштерін көрсетті (тиісінше 30.3%, 25.5%, 24.3% және 26%). Бұл импорттық құрамдас бөліктерге айтарлықтай тәуелділікті көрсетеді, бұл осы секторлардағы экспортқа жұмсалатын шығындар құрылымының елеулі үлесіне баса назар аударады. Металдар секторы 40% асатын қатысу үлесімен ерекшеленеді, бұл жаһандық құн тізбегіндегі маңызды орынды айқындайды. Жұмыстың практикалық маңыздылығы – GVC-ке кері интеграциялануы мүмкін салаларды анықтауы.

Зерттеу Қазақстанның GVC-дегі позициясын талқылап, жоғары деңгейлі өндірісті анықтау мүмкіндіктерін зерттей отырып, Қазақстанды өндіріс орны ретінде GVC-ке интеграциялау әлеуетін бағалау үшін одан әрі терең зерттеулер қажеттігін көрсетеді.

Түйін сөздер: жаһандық құн тізбегі, халықаралық нарықтар, сауда саясаты, ілгері және кері интеграция, сауда көрсеткіштері.

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Оценка степени вовлеченности казахстанских отраслей в глобальные цепочки добавленной стоимости

Структура экономики, наличие ресурсов и производственных мощностей в целом определяют участие товаров страны в глобальных производственных цепочках. Целью данного исследования является оценка степени участия в глобальной цепочке создания стоимости (ГЦСС) казахстанских отраслей для понимания интеграции страны в мировую экономику и ее конкурентоспособности на международных рынках.

Оценка участия казахстанских товаров в ГЦСС включает широко признанные индикаторы прямой и обратной интеграции, представленные экспертами Всемирного банка. Этот анализ углубляется в причинно-следственные связи внутри модели спроса, позволяя понять тонкости интеграции казахстанских товаров в производственные цепочки. Результаты показали, что участие Казахстана в ГЦСС в основном обусловлено перспективным участием. Пик участия в ГЦСС пришелся на 2004-2008 годы, при этом общий объем участия превысил 45%, особенно в таких секторах, как горнодобывающая промышленность, производство энергии, производство резиновых и пластмассовых изделий и цветных металлов. Хотя роль страны как глобального поставщика сырьевых товаров уже давно обсуждается в литературе, результаты этого исследования определили отрасли с относительно более высокой степенью обратной интеграции. В некоторых секторах, включая резиновые и пластмассовые изделия, компьютерное и электронное оборудование, транспортное оборудование и текстиль, наблюдается более высокий уровень обратного участия (30,3%, 25,5%, 24,3% и 26% соответственно) по сравнению с прямым участием. Это предполагает значительную зависимость от импортных компонентов, подчеркивая заметную долю структуры затрат на экспорт в этих секторах. Сектор металлов с уровнем участия, превышающим 40%, имеет заметное положение в ГЦСС. Практическая значимость работы связана с определением отраслей, которые могут быть обратно интегрированы в ГЦСС.

В исследовании обсуждалась позиция Казахстана в ГЦСС и изучались возможности определения высокотехнологичного производства, оно подчеркивает необходимость дальнейших углубленных исследований для оценки потенциала интеграции Казахстана в ГЦСС в качестве производственной площадки.

Ключевые слова: глобальные цепочки добавленной стоимости, международные рынки, торговая политика, прямая и обратная интеграция, торговые индикаторы.

Introduction

Globalization has become an essential element in economics and politics since the middle of the 20th century. Considering the economic aspect of globalization, it is closely related to international trade, which allows the exchange of goods and services between countries. Embedding in global supply and service chains is essential for the economic development of countries. A participation in global value chains implies the active involvement of the country in international trade networks and the integration of its economy into global processes.

Within the globalization phenomenon, the Global Value Chain (GVC) is a combination of the number of economic measures required to produce from an initial planning stage through manufacturing and after all to the user. Products become multinational as different elements and manufacturing processes take place in a various geographical areas. Thus, the GVC's central idea is to distribute and trade the different phases of production across countries, based on territories' cost effectiveness degree (World Bank, 2019).

The prioritization of GVC integration and export potential growth is a paramount goal for Kazakhstan within the realm of economic development. This occurrence can be attributed to the relatively diminutive size of the country's domestic market, which consists of a population of merely 20 million. Kazakhstan boasts abundant mineral reserves, which have consistently conferred a competitive edge upon the country (Ross, 2019:796).

Since a long time, it is discussed that Kazakhstan's role mainly involves the supply of raw materials rather than processed products to its trading partners. At the same time, it is widely acknowledged that a huge step up towards more GVC integration as an industrial country could be made due to the vast mineral resource base, a favorable investment climate and strategic logistics opportunities.

Reports and studies state the importance of GVC for Kazakhstan, yet limited information available on what extent the industries of the country participate in GVC. The relevance of this study is enhanced by the fact that the GVC is a key determinant for the industrial development and non-resource export promotion which have been always priorities for the country. Having analyzed

previous studies and literature, this paper aims to investigate the level of linkages of Kazakhstani industries within GVC applying contemporary research methods of the input-output model.

