UNIVERSITY COLLEGE LONDON
School of Slavonic and East European Studies

CHARLES UNIVERSITY
Faculty of Social Sciences

Chuanli Xun

The Transformation of Russian Industrial Structure

Master's Thesis

Supervisor: Research Associate Karel Svoboda (PhD)

Prague, Czech Republic
1 August 2022

The thesis conforms to the requirements for a Master's thesis

.....(signature of the supervisor and date)

Admitted for the defence .....(date)

Head of Chair: .....(name, signature and date)

Chairman of the Defence Committee .....(signature)

The thesis is 20672 words in length.
All works and major viewpoints of the other authors, data from other sources of literature and elsewhere used for writing this paper have been referenced.

UCL Student number: 18151316
Charles University Student number: 92234181

. .....(signature of the author and date)

Student's signature

Table of Contents

ABSTRACT

Over the three decades, the Russian Federation government introduced a string of industrial policies responsible for industrial structure change from a planned state-run economy to the market-based one and the return of command control structures under President Putin. It grew out into four phases of economic growth from 1991 – the post-communist decline between 1991 and 1999, the reconstructive phase between 2000 and 2007, the recession between 2008 and 2010, and the stagnation phase from 2010 to the present (Mau, 2016; Ahrend and Tompson, 2005; Aris and Tkachev, 2019). Consequently, this study investigates Russia's industrial structure transformation through these four phases of economic growth. While the Russian government implemented industrial policies annually for short, medium and long-term development, the four phases of economic changes domicile their impacts. In this respect, the study will compare the shifts in industrial structures during these four phases of Russian economic growth by comparing their industrial structure upgrade index.

In this respect, the study focuses on realising Russia's structural adjustments together with transformation methods over the three decades of its existence. It includes showing how the Russian economy experienced growth (exponential, slow, retarded) over its four phases of economic development. It highlighted when it experienced difficulties in its adjustments and the impact of industrial policy on stimulating structural change. In the evaluation, the study expects to reveal changes in features that impact economic growth, quality, momentum, structure, wealth distribution, and institutional environment. Over the four phases, Russia's economic growth, decline, and retardation have occurred. Evidence from existing studies explains the structural change theory that economic development happens with industrial improvement and structural optimisation. It inspires the research about how Russia experienced industrial structural change over the four phases of its economic growth. In the process, the study evaluates how supply-side and demand-side determinants and mechanisms of industrial change suggested by Xiao, Pan, and Liu (2018) impacted Russian industrial structure change over the four phases.

In exploring the transformation of the Russian industrial structure, the study improves on evidence from existing studies. From existing studies (Aris et al., 2019; Savona et al., 2005; Warwick, 2013), structural transformation explored is the interrelated process of industrial structural change that comes with economic development. To existing studies (Song et al., 2013;

Zhang et al., 2022; Han et al., 2017), structural transformation is the change in the structural composition of the economy defined by an increase in the share of non-agricultural sectors, while that of agriculture decrease. Another aspect is that the sectoral shift reflects in the patterns of employment – the level of the workforce engaged in non-agricultural sectors increases while those in agricultural ones decrease. The structural change also occurs with the redistribution of labour between rural and urban areas. It also causes an increase in the capital-labour ratio employed in non-agricultural sectors and a decrease in the agricultural ones. Given the above understanding, the study evaluates how the Russian industrial structure transforms in the four economic growth phases.

However, these evaluations in existing studies are a shallow and traditional exploration of industrial structure, as Chen and Xie (2019) suggested. In specific further developments, the study checks the influence of industry policy on industrial structure composition in its three levels – primary, secondary, and tertiary. It requires a detailed investigation of determinants responsible for industrial structure change; the study classifies them under demand-side and supply-side factors. In the process, the study shows the trade-off between factors for Russia to realise a particular industrial structure transformation. As a net contribution from determinants of industrial structure drives advances in industrial structure, the study evaluates the determinant of Russia's federation industrial structure transformation for the four phases of economic development in supply-side and demand-side classes. On the demand side, the factors considered touch consumption demand, investment demand, and export demand. In contrast, on the supply side, they include those touching technology supply, labour supply, and institutional supply.

Chapter 1: Introduction

Background

Over the last three decades, the Russian industrial structure underwent significant changes as the state implemented different industrial policies to support the transition from a planned state-run economy to the market-based one and the return of command control structures under President Putin (Simachev and Kuzyk, 2018). The changes inspired Russia's gross domestic product (GDP) growth from 516.81 billion dollars to 1483.50 billion dollars in 2020, as confirmed by the rise of GDP per capita from $3,493 in 1990 to $10,127 in 2020, which was about a threefold increase

over the three decades, maintained an annual average increase at 1.14 per cent growth. In the process, Russia managed to upgrade its industrial structure significantly from having employed 14% in agriculture (The World Bank, 2022a), 40% in manufacturing (The World Bank, 2022c), and 46% in service sectors (The World Bank, 2022b) in 1990 to 5.83% in agriculture (The World Bank, 2022a), 26.79% in manufacturing (The World Bank, 2022c), and 67.38% in service sectors (The World Bank, 2022b) by 2020. It reveals that the industry policy moved the economy toward the tertiary (service) sector, becoming the vital sector for employment by 2020, exceeding a 60% change in structure. The above adjustment of Russia's industry structure change is consistent with the recommendations in existing studies (Greenwald and Stiglitz, 2013; Chen and Xie, 2019) that a model of industrial optimisation in a country supports the movement of employment from the primary sector to the manufacturing industry and eventually to the service sector. It matches how the government creates more value and improves its industrial structure by shifting from labour-intensive activities to capital-intensive and intensive technology use.

Inspired by the new Russian Federation after the collapse of the Soviet Union by the shortcomings of the planned state running of the economy, different Russian governments instituted industrial policies to move the country forward (Simachev and Kuzyk, 2018). Because of industrial policy implemented annually, Russia managed through four phases of economic growth from 1991 – the post-communist decline between 1991 and 1999, the reconstructive phase between 2000 and 2007, the recession between 2008 and 2010, and the stagnation phase from 2010 to the present (Mau, 2016; Ahrend and Tompson, 2005; Aris and Tkachev, 2019). In these four economic phases of industrial changes, Russia experienced changing interior trends (changes in labour force concentrated in primary, secondary, and tertiary industries) despite the external pressures (competitiveness from emerging markets, sanctions) that caused different reactions and adjustments in numerous sectors. In this sense, Russia's administrations support the structural economics that has government-driven interventions in the market economy, giving judicious guidance assisting in solving external issues that businesses face in their industrial upgrades and coordinating infrastructural investments that the internal enterprise decision-making capacities cannot solve (responsible of economic growth and causing industrial structure changes) (Chen and Xie, 2019). It explains why the industrial policy is essential for the Russian government to guide its economy towards development. The execution of industry policy by the government met

Alcorta, Haraguchi, and Rezonja's (2013) observation that industry policy implemented by the government focuses on intervening during resources allocation, distribution of benefits, limiting or initiating businesses behaviours and determining the direction of industrial development. Based on these findings, the study aims to evaluate the impact of industrial policy by the Russian government from 1991 to 2020 on changing industrial structure. Specifically, the study furthers the micro-level measurement of industry policy and structure change modelled by Chen and Xie (2019) through understanding by Xiao, Pan, and Liu (2018) that revealed the ways it employs the demand-side and supply-side determinants mix of industrial structure.

The demand-side and supply-side determinants of industrial structure change reveal the competing interests created by industry policies that determine the direction of change in a country (Gabardoa, Porcileb, and Pereimac, 2018). It is a further development from theories raised by van der Linden and Dietzenbacher (2000) and Savona and Lorentz (2005) about input and output determinants of structural changes. Based on fiscal and economic variables, the demand-side factors define consumption demand, investment demand, and export demand, whereas the supply-side consist of technology supply, labour supply, and institutional supply (Xiao, Pan, and Liu, 2018). When an industry policy by the government focuses more on the supply-side of determinants, the structural change moves towards them just like it does on the demand side when the focus is on it more. However, it does not mean that the supply-side or demand-side is better than the other in optimising a country's industry structure. It is the attainment of the right balance given the prevailing pressures from external and internal pressures that moves industry structure (Swiecki, 2017). In this sense, the study explains how demand-side and supply-side came into play during the four Russian economic phases between 1991 and 2020 to drive industrial structure transformation.

Statement of Problem

Just like other industrial countries, Russia has been experiencing far-reaching industrial structure changes in its economy. Like many developed and developing countries, Russia has been responding with the cure that work to best based on their historic impact – radical policies supporting its market competition. However, the outcome on industrial change has had different

reactions that scholars cannot avoid but wonder the direction of the significant industrial structural change in Russia over the three decades.

In recent years, several studies (Greenwald et al., 2013; Chen et al., 2019; Ahrend et al., 2005; Alcorta et al., 2013) have decent information about the industrial transformation of different countries. They give valuable insights into the role of industrial policy in industrial transformation and supply-side and demand-side determinants of structural change. However, little evidence exists (Simachev et al., 2018) concerning Russian Federation's industrial structure shift from its emergence in 1991 to the present or focused on one or several economic phases the country has undergone marketing its different industrial transformations. Moreover, most studies (Han et al., 2017; Zhang et al., 2022; Chen et al., 2019) on industry policy takes a detailed look at strategy, objective, and impact in a qualitative manner. Developing from the few (Xiao, Pan, and Liu, 2018; Han, Huang, and Wang, 2017; Zhang, Wang, and Zong, 2022; Chen and Xie, 2019) that sought the effect of industrial policy in a quantitative framework, the study employs financial and fiscal tools attached to industry policy to determine industrial policy.

Evidence from existing studies about industry policy in pushing for industrial structure transformation has mixed outcomes. A quantitative analysis of the impact of industry policy done by Xu (2006) and Baldwin (1969) focuses on trade protection policy's influence on infant industry protection. They show that it does not better the performance of the infant industry – a suggestion that infant industry theory under industry policy is not verified. Another evaluation of tax incentives, offering subsidies, and industrial protection as the variables of industry policy by Beason and Weinstein (1996) and Harrison and Rodríguez-Clare (2010) revealed that total productivity did not improve with industry policy. Aghion et al. (2012) study observed that industry policy improved net entry of companies, investment, and employment, yet it did not impact the total factor productivity. Songand Wang's (2013) study of three five-year plans representing important industrial policy showed that industrial policy improves overall productivity. An exploration by Criscuolo et al. (2012) focused on industrial policies in ways to employ tax incentives, research & development subsidies, and government subsidies. The emphasis was on competition and innovation scale theories that focused on understanding industry policy on total factor productivity. The outcome of the study emphasised that the industrial policies that promoted competition were better for supporting total factor productivity. When evaluating

whether industrial policies promote innovation, Oughton, Landabaso, and Morgan (2002) discovered that it results in more patents. Yet, most companies focus on getting more quantity from innovation than they do on quality. Zhang, Wang, and Zong (2022) and Han, Huang, and Wang (2017) studied Chinese industrial policy in their numbers and regulations, revealing that they promoted industrial structure transformation. From the above evidence, the existing literature provides detailed discussions and empirical determinations of the impacts of industrial policy on industrial structure transformation.

However, a few studies (Han, Huang, and Wang, 2017; Zhang, Wang, and Zong, 2022; Chen and Xie, 2019) focus on measuring the industry policies at the micro-level. They reveal their transformation in industrial structure and their impact on economic growth. They also affirm that industrial policy is an essential tool that governments engage to accelerate structural transformation, drive economic growth, and optimise efficiency. It is a gap that studies have not considered with details on how industrial policies affect monetary and fiscal measures in Russia. Exploring how industrial policy can result in industrial structure transformation to promote economic growth through fiscal measures reveals industrial structure transformation caused by the industrial policy in more specific and practical ways.

When the study determines the industrial policy impact at micro-level, it contributes to emerging studies that focus on how industry policy contributes to industrial structure transformation at micro-levels. In particular, the study borrows micro-levels investigation and their contribution to industrial structure transformation from Xiao, Pan, and Liu (2018); Han, Huang, and Wang (2017); Zhang, Wang, and Zong (2022); Chen and Xie, (2019) quantitative evaluation of industry policy and their micro-level impact. When measuring the micro-level industry policy effect, there is a clearer picture and depth in the quantitative movement of industrial structure from the industrial policy. As a highly objective foundation of government designing industrial policy, the study can relate to what the governments focus on in their policy execution. The study also engages the findings by Xiao, Pan, and Liu (2018) and Gabardoa, Porcileb, and Pereimac (2018) that classes the micro-levels as supply-side or demand-side, thus setting for a trade-off in the impact of industrial policy on the industrial structure transformation. By bringing the two contradictory and competing aspects of industrial policy in classifying them as demand-side or supply-side, the study allows micro-level determinants of structural change to contribute negatively or positively. Unlike

Han, Huang, and Wang (2017) and Zhang, Wang, and Zong (2022), this study evaluates the micro-level at Russia's national level rather than the ways scholars studied them at Chinese provincial and cities levels, respectively. In this process, the paper fulfils the gap in the study that no evidence suggests that scholars applied micro-level measures to determine the industrial structure transformation in Russia and set an opportunity for future researchers to explore it at levels of Russian cities and other administrative structures.

The study also fills the gap that a country undergoes different economic phases over the years from implementing various industrial policies. Instead, the study intends to meet the gap in studies that economic phases are the outcome of industrial structure transformation, a field with inconclusive exploration by other researchers. By the evaluation, the study shows that Russia's four economic phases between 1991 and 2020 did not just happen; industrial policy influence at the micro-level impacted structural change.

Research Aim and Objective

The study aims to evaluate the transformation of the Russian industrial structure over three decades. The researcher answers the following questions.

i. How has Russia's industrial policy influenced structure change over the last three decades? Did it affect the four economic phases Russia experienced in this period?
ii. Are the four economic phases experienced in Russia between 1991 and 2020 related to industrial structure change in the country?
iii. Are micro-level measures changing between the four economic phases experienced in Russia between 1991 and 2020?
iv. What are the trade-offs between supply-side and demand-side fiscal (micro-level) measures in the four economic phases that Russia experienced between 1991 and 2020?

The study realises its aim when answering the questions by attaining the following objectives.

i. Dividing the three decades into four phases defining Russia's economic growth
ii. Compare the industrial structure upgrade index for the four economic phases
iii. Compare shifts in supply-side over the four phases by three sectors

iv. Compare changes in demand-side over the four phases by three sectors

v. An empirical study of Russia's industrial structure transformation

Research Outline

The rest of this research has the following sections. Chapter 2: reviews existing literature about different indexes measuring industrial policy, industrial structure transformation, micro-level (fiscal) quantitative measure of structure change, Russia's industrial policy from 1991 to 2020, Russia's four economic phases, and conceptual framework. Chapter 3: discusses the research design, method, data sources, theoretical analysis and hypothesis development, research model specification, and ethical considerations. Chapter 4 presents findings from a descriptive analysis of the industrial policy index and supply-side and demand-side micro-level measures based on the four of Russia's economic phases. It also offers an empirical discussion about basic regression and heterogeneity tests, among other detailed statistical analyses of the relationships between industry policy index over the four economic phases and supply-side and demand-side micro-level measures based on the four of Russia's economic stages.

Chapter 2: Literature Review

2.1 Introduction

The following chapter reviews evidence about structural change related to the topic of study. It engages evidence from articles about Russia and those of other countries analyzing the ways industrial policies cause structural change. The measure of structural change, reflected in economic change, the insights evaluated involves fiscal or micro-level determinants of economic change, that reveals structural change. Another focus of the existing studies provided in the study involves quantification of the industry policy for numerical determination of its impact and inclusion of its influence into the empirical evidence. By evaluating these aspects from existing studies, the outcome is the conceptual framework explaining the gap filled during this study.

2.2 Russia's Industrial Policies and Economic Phases

From 1990s to present, Russian government instituted industry policies and improved them for economic reforms and improve economic performance. From 1991, Russia economic growth has undergone four important phases: it experienced post-communist decline between 1991 and 1999, reconstruction phased happened between 2000 and 2007, it suffered recession between 2008 and 2012, and entered stagnation phase from 2013 to present. Despite these four economic phases, Russia economy was turbulent based on its unique challenges that government instituted different industrial policy to steady it. Based on these four economic phases that show Russia's economy at different experience and the feel of industrial policy to steady economy, the study argues that there was connection between industrial policies government instituted, economic performance, and resultant structure change. Consequently, the importance of reviewing industrial policies against the economic phase Russia was undergoing.

2.2.1 Post-Communist Decline (1991-1999)

The Russia of 1990s experienced belated structural crisis that occurred in rest of western Europe and USA caused by post-industrial economy. Russia managed to borrow its time from the crisis experienced in the developed world by instituting high commodity revenues in 1970s. The experience was its failure to escape the post-industrial structure change. The half-hearted reforms

in 1980s targeted to introduce some market efficiencies but ended up worsening the situation by undermining the foundational in the traditional structures and disciplines associated with the command economy without setting anything effective for their replacement. The crisis also worsened from country's transition from communist Soviet Union set up. Russia adopted the Washington suggested consensus style polices for market liberalization, privatization, and macro-economic stabilization. Finally, the issues emerged associated with the important politico-economic transformation that happened caused by settings of a collapsed state. The collapsed state could not collect taxes or control its spending, the hiking inflation demonetized economy, and the monetary policies reduced to political instrument of printing press.

The outcome was an economy on free-fall, marked by GDP dropping between 8% and 17% caused by political circumstances and chaotic economic conditions. The rising subsidies were backing the controlled prices, declining production, and collapsing tax discipline that caused 16% budget deficit (solved by printing more money), ballooning money supply, and rendering final wreck to remaining price controls. With authorities lesser receptive of price liberalization, wholesale prices inflated by 131% where for retail rose by 90% with food prices jumping by 112%. The double impact of price-controls and monetary incontinence resulted in high inflation that came with shortages generated price controls. Equally, the exports fell by 40% and imports by 80% with external debt rising by 556% reached $67 billion of Ruble GDP at market exchange rate and foreign reserves declined to $60 million. In this framework, Russia felt into trap of inability to service its debt until it restructured its economy.

Faced with these challenges, the government adopted a big-bang implementation of economic transformation that included rapid implementation of trade and price liberalization and extensive privitisation. It was the right framework given central authority and its associated institutions were not manageable. The framework of fixed prices was in ruins and impossible to execute price controls to guarantee sufficient supplies and sufficient levels that would make the system credible. About 80% of wholesale or producers and 90% of retail were set free except for those supplying food, raw materials and supporting exploitive industry. Another thing is that state conducted external liberalization that included abolishing state foreign trade monopoly and the quantitative control of imports. Government conducted drastic reductions in their spending on defense procurements. Fiscal tightening through tight monetary policies occurred through relative price

adjustments caused by trade liberalization and excess liquid in markets absorbed to stabilize prices at new levels.

In the end, Russia attempted a post-communist economic transformation through industry policy largely failed to realize expected reforms. According to Aliaskarova, Pashkus, and Blagikh, (2020), the reforms were fast, radical and 'shock therapy' being neo-liberal, privitisation, and monetarism. Ahrend and Tompson (2005) argue that several financial collapse over 1991 – 1999 affirms that the reforms were slow and partial. Instead, Russia being pervasive, had corruption and rent seeking thriving. The impact of reforms ensured a few people became extremely rich on the partial reforms that they can influence politicians and government officials. Aris and Tkachev (2019) argues that the failures came from extraordinary rent-seeking by established corporate managers through exports, subsidizing credits, direct government subsidies, and import subsidies, which ensured government gained little from the implemented policies (privatization, market liberation, macro-economic stabilization). The huge market distortions coupled with unconstrained economic elite ensured government was in hand of rich rent seekers and undermined the democracy growth in the country that would ensure policies implemented were success. Even though rent seeking has reduced over time, the Russia government grapples with corruption. Rent seeking has caused financial crisis (like 1998) affected reforms negatively but as it increases in competition there are more limitation to it.

2.2.2 Reconstruction Phase (2000-2007)

After tumultuous period, Russia managed to restore its equilibrium after adopting orthodox macro-economic policies from experience of their use in Latin America. During period between 2000 and 2007, Russia managed to recover and grow its economy at rate between 6% and 7%. It was political and demand stabilization that came with widescale implementation of economic legislative that pushed for reconstruction process.

From 2000 to 2007, the government reconsidered its role, balanced the market assessment, government failures, and intensified focus on the stimulation of innovation through a national system of innovation. The country faced risk of deindustrialization considering companies were moving their supply chains to countries where they benefited from retarded factors (less restrictive

environmental controls, cheap labor, source of raw materials), unfair competition, and weakening economic growth. Under these conditions, the industrial policies executed in period 1991 – 1999 (market programmes like deregulation, privitisation) were no longer causing significant impact on the economic growth. At time like this, evolutionary theory suggested consideration of factors like education, interaction, and acceptance of knowledge, revealed through technology dynamism and contribute to emergence of new technological industries. The growing globalization was weakening the possibility of vertical industry policy and execution of the traditional instruments like subsidies, demands, and tariffs for the local markets. Rather, the increase in focus was implementation of industry policy that considered the compensation for strategic market failures, supporting innovation, and improvement of education.

In this respect, there was active convergence of industrial policies and innovation policies over period 2000 - 2007. They ensured that convergence of industrial policies contributed to horizontal growth while innovation policies caused vertical and specialization, the most important part of industrial policy over this duration. The industrial policies for period 2000 – 2003 pushed the development of market institutions while resulting in structural reforms. They included mild regulation policies touching taxes, tariffs, exchange rates, and natural monopolies with intention of utilizing regenerative growth and budgetary constraints to attain high levels of personification and increase business activities. From 2004 to 2007, the industry policies executed focused on diversification and stimulation of innovation through vertical industry policy, long-term planning, and coming up with development institutions who consideration is substantial budgetary resources that focused on building vertical government control, institutionalization of access, and increasing number of organizations developing industry policy. In the end, the period 2000 – 2007 managed to develop market institutions (attained deregulation and equal competition while it reformed systems of power, administration, tax system, natural monopolies) between 2000 and 2003. It also improved the roles state played in strengthening economy and push for a vertical industrial policy (vertical power structures, remove influence of big businesses on government, targeted project for structure changes, remove budget limitations, extend resource potential of state, stabilized business environment and created long-term growth opportunities) between 2004 and 2007.

2.2.3 Recession (2008-2012)

The global recession impacted Russian economy severely as the economy largely depend on exploitive commodities. It experienced tumbling oil and gas prices, which exposed the structural problem the country adopted for recovery from post-industrial crisis. The policies executed over this period focused on getting Russia from the severe economic crisis. The crisis pushed the state to change from being tactical to strategic in its objectives to extend of implementing manual control and the state reconsidered its development opportunities and priorities for the large-scale reconstruction of economy.

During 2008 -2009 period, Russia implemented highly selective industrial policies that some measures successfully reduced the administrative pressure businesses faced. Other measures had the focus on compensating the economy from recession implications on vulnerable sectors while providing support for the strategic firms. For example, the state had focus on agriculture, housing construction, transportation industry, military industry-complex, and car/farm machinery building. Over crisis time, Russia limited the activities of development institutions in their resources engagement and provided more focus on solving anti-recessionary issues. Some of the inti-recessionary measures forced had considerable derogation from the market principles with various measures connected to the substitution of private demand with public demand, support of sustenance of activities of operationally profitable businesses, protectionism for certain sectors, attempted administrative price controls, redistribution of losses, and limited transparency for the reciprocal obligations of state and private businesses. Some long-term strategies adopted earlier served in the development of sectors like pharmaceuticals and fisheries during crisis time. Some packages adopted included stimulating innovation development to reveal the direction of reducing more state engagement in management of economy. For example, ‘the first session of the committee on modernization and technology development of the economy of Russia’ happened in 2009 with the focus of pushing for strategic technology as priority. The targeted areas were energy efficiency, energy economy, information technology, nuclear technology, telecommunication, space technology, pharmaceutical industry, medicine, and nanotechnology. In the same period, there was development of ‘manual control’ for the economy.

For the period 2010 to 2012, Russia implemented industry policy focused on managing post-crisis learning and implementation of technological industry policy. The lessons Russia took from financial crisis led to the development of specific industry policy ideologies executed over the period 2010 – 2012. From the 'guideline for action of the government of Russia' approved in 2008, the state implemented growth of high-tech and backbone companies and strategies of development in various engineering subsectors. The government actively sought and implemented new instruments of horizontal policy that focused on technological platform development, related grants to stimulate partnerships between companies and universities, creation of innovative trends for the system of procuring for public use, creation and adoption of programs that drive innovation growth for the big state firms and support the creation of region-based innovation clusters. However, they faced the challenge of being seized by the traditional interest groups, obstacles on extension of best practices, and issues of limiting accumulation of critical mass required for stable self-sustaining transformation. The focus was strengthening of technological and innovative direction through industry policy to meet the competitive direction in the global environment. In the end, Russia shifted from vertical sectoral industrial policy to one of technological industry policy that drove the search for new factors to cause economic growth and attract interest groups in field of education, technology, and science.

