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Improving Evaluation Criteria for Assessing the Impact of Industrial Structural Changes on Economic Growth

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Abstract: Structural change has been identified as one of the key determinants of long-term economic growth and competitiveness in developing countries (McMillan & Rodrik 2011). Nevertheless, contemporary evaluation frameworks based on very narrow quantitative metrics tend to neglect the multidimensionality of innovation, digitalization, and sustainability. This research fills this gap in methodology by developing a more elaborate framework for measuring the effects of the industrial structure transformation on the economic growth, incorporating Uzbekistan as a concrete example. The comparative work is both systematic and econometric in nature, using inter-industry regression models linking the value-added (MVA), to factors such as trade openness, industrial policy, foreign direct investment and technological development. Recent research suggests that technological innovation and human capital investments (74% and 58% of industrial investments, respectively) are key determinants of structural transformation. In addition, a growing portion of heavy industry and non-ferrous metallurgy is also noted, confirming the course of moving towards forming an export orientation and technology-intensive industrial base in the country. Their findings underscore the importance of a more inclusive institutional arrangement integrating macroeconomic stability, growth, and structural mechanism. This research offers more granular information on industrial policy by incorporating innovation capacity and environmental sustainability into industrial policy evaluation, providing a more comprehensive framework to inform industrial policy for policymakers. The suggested multidimensional model provides more explanatory power than existing methods and real-world applications for improving sustainable inclusive and tech-led economic growth.

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1. Introduction

The sustainable economic growth and national competitiveness have long been associated with the process of transformation of the sector structure in industry. Economic modernization and diversification are, at a core level, about reallocating labor, capital, and resources from low- to high-productivity sectors. The process becomes especially relevant in developing economies, like Uzbekistan, as the country moves from a resource based economy to a knowledge based one [1]. The success of industrial policy not only depends on how fast such structural transformation can happen, but also about where the assessment mechanisms are at what stage policy interventions should be assessed, and how to be able to draw lessons of what worked and what did not, and why [2].

Conventional approaches to capturing the dynamics of change in the industry are heavily dependent on quantitative parameters indicative of sectoral output and employment while being blind to various qualitative aspects such as technical progress, absorptive capacity, and sustainability.

Different viewpoints regarding structural change can be found in current economic theories. Early classical economists like Lewis, who focused on the transfer of labor between sectors, and Chenery and Syrquin, who documented patterns of industrial diversification over the course of development, evidenced that structural change is a common experience across the world. Recent work by Rodrik and McMillan et al [3]. They emphasize the roles played by technological upgrading, digitalization and global value chain integration. In spite of this emerging body of work, we still lack a clear methodological framework to evaluate the qualitative nature of transient industrial transformation. This widens the divide between theory and practice as knowledge and practice in industry, especially in emerging economies with rapid but uneven industrial reforms, has changed faster and more dynamically than the scientific knowledge needed to inform policy [4].

To address this gap, the current work introduces a multi-dimensional framework for analyzing patterns of industrial performance that combine quantitative and qualitative indicators of industrial performance. Methodology comprises comparative and econometric analyses by using inter-industry regression models to determine the main drivers of manufacturing value-added (MVA). Using time-series and panel data between 1994 and 2020, it looks into variables such as trade openness, industrial policy, FDI, innovation intensity and human capital development. In this way it is possible to estimate both the direct and indirect effects of structural change on economic growth.

Initial Findings We find that industrial innovation, technological modernization and investments in human capital are crucial for sustainable industrial development in Uzbekistan. These findings highlight the need for innovation, digitalization, and environmental sustainability to become embedded in any evaluation framework within our industries [5]. The results from our study are crucial for policymaking as they can serve as a basis for the design of adaptive industrial policy in the frame of the objectives outlined in the "New Uzbekistan 2022–2026 Development Strategy." Through such an evidence-based evaluation framework, the study helps to shed light on the reasons why structural transformation has the potential to induce an inclusive, technology-driven, and resilient path of economic development.

Literature review

Classical and contemporary economic theories provide different perspectives on structural transformation. Lewis (1954) emphasized the transfer of surplus labor from traditional sectors to modern industry as a driver of growth, while Chenery and Syrquin (1975) developed models explaining how industrial diversification accompanies economic development. More recent approaches highlight the role of technological progress, innovation, and digitalization (Rodrik, 2016; McMillan et al., 2014).

The theoretical framework for evaluating structural change must therefore account for both quantitative and qualitative dimensions of industrial transformation [6]. Quantitative changes refer to shifts in sectoral output, employment, and capital intensity, while qualitative changes encompass technological upgrading, innovation capacity, and integration into global value chains.