Literature review

Global value chains form new realities of production organization for economies. Multi-component products are developed in one country, parts are manufactured in another, and assembled at the final destination. About two thirds of world trade is accounted for by GVCs (World Bank, 2019).

Countries are trying to create favorable conditions for doing business, new technologies are being introduced, tariff regulation tools are being revised, and transport costs are being reduced. Participation in the GVC implies significant benefits for attracting investment, international trade, increasing the income of the population and stimulating business to export discipline. In particular, according to the World Economic Forum, lowering the barriers to a country's involvement in GVCs (for example, administrative or non-tariff barriers) can lead to an increase in global GDP and trade by 5% and 15%, respectively (Xing et al., 2021: 150).

Measuring the competitiveness of countries in international trade along with their participation in GVCs has long been an important issue, in addition, the increasing globalization of trade and the geographical distribution of production stages make the measurement even more difficult (Seric & Tong, 2019). The traditional measure of the competitiveness of international trade is the share of countries' exports and imports in world trade. However, a traditional measurement and indicators that takes into account GVCs may give different results. When considering GVCs, the specialization of countries in relation to a variety of productive activities needs to be carefully analyzed in order to obtain a more accurate measure of trade competitiveness (Beltramello et al., 2012: 5). For example, if the set of exportable intermediate goods is used as a measure of trade competitiveness, it can be argued that emerging markets contribute more to world trade in low-tech industries. However, based on an analysis of export performance in terms of GVCs, it was shown that emerging market countries also received a significant share of world exports in high-tech

industries (Gnangnon, 2018; Kowalski et al., 2015:22). In addition, emerging market countries have received a significant share of exports of both final and intermediate goods.

Specialization in production activities can be explained by position in the production chain, for example, the stages of forward and backward participation. Forward participation countries produce raw materials or knowledge (e.g. research, design) used at the beginning of the production process, while countries located in the backward participation direction assemble processed products or specialize in customer service (UNCTAD, 2013:117). As a rule, upstream activities are related to the production of intermediate materials, and subsequent activities involve the assembly of products at the final stage. The position of a country in the production chain determines the benefits of participating in GVCs. For example, although this benefit varies by industry entity, research and development activities tend to generate higher added value than assembly activities (Xing et al., 2021).

In terms of emerging markets, they have been able to quickly integrate into global operations and enter new export markets thanks to GVCs, but this does not mean that these emerging markets will necessarily be able to improve their position in world trade in the later stages of production (Beltramello et al., 2012: 9).

The fundamental importance of integration with global value chains for Kazakhstan was noted in the report of the World Bank (2019). Economic diversification can be achieved through greater participation in global value chains (GVCs).

It is noteworthy that the subject area in question is a relatively recent addition to our national discourse, with available resources predominantly emanating from the latter half of the 2010s. Aligned with the prevailing international paradigm, Kazakhstan is exerting efforts to augment the proportion of non-resource exports with the intention of maintaining a steady integration in GVC as an end-product manufacturer (Orazgaliyev, 2017:7; Salihova et al., 2019). Overall, the literature on this topic (Anderson et al., 2018; Akhtanova & Tamenova, 2019; Azretbergenova & Syzdykova, 2020) suggests that Kazakhstan ranks below average in the GVC; however, it also indicates the potential for its consolidation in the long term, subject to appropriate action by the government. From the

point of practical importance, scholars find consensus that by being included in global value chains, domestic companies will receive information and access to world technologies and knowledge, in addition will be able to achieve productivity growth through the application of best practices and compliance with international standards.

Practical implications emphasized by scholars include the potential for domestic companies to gain access to global technologies and knowledge, as well as achieving productivity growth through the application of best practices and adherence to international standards. Literature supports the idea that Kazakhstan's strategic inclusion in GVCs is crucial for its economic development and diversification. However, there exists a dearth of extensive literature on the specific ways in which Kazakhstan's sectors are being integrated into the GVC, which proves the relevance of this study.

Methodology

To comprehensively assess the degree of involvement of Kazakhstani goods in GVCs, this study employed quantitative research design with a well-established method developed by specialists at the Bank of Italy (Borin & Mancini, 2019). This method integrates global trade statistics with national accounts, constructing international input-output tables. These tables discern the destination of imported goods, distinguishing between those directly consumed and those utilized in creating value added for final consumption or subsequent export.

The cornerstone of this study relies on the Trade in Value Added (TiVA) database, a robust source for analyzing the intricate dynamics of GVCs. TiVA data specific to Kazakhstan is available for the period spanning from 1995 to 2018. This dataset encompasses a comprehensive range of products across 66 economies and 20 industries, as defined by the International Standard Industrial Classification (OECD, 2021). It should be mentioned that dataset for Kazakhstan reports later than that of for OECD countries.

Data and Sources: The utilization of TiVA data ensures a meticulous examination of the involvement of Kazakhstani goods in GVCs. The dataset draws from a synthesis of world trade statistics and national accounts, providing a nuanced understanding of the flow and

transformation of goods across international borders. The period under scrutiny, was selected to capture long-term trends and variations in the involvement of Kazakhstani goods in GVCs.