2.2.4 Stagnation Phase (2013-Present)

From 2013, Russia has not executed innovative and widescale policies with the focus of recovering its economy from the impact of global recession. After more than a decade of recession occurrence, the country grew sluggishly and continues to depend on proceeds from exploitive for funding its economy. From this period, there was implementation of the document 'the strategy for innovation and development of the Russian Federation for the period until 2020'. It marked a new stage for industrial development in Russia at the time the country was experiencing tightening budgetary resource, accumulation of major social commitments, and change of conditions in executing the industry policy after Russia accession to World Trade Organisation (WTO). The period was significant for it was for searching new sources of growth that consisted of various types of industry policies. Its focus included introduction of reindustrialization of the Russian economy, development of new high-tech employment opportunities, and huge growth in business environment. The consideration included the focus on increasing the proportions of items from

knowledge-intensive and high-tech industries and their contribution to the gross domestic products. It was in this period that government distributed the shared responsibility that allowed agencies and ministries monitor indicators on voluntary basis. The transformation of industry structure continued with the adoption of 'development of industry and increase its competitive advantage' that increased the state program number of priorities to 14 put in the classes of sectoral views based on three market structures (traditional industries for products oriented to user demand, traditional industries for products geared towards investment, and new industries). State adopted programs focusing on sectors like electronics and radio industry, aircraft industry, ship building, medical and pharmaceutical industry, and atomic energy. In the period, there was reduction of crisis for there was implementation of different sectoral development strategies. However, the state program did not yield much of anticipated outcomes and served an extra bureaucratic superstructure for different federal government budget expenditures. In the end, there was adoption of action plans for growth in five sectors (biotechnical and genetic engineering, information technology, engineering and industrial design, production of composite materials, optoelectronic technology, and photonics).

Since 2014, the Russian government implemented policies for improving their positions in the international trade while supporting import substitution and promote exports. Russia implemented import-substitution policy from 2014 and generated import-substitution indicators from macro-economics of the industrial sectors. Consequently, it has managed to reduce importation in programming sector by 75 percent by 2020 and for the automatic transmission in automobile industries after 50 percent reduction in the importation of the light engines. By import-substitution policy, Russia manages to create internal capacities to handle aggressive external policies including sanctions by western countries and creates its independence by building internal capacities, improving internal production facilities, advancing technology, and manufacturing of products.

In attaining export promotion objective, Russia continuously implements 'special economic zones' policy that encourage the local and international companies to invest locally and create more local employment opportunities. Russia has actively developed industrial parks through the nation for establishing local agencies to act as private businesses that support the industries, storage, transportation, and administration facilities needed for manufacturing to grow.

Other efforts geared towards substituting the primary sector with secondary and tertiary sectors. The mechanisms included the industrial development fund that support the modernization of manufacturing industries, localization of production, and export in 2014. The 2015 implementation of Russian export center that served the support to non-primary exports and involvement of new companies in foreign trade activities in 2015. The 2016 to 2025 execution of priority of priority project 'system measures for the development of international cooperation and exports' for the creation of a complex of state instruments to support the non-primary exports and develop environment enabling their export activities. Another implementation was the priority project 'international cooperation and export in industry' from 2016 to 2020 caused increase in non-primary exports with the focus on products generated from four pilot industries: automotive industries, agricultural machinery, railway machinery, and aviation in industry. From 2016 to 2020, there was implementation of priority project 'exports of agricultural products' to increase the exports of agricultural products, first – finished goods.

During the duration from 2015 to 2035, the Russian government focused on structural change and formation of new sectors and markets. The focus was the creation of new promising markets and development of advanced technologies and new businesses. By scientific innovation policy, Russia drives industrial transformation by restructuring the industrial structure from military to civilian. In this regard, Russia's 'National Technology Initiative 2014' promoted research and development by encouraging the local scientific, research institutions, and private firms to create local technologies and innovation that matches the ones imported while at the same time the country strengthened multilateral and bilateral cooperation with several countries to improve their R&D facilities. It was a program promoting digital economy in the Russian Federation from 2017 to 2024; its effort created conditions accelerating digital transformation of economy, increasing efficiency, and lowering the barriers to the creation of new sectors.

In Russia development of science and technology, there were efforts to progress 2013 program (Russian Science Foundation) that supported the basic research, research training, and improvement of research teams to occupy the leading positions in specific important science fields. Scientific and technology development strategy of Russian federation over 206 to 2035 served to offer leadership in chosen scientific and technological development fields for existing and new

markets to impact technology, products, and services – developing an integrated national innovation system.

Some measures implemented focused on improving efficiency and innovation and supporting fast-growing firms. The 2017 to 2025 priority program ‘improving labor productivity and supporting employment’ focused on the increase in labor productivity mainly originating from organizational innovation and training: reduction in administrative barriers. For the priority project ‘support of private high-tech leading companies (national champions)’ executed between 2016 and 2020, it ensured there was outstripping growth in private high-tech export-oriented companies that formed on their basis Russian-based TNCs.

Other measures executed sought to develop human capital. For project 5 – 100 between 2012 and 2020, there was implementation of the action plan for the development of leading universities. It increased competitiveness in the leading Russian universities in global scope in the leading fields of research and educational centers. It ensured by 2020, there entrance of at least five Russian universities in list of top 100 world leading, based on world university ranking. In follow up policy, the 2016 – 2025 priority project ‘universities as centers of innovation creation center’ ensured sustainable global competitiveness for about 10 leading Russian university by 2025. It was achievable through developing 100 universities centers of innovation, technology, and social development across regions by 2025. Another running between 2016 and 2025 is the priority project ‘modern digital educational environment’ that created conditions for systemic quality improvement and expansion of chances for continuing education in all categories of citizens by developing the Russian digital educational space. The 2016 – 2020 priority project ‘workforce for advanced technologies’ develop a competitive system of secondary vocational education for offering training to supply highly qualified specialists and workers that serves to match the modern standards and advanced technologies requirements.

2.3 Structural Change Through Industrial Policy

Industrial policies are government-driven efforts to change the economic structure of the economy. On one hand, the standard argument is that efficient markets do not require government to intervene in sectoral allocation of resources or when choosing technique to employ. However,

crisis facing each country and desire to exploit comparative advantage in the nation bring out another argument that market operate inefficiently and without a strong government intervention some firms and industries would suffer without lifelines and eventually perish. It is in this respect that scholars acknowledge pertinence of industrial policies. In this respect, industry policies implementation is moving away from the picking 'winners' versus 'losers' to creating policy mainstream. In Russia's case of conflicting with western developed countries and preferring to work closely with countries considered threat by the western empire, having a responsive industrial policy framework is important to inspire the country growth. With the recognition of market imperfections being widespread in low-income countries, well-developed government policies can result improved economic outcomes. An understanding is that the private sector can contribute to formulating and executing these industrial policies. For most of data significant in making decisions is experienced by companies, there is the need for having structured engagement for close or strategic coordination between the public and private sectors. It helps in designing the most appropriate public actions, which is important in offering effective feedback on policy implementation.

In the following analysis, there is a revelation of different industrial policies implemented by Russian Federation. However, there is limited analysis about the impact on industrial structure they caused in Russia. Nonetheless, these industrial policies execution in other countries can provide an overview of their possible impact to Russia. In this section, the review of existing literature focuses on creating an understanding of what structural change the Russian government might have sought by implementing these policies or revealing that the industry policies cause some economic and industrial structural changes that governments find important.

2.3.1 Competition Policy

The aims of competition policy are ensuring the market practices and strategies do not reduce the consumer welfare. When implemented as industry policy, their aims are to secure the framework conditions and make them favorable to handle industry competitiveness and handle sector-specific production rules in accordance with movements of tax measures and public funds. In this respect, implementation of competition policy is in a way of interacting as an industry policy. It is implementation in a way that competition policy acts as industry policy; competition becomes the

basis for effectively protecting and promoting the execution of competition policy rules. Consequently, it removes market-entry barriers, create innovation incentives for entrants seeking to improve the market positions they hold and better customer basis; it gives incentives to innovate and protect market share from the competitors. By innovation, there are better products in the market offered at competitive prices - for better consumer and producer welfare. It increases capacities through growth-inducing investments. Their execution as industry policies depends on the competitiveness of the markets and serves to promote some levels of competitiveness. By implementing them in vertical manner, they do not offer selective advantage to certain companies. They apply to many companies in the industry without any discrimination that they induce sustainable growth.

2.3.2 Trade liberalization and Foreign Direct Investment

Policies that make a nation's economy open to trade and conduct investment with other countries are suitable for progressive economic growth. Based on evidence, there is no other nation in the latest decades that has achieved economic progression through improving the standards of living considerably without becoming more open to the rest of the countries for trade. For example, opening for trade and foreign direct investment has been instrument for the economic growth of east Asia countries like China and India that have reduced their import tariffs progressively from 30 percent to 10 percent. By opening their economies, these countries have created a competitive advantage in sector of manufacturing. In this respect, they attracted huge number of foreign companies to operate locally and create job opportunities that pulled millions of people out of poverty. Evidence from existing studies suggests that the more-outward nations tend to grow faster and consistently than the ones with an inward-looking concept. Thus, it explains why developing countries that opened for trade liberalization experienced faster growth and reduction of poverty as confirmed by faster growth in countries more receptive of trade liberalization in 1980s and 1990s than those that did not embrace.

Trade liberalization free up trade that benefits the poor. As developing countries cannot afford the largely implicit subsidies that are channeled to reduce the privileged interests offered through trade protection. Furthermore, higher growth resulting from free trade causes an increase in the incomes of the poor in almost equal proportions to the whole population. It creates new jobs for the

unskilled workers that pulls them into the middle class thus reducing the inequality levels in the countries and cause more economic growth.

Trade liberalization also increases the movement of merchandised goods. The industrial countries benefit from trade liberalization by receiving higher number of industrial products whereas the developing nations that liberalizes trade acquires benefits more than double the volume of aids they receive. The percentage of GDP the developing countries gains through liberalization is higher than the one gained to the industrial ones for their economies have more protection and fitted with higher barriers.

From liberalizing markets, the countries acquire new markets in other countries. Yet, they have more benefit in their liberalized markets. The primary sector benefits more from higher demand of raw materials whereas their manufacturing sectors becomes tool for production of wider markets demands. For manufacturing and agricultural sectors are relatively important to developing countries than in industrial ones, they ensure the low-income countries benefits the most from trade liberalization.

2.3.3 Attraction of direct foreign investment

When a country attracts foreign direct investment (FDI), it attracts multinational firms (MNE). MNEs are the main drivers of the global production output (1/5) and global trade (2/3). They drive the private sectors R&D, which is important in developing new technologies. As they bring more productivity levels, they hire local expertise, semi-skilled, and unskilled workers. They bring expatriates who train the local workers on important skills for growth of a country. The firms result in improved aggregate output, better involvement in global production, and drive the expansion of local suppliers. As they work with local companies and conduct operation upgrades, the host country receives benefits that include receiving sophisticated technologies. In this respect, policies attracting more direct foreign investment are beneficial to the developing countries.

2.3.4 Science Policy

The science policy focuses on the production of science knowledge by covering the aspects of public research funds granted in competition, (semi-) public research institutions including

libraries, universities, laboratories, and research centers, covers tax incentives to firms, consider high education, and involves intellectual property. In this respect, the focus on science policy, as an industry policy, is governing roles of public research funding, tax incentives to firms, higher education, role of intellectual property rights relative to access of public knowledge base. Science policy sets the rules and regulations when conducting research, support that ensure scientific investigation are safe, secure, meeting the highest standards of research integrity, and addresses the changing ethical considerations. It is an enabler of science, smoothens road by removing obstacles that delays research advancement and supports the building of new research collaborative frameworks. It steers the science, cultivate burgeoning areas of research, sets up the societal challenge that science must address, or synthesizing the data serving to set research priorities.

2.3.5 Privatization Policy

During 1980s, there was substantial privatization caused by the theoretical developments in economics evidence of state-owned enterprises being inefficient and unresponsive to consumer needs. Privatization took different forms: the outright sale of assets owned by the state to private investors, forming public-private partnership pacts through contracting and franchising. Several studies have suggested that the performance of privatized companies has mixed outcomes; it has caused an improvement in economic gains in some nations but wider governance issues to the political and legal system of other countries, highly disappointing outcomes. It has not always deduced the state interference from management of business and services; rather, corruption and cronyism continue to affect the number of privatizations. State sells-off redistributed wealth and income, which caused gains and loser to different industries. However, its impact on the employment and people working conditions is lesser clear. The impact of privatization on technology and innovation, competitive policy, income distribution, and wealth distribution remain an issue of debate among scholars. There is no clear way of effectively and efficiently managing state-owned companies despite the boundary between private and public sector being fluid for state owned enterprises succeeds when political and economic conditions favor them.

2.3.6 Reindustrialization policy

The reindustrialization policy stimulates an economic growth by government aid in ways that revitalize and modernize the aging industries and drive growth of emerging ones. Some of activities governments engages include improving the share of manufacturing sectors through promoting high tech branches, introduction of special economic zones, clustering of industries, and supporting key enabling technologies driving smart specialization promoted across all levels. When improving the competitiveness of industries at national and international levels, it involves participating in global value chains. Other efforts include improving the financing of the SMEs, upgrading of transport systems, bettering energy sector, improving communication infrastructure, and bettering of services, creating a connection between energy and industry policies, particularly in improving renewable energy sources. Other activities engaged by governments include bettering the governance and coordination across all spheres of governance.

2.3.7 Protection of national sector

One of the important processes followed when implementing public policies to protect national sector involves a country promotion effort substituting imports and promoting exports. The import substitution processes focus on promoting rapid industrialization inspired by creation of high barriers to foreign goods while encouraging the growth of internal production capacities. The import substitution is a package that constitutes of several policies with range of controls, limitations, and prohibitions that determines the import quotas and drive high tariffs on imports. The trade limitations guard the domestic industries to allow them gain comparative advantage while they substitute domestic goods that were formerly acquired through importation. The policies drive growth through the believe that economic growth acceleration can occur from actively directing economic activity in other sectors than agriculture and other resource-based sectors to those of manufacturing. The wide range of quotas, outright prohibitions, and tariffs restrict the imports defined in the import substitution policy, which do not constitute any form of infant industry protection. In infant-industry protection, there is protection for a period after understanding of the expectations that industries and sectors gains some advantages after learning for some periods. For import substitution, it protects all industries indiscriminately, without minding whether they are generating technological externalities or acquire any chance of gaining

competitive efficiency. The advocate of import substitution depends on several factors like sharp reduce in prices of commodities and raw materials. They occur to help government target one or several industries highly suited for local industrialization. The erection of barriers to trade in products for this industry helps encourage more local investment. Later, the government can reduce the barriers as the industries gain more development. With the right protection, the industries continue to thrive even as the government lowers its guards.

In the opposite of import substitution is the export promotion where a government promotes the growth of industries that has capacities to compete with foreign rivals. The aim of export promotion is to trade abroad, create competition, and that remedies the returns of scale. The large objective of to ready the targeted industries to compete with the rivals in the international markets, which make the country protect the countries at their childhood. The exports working against high rivalry betters their technologies and quality making them suited rivals. They research and develop to innovate more than their competitors. The country offers them the local comparative advantage for their specialization in production that engage the local factors of production. In this respect, the structure of the industry serves in harmony with the one for the country. For instance, those countries with comparative advantage in human resources, they employ an export substitution strategy addressing the unemployment challenges. In the end, the impact of the export promotion is the values of exports from a country. When there is increase in export, there is more value in foreign exchange inflows. Nonetheless, it comes with an improvement in import expenditures as there is increase of income of the country that it worsens a nation’s balance of trade.

2.3.8 Diversifying from primary sector

As global economy stagnates, the uncertainty with the future is driving governments to consider diversifying their source of income. The countries that depend on production and export of a low range of products to earn or target a few overseas markets are more uncertain of the change in the markets. Those countries depend on exploitive (minerals), agriculture, basic commodities, and one line of economic growth as dominating their exports are largely poor and are declining sharply in the growth trends. In their miseries, they insist on the importance of diversifying economies for sustained, job intensive, and inclusive growth.

The importance of diversifying the economy is that there are generation of new routes and opportunities for diversifying poor countries even though they face economic problems associated with slugging economy. Diversification offer spatial splitting of production through a wider geographical area that with the emerging and growing regional and global value chains, they provide better ways for developing nations to export services, tasks, and products. The value chains supply developing countries with paths out of the trap of holding onto specialized whole industries, bearing the costs and risks the strategy brings. Even with newer technologies reduce the communication and transport costs, they create huge chances for developing countries to export more services for instance back-office processing. Such expansion increases production base on top of diversifying the employment structure for instance including women and bring the chance to realize productive work.

During commodity boom, countries depend on resources have issues designing and executing public investment policy and their reforms that supply framework for diversification. With high commodity prices, there is overly appreciated exchange rates, which can undermine the competitiveness of probable new export activities. The problems increases when the government cannot the distortions in the market associated with products, services, and factors of production (entrepreneurial or market resources, raw materials, capital, labor). For example, in rent seeking (companies seeking government favors like subsidies) and inadequate transparency can cause instability and internal conflicts as public and private stakeholders compete to share revenues created through resources extraction. In this respect, the government must modify its regulatory mechanisms that moves from rigid tools that governs investment in extractives towards highly flexible methods that push for investments in more wide range of activities. In the end, even though diversification is more significant to countries dependent on minerals and commodity, it is an issue for developing countries who seek to supply high-productivity jobs within the growing workforces.

2.3.9 Public Procurement Policy

When implementing industry policy, governments are considering public procurement policies for their ability to grow innovation. Public procurement is a means of addressing challenges in society and supporting structural transformation. They emphasis on meeting the demands of public sector capabilities and serving the practitioners on ground. The public procurement policy emphasis the

extent that purchasing something new could generate new market, customers, and drive innovation on products or services. By procurement contracts, there is incentive to develop new technologies (for example, field of nanotechnologies) especially for those stakeholders who do not receive government support in their research & development subsidies. It can also legitimize the product standards, develop new markets while expanding the existing ones, and ease the adoption and diffusion of innovation. By accelerating technological developments and adoption, procurement can cause a change in the industrial structure. In this respect, it influences the evolution of the existing and anticipated markets by modifying the composition of competition that it makes them more attractive and highly accessible to new entrants.

By considering public procurement in industry policy, the aspect to influence is at national and subnation levels. A considerable level of public procurement happens at subnational levels, which not only influence the spatial footprint of public demand but also affect the local economy and markets. It also impacts the nature of demand by being closer and more adaptable to end consumers in respect to domains like personal services, education, or transport. Its address can only occur by having public procurement relevant at subnational, national, and global levels. Those policymakers who identifies specific problems or needs can take the route of being lead users that they make their subnational levels fields of changing public procurement into offering solutions framed in context of the problem that policy negotiation result in creative solutions. The procurement policies define the ways to solve the limitations of the small domestic public and private markets as well as the administrative capacity restraints. In doing so, they embedded the local structures (institutions embedding) and conduct their replication into spheres of localities and scaling them into corporate domains and practices, resources, and actors.

2.3.10 Trade Policy

Trade policy serves to make the regulations and policies of a country more transparent. A country or block of countries manages trade with other outside their jurisdiction through trade and investment relations. Trade policy is a set of regulations, agreements, and practices set by governments to affect trade with another country. Each country has responsibility for its standards of trading that include regulations, tariffs, and subsidies. The trade policies of a country affect the international economy and financial markets. They impact the aspects of goods availability,

pricing of goods, and exchange rates. When designed appropriately, trade policies increase or reduce levels of international trade depending on government desires. In the end, they are meant to strengthen the economy of a country. Their targeting can be several things like jobs, tariffs, foreign retaliation, import and exports or they take the focus on setting standards meant to promote collaboration or lower trade barriers, or set trade laws and agreements. As their setting depends on government intentions, the more aggressive protectionist policy design favors the growth of domestic industries than the international ones. In its designing, it includes issues of setting quotas on the number of imports and giving the local producers incentives through subsidies. On the contrary, when a country seeks an open trade policy, it increases its participation in international investment and focus on reducing the barriers of doing international businesses. In most of the countries, their trade policies are with the margins of these two extremes that they keep changing them based on the domestic political pressure and global economy movements.

2.3.11 Innovation and Technology Policy

Technology policy focuses on the advancement and commercialization of sectoral technical knowledge. The instruments of technology policy include public procurement, public aid to strategic sectors, bridging institutions (research world to industry), labor force training and improvements of technical skills, standardization, technological forecasting, and benchmarking industrial sectors. The technical policy is more focused on developing the commercialization stage and associated with sectoral bases for technical knowledge.

On the other hand, the innovation policy focuses on the overall innovation performance of the economy. Its instruments consists of improving individual skills and learning abilities (general education and training of labor), improving organizational performance and learning (quality control, ISO standards), improving access to information (information society), environmental regulations, bioethical regulation, corporate law, competition regulations, consumer protection, improving social capital for regional development (clusters and industrial districts), intellectual benchmarking, intelligent, reflective, and democratic forecasting. The innovation policy appears to the whole performance aspect and links to the set of institutional architecture arrangements operating at that level.

2.3.12 Sustainable growth policy

As industrial policy become a major issue in the industrial nations, there is the push to define the way future industrial global will differ from the past. Some suggestions have been having a green industrial policy for sustainable structural change. Other framework has suggested a pro-market approach to the industrial policy in different economies. In developing sustainable growth policy, suggestion include considering industry policy as state of mind that create a climate of collaboration and cooperation between private and government through the discovery process to generate a positive spillover to other sectors that does not based on pure financial incentives that pick winners. Rather, it needs target activities in the broad sectors, not firms, to promote activities not prevent exit and follow market than leading them. It should prevent lock-in instances that prevent investing in the old technologies. It is a way of preventing 'dirty programs' from generating 'dirty products'. The sustainable industrial processes serve to avoid decisions taken through conserve path dependence tendencies. They should help creating new comparative advantage that support developing countries in diversifying – stimulate more exports without preventing imports. It favors competition than being an adversary. It should not protect non-viable local firms; rather allow them phase out. They should not serve in isolation but merge with innovation policy. It needs to build around and work in the support of education policy. By being systematic, it can push competition through the pull of beyond GDP. Its setting takes the outlook of the future – where economy need be in the next several decades and align with pillars of welfare, capabilities, and competitiveness.

2.4 Economic Determinants of Structural Change

Structural change is the reallocation of labor and resources across agricultural, manufacturing, and service sectors. When growing, economy reallocate labor and other resources including capital out of agriculture into other necessary processes of growth. The cause is the relative inelasticity of per capita demand of agricultural goods and income-inelastic at high levels of income. Moreover, land is a fixed dominant factor in agriculture that restrict absorption of labor faced with growing population. In this respect, growth is likely to generate labor and resources a reallocation from agriculture into manufacturing and service sectors where they would generate more value.

It also entails the changes occurring in production and employment in and between all sectors of the economy, that would refer to the emerging new sectors and disappearing the old ones. As part of the persistent process of structural change, the declining agricultural sector cause massive changes in the economic landscape for the modern industrial countries. Industrialization process does not only modify the size and share of each sector in the economy but also affect the size of cities and the people's way of life.

The relationship between the process of structural change and macro-economic determinants of structural change is growing. The first version is by Engel's law operates on employment shares – an increase in income cause agriculture to shed labor from the low inelasticity of demand for farm goods. The second is an explanation by Baumol (1967) refers to 'cost disease' that means that the relative faster productivity growth in agriculture drives farm workers to create complementary products. Final explanation is the different factor intensities in production means that agricultural production is highly conducive to quick capital deepening, which pulls more labor into the more labor-intensive non-farm sector. The first explanation takes a demand side while the second and third are the supply side: the first side is a utility-based explanation whereas the second and third are based on the changes of the relative price. The first explanation depends on income or utility demonstrations, which explains the changes through the differences of income elasticities of demand across sectors. If one takes a non-unitary expenditure elasticities of demand (the non-homothetic preferences) shares, it implies that the changes in income results to changes in expenditure shares and to reallocation of labor across sectors even if relative price are constant. The second and third channels relying on the changes in the relative prices reveals that changes affects sectoral expenditure and labor shares when the elasticity of substitution across sectors is different from one. For second channel, the change in relative price is result of differential productivity growth across sectors. Changes in industrial structure originates from the differences in the exogenous rate of productivity across sectors. The differences cause change in the relative prices, which motivates the reallocation of labor across sectors. The third channel explains that relative price changes from the change in relative prices and the supply input if the sectors factors engagement in production differs. In this respect, one can reveal the structural change through relative price changes and technology improvement is neutral.

Gershman et al. (2018) observed an important contributor that technological advancement is, that it serves the driving force of structural change implied that rapid changes in production structure is inevitable provided the differential influence of technological innovations on various production sectors, the differing income elasticity of domestic demand for various consumer products, and the changing comparative advantage of foreign trade. In this respect, the varying income elasticities of demand and the differential influence of technology were driving the structural change. The higher diversity in productivity development in different sectors and industries the emphasize is not just changes in structural structure as long-term occurrence but also a common pattern of growth performance for sectors and subsectors.