The post-soviet development of Uzbekistan can be divided into two time frames: 1991-2016 and 2017 to the present day. The economy of Uzbekistan during the 25 years can be characterized as a planned, and state-managed distribution of resources and products, followed by an economy focused on import substitution, hence with little competition in local markets [7]. The government determined foreign exchange and interest rates. The economy developed due to heavy industry, great use of natural resources and physical capital, and subsidizing of inefficient state-owned companies (Popov, V., Chowdhury, A., 2005). Thus, Uzbekistan did not follow its comparative advantages in choosing its industries, so resources were misallocated and limited labor mobility. GDP growth started only from 1996-2%, 1997-5%, from 1998 to 2003 was about 4% (IMF, 2003). According to

scholars L. Alcorta, N. McGregor, B. Verspagen, and Adam Szirma (2021), industrialization has two critical determinates: internal and external determinants [8]. Local determinants consist of market size, consumption, investment, endowments, and human capital. In contrast, external determinants consist of openness to trade degree, capital account liberalization, depreciation of the national currency as the main currency of foreign trade, etc. A group of scholars led by N. Haraguchi, B. Martorano, and M. Sanfilippo (2019) found that successful industrialization correlates to the country's high organizational stability, which can also be found in the characteristics of East Asian Newly industrialized countries. Market lead and state facilitated approach (Lin, 2021) would enable a certain level of industrialization, and a politically more powerful government would adopt more gradual reforms (Wang, 2014) toward better industrial upgrading. According to this scientist, economic growth means an increase in aggregate supply, or in other words, an increase in the volume of real and potential GDP. Growth (in economics) is a repetition of the volume of goods and services produced in a country in an increased amount compared to previous years (periods) Ensuring economic growth is the main goal of any country's economic policy. Economic Growth is based on the development of leading sectors of the economy [9]. Economic growth is based on an advanced production structure, high labor productivity, the production of competitive products that are in high demand in the domestic and foreign markets, and the sale of products in favorable markets. In other words, economic growth means a constant increase in the real volume of product production and, at the same time, an improvement in technological, economic and social characteristics in the development of society. In determining and calculating Economic Growth, the gross domestic product (GDP), which is the most general indicator of a country's economic development, serves as the basis and shows the positive change in the volume of real GDP over a certain period of economic growth [10]. Economic growth rates are reflected in the growth rates of GDP. Economic Growth represents the general state of development of the country's economy. Although the change in real GDP provides information about the state and dynamics of the country's economy, it does not fully reflect economic growth. For example, the growth rate of the country's population was 3%, and the growth rate of real GDP was also 3%. In this case, although the GDP volume has increased, people's incomes remain unchanged. Therefore, another indicator is used to fully reflect economic growth - the change in real GDP produced per capita. There are also qualitative factors of economic growth, which include the productivity of labor, capital and land (natural) resources. Economic growth that occurs due to qualitative factors is called intensive growth [11]. The limitation of production factors limits the possibilities of extensive growth. Therefore, intensive growth is considered effective in conditions of limited resources. The development of science and technology also stimulates intensive economic growth. In recent years, a number of social indicators have been considered as a condition and result of economic growth. In the growth sector - the dynamics of employment; in the distribution sector - the dynamics of real incomes of the population and a number of other indicators; in the exchange sector - the development of the material base of trade and public catering, the dynamics of retail trade turnover; in the consumption sector - the growth of consumption and non-production savings.

2. Materials and Methods

Using a mixed-method approach - quantitative econometric analysis and qualitative assessment - this study examines the effect of industrial structural transformation on economic growth in Uzbekistan. Incorporating systematic, comparative, and structural analyses, the research facilitates an understanding of the quantitative and qualitative dimensions of industrial change. Data for 1994–2020 were obtained from national and international statistical databases including manufacturing value-added (MVA), trade openness, industrial policy, inflation rate, exchange rate, foreign direct investment (FDI), employment and gross fixed Capital formation. Based on the interindustry cross-sectional and panel regression models, the study tests the hypothesis of the linkage between variables of industrial structure and an economy by taking MVA as the dependent variable

and trade openness, industrial policy, and technological innovation as the dominant independent variables. Model robustness checks control for expected years of schooling, employment in industry, and capital accumulation on top. Econometric analysis uses both simple and multiple linear regression to estimate the magnitude and direction of these relationships. It also uses qualitative evaluation methods to measure capabilities like innovation capacity, sustainability and digital transformation, which are usually discarded in classic frameworks. The methodology offers a comprehensive framework to assess the role of industrial restructuring in sustainable growth through the integration of results from statistical analysis with theoretical findings. This enables more accurate, evidence-based conclusions and expands the scope of linking structural policy evaluation with economic modernization strategies in Uzbekistan.

3. Results

Industrial Indicators



Figure 1. Industrial indicators in January 2025 [12]

In January 2025, real turnover, hours worked, and employment in the manufacturing industry advanced, showing a recovery compared to the performance in December. On the other hand, real wage mass and the real average earnings of industrial workers declined, reflecting the difficulty for workers' earnings to maintain their purchasing power in the face of the level of inflation that has been recorded in the economy (Figure 1).