The chosen research period from 1995 to 2018 is justified by the need to examine the long-term evolution of Kazakhstani goods in GVCs. According to OECD (2021), TiVA indicators starting from 2019 might be distorted due to COVID pandemic and economic shocks. It should be mentioned that the dataset for Kazakhstan reports later than that of for OECD countries. Nevertheless, the duration of this study enables the identification of patterns, shifts, and structural changes that may have occurred over time. Additionally, considering the dynamism of global economic conditions, this timeframe captures key events and developments that are pertinent to the research question.

Research question of this study attempts to answer the following research question: To what extent are Kazakhstani industries integrated into GVCs? The generally recognized criteria for the involvement of the national economy and its industries in global value chains are indicators of forward and backward integrations.

Backward participation refers to the impact of any change in the output of a sector on the sectors producing its resource requirements. This indicates the interdependence of the sector with its suppliers. This term focuses on causality in the demand model. Backward participation also measures the dependence of a sector on the industries that provide their resource needs (Borin & Mancini, 2019: 19).

For the input-output model $B = (I - A)^{-1}$.¹ Lf backward of the j-th sector is obtained as the sum of the elements of the j-th column of the Leontief inverse equation L. In the n-sector of the economy, the total feedback of the j-th sector is calculated as:

$$BL_j = \sum_{i=1}^n l_{ij}, \quad (1)$$

where:

$L = [l_{ij}]$. In this context, backward participation is analogous to an output multiplier.

Conversely, forward participation refers to the effect of any change in a sector's output on sectors that consume its output as a contribution to their

own production. This indicates the relationship of the sector with the sectors that buy its products. This term focuses on causality in a supply-side model. Forward participation measures a sector's dependence on sectors that use their products for production.

Forward participation can be obtained using the Ghosh model:

$$x' = v^2 (I - B)^{-1} v' G, \quad (2)$$

where:

the forward link of the i-th sector is calculated as the sum of the elements of the i-th row of the Gauche matrix G. The total forward link of the i-th sector is calculated as:

$$FL_i = \sum_{j=1}^n g_{ij}, \quad (3)$$

where:

$$G = [g_{ij}].$$

The use of normalized values helps to estimate the relative strength of cross-industry links. This allows industries to be classified as more or less dependent on resource providers (backward link) or users of their products (forward link). Both forward and backward were normalized by dividing the sector link by the average link of all sectors. The normalized backward link (NBL) for sector j is calculated as:

$$\overline{BL}_j = \frac{BL_j}{\frac{1}{n} \sum_{j=1}^n BL_j}, \quad (4)$$

and the normalized forward link (NFL) for sector i is calculated as:

$$\overline{FL}_i = \frac{FL_i}{\frac{1}{n} \sum_{j=1}^n FL_j}. \quad (5)$$

This method provides unity as a boundary between industries considered independent of other industries (below average or weaker association) with industries more dependent on other industries (higher average or strong association).

The evaluation of the involvement of Kazakhstani goods in GVCs incorporates widely acknowledged indicators of forward and backward integrations. This analysis delves into the causal relationships within the demand model, providing

¹ B - inverse input-output matrix for 66 countries and 20 industries

² The share of direct value added in each unit of gross output produced by the country.

insights into the intricacies of Kazakhstani goods' integration into global production chains.

In adopting this comprehensive methodology, the study endeavors to offer a nuanced understanding of the dynamics and implications of Kazakhstani goods in GVCs, contributing to the broader discourse on international trade and economic integration. The robustness of the methodology ensures the reliability and validity of the findings, strengthening the overall credibility of the research. The obtained results for examination of the degree of involvement of Kazakhstani goods in the production chains at foreign enterprises are presented in the following section.

Results and discussions

The comparative position of Kazakhstan's participation in GVCs is given in the World Bank report in Table 1. Backward participation refers to the contribution of foreign value added to the

exports of the economy (or sector of the economy). The share of forward participation shows how much of the local value added of an economy (or sector of an economy) is embedded in the production of other economies (World Bank, 2019). It can be seen that in Asian and European countries average backward participation prevails over forward participation. Generally, the level of forward participation does not exceed 25%, whereas this indicator for Kazakhstan accounts for over 40% in average.

To analyze the degree of participation of Kazakhstan in global supply chains, input-output data of international institutions classified in accordance with the nomenclature standards were used. Data for Kazakhstan is available from 1995 to 2018. Relevant analyses on GVC participation for other developing countries also apply input-output data, while authors studying Kazakhstan mention the importance of this approach (Wang et al, 2022).