In Imbs and Wacziarg (2003) study, in America the development that occurred between 1948 and 2000 start with an already declined primary sector to about 10% of value added with less than 10% of employment in private economy and the tertiary sector was the dominant in value addition and employment. The secondary (manufacturing, construction) share sector declined considerably in the sector. As primary shares declined weakly, the tertiary sectors grew rapidly. By checking the value added and employment share, their development was similar. During the same time, the USA experienced thorough growth in its technological advancement compared to other nations over the same duration. The USA managed a long-standing lead over other countries based on its comparative advantage in mass production from its large resources base and manufacturing of high technology caused by huge investment in education, effective utilization skills from firm and investment in research and development.

Industries with medium to low rates of technological advancement are put at the primary sector whereas those with high are in the primary sector. Some firms with low, medium, and high technological growth are part of tertiary sector. Based on Mau (2016) argument, where development of rents and profit influence pace and direction of structural change of employment and output, the structure of relative price, driven by impacts from the growth of rents and profits, determines the allocation of production factors in different sectors. On the supply-side, sectors with high rate of technological development and labor productivity gains more significance whereas those with low rate of technological progression and labor productivity lose ground and suffer in employment and value added. In Mikheeva (2016) findings about employment of technology in three sectors in isolation, it would result in small expansion in primary and secondary

sectors but a decline in the tertiary sector. On the demand-side, the demand for primary sector is saturated is followed with an increase in the demand for secondary sector goods as the real income per capita rises. Eventually, the demand becomes saturated. For tertiary sector, the demand never becomes saturated as real income per capita increases. In this respect, it means that changes in relative price and innovation of process, which differentially improve labor productivity do not cause direct influence on the structure of demand. Consequently, the impact of technology on structure change dominates the supply side forces. It means that technological growth that affects labor requirements of production and real income per capita drives the structural changes, but the direction of the change depends on the demand-side.

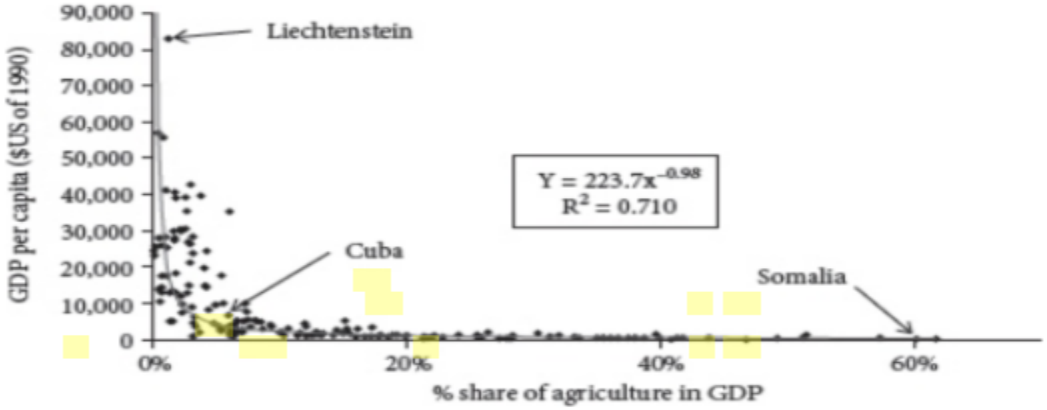
2.5 Outcome of Transforming Industrial Structure

2.5.1 Wealth (GDP per Capita)

The three categories of industries are related to economic development in different ways. Contributing just 5 per cent of aggregate gross domestic product (GDP), primary industry (agriculture) is the lowest ranking sector in the present global economy (van Arendonk, 2015). Ranking second is manufacturing at 26 per cent contribution to GDP, while the service sector, at 69 per cent contribution, is the highest dominant (Anwer, Farooqi, and Qureshi, 2015). As a surprise, most developed economies in the world generate less than 2 per cent of their GDP from the primary sector, with a few countries on fridges like New Zealand (5.3%) for extensive meat and milk production and Iceland with a focus on fishing (The World Bank, 2022). On the opposite, the least developed countries, small and war-torn, are agriculture intensive nations that deliver about 62 per cent of their GDP from agriculture (Singh, 2020). Not even a single country listed as least developed by the United Nations (UN) has less than 3 per cent of its GDP derived from agriculture (Tandon, 2021). For this reason, the primary sector is an essential indicator of industrial advancement and wealth. Having a low concentration of agricultural products does not mean the sector is small and unimportant. The low agriculture shares in advanced countries show that the primary sector is growing but faster service and manufacturing.

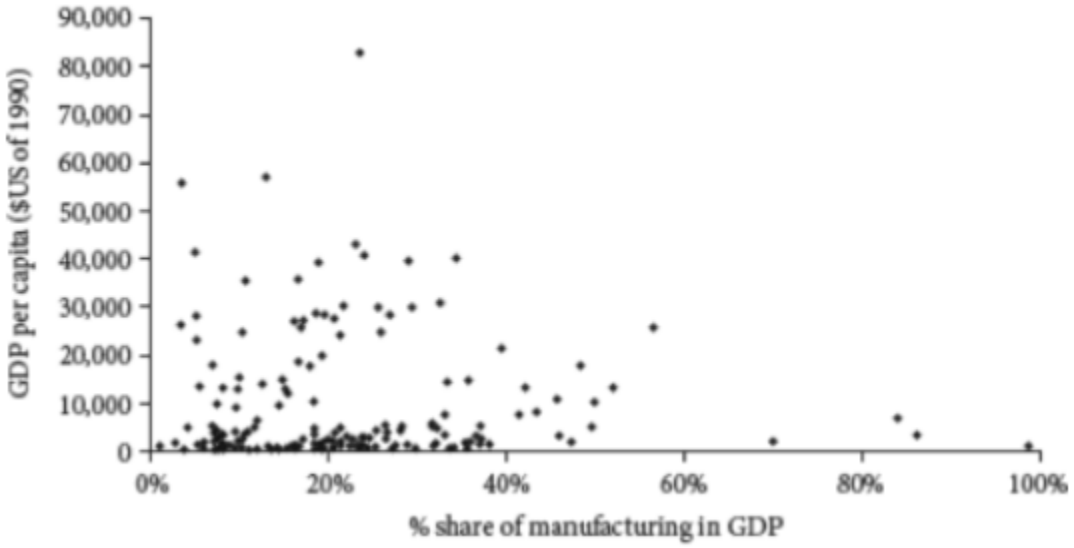
When visualized as a group, the world economies present a strong inverse association between the primary sector (agriculture) and GDP per capita. A huge focus on agriculture is associated more

with lesser wealth. Atakian (2013) study presented a dot chart showing each country's agriculture share against its per capita output. It revealed a nonlinear association starting from the lower right-hand end of the group and shifting to the left, indicating a shift from a higher share to the lower for the primary sector. The lower levels of GDP per capita are an indication that the shift from the primary sector is likely to cause an extra change in wealth. An illustration that a reduction of Somalia's 60 per cent agricultural share would cause an improvement in national income per capita from $106 to $212.



The lower hand corner of the chart shows a fall in the agriculture sector to less than 10 per cent of the national economy, at the point national income started to increase significantly (Atakian, 2013). Countries like Cuba have industrial development that includes exportable services in tourism and professionals like doctors. Even though they have a modest income, they do not have vast portions of the population in starvation and poverty (Kniivila, 2007). Instead of having average incomes of several hundred per year, they have risen to thousands of dollars. The far-left corner of the chart reveals a different set of trends (Atakian, 2013). Countries presenting the lowest levels of agricultural activities have a sharp increase in their wealth. While their primary sector reduces to less than 3 per cent, their GDP per capita has increased to tens of thousands, as presented in the Liechtenstein example. One can see that the upper right-hand corner of the chart is empty, meaning that there is no combination of wealth and high production in the primary sector. High agriculture goes together with extreme poverty, all in cases. In confirming the trend, in the lower-left corner of the chart, with agriculture below 3 per cent, the countries do not present cases of extreme poverty.

Manufacturing in the secondary sector has been the surest way for low- and middle-income countries to reduce poverty and generate employment (Moro, 2012). In wondering whether manufacturing translates into high wealth, Atakian (2013) study presented a graph of the proportion of the level of manufacturing of each country against their GDP per capita. The visual pattern developed shows widely and randomly scattered points on the chart, implying that there might be no relationship between the manufacturing sector and the wealth of a nation. The only significant trend that emerges is that, just like in agriculture and wealth relations, none of the wealthy nations comes with a high manufacturing share. The only countries that present the semblance of high manufacturing and wealth depend on extractives like oil and natural gas. They are the countries with over 40 per cent of manufacturing and give over $10,000 GDP per capita, but they are a small minority group. Most of them have lower factory output than their crude oil extractions.

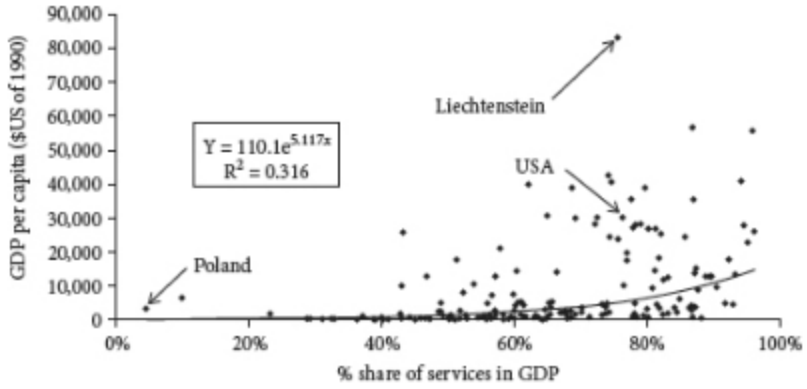


Another significant trend in the graph of GDP per capita against per cent share of manufacturing in GPD is that nations with low manufacturing shares range from low to high income per capita. Similarly, nations with a low-income range from those with high to low manufacturing. Thus, the chart implies that having a high concentration of manufacturing facilities does not translate to economic wealth. In affirmation, Mijiyawa's (2017) study implies that the secondary sector has had lesser contribution to economic growth than primary and tertiary sectors. The secondary sector requires skilled workers and cannot effectively employ the whole population of human resources

with unequal endowments. The current idea of the association between manufacturing and wealth is a remnant of the distant past. Simon Kuznets observed that wealthier nations had a strong rise in wealth. The manufacturing sector for the service sector had not grown into important sectors, making them impossible to trade (Kniivila, 2007). In these early times, manufacturing resulted in wealth creation, and policymakers implemented this concept. With modern understanding, the service sector is taking the central stage with important financial, engineering, and architectural services. In this respect, it overturns the old thinking about industrial structure. Maintaining a manufacturing sector is still important for long as it is technologically advanced, but this requires greater recognition of the same advance in the service sector.

The general trend associating the service sector and national wealth is that they grow/rise together. Mathur (1972) argues that the size of the tertiary sector has a rising linear relationship with economic development. Within employment in the tertiary sector, there are a shift in employment to favour services that classify as “new” and “complementary” (education, banking, finance, medicine and health, government administration, transportation, wholesale, and retail trade) against the “old” and “traditional” (personal mainly domestic servants, legal and business, religious and welfare) services. With the significance of service industries, there has been a redirect towards exploiting opportunities in the service sector.

A chart of a country’s service share and GDP per capita reveals that all wealthy economies acquire a significant portion of their GDP from the service industry. Equally, the least developed countries acquire the least of their wealth from the service industry. Even though many countries with a high concentration in the service industry present poor GDP per capita, the trend varies significantly and requires further scrutiny. Witt and Gross (2020) observed that the best fit curve for service data about GDP per capita is at R square 0.316, meaning the service sector can only predict 31.6 per cent of GDP per capita. The correlation between services and GDP per capita at 0.427 is a moderately positive association. Correlation and R square affirm that output per person increases as the industrial structure shifts towards the service industry. However, the shift is weaker than in the primary sector (agriculture). The service sector has data with lower dispersion (o.316) than the agricultural sector (0.710). The service sector presents a lower coefficient of determination than agriculture. One can conclude that service indicator does not provide a robust indicator of a nation’s economic wealth.



Atakian (2013) study revealed that the service sector presents two special qualities compared to the other industrial sectors. No country has a special, very low concentration of services in their economy like visualized agriculture, where some countries had zero or less than three per cent. What is more, there is no developed country with lesser than 40 per cent of service contribution to their GDP. This condition is likely an indication that industrial service specialization is the precondition for wealth generation. It sets services as an essential specialisation method away from the manufacturing and agricultural sectors. However, focusing on services does not guarantee high wealth creation. At almost any level of service of concentration, there is an income range from extreme poverty to wealth. For instance, between 60 and 90 per cent, there are wealthy and developing nations. The USA and Liechtenstein, ultra-wealthy nations, have similar services for their GDP, just like Senegal, which has almost 30 times lesser income.

When one extends this comparison, it explains the cause of disparities. Even though USA and Liechtenstein present similar share levels in the service sector, Senegal's has levels of agriculture higher than the world standard. Worse, its farm productivity is very low, considering 12% of GDP comes from three-quarters of its labour force. In comparison, the USA derives its 2 per cent of GDP from agriculture, which employs 1 per cent of its labour force (Atakian, 2013). In this regard, Senegal has not shifted from farming to manufacturing. Its service industry is not from technological advancement, specialization, and efficiency.

The evaluation of the three industries' relationship to the wealth of a country reveals that agriculture has the highest correlation to GDP per capita. However, it is the least dispersed data point in all chart areas. With this view, agriculture presents a better view of the economic effect of

industrial structure than any other sector. It does not represent a simple leftover from the age of high technology or the service or manufacturing sector. Thus, the agriculture shares of GDP per capita is the best factor for predicting a nation's wealth and poverty.

There has never been a correlation between rising wealth and the service sector. Manufacturing was the key to growing prosperity in the 1950s and a darling for the world's industrialized countries. The service was still challenging to trade internationally, which caused limitations on these sectors' growth. The inability to trade services made advancement local, making some countries lag in the service sector even though their wealth grew from manufacturing. As the three sectors are now tradable globally, the correlation between the three sectors can only get better. A more significant share of the service sector gives wealth generation a higher possibility. As agriculture and manufacturing sectors continue to decline, even the large nations do not have practical limits on their service sector share. Thus, the evidence that the new world economy is shaping up.

Countries with considerable industrialization and income generation exploit the transformative chances of offering services. The past three decades have seen the service sector grow faster than manufacturing. As Berardino and Onesti (2020) study, in 2019, service employed 45 per cent of workers in developing countries and contributed 55 per cent of their gross domestic product (GDP). In developed economies, the service sector accounts for 75 per cent of GDP. Mathur (1972) revealed that countries with expanded trade-in service had accelerated adoption of new technologies, upgraded workers' skills, exceptional attention to service, and boosted manufacturing. Atakian (2013) suggested that opportunities in service industries offer spillovers in scale, innovation, and multiplier effects that make manufacturing more productive. Consequently, industrial structure transformation shows the position of industries to exploit opportunities presented for maximum economic growth. Sit (2020) revealed that the policymakers are not just focusing on supporting manufacturing or services, but they are taking advantage of service growth potential and contributing to jobs and productivity.

2.5.2 Valued Added

Acevedo, Mold, and Perez (2009) studied changes in value-added to agriculture, manufacturing, and service sector by transforming industries (compared to developing and developed countries). The sectoral share of hours worked, and nominal value generated indicated the level of development for the five non-European countries (USA, Canada, Australia, Japan, and Korea) and 15 European countries. The vertical axis of the plot was for the monetary value of hours worked or the total share of hours worked for the agriculture, manufacturing, and service sector. At the same time, the horizontal one represented the log of GDP capital over time. The study revealed that the total share of hours worked, and the nominal value brought to the agriculture sector reduced with an increase in the country's level of development. In contrast, the level of service and value generated increased with the level of development. The data indicated the hump shape for the manufacturing sector for all countries, except Korea, which revealed a decrease in manufacturing shares. Besides Korea, developing and developed countries had flattened out nominal value even with time added.

Herrendorf, Rogerson, and Valentinyi's (2014) study also evaluated value-added by checking the annual growth rates of real value-added per capita equal to real per capita GDP by a group of countries at constant 2005 prices in US dollars over 1991 to 2012 duration. For the least developed countries, diversified exporters and economies specialized in manufacturing performed better than those dealing with minerals and exporting fuels and those in the agricultural sector. The least developed countries grew slower than other emerging economies.

A United Nations Conference on Trade and Development - UNCTD (2013) evaluation of structural transformation experiences for countries and regions worldwide conducted a cross-sectional assessment of sampled advanced economies, emerging ones, and low development countries. The study found that the country’s fundamentals define its significant variations in the real value-added share for each sector. Depending on natural resources and agriculture, those countries had little structural change, yet they had large and systemic differences between their actual and predicted value. The study concluded that the sectoral shifts are not mechanical; rather, their speed of occurrences and impact are from the willingness and capacity of labour and capital to migrate to a highly productive sector largely moved by institutions' environment and policy enactment.

In Venables's (2016) findings, a country cannot be involved in producing an item they do not know about it. The production of goods is the space for moving economies. It illustrates goods exported to the world, with the distance between the two goods being those chances of producing one good is the fact another country makes a different good. In the argument of structuralist theorists, a country moves the good it produces to another country close to it. Close means that the two countries have almost similar knowledge and capabilities of producing a certain commodity. Thus, in product space, commodities are close when the ability to make them is close and distant when it is far apart. The interrelations configure a network of items that map an economy's point that moves to another. Thus, the source of diversification and development of increasingly complex goods.

Torvik's (2009) evaluation of a commodity price boom revealed that the developed economies are capital exporters to other richer nations. The developing countries are exporting manufacturing products. On the other hand, the low-income countries are net products importers and exporters of raw materials. Warwick's (2013) examination of the contributions to the economic growth of service and two manufacturing (technology-driven and human-capital dependent) industries for 28 OECD economies from 1990 to 1998 revealed that there was an increase in manufacturing effort that caused a positive and significant effect on the level and length of GDP growth.

Nubler (2014) study revealed that countries that upgrade their productive structures and export more sophisticated goods grow faster. The study observes that export shares by sector as the percentage of GDP can measure the level of structural transformation of a country. According to OECD (2015), countries with low income intend to improve the domestic value-added to their exports by upgrading their functions. The middle-income nations prevent the middle-income countries' trap by upgrading processes and products; they try to establish their brands. Salazar-Xirinachs, Nubler, and Kozul-Wright's (2014) analysis of dynamics in 124 countries found that structural transformation happens with export sophistication and diversification supports the middle-income countries in overcoming the middle-income trap.

2.5.3 Employment and Labour Productivity

An empirical study by Herrendorf, Rogerson, and Valentinyi (2014) about the association between structural transformation and economic growth revealed that an increase in labour from lower to higher productivity sector results in higher static gains (value addition). The technology gain further improves the economic growth (dynamics growth). It demonstrates why structural transformation results in quicker economic growth. The result was interesting in Uddin's (2015) evaluation of the association between GDP growth and employment share in industries like agriculture, manufacturing, and service. When there is a reduction in the number of people employed in the agricultural sector, it increases economic growth. Nations in the East, West, and Southeast Asia managed to reduce their employment in agriculture by about 14-26 per cent, resulting in an average of 6 per cent economic growth. Countries in the sub-Sahara focused on reducing their agricultural employment by less than five per cent, resulting in 3.6-4.4 economic growth.

McMillan and Rodrik (2011) evaluated changes in employment caused by industrial structural shifts in the manufacturing sector. When industrial employment grows, it results in faster economic growth. Countries in Asia experienced structural transformation by increasing the size of their manufacturing capabilities; they also reported an increase in employment by 8.5 - 6.3 per cent. Countries in North America and Sub-Sahara where there is a little industrial transformation happening have experienced an insignificant rise in employment levels.

An investigation by Rodrik (2013) of a service-based industrial structure and its level employment revealed that there is no strong association between service employment and contribution to GDP growth. The cause is the heterogeneous nature of the service sector, made of low productivity (non-tradable) services and highly productive (tradable) services. When there is a structural shift favouring low productivity instead of high productivity (as it happened in many developing countries from 1990 to the present), it is more likely to associate with slow economic growth.

2.5.4 Industry Concentration

Imbs and Wacziarg's (2003) study revealed a crucial empirical regularity through a large cross-section of countries. As the emerging nations become more affluent, there is a reduction in sectoral

production and employment concentration. The cause is an increase in the diversification of their industries into different sectors. In Atiyas's (2015) findings, the structural transformation can occur from producing increasingly complex products. Structural transformation as industrial upgrading at firm and national levels is a gradual process of migrating to higher value addition and more productive activities.

An evaluation by Lyocsa, Svoboda, and Vyrost (2010) builds that a negative association between informal settlement and GDP per capita – informal growth negates the growth in developing countries. The casual workers tend to live worse than those who live and work in informal areas. As countries transform their industries, the formation of cities, especially in developing nations, is taking the shape of slums. The slum areas in towns are expensive to live from the lack of social safety net and issues with a high cost of informal service providers. The outcome is growth in urban inequalities from the differential wealth concentrations in different parts of cities.

Oyelaran-Oyeyinka and Lal (2016) studied structural transformation and geographic concentration that involved emerging countries, China, Korea, and Singapore. The study found that manufacturing clustered and concentrated in certain areas, becoming cities, as the structure changed from agriculture to the manufacturing sector. The trend only changes when the economy shifts from dependence on the manufacturing sector to service. The argument for the changes is that agriculture is land-intensive, unlike manufacturing, and services depend less on land. Consequently, when manufacturing replaces agriculture, they tend to cluster. When service becomes more important than manufacturing, they tend to disperse. Another cause of clusters in manufacturing is the drive to reap a high concentration of knowledge and sharing of resources. As the nation matures its manufacturing facilities, they become less dependent on these resources and can manage to shift to remote areas for cost-saving. Ketels (2017) explained that was why industries in developed countries like the USA and western Europe have their industries in urban and remote rural areas for they relocated to less congested areas. It also demonstrated why less developed economies have a strong manufacturing presence in town areas. A significant trend to note is that companies with high levels of innovation prefer urban areas where knowledge spillovers are strong. Consequently, that is the understanding of the geographic area and industry concentration.

2.6 Conceptual Framework

When building structure change, the study establishes the changes in the relationship between input and output to influence the structure of the economy. In doing so, the study decomposes technical coefficients added through industrial policy and their contribution to the structure change by causing economic growth, analyzed through structural decomposition method. The method decomposes the output or value added into sever important determinants, which include technological change that reflect the changes in the output-input structures of economy. In evaluating structure change, the decomposition method establishes productivity change in each sector, average substitution of products, and sector-specific substitution.

In furthering the decomposition method, the study also brings in the issue of influence of demand and supply forces on pushing for sectoral reallocation and changing the industry structure. The traditional industrial structure change theory does not consider factors causing change as from supply and demand side. The studies focus on the way industrial policies cause industrial structure upgrade by affecting driving factors, also called acceleration factors, that includes technological improvement, environmental regulation, foreign investment, financial development, social needs, R&D input, export-import, demographic transition, increased urbanization, change in consumer demands, and labor input, among others. In considering the supply and demand factors, the study adopts Xiao et al. (2018) observation classifying the factors of structural change into those of demand side (export, investment, consumption) and supply side (technology, labor, institution). In other simpler words, the supply side refers to the input factors whereas the demand side are the output factor in the decomposition model.

CHAPTER 3: METHODOLOGY

3.1 Introduction

The study focuses on showing Russia's multiple dimension effect on economic growth indicators from a single sector for manufacturing, service, and agriculture through industrial transformation. In this respect, the study has three categories based on the three industrial categories – agriculture (primary), manufacturing (secondary), and service (tertiary). The evaluation is multiple dimensions for each category for the five economic growth indicators. During the analysis, a timeline of industrial policies enacted by the Russian government is an important consideration for it reveals the background drivers of structural transformation. The study is a mixed-method (depends on qualitative and quantitative data) based on secondary data. The quantitative data undergoes intensive analysis, for it is the main framework of this study as it provides important insights about movements of the economy from industrial transformation. The qualitative analysis undergoes only summarization and timeline mapping to indicate when the Russian government implemented an industry policy possibly responsible for the change in industrial structure.

3.2 Designing a Mixed Method

The study engages a mixed (qualitative and quantitative data) research method. Secondary data allows the use of information collected and compiled by another person while answering a different set of research questions. It is an opportunity to maximize the use of data that took enormous resources (finance, time) to generate. When using secondary data, it is best to comprehend, contextualize, and evaluate the desired research outcome to avoid stayed outcomes. Qualitative data for industrial policy collected is qualitative, whereas the data for economic indicators per manufacturing, agriculture, and service sectors are quantitative. For industrial policy, the collection is for the name of the policy, its targeted outcome, and the time of enactment. The quantitative data for economic indicators is the study's duration in their respective measures over years 2000 to 2020. A concurrent design engaged derives value for this study by comparing findings from qualitative and quantitative sources to display both types of data jointly. Engaging qualitative outcomes assisted in identifying different variables from quantitative surveys. The combination of the two allowed improved evaluation as qualitative data addressed the limitations

of quantitative and quantitative data for those of qualitative data. Consequently, the joint display of outcomes improved understanding by combining data with text on the charts.