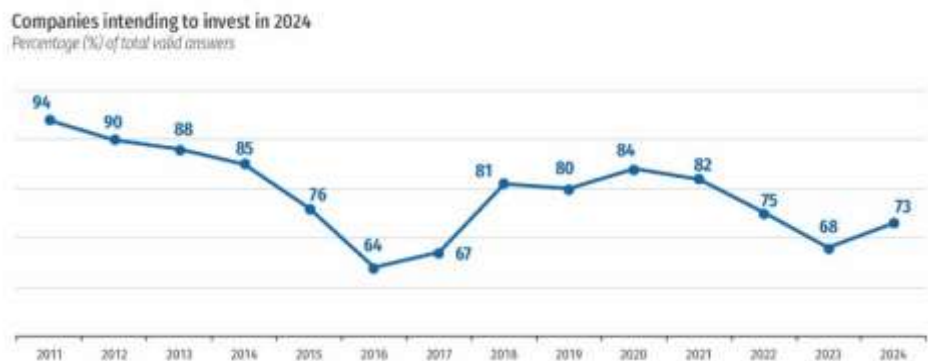


Figure 2. Trend of industrial survey responses (% of total valid answers), 2011–2024. For 74% of companies, the investments made were aimed at technological innovation. In addition, 58% of companies invested seeking the improvement of human capital (Figure 2).

Table 1. Estimation technique of methodology

| Methodology Model | Specification | Data Base | Nature of Observed Impact |
|---|--|---|--|
| Inter-industry cross/panel section regression | (1) MVA growth is a function of various determinants | Various factors, including TO have significant effects on MVA performance | Various determinants, including a positive impact of trade openness to |

industrialization, are mainly obtained via scale benefits from comparatively advantaged sectors due to low factory price ratios

Industrial Policy, the trade openness index, average import tariff, exchange rates, inflation rate, average wage, tax rate, FDI, and industrial policy are independent variables. At the same time, the manufacturing value-added as a share of GDP is measured as dependable variables (Table 1). The data used in the study was mainly collected from 1994 to 2020 years. Expected years of schooling, employment in industry, and gross fixed capital formations are considered as control variables.

To achieve the specified objectives of this work, the author carried out work to identify the key determinants of industrialization in the case of Uzbekistan using quantitative and qualitative approaches of methodology. Econometric simple and multiple linear regression is an effective tool for the scientific justification of the correlation between multiple factors and industrialization and other factors affecting industrialization [13]. Leading sectors of the industry are: cotton cleaning, machine building, textile, gas, precious metals, electronics, instrument making, aviation, oil processing, car making, and agricultural processing.

Other sectors, including chemical and oil and chemical, power, metallurgy, sector of construction materials and light industries are developing fast.

Uzbekistan has powerful thermoelectric power stations, which generate almost 90 percent of electric power in the country. The metallurgical industry is comprised of companies that extract, treat and process raw, ferrous and non-ferrous metals, This sector makes more than 10 percent out of the total of industrial production. There are many predicted reserves of gold, silver, copper, uranium, lead, zinc, tungsten, molybdenum, lithium, aluminum, and other rare metals and minerals in the country [14]. Given that, the share of the metallurgy is expected to further rise in the total amount of industrial production. Products put out by the industry, especially those of non-ferrous and precious metals, are considered to be a rare at the world market, and will serve a good reason to extend their export with a view of enriching the country's currency fund. The non-ferrous metallurgy, with its main base in the Angren and Almalyk mining industrial area, includes production of copper, refractory and heatproof metals, and gold, respectively. The largest enterprise of the sector is the Almalyk Mining and Smelting Enterprise. Over the last years, the share of the heavy industry within the total amount of industrial production has increased. And accordingly, the share of the light and food industries has decreased. The given tendency calls for creation of the new independent national economy.

During the first stages of economic reforms, the country chose to limit the consumer market by redirecting all the efforts and funds onto structural changes in the economy, and grounding the foundation for the modern export-oriented production, equipped with the latest technology [15]. The light and textile industry is also significant in creating and extending the industrial complex of the country. More than third of the total number of industrial companies in Uzbekistan are concentrated in the given sector, as well as make up the country's basic funds and number of personnel engaged, huge share of the foreign trade balance, and currency revenues. Given the specific features of the country with its large farming practice, the diverse light industry was put in place incorporating production of the cotton-fiber, cotton and silk cloths, raw silk, ambary fiber, hosiery, upper and linen knitted wear, ready-made garments, footwear, and other. The making of carpets, haberdashery, and china-faience ware is considered to be a part of the country's light industry.

4. Conclusion

To conclude from the above, structural reform and development of the economy requires the introduction of a modern and inclusive institutional system based on rapid identification and elimination of existing problems and obstacles. Including:

1. ensuring consistency between macroeconomic stability, economic growth goals and structural reforms;
2. introduction of effective systems and mechanisms based on modern forecasting models for managing economic cycles caused by external and internal factors;
3. the absence of a comprehensive system and coordinating state body, regulatory framework, criteria and evaluation methodology for the development and implementation of measures aimed at reducing poverty.

The modernization of industrial structure assessment frameworks is essential for evidence-based policymaking. Traditional approaches must be complemented with new indicators that capture innovation, sustainability, and digital transformation. A multidimensional evaluation model allows policymakers to better understand the mechanisms through which structural change drives economic growth and to design strategies that promote sustainable, inclusive, and technology-driven industrial development.

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