Table 1 – Averages of GVC participation

<i>% share of total gross exports</i>	Kazakhstan	Asia	Europe	North America	South America
Total GVC participation	53	44,4	48,8	37,8	36,5
Forward participation	43,2	20	21,2	22	23,5
Backward participation	9,7	24,4	27,6	15,8	13

Source: World Bank, 2019

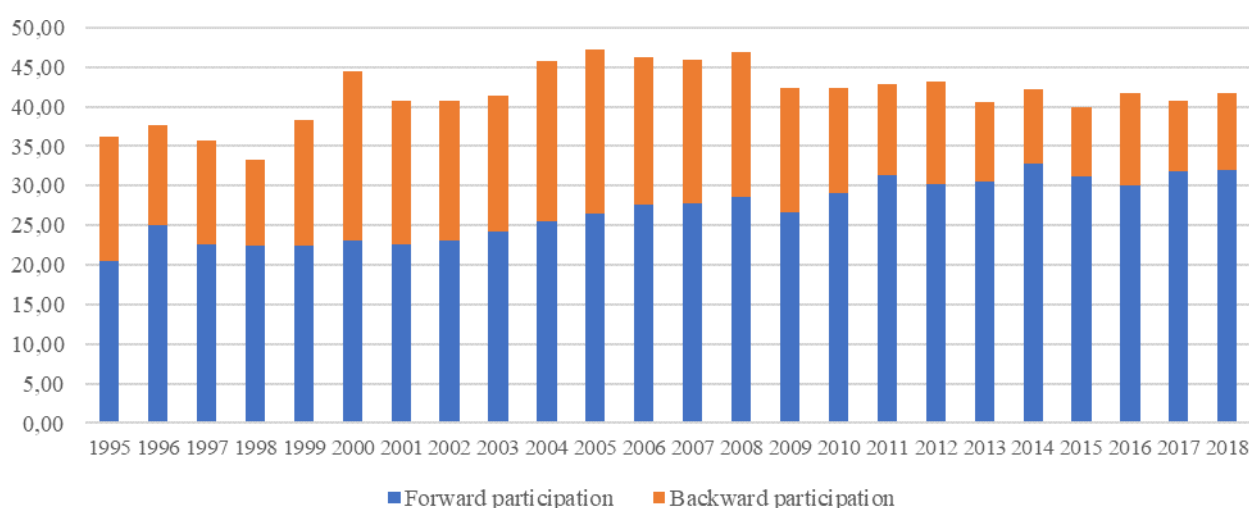


Figure 1 – Participation of Kazakhstan in GVCs (% share of total gross exports)
Source: compiled by authors based on the source OECD, 2021

Kazakhstan's participation in the GVC is mainly due to the supply of goods for foreign export (forward participation). The intensity of Kazakhstan's participation in GVCs was the highest in 2004-2008, when the total participation in GVCs was over 45% and the backward participation reached 20% (Figure 1). Increasing dynamics of forward participation once again confirms the dependency of the country's economy on trading raw materials over the last two decades.

The traditional sectors with a relatively high participation of Kazakhstan in the GVCs are: mining, energy production, rubber and plastic products, base metals (metals that have not been

processed) with an average participation rate of more than 40% (Figure 2). Active participation in these sectors is due to a relatively high forward participation rate of 30%, i.e. Kazakhstan supplies products to other countries for further processing. These indicators once again underline the role of Kazakhstan as a source of raw materials for the processing units of other countries.

These results go in line with the concerns of Kazakh scholars that underline the critical importance of the export diversification in the light of economy's dependence on the commodity sector (Akhtanova & Tamenova, 2019:198; Azretbergenova & Syzdykova, 2020:159).