3.3 Variables

The study intends to measure productivity (GDP per capita, value-added per share, exports, employment/labour productivity) and structural transformation in urban demographics. The study follows Chambers (2002) understanding that productivity is the ratio of output measures against that of input. The concept of productivity measures technical efficiency, benchmark production and tracks the technical changes. Based on the research concept, there are different productivity measures that the researcher can choose depending on data availability. The measure of productivity can be a single factor measure depending on the measure of output to the one measure of input (for example, labour productivity), or a multiple factor measure determines output against several inputs (for example, total productivity). It involves computing a ratio between value-added and total number of hours worked when computing labour productivity. The ratio provides an understanding of the way labour can create output. The change in labour productivity can also show changes in the capital – an industry defined by high labour productivity can indicate high capital intensity and low labour intensity that matches the addition of high value with restricted labour use (for instance, mining).

Total factor productivity can imply changes accounted by labour, capital, and other factors driving economic growth. It refers to the difference between the growth of output and inputs, which is determined by the weight of its factor shares. Total factor productivity gives a more comprehensive visualization of productivity than single-factor productivity; it accounts for a higher number of independent factors. When engaging total factor productivity, it follows two important assumptions given in the standard neoclassical theoretical framework (a) a production function has a constant return to a scale; and (b) the existence of perfect competition that each factor of production receives payment of the marginal product. By these assumptions, the total factor productivity can have two parts – one part explains factor accumulation, and the other contributes to increased productivity. The way a factor contributes to the growth means its growth rate is weighted by the share of GDP per capita accrued to that factor. In this regard, the total factor

productivity refers to residual from observed growth and a fraction defined by the factor accumulation.

3.4 Model Specification

The model developed is for a comparative basis after dividing Russia's economy into three sectors: agriculture, manufacturing, and service. In analysing indicators aggregated over the years (2000 – 2020), expectations are biased to the years with significant shares in the output and employment. The study takes three steps – (1) evaluation of the economic situation of Russia, (2) decomposition of labour productivity, and (3) evaluation of sectoral contribution to labour productivity growth.

3.4.1 Economic Situation of Russia

The intention is to know how the Russian economy performs and reveal its structural characteristics. Specifically, the researcher determines the composition of employment and nominal value generated from a sector and the sector benefitting the most from structural transformation. It involves looking into the real value-added per capita (equivalent to GDP per capita, value-added) over the study timeline (2000 – 2020). The researcher determines the years when Russia's economy was growing fast, medium, and slow. It also helps reveal the relation of the overall economy's trend against the agriculture, manufacturing, and service sectors. In anticipation, this study raises that the service sector grew at the highest rate, followed closely by manufacturing, and the agriculture sector grew slowest.

Another description was the structural change dynamics in employment levels against the nominal value (GDP per capita, value-added). The process reveals the changes of employment between different sectors over time (workers move between agriculture, manufacturing, and service sectors). The changes in employment depend on the growth rate in employment as per the initial conditions and the rate of population growth. It helps reflect the share of workers in the Russian economy dedicated to the agriculture, manufacturing, and service sectors.

The industrial structure has several components and can only suit the description based on the many variables. The researcher examines the distribution of employment and concentration of industries against their output, value-added and GDP per capital for agriculture, manufacturing,

and service sectors. The evaluations are the share of employment industry concentration and GDP per capita or value-added across the sectors. The study's disaggregation level is three based on the number of sectors considered for analysis, research questions, and data available. For this case, consideration is specifying the model the levels of disaggregation that divide the economy into three sectors.

When calculating the total employment and output (GDP per capita, value-added), the researcher sums up the number of workers in each sector. The researcher determines the total nominal value-added and GDP per capita by determining the nominal value-added and GDP per capita that each sector creates. Assuming employment, L, and total value-added or GDP per capita, X, the total employment is $L = \sum_{i=1}^{n} L_i$ and $X = \sum_{i=1}^{x} X_i$ indicating that L_i is the number of workers or employees in sector i and X_i The nominal value generated (GDP per capita or value-added) in sector i. With these definitions, the distribution of employment against nominal value generated in each sector results from dividing the following expressions by the aggregated employment and output, respectively.

$$\sum_{i=1}^{n} \frac{L_i}{L} = \frac{L_1}{L} + \frac{L_2}{L} + \cdots + \frac{L_n}{L} = \sum_{i=1}^{n} \lambda_i \quad \text{..... equation 1}$$

$$\sum_{i=1}^{n} \frac{X_i}{X} = \frac{X_1}{X} + \frac{X_2}{X} + \cdots + \frac{X_n}{X} = \sum_{i=1}^{n} \theta_i \quad \text{..... equation 2}$$

For the equations 1 and 2, λ_i and θ_i Refer to shares of total employment and nominal value created (GDP per capita, value-added) by sector i. Notably, the summation of the share must be unity. The expectations are from understanding that employment, value-added, or GDP per capita is nothing less than the sum of its components. The data for calculating these trends are collected from World Bank, OECD, United Nations National Accounts (UNNA), International Labour Organization (ILO), and Global Employment Trends (GET).

3.4.2 Decomposing Labour Productivity

This section comprehends how the changes in structural transformation patterns determine growth in labour productivity. By decomposing labour productivity growth into its constituents through the divisia index decomposition method, one can only understand this. It reveals the reallocation

from structural change relative to direct productivity or within effect. Comparing reallocation impact to year shows the time a major structural transformation process happened. When there is little change in reallocation, it shows the difficulty in changing the production structure. Anticipation is that the service sector experiences the fastest growth in labour productivity and the highest real-location effect. For the manufacturing sector, which mainly depends on extractive and fuel, the direct productivity increases to cause aggregate labour growth, but in minerals, the structural impact is negative.

3.4.2.1 A Divisia Index Decomposition

The Divisia index decomposition is one method employed when decomposing aggregate labour productivity by the economy levels of employment-to-population ratio, unravels sectoral contribution impact attached to the Divisia index. The Divisia index is a weighted sum of logarithmic growth rates, given that weights represent the components' shares in aggregate value. When determining decomposition, the first level is determining the aggregate indicator to decompose as a function of the factor of interest. One starts by calculating aggregate labour productivity, a ratio of total value-added against total employment. In this regard, the aggregate labour productivity reflects dynamics within and between sectors.

Given that there are n sectors in the economy, each sector i can generate real value-added X_i, as the value of production at constant prices and employs L_i Workers. Given this information, the total employment in the economy is the summation of the sectoral employment $L = \sum_{i=1}^{n} X_i$. As the prices across sectors differ, one cannot determine total value-added X as the sum of sectoral real value-added. Instead, one computes the real the total real value-added as the summation of the nominal value-added by each sector (current sectoral prices, P_i, dividend by the overall price index P. Therefore, it means that the aggregate labour productivity is as follows.

$$\varepsilon = \frac{X}{L} = \frac{\sum_{i=1}^{n} P_i X_i}{\sum_{i=1}^{n} P L_i} \quad \text{..... equation 3}$$

One can multiply the equation by $\frac{L_i}{L_i}$ to define aggregate labour productivity into the following product of three factors.

$$\varepsilon = \frac{X}{L} = \sum_{i=1}^{n} \frac{X_i}{PL_i} = \frac{L_i}{\sum_{i=1}^{n} L_i} = \sum_{i=1}^{n} \rho_i \, \varepsilon_i \lambda_i \text{ ………………… equation 4}$$

For the equation, $\varepsilon = \frac{X}{L}$ is the sectoral labour productivity, $\lambda_i = \frac{X}{L}$ implies employment share, and $\rho_i = \frac{P_i}{P}$ Indicates terms of trade. With these determinations, labour productivity can quickly decompose into several contributing factors. The changes in sectoral labour productivity signify within productivity effects -the changes in the economic structure of the economy as determined by the labour shares that lead to structural change effects, and change in terms of trade reflects market structure effects. When one assumes that the variables under consideration are continuous, the differentiation equation 4 above regarding time, t, and dividing both sides by the aggregate labour productivity ε yields the following.

$$\ln\frac{\varepsilon}{dt} = \sum \theta_i [d \ln(\rho_i)/dt + \ln(\varepsilon_i)/dt + \ln(\lambda_i)/dt] \text{………………… Equation 5}$$

From the equation, the weight θ_i refers to the share of sector i in the total nominal value-added. After integrating equation 5 over the time interval $[O, T]$, it results in the following Divisia decomposition of aggregate labour productivity.

$$\ln\frac{\varepsilon_T}{\varepsilon_0} = \int_0^t \theta_i \left[\frac{d \ln(\rho_i)}{dt}\right] + \int_0^t \theta_i \left[\frac{d \ln(\varepsilon_i)}{dt}\right] + \int_0^t \theta_i \left[\frac{d \ln(\lambda_i)}{dt}\right] \text{……………… Equation 6}$$

After engaging the exponential equation for equation 6 above, it results in the following.

$$D_{agg} = D_{prod} D_{str} D_{price} \text{ ………………………………………... Equation 7}$$

The components of the above equation represent the following

$$D_{prod} = exp^{\left(\int_0^t \theta_i \left[\frac{d \ln(\rho_i)}{dt}\right]\right)} \text{ …………………………………………... equation 8}$$

$$D_{str} = exp^{\left(\int_0^t \theta_i \left[\frac{d \ln(\varepsilon_i)}{dt}\right]\right)} \text{ …………………………………………... equation 9}$$

$$D_{price} = exp^{\left(\int_0^t \theta_i \left[\frac{d \ln(\lambda_i)}{dt}\right]\right)} \text{ …………………………………………... equation 10}$$

As the data can be discrete, the decomposition equation to match the discrete format of the data is as follows.

$$D_{prod} = exp^{(\sum_0^t \ln(\rho_i)(\theta_{i,0}+\theta_{i,t}/2)} \text{ ..... equation 11}$$

$$D_{str} = exp^{(\sum_0^t (\ln \varepsilon_i)(\theta_{i,0}+\theta_{i,t}/2)} \text{ ..... equation 12}$$

$$D_{price} = exp^{(\sum_0^t (\ln \lambda_i)(\theta_{i,0}+\theta_{i,t}/2)} \text{ ..... equation 13}$$

By turning to employment generation, an important insight is that a sector creates enough jobs (create jobs more than its population growth) in case its output per capita is growing faster than its labour productivity. To reveal these suggestions, one can identify $\emptyset = \frac{L}{P}$ given that p is population. The labour productivity in a sector i is indicated as $\varepsilon_i = \frac{X_i}{P}$. After conducting some algebraic manipulations, the employment-to-population is written as follows $\emptyset = \frac{\varepsilon_i}{\varepsilon_i}$, a similar approach for the aggregate labour productivity, given the growth rate, $\emptyset$, can decompose as follows.

$$\ln \frac{\emptyset_T}{\emptyset_0} = \sum_{i=1}^n [\ln(\varepsilon_i) - \ln(\varepsilon_i)]\left(\lambda_{i,0} + \lambda_{i,T}\right)/2 \text{ ..... equation 14}$$

The equation above provides λ_i as the sectoral employment share, the Divisia decomposition of employment-population ratio growth rate is as follows by engaging a multiplicative form.

$$D_{empl} = \frac{D_{inc}}{D_{prod}} \text{ ..... equation 15}$$

For the above equation, D_{inc} refers to income per capita index and D_{prod} the productivity index.

3.4.2.2 A Shift-Share Decomposition

The study employs a shift-share decomposition in quantifying structural transformation. It is an accounting-based approach developed to evaluate the impact of structural change on productivity growth. As Marquez, Ramajo, and Hewings (2009) describe this method, it is a purely descriptive method that seeks to decompose the change of an aggregate into respective structural components,

showing the change in the composition of the aggregate, and change within the individual units that constitute the aggregate.

When deriving this method, the labour productivity is denoted as P, a nominal value generated Q, labour input in work-years N, and industry (i=1, 2…m). By following the divisia decomposition method, the labour productivity is as follows.

$$P = \frac{Q}{N} = \frac{\sum_i Q_i}{\sum_i N_i} = \sum_i \left[\frac{Q_i}{N_i}\frac{N_i}{\sum_i N_i}\right] = \sum_i [P_i S_i] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{Equation 16}$$

From the equation, $P_i = \frac{Q_i}{N_i}$ refers to labour productivity for industry i and S_i the share of industry i in total employment. After straightforward algebraic manipulation of the equation by engaging Δ in implying the difference in a variable between two points in time, as follows $\Delta P = P_i - P_o$, the equation can transform into a growth rate formulation.

$$\frac{\Delta P}{P} = \sum_i \left[\frac{P_{io}\Delta S}{P_o} + \frac{P_i \Delta S}{P_o} + \frac{S_{io}\Delta P}{P_o}\right] \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{Equation 17}$$

In the first term, there is a reflection of contribution to productivity growth from the change in the reallocation of labour between industries. It is positive when the share of high productivity industries increases for total employment. In the second term, there is an interaction between the change in labour productivity for each industry and the changes in labour shares. It is positive when the high productivity growth industries also increase their employment shares. In the third term, there is the determination of the contribution of productivity growth within industries weighted by the share of these industries in total employment.

3.4.3 Sectoral Contribution to Labour Productivity

Evidence suggests that productivity growth originates from direct productivity effects than reallocation effects. One can wonder, which sector contributes the most to productivity growth? In this last step of the analysis, the study generates an answer to this empirical inquiry. From the decomposition Divisia index, a sector has a negative reallocation effect when it has reduced its share of employment. There is a positive reallocation effect when workers transfer from a low

productivity sector to a higher one. When the aggregate reallocation is positive, the structural change is beneficial to the economy.

The analysis of direct labour productivity and reallocation effect must be concomitantly considering that labour productivity and employment relate to each other. When there is a rise in employment in a sector, labour productivity declines when the output does not satisfactorily expand. Equally, a surge in the sector's labour productivity can result in more capital-intensive methods of production that cause a reduction in employment. From these two cases, the idea of structural transformation drives high productivity in sectors that generate more jobs while pushing productivity gains higher.

When determining sectoral contribution, one determines (1) values for aggregate productivity growth, reallocation effect by sector, and direct productivity effect by sector, then (2) evaluates a Pearson's correlation coefficient. The intention is to reveal whether labour productivity is associated with changes in productivity with structural transformation in what sector.

3.5 Data Source and Analysis

The address of the study is to classify data originating from the Russian economy into agricultural, manufacturing, and nonmanufacturing sectors. The agricultural sector represents the primary industry while manufacturing the secondary and nonmanufacturing the service industries. It helps reveal the different economic growth within individual sectors. Another goal of the study is to show the timeline of change in Russia's industrial policy for the economy and individual sectors. Doing so reflects a change in industrial policies and their impact on each industry and resultant economic growth.

The data cited for this analysis originates from different sourcing depending on whether it is qualitative or quantitative data. Several journal articles, conferences, blogs, and news websites detailed qualitative data describing Russia's industrial policy from 2000 to 2020. The important way of finding the suitable literature on this topic is by searching journals (Google Scholar, Directory of Open Access) that publish articles associated with the topic of interest and Google search to find blogs and other news websites for Russia's industry policy. The researcher engaged in a broad search using the right keywords to choose the right articles. Using unreliable sources

would hurt this study's credibility through lesser powerful arguments; a process for identifying credible sources ensured they were in-depth, objective, currency, authority, and purpose. More than a light overview of the content against the topic (Russia industry policy from 2000 to 2020) assured the depth of coverage. A check of the way the data in the source and the correct citation would benefit the understanding of Russia's industry policy from 2000 to 2020, guaranteeing the source was free from biases and objectives. For the currency of the content, the source date of writing or publishing was set between 2000 and 2020. An evaluation of a number of authors (the higher, the better) and each author's fitness (education level, other published works) informed the conclusion of the author's authority on the topic. A confirmation that the source served the purpose of teaching, knowledge generation, research, and changing the public opinion revealed the source's purpose was like that of the source. Following these areas, it was possible to reduce the number of sources to a small with specific, credible sources that led to dependable conclusions.

The study employed a panel of quantitative data covering the duration from 2000 to 2020. Panel data contained more information, variability, and efficiency than pure-time series or cross-sectional data. The data had a cross-section and longitudinal observation. It can measure and detect statistical trends that cross-sectional and time-series data cannot do. The citing of quantitative data about economic indicators in their categories of agriculture, manufacturing, and service over a monthly basis from the year 2000 to 2020 was from World Bank, OECD, United Nations National Accounts (UNNA), International Labour Organization (ILO), and Global Employment Trends (GET) websites.

The UNNA serves comprehensive data on GDP in disaggregated economic activities. The ILO provides data on key indicators of markets showing employment by economic sector, labour productivity, and employment to population ratio. The GET website serves data on employment by sector and gender. By taking monthly data, the researcher ensured the preservation of the time series effect in the data. The importance of using World Bank and OECD data is that they provide data in volumes and details without charges, yet individuals or groups of research would find it challenging to collect and mass it. World Bank and OECD collect data as it becomes important tools for supporting important management decisions and offering essential statistical information for banks and others involved in the economy to advise their operational activities. As the two

apply internally acceptable standards and norms when collecting data, the dataset they generate is consistent and reliable for analysis.

3.7 Research Ethical Consideration

The use of secondary data on its own is a sensitive ethical issue. It optimizes value from the public investment in data collection, lowers the burden on respondents, and guarantees the replicability of study findings and greater transparency of research procedures and the integrity of the research work. The value attached to secondary study emerges from the complete realization of benefits that outweighs the risks regarding re-identifying individuals and revealing sensitive data. In this respect, data utilisation occurs when important ethical conditions occur - de-identifying data before release, consent of subject reasonably assumed, the outcome from the analysis does not re-identify the respondents, and engaging data does not cause any stress or damage. The study utilizes major public non-profit data and large research-driven data to create national statistics. They are aware of these aspects of research and created services and infrastructure for archiving, managing and releasing data ready for secondary analysis by fully observing the principles above. The work these institutions does is ensure the data collected fulfils all the ethical consideration related to secondary data. By accessing data through these institutions, the burden of ethical consideration shifts from the researcher to the institutions. The only remaining issue is acknowledging these sources of data in the research process to avoid plagiarism. When avoiding plagiarism, the researcher employed Harvard referencing system to recognise all secondary sources, including existing literature, for all information borrowed from other authors.

CHAPTER 4: RESULTS AND DISCUSSION

4.0 Introduction

The section reveals patterns from structural transformation consequent to an evaluation of production measures from numerous separate datasets. It evaluates available historical time series data for the Russian economy from 1991 to 2020. The insights inform the structural transformation movement in labour employment, value-added, and GP values by three sector models (agriculture, manufacturing or industry, and service) of structural transformation.

4.1 Industrial structure

Structural transformation refers to the transition of an economy from low productivity that is labour intensive to higher capital and skill intensive productivity. As an item sought by countries, industrialization is the process that allows the inclusion of innovation and technology in production factors, progressively enhancing changes from labour-intensive to skills and capital-intensive production. Accordingly, industrialisation in countries put efforts towards moving their economies from low productivity and labour intensive to higher productivity with capital and skill intensive. Nations like China adopted innovative frameworks that helped the country move from low productivity to high productivity over three decades. Developed countries in Europe and the USA adopted frameworks after World War II that sustained their economic transition from low productivity to a high one. Thus, the common direction and recommendation made by United Nations (UN) are that countries increase their productivity. In the same line, Russia has been moving its economy towards high productivity. Consequently, the research focuses on revealing the changes in the structural transformation of Russia over time by studying how its factor of productivity moves over time.

Coincidentally, the changes from low to high productivity of the economy reveal structural transformation caused by the movement of production factors (labour, capital) from agriculture to manufacturing and service sectors. Even though agriculture invigorates economic growth, creating jobs, reducing poverty, and improving a country's food security, countries with it contributing a more significant part of their economy tend to have low productivity and higher labour participation for a low income. Undoubtedly, agriculture plays an essential role in supplying labour

to manufacturing and service sectors, raising rural revenue. Yet, studies reveal countries depending on agriculture have an economic structure lagging behind those not relying on it. The history of economic thoughts regards structural transformation as an essential engine of economic growth and development. For example, during industrialisation, productivity enhancement in agriculture supports the progressive release of labour and capital towards more productive countries in the manufacturing and service sectors. Capital and labour supporting industrialization in the manufacturing and service sector spur high productivity and better income generation. The shift of capital and labour as factors of production from low productivity companies to the highly productive ones benefits the developing countries, where the productivity differential runs deeper. For these reasons, the study focuses on changes in factors of Russia's productivity (capital, labour) between agriculture, manufacturing, and service sectors over time to explain its structural transformation over the time series.

4.2 Russian Job Market

A combination of job participation rate, unemployment rate, and unemployment rate defines a country's job market. One way of showing the number of people in the Russian labour force is through the participation rate. It reveals the total number of employed and unemployed persons expressed as a percentage of the total working-age population (number of civilians, non-institutionalized aged 16 and above). The labour force participation rate measures the proportion of unemployed job seekers constituting the labour force (both employed and unemployed persons, not the whole population) (Jones and Riddell, 1999). With this understanding, figure 1 below presents the labour participation rates for the Russian economy from 1991 to 2020. Even though it varies significantly, at an average of 72.414 and a standard deviation of 2.095, the labour participation rate over time series is stable at a higher rate than the world average of 59 (See Figure 3). Figure 3 also indicates that in Russia, the number of engaged workforces aged between 15 and 64 varied between 67.19 (minimum) and 75.88 (maximum). Russia experienced a declining labour participation rate, peaked in 1991 at 75.88 before declining over the following years to reach its lowest in 1999 at 67.19 rates (See Figure 1). The trend is consistent with declining labour force trends in their participation in the 21st century; as Toossi (2007) observed, the retirement of baby boomers in large droves lowered the number of labour force participation. In 1999, Russia experienced an economic crisis that declined the labour participation rate. Efforts to contain the

financial crisis improved labour participation from 2000 steadily, and continued government intervention continued to sustain the participation rate higher than 72 per cent.

Figure 1: Labour participation rate

The unemployment rate can reveal the percentage of the labour force in Russia's market without a job. Figure 2 below shows Russia's unemployment rate trend between 1991 and 2020, the average unemployment rate at 7.371 (standard deviation of 2.41) is the proportion of the labour force actively seeking a job. The unemployment rate rose steadily from 5.13 in 1991 to the highest in 1998 at 13.86 before declining steadily in 1999 to reach the lowest in 2019 at 4.6 (See Figure 3). The unemployment rates can rise and fall for different reasons.

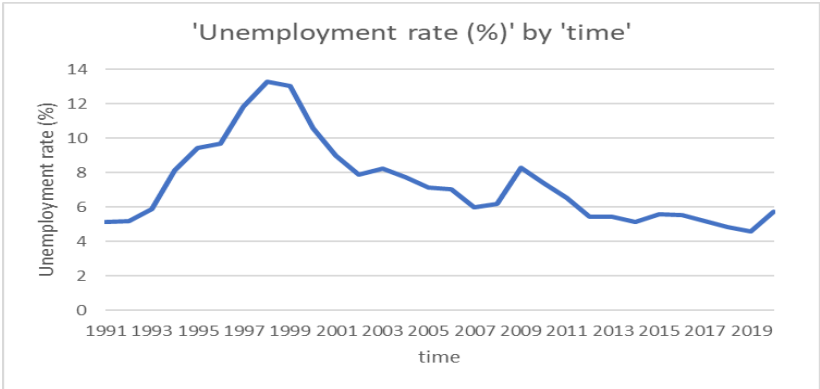


Figure 2: Unemployment rate

Even though the most common is when there is a change in the number of people seeking employment, the variation in labour size can also cause the change. Workers who feel discouraged and stop searching for work drop from the workforce. In economic meltdowns, the labour force can decline or grow slower than usual from the net impact of the large number leaving the employment and the lower than the usual number of employed. Those leaving the labour force yet are in ages in working age are not considered unemployed; some authors argue the unemployment rate alone is a misleading understatement of labour market weakness. When the economy is on recovery, high unemployment rates persist, yet there is an increase in jobs created, more workers start searching for work, and rejoin the labour market.

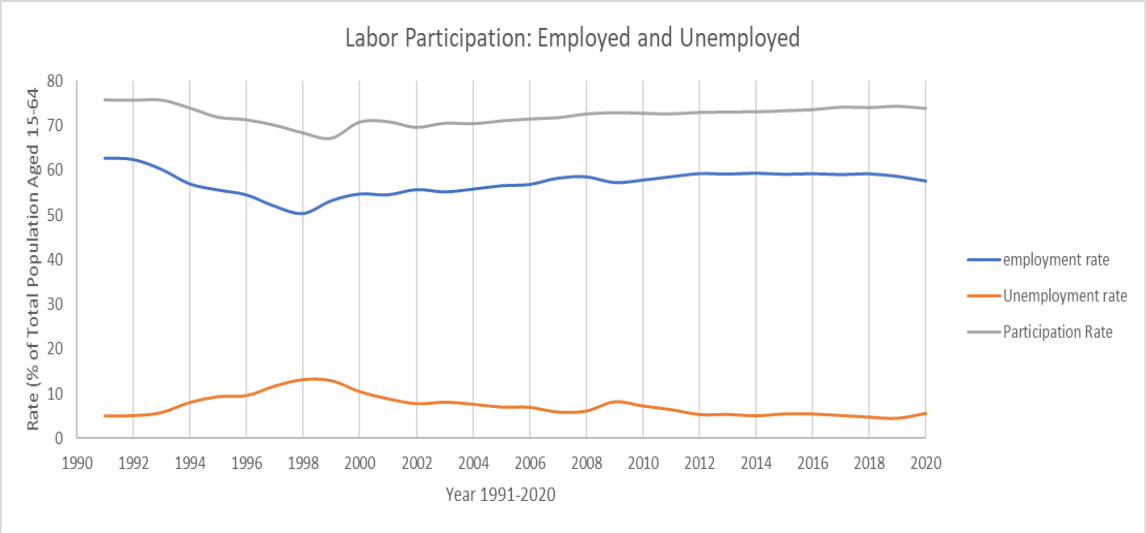


Figure 3: Labour participation, employment, and unemployment rates

The employment rate determines the extent of labour participation in industries in Russia utilising the available resources (people present to work). According to Figure 4, Russia's employment rate declined from its highest in 1991 at 62.76 to 1998, when it reached its lowest at 50.31 but started to recover from 1999 to reach a high of 59.39 in 2014 (also see Figure 3). At an annual average of 57.73 and a standard deviation of 1.80, the employment rate reveals the proportion of people employed against the working-age population in Russia. The employment rates move with changes in the economic cycle. Over the long-term, government roles in higher education and income support policies or those redefining employment of women, youths, and disadvantaged groups. The working-age adjustments impact the number of people available in a population to work.

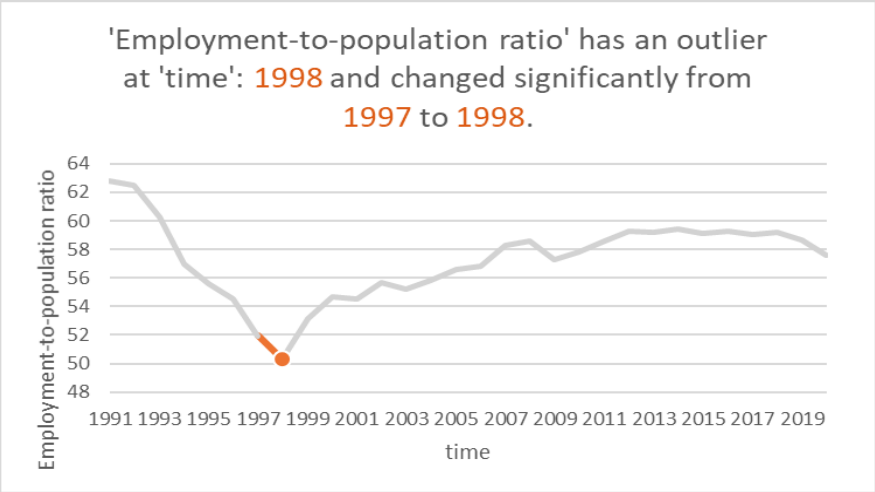


Figure 4: Employment rate, also called employment-to-population ratio

Taking labour participation rate, employment rate, and unemployment rate together offers a comprehensive image of the job market. When a labour market has a high participation rate and low unemployment rate shows, the labour market is robust (Herrendorf, Rogerson, and Valentinyi, 2014). Figure 3 indicates the participation rate (average at 72.414, minimum at 67.10, maximum at 75.88) and unemployment rate (average at 7.371, minimum at 4.6, maximum at 13.26) implies the employment rate at (average at 59.293, minimum at 50.31, maximum at 62.76). The employment rate and labour participation rate and unemployment rate and labour participation rate are highly correlated (See figure 4). Consequently, the Russian labour market has been highly flexible and stable over the past three decades (1991-2020).

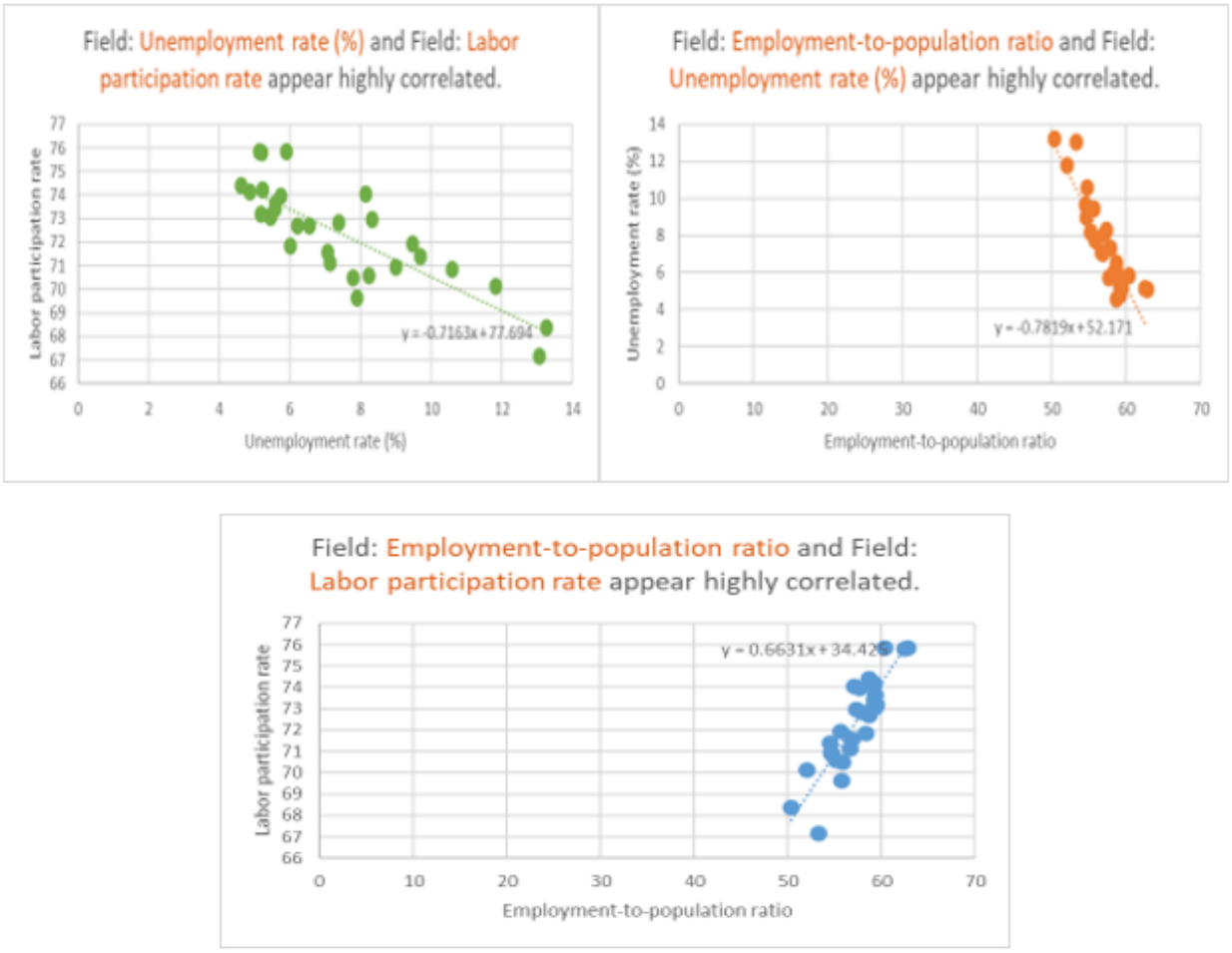


Figure 5: Correlation between labour participation, employment, and unemployment rates

4.3 Employment by Sector

The Russian job market derives employment from different economic activities. The economic activities fall under three industrial sectors (agriculture, manufacturing, and service). Getting information based on the sector of economic activities is important in revealing the wide changes in employment and identifying the stage of economic development. A detailed dataset of employment by sectors of economic activity allows the engagement of statistics in determining the shares of workers in each sector (agriculture, manufacturing, service) by the total employment in the economy. Comparing the percentage share of workers in each sector serves as a comparative extension to suggestions under sustainable development goal (SDG) 9 (Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation) that

proposes the use of the share of workers employed in the manufacturing sector as an indicator of the progress of an economy to attaining SDG 9.

ILOSTAT and World Bank provided data about employment by sector of economic activity and detailed categories of economic activities. The study takes total employment as all working-age people who were under employment and self-employment at a specified period. They were in a working-age population who were above the legal working age. For statistical reasons, the study collected people between 15 and 64 as the specific age group meeting a threshold for inquiring about an economic activity; The age group 15 – 64 years is suggested for use to ensure international compatibility. The classification of people employed by economic activity means that it infers to the main economic activity of the company the person worked for during the period of reference. The branch of economic activity of a person is not dependent on specific functions/duties the person does for a job but on the features of an economic unit employing the person.

The understanding by Rusanovskiy and Markov (2018) inspired an analysis of employment by sector. As economies develop, they tend to reallocate jobs from agriculture and labour-intensive primary sectors to other capital-intensive emerging sectors in service sectors. In facilitating the shift, workers migrate from rural to urban, yet the economic rate of employment in agriculture drops like the service sector increases. In this respect, in a country with an industrial structural shift and implying an advancing economy, an evaluation of employment by sector over time series should show increasing employment in the service sector at a reduction in the agriculture sector.

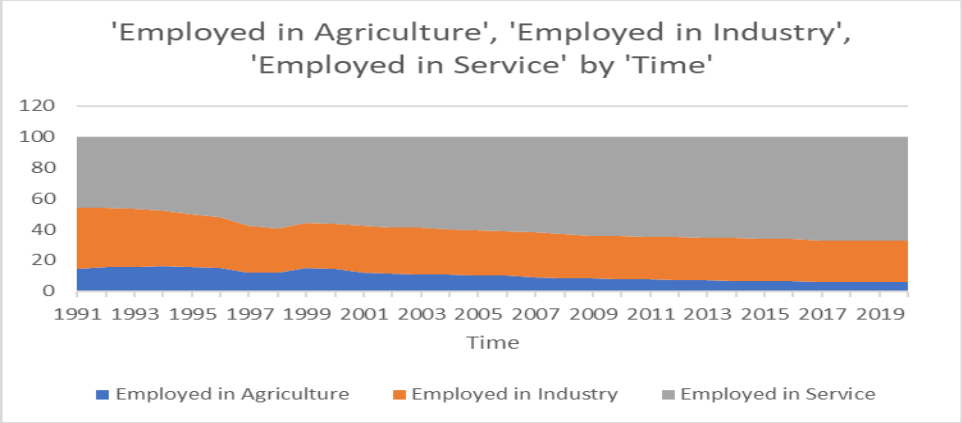


Figure 6: Proportions of sectoral employment by the job market

The three sectors defining Russia's economic activity reveal an interesting structural transformation of the labour market. Figure 6 demonstrates that the service sector provides the highest number of employment chances than manufacturing, runners up, and agriculture, the lowest. Figure 7 shows the structural transformation of the labour market from the three sectors defining Russia's economic activity over three decades of this study. At a low of 5.82 per cent and high at 16.15 per cent with 3.561 standard deviation employment from agriculture, expectations are that agriculture levels of employment were significantly lower than what manufacturing contributed (low at 26.69%, high at 39.96%, std dev. 3.177) and service sector (low at 45.68%, high at 67.38% std dev. 6.911) despite the wide variability of employment rates within each sector over the years. From this revelation, the service sector extracted its workforce from manufacturing in the first decade (1991 - 2000) but shifted to the agriculture sector in the second and third decades (2000 – 2020).

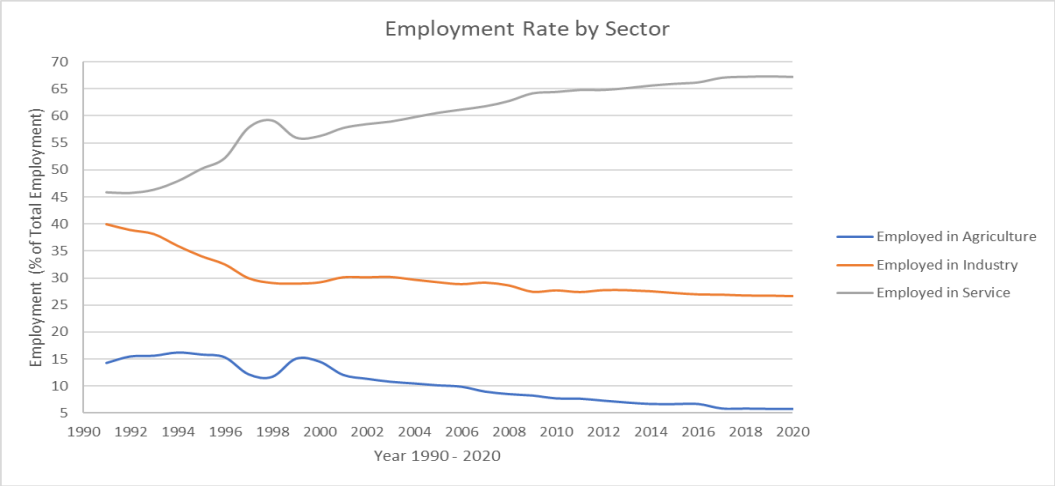


Figure 7: Three sector economic activities of Russia's economy

The study agreed that a structurally transforming economy reduces the size of workers in agriculture significantly. Thus, it affirmed that Russia had undergone a significant structural transformation over the three decades of study. Over the three decades of study, Russia's agriculture activities contribution to the labour market was as low as it employed an average of 10.32 per cent of Russia's workforce annually. A visualization of yearly change over the three-decade time series of employment by sector reveals the detailed structural transformation workforce in the agricultural sector. The agriculture sector saw a slightly rising change in the

number of people employed from 1991 to 1993 before it slumped consistently to 1998 when there was a sudden great that took just one year (1999) to slightly recover but marked the beginning of a steady steep decline in employment in this sector. A linear line of best fit shows that the trend is slopping from the upper right-hand corner to the bottom left corner, a negative gradient (- 0.389). The indication affirms that the number of people employed in agriculture declined steadily over three decades of study. As a suggestion of these findings, there is a possibility that the Russian economy demands more workers to move from the labour-intensive agricultural sector to capital-intensive sectors. An indication is the transformation of industries from primary economic activities to tertiary ones. However, this is subject to confirmation by workers' movement within the manufacturing and service sectors.

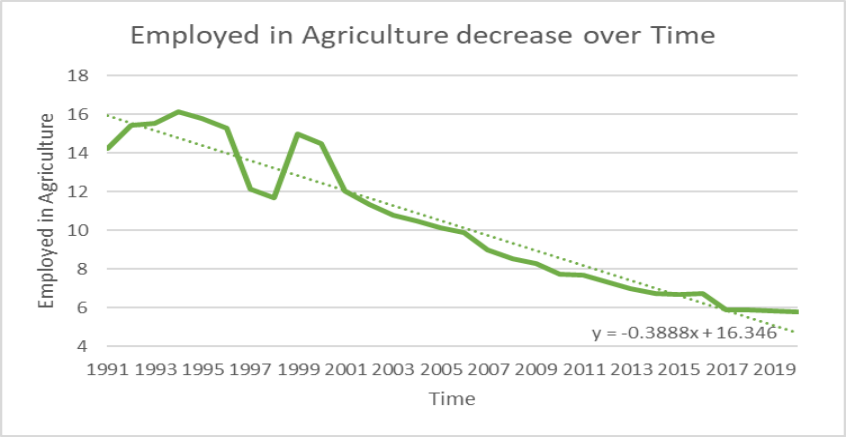


Figure 8: People employed in the agricultural sector between 1991 and 2020

Institutes (refer to SDG 9), scholars and economic commentators reveal that manufacturing is the driver of economic growth in some developed countries. In worrying whether manufacturing provided labour to a high number of employees in the Russian economy, the study generated a three-decades time series of employment in the manufacturing sector against time. The study observed that when there is structural transformation, the number of people employed in the manufacturing sector tends to decline. At an annual average of 30.03 per cent of total employment in Russia, manufacturing was the second-lowest contributor to the labour market after agriculture (lowest). For the manufacturing sector, there was a high steady decline in the number of people working in the manufacturing sector over the first decade (1991-2000) with a noticeable low reached in 1998. Still, there was a slightly apparent decline in employment in the sector from 1999

to 2020. Upon fitting a linear line of best fit on the generated graph to show the overall employment trend in the manufacturing sector, the study confirmed that the trend declined from the upper-left corner to the bottom-right corner, with a negative gradient (-0.355). Compared to workers' movement from agriculture (-0.389), the service sector had a lesser transformation in the number of workers employed. The observation that the manufacturing sector expressed a decline in the number of workers employed was unsatisfactorily supported by existing literature. Li et al. (2022) revealed that the number of workers in the manufacturing sector increased with industries moving from labour-intensive to capital-intensive. Qianfangming (2009) observed no considerable change in the number of workers employed by the manufacturing sector as countries transformed their economies.

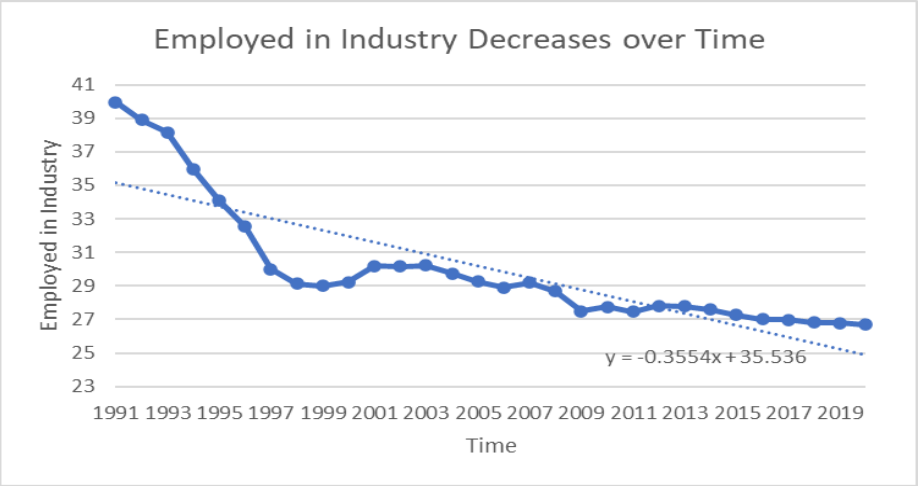


Figure 9: People employed in the manufacturing sector between 1991 and 2020

The proportion of workers migrating from agricultural and manufacturing sectors of economic activities in Russia was moving to jobs in the service sector. Amid a steady decline in the number of people employed by agriculture and manufacturing economic activities in Russia, the service sector of economic activity reported a steady increase in the number of people employed. At an annual average of 59.65 per cent of the total employed in the service sector compared to that of the manufacturing sector at 30.32 and the agricultural sector at 10.3, the service sector was the highest ranking and highly dominant contributor of employment in the labour market. Even though there was a spike in 1997 and sudden rectification of trends in employment in the service sector in 1998, afterwards was a steady rise number of people employed from 1999 to 2020. After drawing

a linear line of best fit to determine the direction of change in employment within the service sector, the resultant line rose from the bottom-left corner to the upper-right corner, a positive gradient (0.743). The findings imply that the number of people working in the service sector rose across the three decades of study. It is comparable that the agriculture sector lost workers at a gradient of -0.388 and the manufacturing sector at a gradient of -0.344. Yet, at a gradient of 0.743 number of workers employed in the service sector increased. It suggests that there is a high chance that workers are migrating from the manufacturing and agricultural sectors to the service sector. However, further testing is essential before reaching this conclusion.

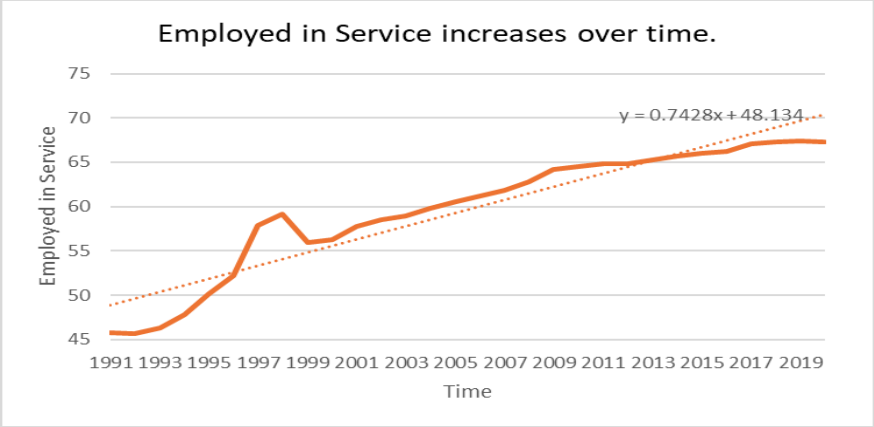


Figure 10: People employed in the service sector between 1991 and 2020

The correlation between the number of people employed in agriculture, manufacturing, and service sectors is an advanced test for investigating whether workers move from agriculture and manufacturing sectors to the service sector. The correlation conducted is in three groups – between those employed in service and agriculture sectors, employed in service and manufacturing sectors, and employed in agriculture and manufacturing sectors. After drawing points using the two coordinates of the above variables, a line of best fit passed through the maximum possible number of points on the scatterplot with an equal number of points above and below the line. With the line of best fit, it was possible to determine the nature of the association between the two variables. When the best fit line rises from left to right, it shows a positive correlation. When it drops from left to right, the variables negatively associate. From the line of best fit, one can determine the slope of the line and establish Pearson's correlation coefficient based on the understanding by

Ludbrook (2010) that *Pearson's (r) is just the standardized slope of a simple linear regression line (fit)*.

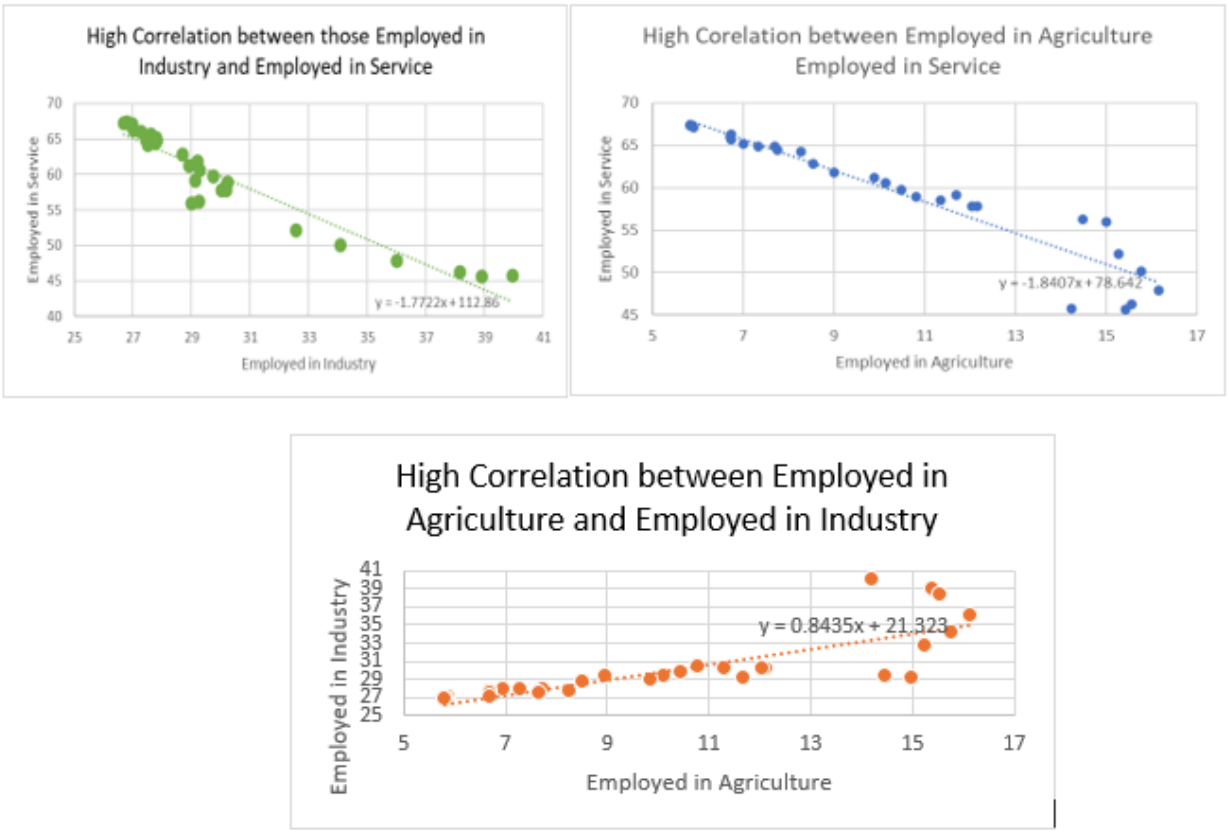


Figure 11: Correlation analysis between those employed in agriculture, manufacturing, and service sectors

With interpretation drawn from the line of best fit and the slope gradient, it was possible to determine the association between those employed in agriculture, manufacturing, and service. As figure 11 reveals, there was a high negative correlation between those employed in industry and service sectors. The line of best-fit drops from the top-left corner to the bottom right corner. The gradient of the slope at -1.772 affirms the observations made. Equally, With the line of best fit descending from the top-left corner to the bottom-right corner, it is established by a gradient of slope at -1.84 that the figure shows a similarly strong negative correlation between those employed in service and agriculture. However, those employed in manufacturing and agriculture presented a strong positive correlation. In approval is a 0.844 gradient of the slope and a slope rising from

the bottom-left corner to the top-right corner. Correlation analysis affirms that labour movement in the manufacturing and agriculture sectors is direct and similar. It means that workers do not move between the manufacturing and agriculture sectors. The workers demanded by the two sectors are different and do not affect the Russian economy. On the contrary, labour movement between manufacturing and service or agriculture and service sectors is indirect and inverse. The workers' movement from manufacturing or agriculture to the service sector affects labour available for other economic activities. In this respect, the Russian economy is experiencing an industrial transformation from 1991 to 2020, characterized by workers migrating to the service sector in the manufacturing and agriculture sector.