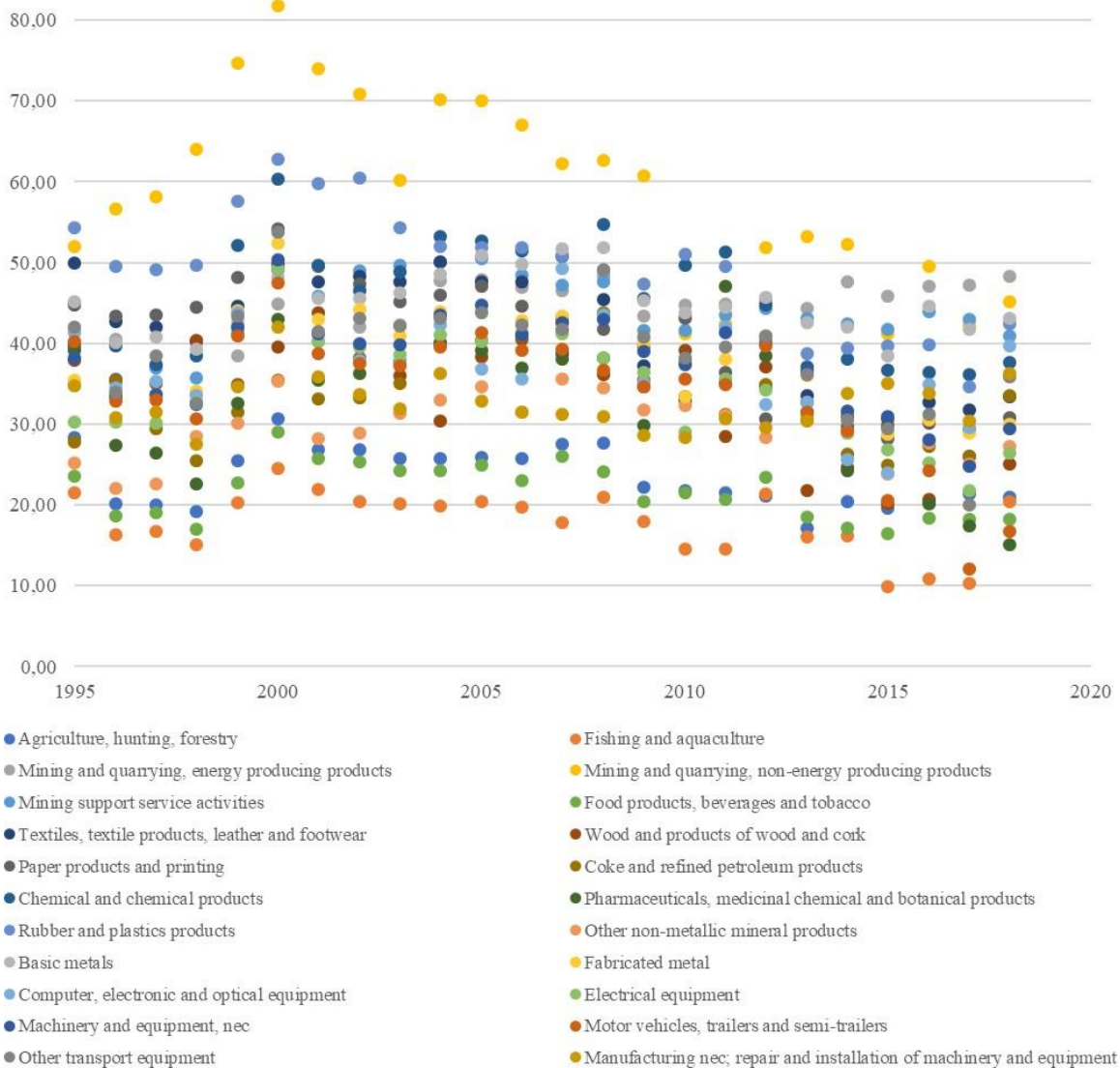


Figure 1 – Participation of Kazakhstan in GVCs by industry
 Source: compiled by authors based on the source OECD, 2021

Other sectors, such as agriculture, forestry and the food industry, tend to be the least active in GVCs, with averages of no more than 20%. The overall participation of Kazakhstan's sectors in the GVC increased by 2000, and after that it had a negative trend (Figure 2). Therefore, country started actively apply industrial development state programmes for economic diversification and export promotion.

Scholars reveal that agriculture sector of Kazakhstan is highly involved in production and internal supply (Anderson et al., 2018). While oil

and gas, mining products generally exported in raw mode, products of agriculture sector get through more value-added process. The industrialization policies and state documents resulted in modernization of flour mills, new oil refinery factories and milk farms which affected to increased food manufacturing.

Although oil products and metallurgy take up the major share in export for Kazakhstan, food products are considered to be a quite competitive in global scale with a potential to growth (Arenas & Izvorski, 2020:17).