4.4 Value-added by Sector

Value-added refers to the net output by a sector after adding up its outputs minus the intermediate inputs. It does not consider the depreciation of fabricated assets or the degrading and depreciation of natural resources. The value-added shows the value created from economic activities of creating goods and services, a net value from summing all output minus the value of intermediate consumption. It also reflects the income available from the labour and capital resources contribution towards the production process. Disaggregating value-added data by sector of economic activity, it reveals the value-added created by the several industries under primary (agriculture), secondary (manufacturing), and tertiary (service) levels of economic activities.

The data for value-added as provided by International Standard Industrial Classification (ISIC) is in US dollar value. It reveals the additional features from the extra economic value of the structural transformation of products and services offered in the economy. A transforming economy tends to create more value from products and services generated from the primary level of economic activities. As a developing economy, Russia added the highest value in the service sector, followed by the manufacturing sector, and the lowest generated in the agriculture sector (see Figure 12). Hence, it defines that Russia, a transforming economy, tends to shift more value-added in manufacturing and service sectors while the agriculture sector does not change.

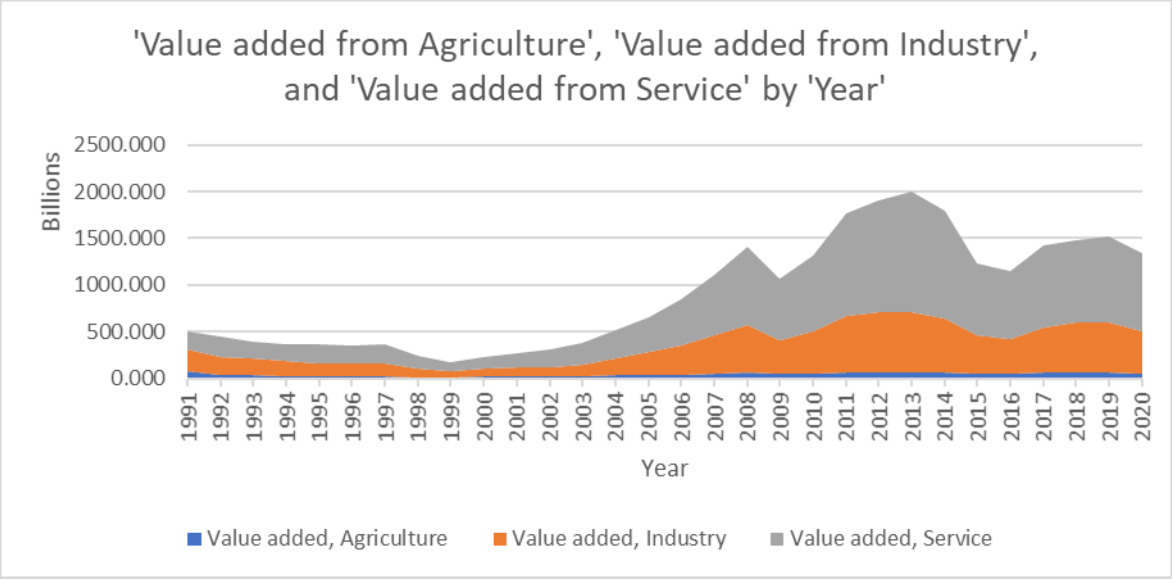


Figure 12: Changes in value-added by agriculture, manufacturing, and service sectors

The value-added to the Russian economy by its different sectors can reveal the movement of its structural transformation over the three decades (1991 – 2020) of study. From the average total annual value-added by Russia's economy worth 898.13 billion US dollars, agriculture's average annual value-added is very low at 5 per cent at 41.57 billion US dollars, manufacturing 35 per cent at 316.49 billion dollars, and the service sector contributes 60 per cent at 540.07 billion US dollar (see figure 12). The service sector has contributed the highest value-added to the economy, manufacturing the second-highest, and agriculture the least amount added. Looking at figures 12 and 13, a detailed time series presentation of value-added over the three decades of study, one understands that there were instances when one of Russia's economic activities sectors added lower value than others. However, the movement in value-added affected all sectors at the same time; a reduction in one sector coincided with that of another sector.

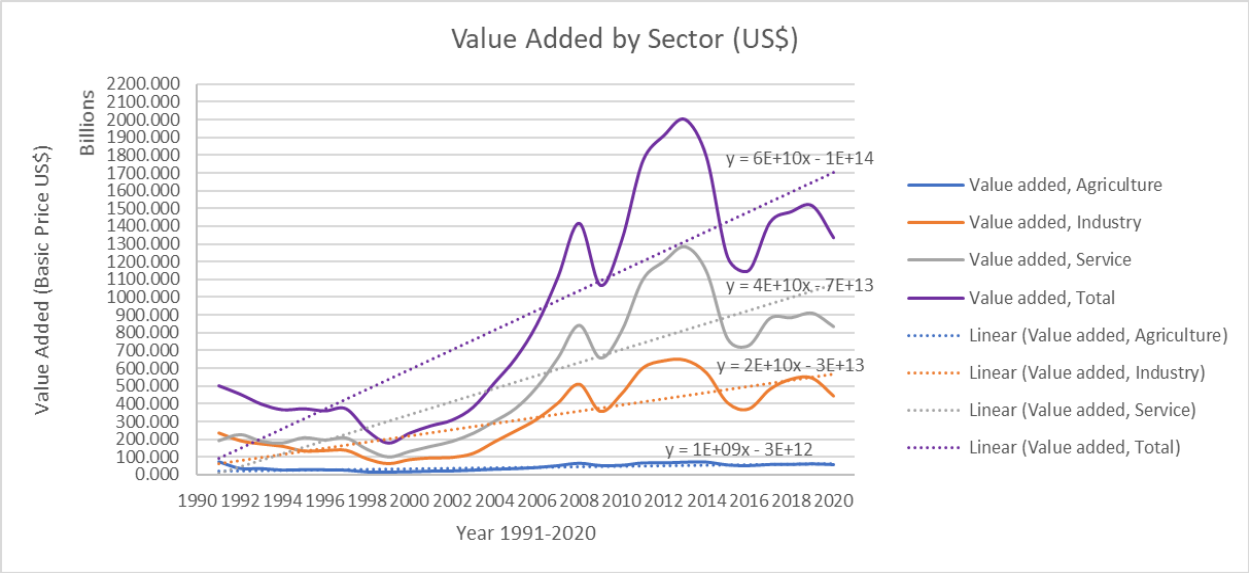


Figure 13: Time series (1991-2020) value-added in agriculture, manufacturing, service, and the total economy

The three sectors of Russia's economic activities reveal that structural transformation caused similar movements of different magnitudes in value-added by agriculture, manufacturing, and service economic activities. Agriculture (range of 58.44 billion US dollars, standard deviation at 18.88 billion US dollars) adds little value to the total value-added to the economy when compared to the value-added by manufacturing (range of 580.66 billion US dollars, standard deviation at 197.74 billion US dollars) and service (range of 1188.84 billion US dollars, standard deviation at 381.47 billion US dollars) sectors. Value-added to the total economy by service sector is more than tenfolds that added by agriculture and two folds that of manufacturing sectors. The value the manufacturing sector adds to the economy is about five folds from the agriculture sector. As fitted lines of best fit reveal in their gradient of slopes increasing from bottom-left corner to right-hand corner, the value-added to the economy by agriculture, manufacturing, and agriculture sectors is positive.

The consideration of value-added in US dollar by sector provides a one-sided visualization of change in value-added based on sector. An economic activity sector could have growth yet negatively impact the economy depending on its contribution to gross domestic product (GDP). Despite the increase in value-added in dollar values, its translation into the impact it causes on

GDP could be lower, especially when GDP grows higher than in past years in some sectors. At the same time, it grows slower or stagnates in others. GDP refers to the total unduplicated value for goods and services a certain economy produces. One calculates GDP through value-added by determining the sector or industry's output before subtracting its intermediary consumption (the goods and services engaged in producing the output). Summing all value-added by each sector gives the country's total economic activity by determining value-added by sector as a percentage of GDP. The figures for agriculture, manufacturing, and service sectors result in 100. In this respect, checking each sector of economic activities by value-added as a percentage of GDP can show a proportion of the total GDP and a time series showing whether a sector contributes to growth, stagnation, or destruction of wealth. For value-added as a percentage of GDP is a ratio (proportion), it reveals whether the overall outcome of value-added (despite growing over the years – See section 4.3) for each sector causes wastage (declining line of best fit), increases wealth (rising line of best fit), or does not change (constant line of best fit).

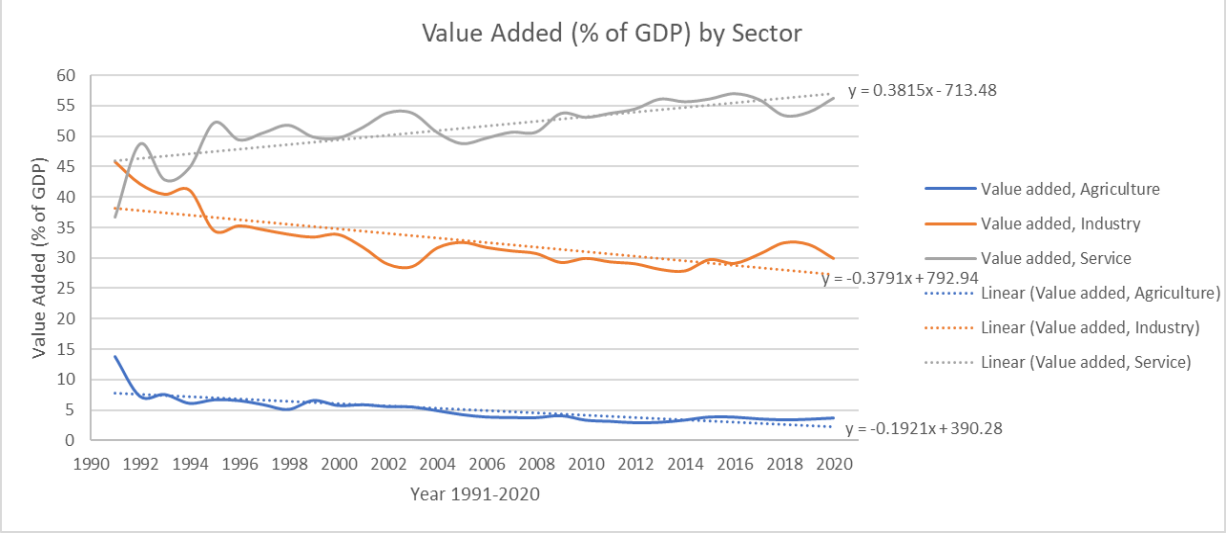


Figure 14: Value-added as a percentage of GDP by sectors of economic activities

The value-added percentage of GDP for each sector reveals an interesting industry structural transformation for Russia's economy. In evaluating the movement of value-added as a percentage of GDP per sector, figure 14 shows the time series trends. At an annual average of 5.02 per cent, the agriculture sector has the lowest contribution to the overall GDP. Coming in second is manufacturing at a yearly average of 32.73 per cent contribution to the total GDP. At an annual

average of 51.54 per cent, the service sector is the highest contributor to the total GDP. The value-added percentage of GDP for agricultural and manufacturing sectors has declining trends from 1991 to 2020. The line of best fit for both has negative gradients and slants from the upper-left to the bottom-right of the graph. Thus, the two slopes show the significance of the valued agricultural and manufacturing sectors created concerning the growth of GDP reduces in importance over time series. In contrast, the value-added percentage of GDP for the service sector has an increasing trend from 1991 to 2020. The line of best fit reveals a positive gradient with a rising slope from the lower-left to the upper-right of the graph. From this observation, one can conclude that value-added as a percentage of the service sector into the GDP gains significance over the time series of study. Thus, the observation can inform understanding that despite the increase in value generated from the agriculture and manufacturing sectors to the GDP, their contribution is low compared to GDP growth inspired by the service sector. Their importance for structural transformation reduces with more growth in the service sector.

4.4.1 Value-added by Agriculture Sector

A look at value-added by the agricultural sector of economic activity shows a conflicting development compared to the existing literature about its participation in industry structural transformation. Existing literature implies that an economy experiencing industrial transformation reduces the value-added from the agricultural sector as more workers and resources are no longer participating in the agricultural sector. In the face of structural transformation, the economies that perform better in their agricultural sector managed to generate a small value addition or retained a zero-value addition. The analysis of Russia’s agricultural sector's contribution to value-added in the structural transformation of the country reveals that it underwent stages of slumping and growing at different times (See Figure 15).

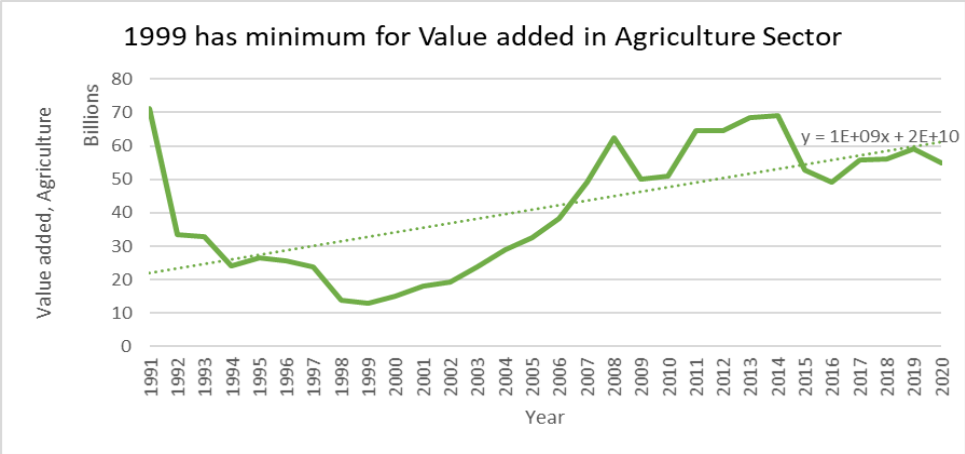


Figure 15: Value-added from the agriculture sector

According to Figure 15, the Russian economy had some trends supporting evidence by most researchers about the contribution of agriculture in the transformation of industrial structure. Other trends contradicted the evidence from existing research. In the first decade of the analysis, Russia had negative value-added from the agricultural sector (1991 – 1999). It implied resources (labour force, capital, equipment) previously engaged in agricultural production and manufacturing or service sectors. For the second decade (2000-2009), the value-added to the economy from agricultural activities increased steadily but dropped suddenly in 2008 but recovered promptly in 2009 to continue rising in 2010. The third decade (2010 – 2020) had the value-added from the agricultural sector increase to 2015 when it suddenly slumped but started to recover and slowly improve to 2020. The last two decades of study (2000 – 2020) imply that Russia managed to develop resource participation in agriculture or other primary production. The fact that Russia depends on mining and other extractive activities explains why Russia's effort toward structural transformation improves the primary sector of economic activities. Upon investigating the value-added trend to the economy from agricultural activities, the line of best fit provides a positive gradient and slope slanting to the upper-right corner from the bottom-left one to show an improving value-added over time series of study.

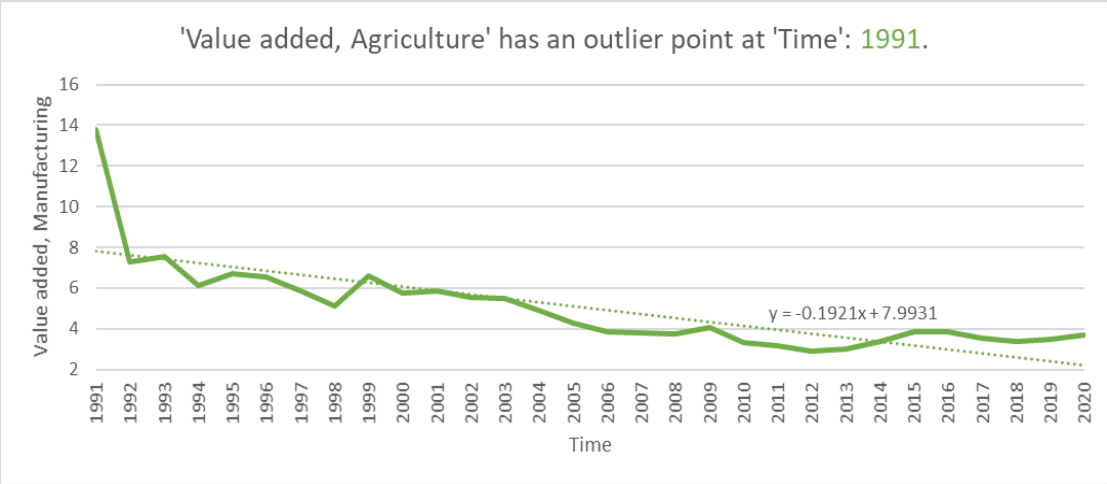


Figure 16: Change in value-added as a percentage of GDP for the agriculture sector

Considering value-added by the agriculture sector as a percentage of GDP reveals the proportionate change (the change in GDP reflects a change in value brought by agriculture). It provides a better visualization of the trends of change in GDP regarding a change in value-added by the agriculture sector over the time series studied. As figure 16 reveals, the value agriculture added to the GDP was high but declined in the first decade of the study (1991 – 2000). By the second and third decades of study (2000 – 2020), the agriculture sector's value to the GDP continued to decline significantly. With a weak correlation between GDP and value generated from the agricultural sector (see -0.19 gradient of the slope), the value-added by agriculture sector did not considerably impact GDP despite being rising in value. The GDP growth rate was higher than the value growth rate derived from the agricultural sector. Thus, GDP continued growth to higher levels rendering agricultural growth at a minimal rate lesser significant to the structural transformation of Russia's economy.

4.4.2 Value-added by Manufacturing Sector

The manufacturing sector's value-added plays an important role in assuring industrial structure transformation. Existing literature emphasizes the need for a manufacturing sector to guarantee industrial structure transformation. However, having a high industrial concentration does not guarantee colossal wealth generation. In addressing this conflicting view in the context of Russia’s

economy, the study generated a graph of value-added by the manufacturing sector against the time series of study in figure 17.

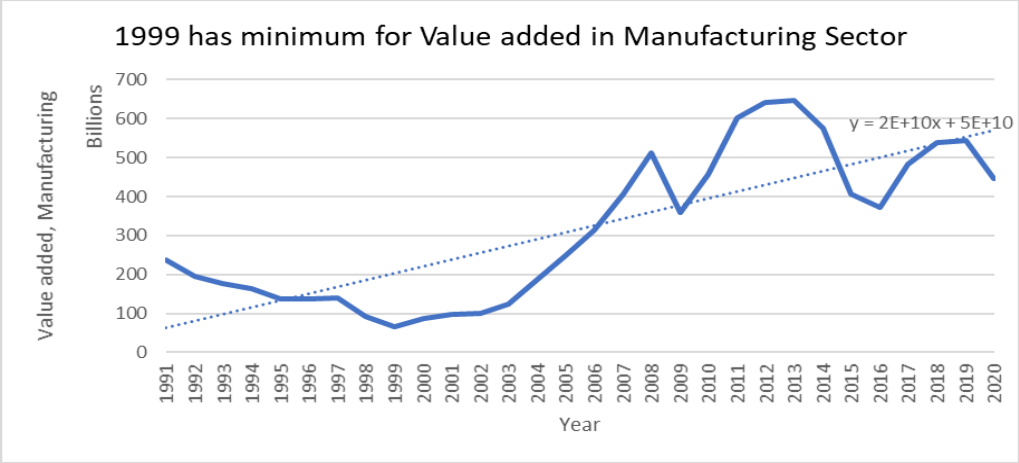


Figure 17: Value-added from the manufacturing sector

Figure 17 shows a decline in value-added from the manufacturing sector from 1991 to reach the lowest in 1999. From 2000, the value-added from manufacturing started to improve steadily until 2008/9 when it slumped but recovered instantly in 2010 (see figure 17). It continued to grow from 2010 until 2014 when it dropped immediately and resumed its sustained positive recovery from 2015 to the present (see figure 17). After generating a line of the best fit, its positive gradient and slope rising from the bottom-left corner to the upper-right corner assures that Russia's industrial structural transformation includes value-added from manufacturing sectors.

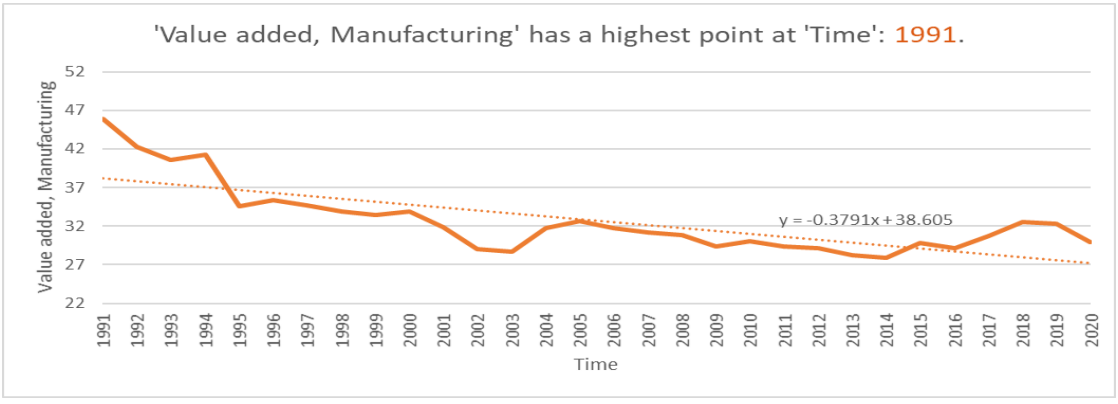


Figure 18: Change in value-added as a percentage of GDP for the manufacturing sector

An evaluation of value-added by the manufacturing sector as a percentage of GDP reveals trends in comparing economic growth rate and the contribution made by the manufacturing sector. The value-added to GDP by the manufacturing sector is declining over the time series. The first decade (1991 – 2020) had high levels of value-added. However, the second and third decades (2001 – 2020) presented a stagnant trend despite some annual variations, revealing that value-added to the GDP from the manufacturing sector was slightly lower than the GDP but relevant and significant. The moderate negative association between GDP and the manufacturing sector (gradient of the linear equation at -0.38) means that the value derived from the manufacturing sector to the GDP significantly contributed to the overall industrial structure outlook.

4.4.3 Value-added to Service Sector

When an economy grows and transforms its industrial structure, it generates high value created from improving services provided to the economic sectors. For this argument, there is high movement of resources from primary and secondary levels of economy activities to the tertiary one. In addressing this concern within context of Russia's economic growth and transformation of industries, figure 19 presents a graph showing value-added in the service sector over the three decades of study. The intense labour demanded in agriculture and manufacturing started participating in the capital intensive market and benefited from low manual work and better pay.

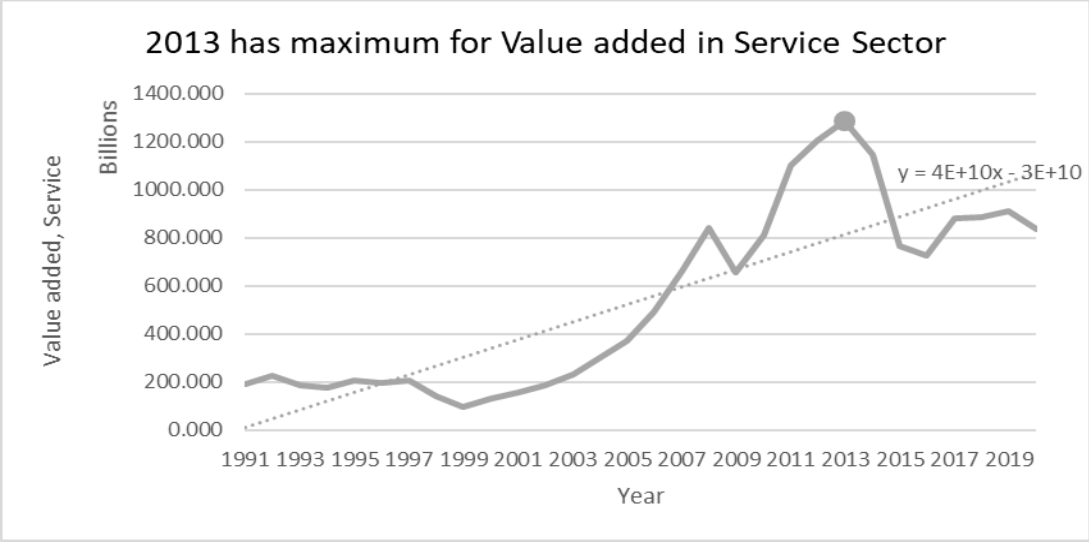


Figure 19: Value-added from the service sector

The graph in figure 19 showed a decrease in value-added by the service sector from 1991 to 1999 when it reached the lowest. From 2001, the value-added to the economy started to achieve the highest in 2013. Even though in the second decade of study (2000 – 2010) the value-added from the service sector slumped for the year 2007/8 but recovered in 2010/2011, the slump in the third decade (2011 – 2020) year 2014/15 was severe that recover that started in 2016/17 is positive and continue to improve the condition in 2020 slowly. The drawn line of best fit generates a positive gradient for a slope of trends from the bottom-left corner to the top-right one. It confirms that Russia experienced positive value-added by service sector as evidence of structural transformation over the three decades of study.

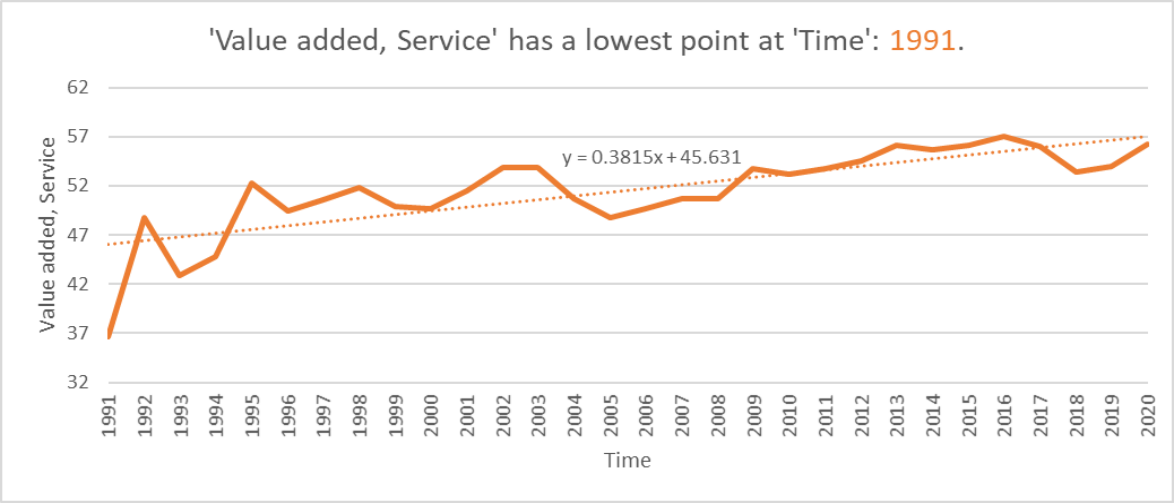


Figure 20: Change in value-added as a percentage of GDP for the service sector

Investigating the association between value-added by the service sector as percentage of GDP can reveal a comparative aspect (value generated by service sector against the total outcome transformation). A graph in Figure 20 shows that the trends of value-added by the service sector as a percentage of GDP start at its lowest in 1991 and increase throughout the study. The year 1991 presented the minimum point of value-added by the service sector as a percentage of GDP. The first decade (1991 – 2000) shows that the service sector's value-added as a percentage of GDP grew at a considerably high rate. From the second and third decades (2000 – 2020), the growth slowed down and stagnated even though it occurred at variations over time. In evaluating the overall value-added trends as a percentage of GDP, the trendline drawn reveals that the slope is

rising at 0.382. Consequently, it means that value-added by the service sector as a percentage of GDP grew and became critical over the time series of study.

4.4.4 Relationship between Value-added by Sector

In a comparative look at value-added movement by agriculture, manufacturing, and service sectors, the three sectors present a similar trend in value generation. As figure 21 shows, the three sectors present a decline in value creation to reach the lowest in 1998/99 and the highest in 2012/2013. The three sectors experience two sudden slumps in their growing value-added – on 2007/8 and 2015/16. A literature check confirms that these are the times the Russian economy suffered from economic meltdowns. The 1998/99 economic crisis grew slowly and crippled value generation over time, unlike the 2007/8 and 2015/16, which were sudden occurrences. Russia's industries managed to recover their economic activities instantly after the 1998/99 and 2008/8 economic crisis but were slow in the 205/16.

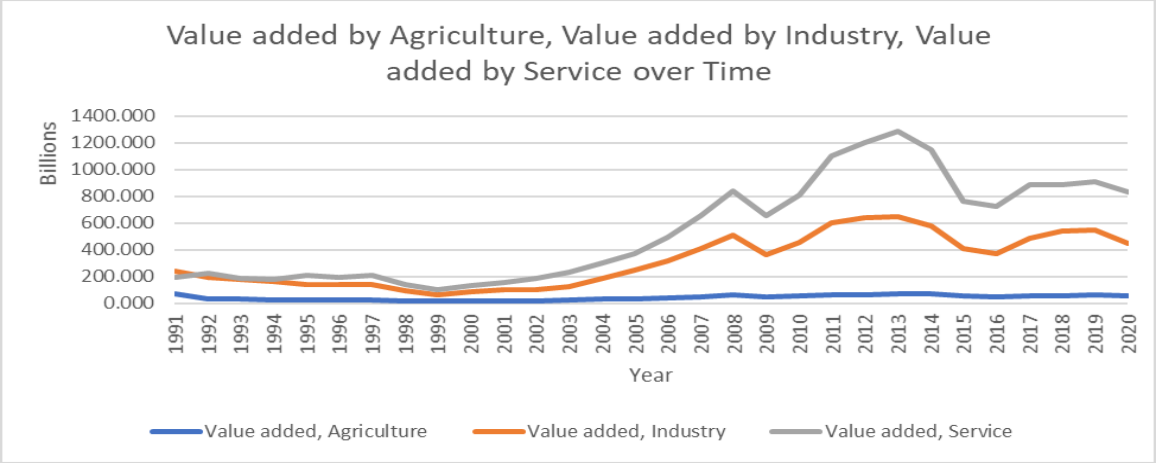


Figure 21: Value-added by agriculture, manufacturing, and service sectors over time

Another observation from figure 21 is that all the three sectors (agriculture, manufacturing, service) are growing their value-added over time series of study. The argument from the existing literature is that Russia's economy highly depends on extractive resources, primary levels of economic activities to generate secondary and tertiary levels of economic activities. Russia must improve its extractive resources for a positive improvement in manufacturing and service sectors. Despite this dependence, the service sector manages to generate the highest level of value-added than

manufacturing, the runners up, and the agriculture sector, the lowest. In this direction, the study confirms that the service sector depends on primary and secondary levels of economic activities to add a higher value than they do. In affirming this observation, the study conducted a further analysis (correlation analysis) between the value-added by the three sectors of economic activities.

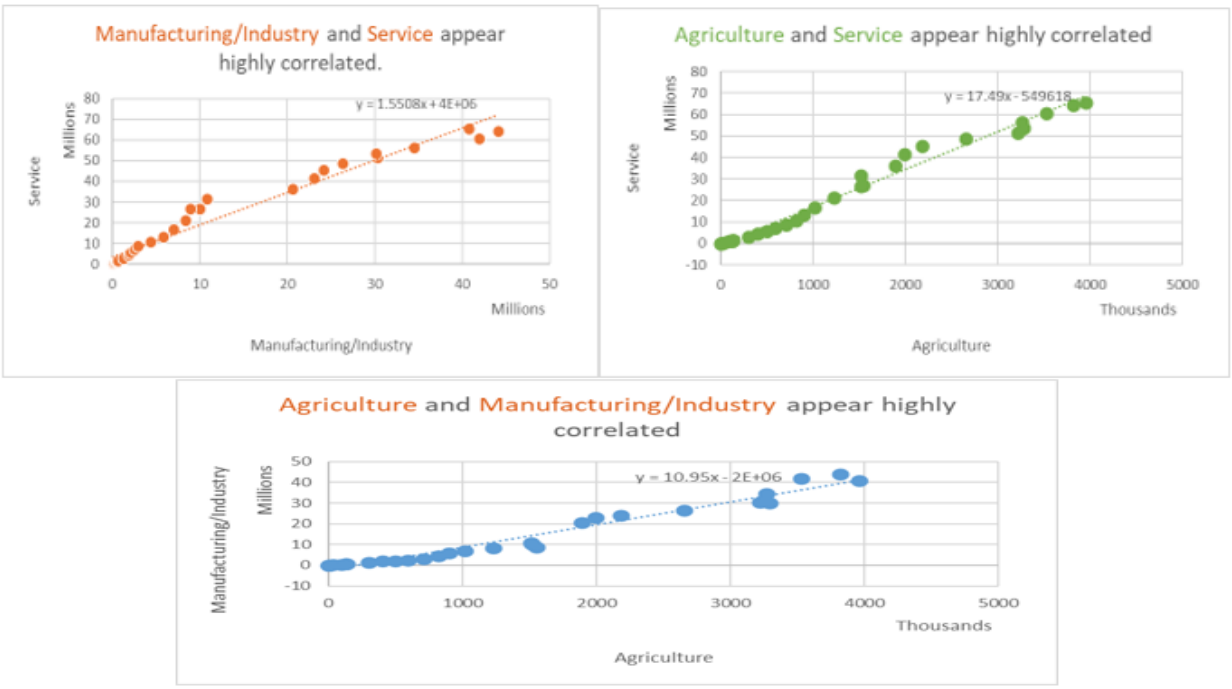


Figure 22: Correlation analysis between value-added by agriculture, manufacturing, and service sectors

The value-added by sector in US dollars reveals a strong positive or direct correlation between the agriculture, manufacturing, and service sectors (see figure 22). The gradients for the slopes between variables value-added from agriculture, manufacturing, and service sectors are positive. The slope is rising from the bottom-left corner to the top-right corner. In this regard, when one of these three sectors improves, it likely generates an increase in the other.

Figure 23: Correlation analysis between value-added from agriculture, manufacturing, and service sectors as a percentage of GDP

The association between value-added by agriculture, manufacturing, and service as per centage of GDP indicates the importance of each sector to the overall value of the Russian economy. As figure 23 reveals the correlation association between value-added by agriculture, manufacturing, and service as per centage of GDP shows, value-added is a negative correlation between value-added for both manufacturing and agriculture against value-added from service as per centage of GDP. However, the value-added from agriculture and manufacturing the per centage of GDP has a strong positive correlation. A graph in Figure 20 showing the value-added trends by the service sector as per centage of GDP implies that the movement is contrary to those experienced by the agriculture (figure 16) and manufacturing (figure 18) sectors. While the manufacturing and agriculture sectors had their maximum point in 1991, the service sector presented the lowest point in 1991. Despite the manufacturing and agriculture sector showing a declining value-added as per centage of GDP, especially in the first decade of study, the service sector had the highest growth in value-added as per centage of GDP. As agriculture continued to decline its contribution to per centage of GDP in

the second and third decades of study, manufacturing and service sector contribution stagnated even though with some yearly variations. Thus, Contrary to declining values added to GDP in the manufacturing and agriculture sectors, the service sector presents a rising percentage of value-added to the GDP. It implies that among the three sectors, the value-added to GDP by the service sector increased in significance over the time series of study, followed by the value-added by the manufacturing sector, and agriculture value reduced with an increase in GDP.

CHAPTER 6: CONCLUSION, RECOMMENDATION, & FUTURE RESEARCHER

6.1 Summary of Study

Russia was an attractive economy for this study based on its special path to economic recovery after the fall of the Soviet Union. The important difference between Russia and other industrialized economies is considerable industrial power (human resources and natural resources). However, the policy strategies by Russia do not have strategic objectives to exploit its comparative advantages (highly qualified workers and natural resources). The country faces the challenge of coming up with a framework for creating new industrial power from relics of the Soviet Union that were at levels of world leaders in the 1960s and 1970s. From the 1990s, Russia made some efforts like privatising public institutions and setting up economic zones. Still, the control of economic activities in Russia by some section of rich people affected the ambitious moves by the government. In this regard, one wonders what transformation the Russian government completed to improve the economy. The most common framework is studying industrial structure transformation as the most reliable identifier of economic growth.

The study described Russia's industrial structure transformation through a three-sector model. The study followed a three-sector model that divides a country's economic activities into three broad sectors. The agricultural category implies the primary level of economic activities, manufacturing is the secondary one, and service is tertiary. The primary (agriculture) sector focuses on extracting raw materials or deriving natural resources from the land. Any economic activity in Russia that grew goods or extracted raw materials from natural resources was put in the class of agriculture. The economic activities under this class include fishing, mining, farming, and oil production. The secondary (manufacturing) sector involves economic activities for converting the raw materials from the primary sector to create new products. Examples of economic activities under this category include construction, manufacturing, food production or building companies. The tertiary (service) sector involved economic activities that provided service to other businesses or people. They include economic activities offered by health and pharmaceutical facilities, wholesalers, retailers, and banking institutions. Therefore, the study evaluated Russia's industry structure transformation through the changes in primary, secondary, and tertiary levels of economic activities under three sectors (agriculture, manufacturing, and service).

The study bases its industrial structural transformation on the observation that the shift of labour from the lower productive sector to high productive results in higher value addition (static gains) as a factor that invigorate rapid technology gain and economic growth (dynamic gains). The interaction of static and dynamic gains explains why structural transformation results in speedy economic growth. As dynamic gains are secondary to static gains, the study focused only on the value-added and employment structure changes in agriculture, manufacturing, and service sectors of economic activity. The study evaluated changes within each variable and interaction between different variables in this respect. For instance, the study evaluated changes in the job market, employment by sector, and value-added by sector as changes within each variable. Later, it evaluated the association between value-added from agriculture, manufacturing, and service sectors and changes in employment structures by value-added per each economic sector – a study of the interaction between different variables.

The study engaged several theories about a country's industrial structure transformation when explaining the findings. For instance, the theory about comparative advantage determined by factor endowment implies that firms move up the industrial ladder and become more progressive and competitive in more capital and skill intensive products. In return, this results in upgrading the overall economy's factor endowment and industrial structure. Critics of the theory argue that depending on factors endowment can be slow for the country to develop. It affects expected structural change and industrial upgrades that limit a country's growth potential. The critics observe that attaining new capabilities, and undertaking new productive activities through strategic industries, even before the correct factor endowment is in place, can generate structural change and industrial upgrade expected in a country.

Another theory argued during this study is the resource-based industrialization theory. The theory observes that resource-rich economies suffer from the resource curse, the Dutch disease, that penalizes the manufacturing industry and causes unsatisfactory results for industrial development and long-term economic development. Like discovering commodity price booms, the discovery of natural resources can cause manufacturing to shrink. Incentives to reallocate resources (labour, capital) to primary sectors of production of commodities divert resources meant for production. An influx of revenue creates an exchange appreciation that makes other economic activities like manufacturing less competitive.

The final theory about the global value chain (GVC) explains how countries focus on lowering lower value-added activities to increase employment, insert themselves into global trades, and learn through production and interactions with other GVC participants. For the challenges in GVC to structural transformation, the study argues about the employment of industrial policies to drive industrial upgrades in value chains.

6.2 Results of the Study

The study analysed the job participation rate, employment rate, and unemployment rate to comprehend the structure of the industrial job market in Russia from 1991 to 2020. With an annual average of 72.4 and a standard deviation of 2.1, with 67.2 being the minimum and 75.9 maximum, the study reveals that Russia has had a stable job market that allows a high number of people aged between 15 and 64 years to provide labour towards the development of economy despite the significant rise and drops in the levels of employment. The study discovered that the labour participation rate over the study duration did not fall below the world average of 59. The study focused on analysing the timeline of the time series in three decades (the first decade from 1991 to 2000, the second decade from 2001 to 2010, and the third decade from 2011 to 2020). In the first decade (1991 – 2000), the labour participation rate dropped steadily to the lowest level in 1991 at 67.19. from the second decade, the labour participation rate improved drastically, and the trend continued into the second decade.

The unemployment rate affirms the proportion of the working population not contributing to economic growth. The study reveals that Russia has a higher unemployment rate at an annual average of 7.371, a standard deviation of 2.41, a minimum of 5.13 and a maximum of 13.86. Its labour market is highly volatile from the wide range of unemployment. When checked through the three decades of analysis, the first decade (1991 – 2000) increased unemployment steadily and considerably to the highest point (13.86). From the second decade (2001 – 2010), unemployment started to decline constantly, and the trend continued in the second decade (2011 – 2020).

The employment rate provides the size of the working population sustained by the Russian economy over the study duration. With an annual average of 57.73, a standard deviation of 1.8, a minimum point of 50.31 and a maximum of 59.39, the study affirmed that Russia employs more

than the average number of people in a working population. However, the wide range of employment rates across the time series of the study shows that Russia has unstable, lesser secure, and undependable job opportunities for the working population.

As correlation analysis reveals, labour participation rate, unemployment rate, and employment rate in Russia are highly related. The check of a gradient of the slope for steepness and direction, a strong indirect movement happened between employment and unemployment rates (gradient at -0.782), a moderate indirect shift occurred between unemployment and labour participation (gradient at -0.716), but the employment rate and labour participation rates were highly correlated (gradient at -0.66). In this respect, the change in labour participation causes a similar change in the employment rate and inverse to the unemployment rate.

The study also analysed trends in Russia's economy to show employment by sector. The analysis was about agriculture, manufacturing, and service sectors of economic activities during the three decades of the study (the first decade from 1991 to 2000, the second decade from 2001 to 2010, and the third decade from 2011 to 2020). The study revealed that the number of people employed in the agriculture sector reduced steadily from the first decade to the second and third. On the contrary, the number of people working in the manufacturing and service sectors increased across the second and third decades of the study. At an annual average of 10.32 per cent, agriculture employed the lowest number of people, manufacturing was the second at 30.03 per cent, and service employed the largest number of people at 59.69 per cent. Across the time series, the study revealed that the number of people employed in agriculture (gradient steepness and direction of slope at -0.388) and manufacturing (gradient steepness and direction of slope at -0.344) sectors reduced over time, unlike those in service (gradient steepness and direction of slope at -0.743) that increased with time. The number of people employed in the agriculture and manufacturing sectors had a high positive correlation (gradient steepness and direction of slope at -0.844). Like trends about people employed in agriculture and service sector who presented a strong negative correlation (gradient steepness and direction of slope at -1.841) is the association between those employed in manufacturing and service (gradient steepness and direction of slope at -1.772).

Another consideration by the study was the relationship in value-added by sector. The relationship studied was at two levels – value-added in dollar values (reveals whether the value per sector was

increasing or decreasing over time) and value-added in the percentage of GDP (showing whether the value-added output resulted in a positive contribution or negative one). The study affirmed that the value-added in dollars by agriculture, manufacturing, and service sectors increases over the study timeline. However, the value-added by each sector varied considerably – agriculture added only 5 per cent at an annual average of 41.57 billion US dollars, manufacturing 35 per cent at 316.49 billion dollars, and the service sector contributed 60 per cent at 540.07 billion US dollars. It means that the service sector followed at second by manufacturing, and service as the last one contributed to the largest sector transformation. The value-added by the service sector was ten folds added by agriculture and twice the one from manufacturing. The value of manufacturing was five-fold that of agriculture. The correlation of the dollar value for each economic sector added to the Russian economy created an understanding that the value-added by manufacturing versus service (1.551), agriculture versus service (17.49), and agriculture versus manufacturing (10.9551) sector had a strong positive association.

Analysis in value-added in dollars check whether there was growth over timeline of study while value-added as per centage of GDP determines the significance of value-added to the economy. The association between value-added as a percentage of GDP and sector was different from an observation made from value-added analysis in dollars. At the value in dollars' worth 5.02 per cent of the GDP, agriculture contribution was almost insignificant compared to the second-lowest, manufacturing sector, at a dollar's value worth 32.73 per cent of GDP, and the highest impacting sector, the service sector, at dollar's value worth 51.54 per cent of GDP. The value-added percentage of GDP by manufacturing and agriculture sectors declined, unlike the service sector, which showed improvement over the study time series (1991 – 2020). The line of best fit at a gradient of -0.19 reveals that the agriculture slope was the least steep, dropping from left-upper to bottom-right compared to manufacturing sectors at a gradient of -0.38. The service sector line of best fit rose from bottom-left to upper-right at a gradient of 0.382. With this information, the service sector was the only one making a positive contribution to the overall value-added to the economy, with manufacturing and agriculture devaluing the economy. For the value they added to the economy, correlation analysis affirms that there is a strong negative correlation between manufacturing and service sectors and agriculture and service sectors. However, the manufacturing and agriculture sectors' value-added had a strong positive correlation. The service sector

significantly contributed to the economy's growth, unlike the agriculture and manufacturing sectors.

6.3 Recommendations from the Study

The study recommends an analysis of labour participation rate, unemployment rate, and employment rate as an overview of the job market of any country. When evaluating industry structural transformation in Russia, this study focused on the changes in the job market in the country. The study revealed that labour participation rate, employment rate, and unemployment rates could provide an overview of the job market of a nation. They were summing employment rate to unemployment rate results in the labour participation rate. For instance, this study conducted their averages, standard deviation, range, minimum, and maximum alongside a trendline mapping to show Russia's job market changes over the past three decades. The study managed to reveal the movements in employment rate and unemployment rates with the way they affected labour participation rate. In this regard, it assessed how labour participation rate, unemployment rate, and employment rates could define the structure of a job market. The study affirmed that changes in the employment rate had a positive change on the labour participation rate, unlike changes in the unemployment rate with a negative outcome. The analysis of labour participation rate and unemployment rate affirmed to the reader that analysis of employment alone would give an image of what to expect in the labour participation rate and unemployment rate. In this respect, the researcher recommends using the employment rate to reveal how different industries an economy employ affect a country's utilization of the working population for economic growth.

As this study revealed that industry structure transformation is about workers moving between sectors, it is recommended that other researchers apply it in their studies. The study also suggests that employment and value-added by sector are essential when measuring industry transformation structure. The employment by sector provides a proportion of the number employed by agriculture, manufacturing, and service sector. Comparing these proportions over a time series, one can understand how one sector (agriculture for this study) loose labour to another gains them (service) and the one with little change (manufacturing). In this respect, an industry structure transformation involves economic activities in industries that make workers migrate from labour-intensive sector

to capital intensive. Workers seek employment opportunities that come with chances to earn a better life and provide work at levels they enjoy.

An investigation of value-added by sector (in the dollar and percentage of GDP) provided interesting outcomes about a measure of industry transformation structure. By value-added in dollars, the study observed value increased or decreased over the time series of the study. For this case, the dollar value for each sector increased over the past three decades. It was a positive aspect and consideration that raised the question of how it transformed the structure of the industry in Russia. In checking the change caused to the economy, the value-added by each sector as a percentage of GDP provides a proportionate measure of value against the overall outcome of the economy. It allowed the determination of the impact value-added by each sector caused on the overall economy. For this study, value-added from the service sector contributed to 52 per cent of GDP, manufacturing added 32 per cent of GDP, and agriculture generated 5 per cent of GDP. The evaluation concluded that the value derived from the service sector was the driving force transforming the industry in Russia, as participating in the manufacturing and agriculture sector was no longer adding value. The study recommends using value-added in the dollar to determine whether each sector is growing its value or not and the value-added as a percentage of dollars to reveal the proportionate impact of value-added from each sector.

The study recommends evaluating employment rates by value-added for each sector to reveal the impact of structural transformation on industries. An increase in the share of total employment results in a decrease in value-added, a percentage of GDP and dollars value, by sector. The manufacturing sector has a hump shape relationship between shares of employment and value-added as a percentage of GDP and dollars. It reveals an increasing share of total employment at increasing value-added as a percentage of GDP and in dollars for low development levels. However, during high development levels, the share of total employment decreases, reducing value-added as per centage of GDP and dollars. The service sector contradicts the manufacturing industry; an increase in the share of total employment results in an increased value-added as a percentage of GDP. In this respect, the study reveals that the agriculture sector resulted in low value-added, and value-added from manufacturing starts declining when value-added from the service sector begins to accelerate. In this respect, each sector's evaluation of employment rates by value-added can measure the industry's structural transformation.

6.4 Direction of Future Researchers

The study experienced several limitations that form the basis for the future researcher. The research had limited time, human resources, and finances. The researcher sought to work with websites that offered data without charges. It left a gap that important data for this study missed the possible high cost. Some analytic methods were outside of the scope of this study based on understanding levels. The future researcher can mobilize to have enough human resources, time, and finances to access all data they might need and analytical processes that can result in the best outcome of the study.