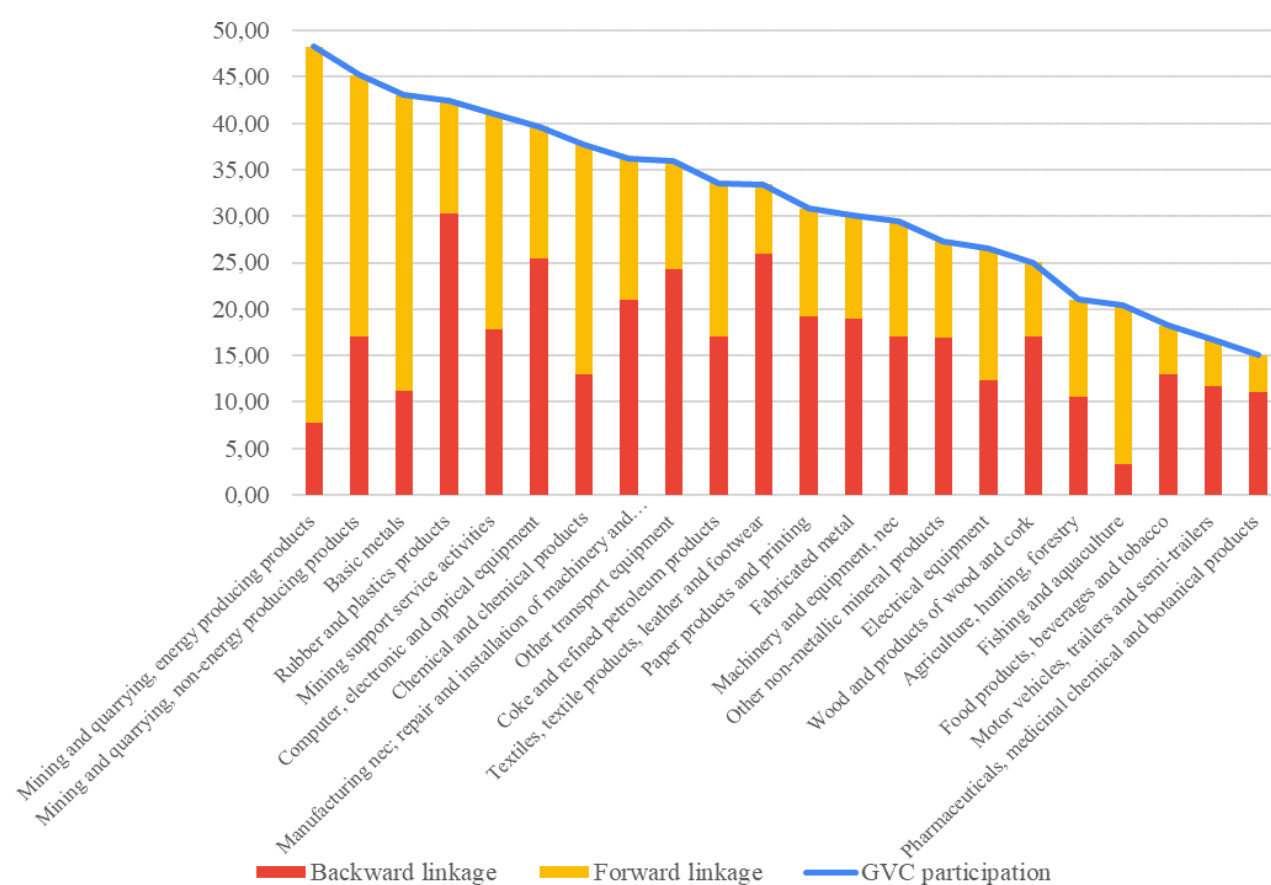


Figure 2 – Participation in GVCs by industry in 2018
Source: compiled by authors based on the source OECD, 2021

Analysis of the latest available data, at the end of 2018, illustrated that Kazakhstan actively participated as a supplier of raw materials for minerals, mining and metals with forward participation rates of 40.5%, 28.1% and 31.9%, respectively (Figure 3). At the same time, the backward participation rates for rubber and plastic

products (30.3%), computer and electronic equipment (25.5%), transport equipment (24.3%) and textiles (26%) markedly exceed those of forward participation in the same industries. This indicates a high share of the cost of imported components in the structure of the cost of exports by these sectors.

Industrialization process results in not only with the positive effect on production, but also increase of import for manufacturing higher added value products. Despite the vast mineral resources, when it comes to intermediate products and components, Kazakhstan is currently dependent from overseas import. This is applicable for machine building industries, textile production and plastic products.

The backward participation rates of some sectors decreased significantly from 2000 to 2018. A downward trend can be seen in the automotive, paper products, textiles and pharmaceuticals sectors (Figure 4). The share of backward participation decreased on average from 35-40% to less than 20%.

One of the industries in Kazakhstan that is actively participating in the global value chain with

a rate of more than 40% is the base metals sector (Figure 5).

As calculations of forward participation show, domestic metal is mainly exported as a raw material and intermediate product to third countries, which is further processed and exported from these countries. Thus, it can be assumed that Kazakhstan could potentially organize the production of components with a high share of raw materials in their cost. Access to the necessary infrastructure and a large volume of raw materials opens up opportunities for the production of more complex products and metal products.

In particular, in the export structure of Kazakhstan, unprocessed copper and copper ores are the most exported along with oil and gas raw materials (Table 2).

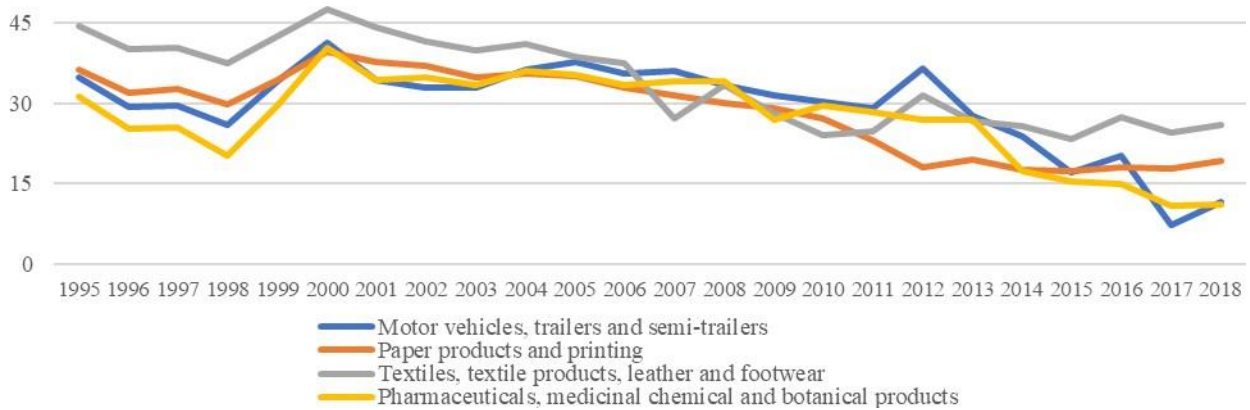


Figure 3 – Backward participation of some sectors of Kazakhstan
Source: compiled by authors based on the source OECD, 2021