The research topic, industry structure transformation in Russia, was broad and left the researcher wandering to fulfil it. The researcher opted to narrow on job or labour market analysis. In doing so, the researcher left consumption markets and the outcome of industrial transformation for the specificity of this study. The narrow number of words was another reason for taking a minimal and one side of industry structure transformation. The future researcher can consider all aspects of industry structure transformation in Russia. In so doing, the researcher will generate a complete view of industry structure transformation.

List of References

[1] Acevedo, A., Mold, A. and Perez, E., 2009. The sectoral drivers of economic growth: a long-term view of Latin American economic perfomance. Cuadernos económicos de ICE, (78), pp.117-142.
[2] Advantour (2022). Russian Industry - Major Industries. Available at: https://www.advantour.com/russia/economy/industry.htm#:~:text=Currently%20Russian%20consists%20of%20the,industry%2C%20transport%2C%20road%20and%20agriculture (Accessed: 23 January 2022).
[3] Aghion, P., Cai, J., Dewatripont, M., Du, L., Harrison, A. and Legros, P., (2015). Industrial policy and competition. American Economic Journal: Macroeconomics, 7(4), pp.1-32.
[4] Ahrend, R. and Tompson, W., (2005). Fifteen Years of Economic Reform in Russia: What has been achieved? What remains to be done? Available at: https://ssrn.com/abstract=881547 or http://dx.doi.org/10.2139/ssrn.881547 (Accessed: 25 June 2022).
[5] Alcorta, L., Haraguchi, N. and Rezonja, G., (2013). Industrial structural change, growth patterns, and industrial policy. In The Industrial Policy Revolution II (pp. 457-491). Palgrave Macmillan, London.
[6] Aliaskarova, Z., Pashkus, V. and Blagikh, I., 2020. Proactive industrial policy as the main strategy for improving Russia's competitiveness in the context of global economic processes. In SHS Web of Conferences (Vol. 74, p. 06002). EDP Sciences.
[7] Andreoni, A., Mondliwa, P., Roberts, S. and Tregenna, F., 2021. Towards a new industrial policy for structural transformation. In Structural Transformation in South Africa (pp. 337-362). Oxford University Press.
[8] Anwer, M., Farooqi, S. and Qureshi, Y., 2015. Agriculture sector performance: An analysis through the role of agriculture sector share in GDP. Journal of Agricultural Economics, Extension and Rural Development, 3(3), pp.270-275.
[9] Aris, B. and Tkachev, I. (2019). Long Read: 20 Years of Russia's Economy Under Putin, in Numbers. The Moscow Times. Available at: https://www.themoscowtimes.com/2019/08/19/long-read-russias-economy-under-putin-in-numbers-a66924 (Accessed: 25 June 2022).
[10] Atakian, J. (2013). Industrial shift: The structure of new world economy. New York, NY: Palgrave MacMillan
[11] Atiyas, I., 2015. Structural Transformation and Industrial Policy. Policy Perspectives, 16.
[12] Bah, E.H.M., 2007. A three-sector model of structural transformation and economic development. Available at: https://mpra.ub.uni-muenchen.de/id/eprint/32518 (Accessed: 23 January 2022).
[13] Baldwin, R.E., (1969). The case against infant-industry tariff protection. Journal of political economy, 77(3), pp.295-305.
[14] Baoyu, P., 2013. Tertiary Industry Development in Henan: Structural Transformation and Geographical Distribution [J]. Henan Science, 5.
[15] Beason, R. and Weinstein, D.E., (1996). Growth, economies of scale, and targeting in Japan (1955-1990). The review of Economics and Statistics, pp.286-295.
[16] Berardino, C.D. and Onesti, G., 2020. Service-oriented manufacturing: assessing the role of intermediate services in industrial transformation in China. International Journal of Economic Policy in Emerging Economies, 13(2), pp.128-151.

[17] Bianchi, P., Durán, C.R. and Laboury, S. eds., 2019. Transforming industrial policy for the digital age: Production, territories and structural change. Edward Elgar Publishing.
[18] Blakeslee, D.S., Chaurey, R. and Malik, S., 2017. Structural Transformation and Spillovers from Industrial Areas. Available at SSRN 3049617.
[19] Butakov, P.V., 2018. The goals of industrial policy of the Russian Federation: State intervention into the economy as a factor of industrialization. Available at: https://www.um.edu.mt/library/oar/handle/123456789/30102 (Accessed: 23 January 2022).
[20] Chambers, R.G., (2002). Exact nonradial input, output, and productivity measurement. Economic Theory, 20(4), pp.751-765.
[21] Chen, C., 2020. Capital-skill complementarity, sectoral labour productivity, and structural transformation. Journal of Economic Dynamics and Control, 116, p.103902.
[22] Chen, J. and Xie, L., (2019). Industrial policy, structural transformation and economic growth: evidence from China. Frontiers of Business Research in China, 13(1), pp.1-19.
[23] Chernopyatov, A., 2018. Labour Productivity in the Economy of the Russian Federation: Analysis. Opción: Revista de Ciencias Humanas y Sociales, (85), pp.679-703.
[24] Cornick, J., 2014. Transforming Economies: Making Industrial Policy Work for Growth, Jobs and Development, Edited by Jose Manuel Salazar-Xirinachs, Irmgard Nubler and Richard Kozul-Wright. Available at: https://heinonline.org/hol-cgi-bin/get_pdf.cgi?handle=hein.journals/intlr153&section=32 (Accessed: 23 January 2022).
[25] Criscuolo, C., Martin, R., Overman, H. and Van Reenen, J., (2012). The causal effects of an industrial policy (No. w17842). National Bureau of Economic Research.
[26] Didenko, N., Kunze, K. and Skripnuk, D., 2015. Russian export strategy and social sector: Consequences of resource-oriented exports on population of Russia. Mediterranean Journal of Social Sciences, 6(5), p.473.
[27] El-hadj, M.B., 2009. A three-sector model of structural transformation and economic development. In DEGIT Conference Papers (No. c014, p. 039). DEGIT, Dynamics, Economic Growth, and International Trade.
[28] Felipe et al., 2014; Palma, 2005; Rodrik, 2016; UNCTAD, 2003a
[29] Gabardoa, F.A., Porcileb, G. and Pereimac, J.B., (2018). On the determinants of structural change: an exploratory model. ANPEC Sul. Available at: https://escueladeverano.cepal.org/2018/sites/escver-2018/files/gabardo_e_porcile_2018_-_on_the_determinants_of_structural_change_an_exploratory_model_0.pdf (Accessed: 25 June 2022).
[30] Gershman, M., Gokhberg, L., Kuznetsova, T. and Roud, V., 2018. Bridging S&T and innovation in Russia: A historical perspective. Technological Forecasting and Social Change, 133, pp.132-140.
[31] Gokhberg, L. and Kuznetsova, T., 2011. S&T and innovation in Russia: key challenges of the post-crisis period. Journal of East-West Business, 17(2-3), pp.73-89.
[32] Greenwald, B. and Stiglitz, J.E., (2013). Learning and industrial policy: Implications for Africa. In The industrial policy revolution II (pp. 25-49). Palgrave Macmillan, London.
[33] Gulin, K.A.E. and Ermolov, A.P., 2015. National Industrial Policy of Russia in the Framework of Neo-Industrial Vector of Development: Conceptual Approaches. Economic and Social Changes: Facts, Trends, Forecast, (6), pp.58-77.
[34] Han, Y., Huang, L., and Wang, X. (2017). Do industrial policies promote industrial structure upgrading? Theory and evidence from China's development. Economic Research Journal, 8, 33–48.

[35] Harrison, A. and Rodríguez-Clare, A., (2010). Trade, foreign investment, and industrial policy for developing countries. Handbook of development economics, 5, pp.4039-4214.
[36] Hepburn, D., Black, A., Ferrazzi, M., Goldstein, A., Hurst, D. and Owen, M., 2013. The World's Industrial Transformation. Chatham House, The Royal Institute of International Affairs.
[37] Herrendorf, B., Rogerson, R. and Valentinyi, A., (2014). Growth and structural transformation. In Handbook of economic growth (Vol. 2, pp. 855-941). Elsevier.
[38] Herrendorf, B., Rogerson, R. and Valentinyi, A., 2014. Growth and structural transformation. In Handbook of economic growth (Vol. 2, pp. 855-941). Elsevier.
[39] Imbs, J. and Wacziarg, R., 2003. Stages of diversification. American economic review, 93(1), pp.63-86.
[40] Iwasaki, I. and Suganuma, K., 2015. Foreign direct investment and regional economic development in Russia: an econometric assessment. Economic Change and Restructuring, 48(3), pp.209-255.
[41] Jones, S.R. and Riddell, W.C., (1999). The measurement of unemployment: An empirical approach. Econometrica, pp.147-161.
[42] Ketels, C., 2017. Structural Transformation: A competitiveness-based view. Handbook on Structural Transformation, Oxford University Press: Oxford.
[43] Khasanov, I.S., 2014. Three-sector structure of the national economy of Russia. Mediterranean Journal of Social Sciences, 5(12), pp.149-149.
[44] Kim, K., Mungsunti, A., Sumner, A. and Yusuf, A., 2020. Structural Transformation and Inclusive Growth. WIDER Working Paper WP-2020-31. Helsinki: UNU-WIDER. https://doi. org/10.35188/UNUWIDER/2020/788-0.
[45] Kniivila, M., 2007. Industrial development and economic growth: Implications for poverty reduction and income inequality. Industrial development for the 21st century: Sustainable development perspectives, 1(3), pp.295-333.
[46] Langhammer, R.J., 2008. Sectoral distortions and service protection in Russia: A comparison with benchmark emerging markets and EU accession candidates. Eastern European Economics, 46(6), pp.70-83.
[47] Li, Y., Ma, H., Xiong, J., Zhang, J. and Divakaran, P.K.P., 2022. Manufacturing structure, transformation path, and performance evolution: An industrial network perspective. Socio-Economic Planning Sciences, p.101230.
[48] Lim, S. and Harland, D., 2001. Dynamic modelling of a three-sector transitional economy. Available at: https://researchcommons.waikato.ac.nz/handle/10289/1661 (Accessed: 23 January 2022).
[49] Lin, J.Y. and Treichel, V., 2014. Making Industrial Policy Work for Development. Transforming Economies: Making Industrial Policy Work for Growth, Jobs and Development. Ed. by Jose M. Salazar-Xirinachs, I. Nubler, R. Kozul-Wright. ILO. P. 65, 78.
[50] Ludbrook, J., (2010). Linear regression analysis for comparing two measurers or methods of measurement: but which regression? Clinical and Experimental Pharmacology and Physiology, 37(7), pp.692-699.
[51] Lyocsa, S., Svoboda, S. and Vyrost, T., 2010. Industry concentration dynamics and structural changes: The case of aerospace & defence (No. 20/2010). IES Working Paper.
[52] Marquez, M.A., Ramajo, J. and Hewings, G.J., (2009). Incorporating sectoral structure into shift–share analysis. Growth and change, 40(4), pp.594-618.

[53] Mathur, R.S., 1972. Economic Development and the Tertiary Sector. Indian Journal of Industrial Relations, pp.31-45.
[54] Mau, V. (2016). Russian Economic Reforms: Lessons and Challenges. Available at: https://www.dahrendorf-forum.eu/event/russian-economic-reforms-lessons-and-challenges/ (Accessed: 25 June 2022).
[55] McMillan, M.S. and Rodrik, D., 2011. Globalization, structural change and productivity growth (No. w17143). National Bureau of Economic Research.
[56] Melkadze, A. (2022). Agriculture in Russia. Available at: https://www.statista.com/topics/6923/agriculture-in-russia/ (Accessed: 23 January 2022).
[57] Merkulova, E.Y., Cheremisina, N.V. and Cheremisina, T.N., 2017. Characteristics of Convergence Processes of Urban and Rural Population of Russia. In Overcoming Uncertainty of Institutional Environment as a Tool of Global Crisis Management (pp. 191-197). Springer, Cham.
[58] Metallurgy-Russia (2022). Welcome to Metallurgy. Available at: https://www.metallurgy-russia.com/ (Accessed: 23 January 2022).
[59] Mijiyawa, A.G., 2017. Drivers of structural transformation: The case of the manufacturing sector in Africa. World Development, 99, pp.141-159.
[60] Mikheeva, N.N., 2016. Comparative analysis of labour productivity in Russian regions. Regional Research of Russia, 6(2), pp.105-114.
[61] Mordor Intelligence (2022). Key Sectors of Russia Market | 2022 - 27 | Industry Share, Size, Growth. Available at: https://www.mordorintelligence.com/industry-reports/analysis-of-key-sectors-of-russia (Accessed: 23 January 2022).
[62] Moro, A., 2012. The structural transformation between manufacturing and services and the decline in the US GDP volatility. Review of Economic Dynamics, 15(3), pp.402-415.
[63] Nubler, I., 2014. A theory of capabilities for productive transformation: Learning to catch up. Transforming Economies, p.113.
[64] OECD, (2015). Options for Low Income Countries Effective and Efficient Use of Tax Incentives for Investment: A Report to the G-20 Development Working Group by the IMF, OECD, UN and World Bank. Available at: https://elibrary.worldbank.org/doi/abs/10.1596/22923 (Accessed: 8 February 2022).
[65] Ott, N. and Wagner, G.G. eds., 2013. Income inequality and poverty in Eastern and Western Europe. Springer Science & Business Media.
[66] Oughton, C., Landabaso, M. and Morgan, K., (2002). The regional innovation paradox: innovation policy and industrial policy. The Journal of Technology Transfer, 27(1), pp.97-110.
[67] Oyelaran-Oyeyinka, O. and Lal, K., 2016. Structural Transformation in Developing Countries: Cross Regional Analysis. United Nations Human Settlements Program (UN-Habitat), 1.
[68] Piesse, J. and Thirtle, C., 1997. Sector-Level Efficiency and Productivity in Hungarian Primary, Secondary, and Tertiary Industries, 1985–1991. Eastern European Economics, 35(4), pp.5-39.
[69] Podmolodina, I.M., Voronin, V.P. and Konovalova, E.M., 2015. Main directions and mechanisms of industrial policy of Russia. Asian Social Science, 11(20), p.170.
[70] Qianfangming, C., 2009. An empirical study on the structural transformation of manufacturing industry in zhejiang [J]. Science Research Management, 5.

[71] Revathi, R. and Aithal, P.S., 2019. A Review on Impact of Information Communication & Computation Technology (ICCT) on Selected Primary, Secondary, and Tertiary Industrial Sectors. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3391455 (Accessed: 23 January 2022).
[72] Rodrik, D., 2013. Structural change, fundamentals, and growth: an overview. Institute for Advanced Study, 23.
[73] Romanova, O.A., 2018a. Industrial Policy Priorities of Russia in the Context of Challenges of the Fourth Industrial Revolution. Part 2. Ekonomika Regiona, (3), p.806.
[74] Romanova, O.A., 2018b. Industrial policy priorities of Russia in the context of challenges of the fourth industrial revolution. Part 1. Ekonomika regiona, (2), p.420.
[75] Rusanovskiy, V.A. and Markov, V.A., 2018. Employment and labour productivity in macroregions of Russia: Spatial interdependence. Studies on Russian Economic development, 29(2), pp.135-143.
[76] Russkova, E.G., Mitrofanova, I.V., Vatyukova, O.Y., Ivanov, N.P. and Batmanova, V.V., 2017. Structural Changes in the GDP of Russia in 1995-2015: Sectoral approach. Regional and Sectoral Economic Studies, 17(1), pp.39-54.
[77] Russkova, E.G., Mitrofanova, I.V., Vatyukova, O.Y., Ivanov, N.P. and Batmanova, V.V., 2017. Structural Changes in the GDP of Russia in 1995-2015: Sectoral approach. Regional and Sectoral Economic Studies, 17(1), pp.39-54.
[78] Salazar-Xirinachs, J., Nübler, I. and Kozul-Wright, R., 2014. Industrial policy, productive transformation and jobs: theory, history and practice. Transforming Economies. Making industrial policy work for growth, jobs and development.
[79] Salazar-Xirinachs, J., Nubler, I. and Kozul-Wright, R., 2014. Transforming economies: Making industrial policy work for growth, jobs and development,(Eds) Geneva: ILO.
[80] Salazar-Xirinachs, J.M., Nubler, I. and Kozul-Wright, R., 2014. Transforming economies. Making industrial policy work for growth, jobs and development. Geneva.
[81] Savona, M. and Lorentz, A., (2005). Demand and technology determinants of structural change and tertiarisation: an input-output structural decomposition analysis for four OECD countries (No. 2005/25). Laboratory of Economics and Management (LEM), Sant'Anna School of Advanced Studies, Pisa, Italy.
[82] Schafran, A., McDonald, C., Lopez Morales, E., Akyelken, N. and Acuto, M., 2018. Replacing the services sector and three-sector theory: urbanization and control as economic sectors. Regional Studies, 52(12), pp.1708-1719.
[83] Sergi., B.S., 2018. Exploring the Future of Russia? s Economy and Markets. Emerald.
[84] Shkolnikov, V.M., Andreev, E.M., Tursun-Zade, R. and Leon, D.A., 2019. Patterns in the relationship between life expectancy and gross domestic product in Russia in 2005–15: a cross-sectional analysis. The Lancet Public Health, 4(4), pp.e181-e188.
[85] Simachev, Y. and Kuzyk, M., (2018). Industrial development, structural changes, and industrial policy in Russia. In Exploring the Future of Russia's Economy and Markets. Emerald Publishing Limited.
[86] Simachev, Y. and Kuzyk, M., 2018. Industrial Development, Structural Changes, and Industrial Policy in Russia. In Exploring the Future of Russia’s Economy and Markets. Emerald Publishing Limited.
[87] Simachev, Y., Kuzyk, M., Kuznetsov, B. and Pogrebnyak, E., 2013. Industrial policy in Russia in 2000-2013: Institutional features and key lessons. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2459905 (Accessed: 23 January 2022).

[88] Singh, H. (2020). What is the Sector-wise contribution of GDP in India? Available at: https://www.jagranjosh.com/general-knowledge/what-is-the-sectorwise-contribution-in-gdp-of-india-1519797705-1 (Accessed: 24 January 2022).
[89] Sit, V.F., 2020. Industrial Transformation of Hong Kong. The Hong Kong–Guangdong Link, pp.163-186.
[90] Skryl, T., 2017. Modern Trends Of Industrial Policy And Its Impact On Russian Economic System. ЦИТИСЭ, (1), pp.3-3.
[91] Skufina, T., Baranov, S., Samarina, V. and Shatalova, T., 2015. Production functions in identifying the specifics of producing gross regional product of Russian Federation. Mediterranean journal of social sciences, 6(5 S3), p.265.
[92] Slepov, V.A., Burlachkov, V.K., Danko, T.P., Kosov, M.E., Volkov, I.I., Grishina, O.A. and Sekerin, V.D., 2017. The country's economic growth models and the potential for budgetary, monetary and private financing of gross domestic product growth. Available at: https://www.um.edu.mt/library/oar/handle/123456789/32774 (Accessed: 23 January 2022).
[93] Song, L., and Wang, X. (2013). Key industrial policies, resource resetting and industrial productivity. Management World, 12, 63–77.
[94] Sozinova, A.A., Okhrimenko, O.I., Goloshchapova, L.V., Kolpak, E.P., Golovanova, N.B. and Tikhomirov, E.A., 2017. Industrial and innovation clusters: development in Russia. International Journal of Applied Business and Economic Research, 15(11), pp.111-118.
[95] Statista (2022). Russia - Distribution of gross domestic product (GDP) across economic sectors 2020. Available at: https://www.statista.com/statistics/271378/distribution-of-gross-domestic-product-gdp-across-economic-sectors-in-russia/ (Accessed: 23 January 2022).
[96] Stiglitz, J.E., 2017. Structural transformation, deep downturns, and government policy (No. w23794). National Bureau of Economic Research.
[97] Stupnikova, E. and Sukhadolets, T., 2019. Construction sector role in gross fixed capital formation: Empirical data from Russia. Economies, 7(2), p.42.
[98] Sun, Y., Li, L., Shi, H. and Chong, D., 2020. The transformation and upgrade of China's manufacturing industry in Industry 4.0 era. Systems Research and Behavioral Science, 37(4), pp.734-740.
[99] Święcki, T., (2017). Determinants of structural change. Review of Economic Dynamics, 24, pp.95-131.
[100] Tandon, T. (2021). GDP of India: Sector wise contribution in Gross Domestic Product in 2020-21, Jagranjosh.com. Available at: https://www.jagranjosh.com/general-knowledge/gdp-of-india-sector-wise-contribution-1630060794-1 (Accessed: 24 January 2022).
[101] The World Bank (2022). Agriculture, forestry, and fishing, value-added (% of GDP). Available at: https://data.worldbank.org/indicator/NV.AGR.TOTL.ZS (Accessed: 24 January 2022).
[102] The World Bank (2022a). Employment in agriculture (% of total employment) (modeled ILO estimate). Available at: https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=RU (Accessed: 25 June 2022).
[103] The World Bank (2022b). Employment in services (% of total employment) (modeled ILO estimate). Available at: https://data.worldbank.org/indicator/SL.SRV.EMPL.ZS?locations=RU (Accessed: 25 June 2022).

[104] The World Bank (2022c). Employment in industry (% of total employment) (modeled ILO estimate). Available at: https://data.worldbank.org/indicator/SL.IND.EMPL.ZS?locations=RU (Accessed: 25 June 2022).
[105] Tikhonova, N.E. and bednosti v sovremennoi Rossii, F., 2014. The phenomenon of poverty in modern Russia. Social Sciences, 45(3), pp.95-111.
[106] Toossi, M., (2007). Labour force projections to 2016: More workers in their golden years. Monthly Labour Review, 130(11), pp.33-52.
[107] Torvik, R., 2009. Why do some resource-abundant countries succeed while others do not?. Oxford review of economic policy, 25(2), pp.241-256.
[108] U.S. Energy Information Administration (EIA) (2022). Russia. Available at: https://www.eia.gov/international/analysis/country/RUS (Accessed: 23 January 2022).
[109] Uddin, M.M.M., (2015). Causal relationship between agriculture, industry and services sector for GDP growth in Bangladesh: An econometric investigation. Journal of Poverty, Investment Development, 8. Available at: https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.676.6370&rep=rep1&type=pdf (Accessed: 8 February 2022).
[110] United Nations Conference on Trade and Development - UNCTD (2013). World investment report 2013: Global value chains: Investment and trade for development. UN.
[111] van Arendonk, A., 2015. The development of the share of agriculture in GDP and employment. A case study of China, Indonesia, the Netherlands and the United States. Master's Thesis, Wageningen University, Wageningen, The Netherlands.
[112] van der Linden, J.A. and Dietzenbacher, E., (2000). The determinants of structural change in the European Union: a new application of RAS. Environment and Planning A, 32(12), pp.2205-2229.
[113] Venables, A.J., 2016. Using natural resources for development: why has it proven so difficult?. Journal of Economic Perspectives, 30(1), pp.161-84.
[114] Voskoboynikov, I.B., 2020. Structural change, expanding informality and labour productivity growth in Russia. Review of Income and Wealth, 66(2), pp.394-417.
[115] Vrolijk, K., 2021. Industrial policy and structural transformation: Insights from Ethiopian manufacturing. Development Policy Review, 39(2), pp.250-265.
[116] Warwick, K., (2013). Beyond industrial policy: Emerging issues and new trends. Available at: https://www.oecd-ilibrary.org/science-and-technology/beyond-industrial-policy_5k4869clw0xp-en (Accessed: 25 June 2022).
[117] Warwick, K., 2013. Beyond industrial policy: Emerging issues and new trends. Available at: https://www.oecd-ilibrary.org/science-and-technology/beyond-industrial-policy_5k4869clw0xp-en (Accessed: 24 January 2022).
[118] Witt, U. and Gross, C., 2020. The rise of the “service economy” in the second half of the twentieth century and its energetic contingencies. Journal of Evolutionary Economics, 30(2), pp.231-246.
[119] Xiao, W.E.N., Pan, J.D. and Liu, L.Y., (2018). China's industrial structure upgrade in the "New Normal": Empirical test and determinants. The Singapore Economic Review, 63(04), pp.1037-1058.
[120] Xu, B., (2006). Infant industry and political economy of trade protection. Pacific Economic Review, 11(3), pp.363-378.

[121] Zhang, W., Wang, G. and Zong, J., (2022). Does the Regional Development Policy Promote Industrial Structure Upgrading? Quasi-experimental Evidence from China. Available at: https://www.researchsquare.com/article/rs-1329218/latest.pdf (Accessed: 25 June 2022).

[122] Zhang, X., Peek, W.A., Pikas, B. and Lee, T., 2016. The transformation and upgrading of the Chinese manufacturing industry: Based on “German Industry 4.0”. Journal of Applied Business and Economics, 18(5), pp.97-105.