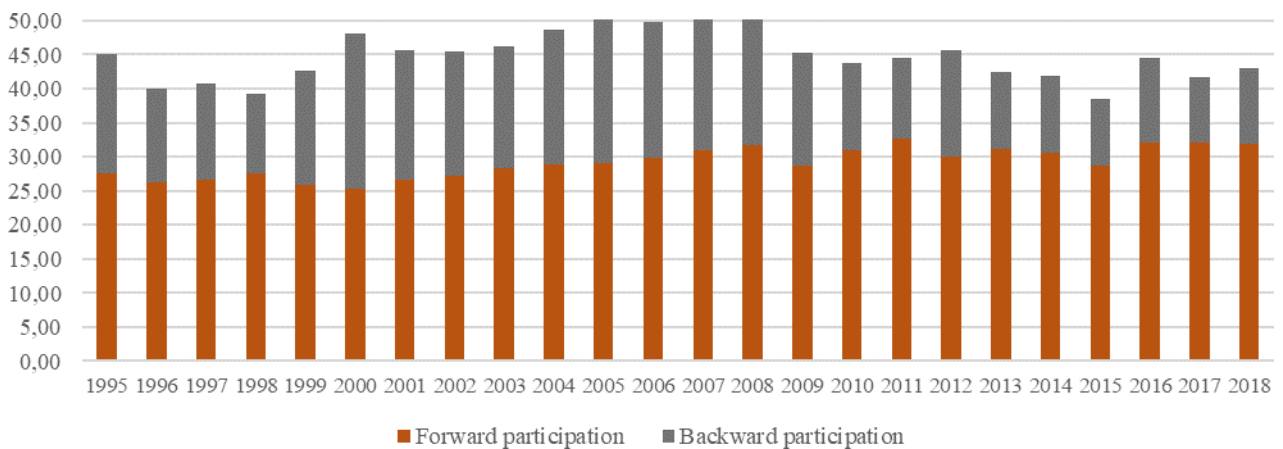


Figure 4 – Participation of Kazakhstan in the GVC in the field of base metals
Source: compiled by authors based on the source OECD, 2021

Table 2 – Top 7 exported goods of Kazakhstan

Million US dollars	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
All goods	88 107	92 281	84 698	79 458	45 955	36 775	48 342	60 956	57 722	46 949	60 321
Petroleum oils and oils derived from bituminous minerals, crude	55 174	56 442	57 249	53 626	26 773	19 378	26 584	37 796	33 563	23 703	31 089
Refined copper and unwrought copper alloys	2 874	3 427	2 693	1 711	1 919	1 824	2 342	2 429	2 506	2 720	3 260
Petroleum gas and other hydrocarbons	3 820	3 619	3 384	3 296	2 384	1 738	2 263	3 012	3 459	2 468	2 106
Radioactive chemical elements and isotopes	2 164	2 752	2 332	2 082	2 347	1 771	1 442	1 345	1 549	1 718	1 764
Ferroalloys	3 370	3 893	1 722	1 839	1 357	1 400	2 205	2 203	1 883	1 657	2 279
Copper ores and concentrates	880	818	587	825	310	444	1 080	1 185	1 153	1 462	1 606
Wheat and meslin	609	1 599	1 253	960	688	685	660	965	1 003	1 137	1 425

Source: compiled by the authors based on the source ITC Trademap (2023)

Kazakhstan has the necessary raw material base for melting and milling of copper products. The cost of labor and electricity in Kazakhstan is significantly lower than current high value-added copper producers, so higher value-added commodities could potentially be considered for copper products (Tables 3 and 4).

According to reports, the country strives to establish manufacturing sites for copper processing. An array of projects has been formed, which will increase the in-depth processing of raw materials and the production of finished products. It is planned by 2029 to increase the domestic processing of aluminum by five times and copper - by 13 times.

Moreover, Kazakhstan imports processed lead products. Wire rod has the greatest potential in the copper industry, its imports to Kazakhstan amounted to \$30 million in 2022. It is followed by fittings, pipes and tubes, plates, sheets, strips and

strips, bars and profiles. Therefore, a creation of value chain allows not only increase the export of processed goods, but also provide import substitution.

The estimation of the value chain in Table 3 can reveal opportunities for vertical integration. Kazakhstan can explore the possibility of integrating various stages of the value chain, from copper mining to refining and processing, thereby optimizing operational efficiency and reducing dependency on external sources. The significantly lower costs of labor and electricity in Kazakhstan as shown in Table 4 present a strategic advantage that could potentially be leveraged to explore and develop higher value-added copper products.

Thus, by observing the copper production chain, it is apparent that the production of semi-finished products significantly increases the value added of products.

Table 3 – Estimation of main processes in the value chain of copper products in Kazakhstan

	Mining	Enrichment	Smelting	Electrolytic refining	Melting and milling	Production of semi-finished products
Final product	Copper ore (2603)	Copper concentrate (2603)	Copper anodes (7402)	Refined copper and copper alloys (7403)	Alloys (7405) Powders (7406) Bars (7407) Wire (7408) Plates (7409) Foil (7410)	Pipes (7411) Pipe Fittings (7412) Cables (7413) Nails and buttons (7415)
Key competitive factors	Availability of raw material base The quality of materials and its structure Competitive EXW value	Availability of stable ore (by quality) Stable factory load	Access to raw materials Vertical integration into the electrolytic refiner. Cost of electricity	Access to raw materials Cost of electricity	Access to raw materials Competitiveness of labor costs and electricity Proximity of sales markets Production scale	Access to raw materials Competitiveness of labor and electricity costs Proximity of sales markets Production scale
VAI*	100	~290	~347	~375	~450-600	~480-1000

*Value Added Index was calculated as the ratio of the specific export value of a ton of goods from higher processing to copper ore and concentrate (2603)
Source: compiled by the author based on the source ITC Trademap (2023)_

Table 4 – The largest exporters of the commodity group (HS codes 7405, 7406, 7407, 7408, 7409, 7411, 7412, 7413)

Exporters	Export value in 2019 (USD million)	Export value in 2020 (USD million)	Export value in 2021 (USD million)	Average salary per month, USD	Electricity cost, USD cents per kilowatt-hour
Germany	5 730	5 745	8 435	4 000	25,6
Japan	2 886	3 030	4 426	2 657	23,7
Taiwan	2 856	2 816	3 905	1 029	11,7
Korea	2 152	2 146	3 191	3 497	11,4
China	1 688	1 858	3 115	1 318	12,8
Kazakhstan	29	27	23	589	4,4

Source: compiled by the author based on the source ITC TradeMap (2023)

Kazakhstan should actively participate in global value chains and move away from the role of a source of raw materials for manufacturing links, with the transition to the manufacturing industry using innovative technologies. While this study analyzed the position of Kazakhstan's industry in GVC and estimated the opportunities of adding value in copper production, further rigorous studies are required to investigate a potential to GVC integration as a manufacturing site.

Conclusion

The presence of rich mineral resources has been a competitive advantage and made

Kazakhstan a supplier of raw material in a high volume to foreign countries for further processing and manufacturing finished products. This resulted in the country's export prevailed by raw materials and a high-share of end-user products in import for covering the demand.

Literature review revealed the increasing importance of GVC participation within the globalization era. Economic stability and trade perspectives are quite correlated with the level of GVC participation. While key studies highlight a critical importance of processed export and GVC integration, few resources reveal the current state of value chain participation of Kazakhstan. Scholars emphasize a current high-share forward

participation of Kazakhstan, with the positive implications in case of strengthening backward integration.

The significance of the current study is that it applied internationally approved method to depict the GVC participation as the degree of involvement of Kazakhstani goods in the production chains at foreign enterprises. The GVC participation dynamics for Kazakhstan shows the highest intensity of GVC participation in 2004-2008, when the total participation in GVCs was over 45% and the backward participation reached 20%.

The share of imported intermediate goods in a gross export of the country equals to 9,7% - coefficient of backward GVC participation. In average, globally, that coefficient equals to 19% whereas in Asian region 24%. The GVC participation of Kazakhstan mainly concentrated in raw materials supply for foreign countries' export as a forward GVC linkage is a relatively high comprising 40,5%, 28,1% and 31,9% for mining and quarrying, basic metals sectors accordingly.

The active engagement in traditional sectors, characterized by a high forward participation rate of 30%, underscores Kazakhstan's position as a source of raw materials for the processing units of other nations. This aligns with concerns expressed by scholars regarding the country's economic dependence on the commodity sector, emphasizing the critical importance of export diversification.

Notably, sectors like agriculture, forestry, and the food industry exhibit lower GVC participation, prompting the implementation of industrial development state programs to foster economic diversification and export promotion. The modernization of flour mills, oil refinery factories, and milk farms has resulted in increased food manufacturing, indicating potential growth in this competitive global sector. Despite oil and gas dominating Kazakhstan's exports, the analysis reveals the competitive potential of the country's food products on a global scale. The latest data from 2018 emphasizes Kazakhstan's active role as a supplier of raw materials in minerals, mining, and metals, with varying backward participation rates in different industries. The decrease in backward participation rates for certain sectors, such as automotive, paper products, textiles, and pharmaceuticals, suggests a shift in the structure of exports, with a decline in the share of imported

components. The base metals sector stands out as a notable participant in the global value chain, with a rate exceeding 40%. The calculation of forward participation indicates that domestic metal is primarily exported as raw material and intermediate products to third countries, potentially positioning Kazakhstan to organize the production of components with a high share of raw materials in their cost. This suggests that Kazakhstan, with its access to necessary infrastructure and abundant raw materials, has the potential to diversify its production into more complex metal products. Overall, the analysis highlights both the challenges and opportunities for Kazakhstan in optimizing its position within the global value chain.

From the practical perspective, considering a high degree of forward GVC integration for Kazakhstan in base metals sector, authors estimated the possibility of processing unprocessed copper in Kazakhstan and exporting it in a more value-added way.

Recommendations of this study include implementation of comprehensive policies aimed at diversifying the export base by encouraging the growth of non-traditional sectors based on GVC analysis, promotion industries with the potential to add significant value to products, developing strategies to reduce dependency on overseas imports for intermediate products. State programmes should contribute and create opportunities for fostering partnerships with global manufacturers, encouraging the transfer of technology and knowledge to build a more sophisticated industrial base. This could involve targeted incentives, subsidies, and support for industries with growth potential.

By adopting these recommendations and conducting further studies in GVC analysis for products and industries, Kazakhstan can strategically position itself to move beyond its historical role as a supplier of raw materials and actively participate in GVCs as a manufacturing hub, fostering economic diversification and sustainable growth.

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