



Article

# Scenarios for Developing Product Localization by Business Entities

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**Abstract:** This study examines the role of product localization and import substitution as key strategies for enhancing the competitiveness and sustainability of business entities in the modern global economy. The research aims to analyze the impact of localization processes on industrial production and to develop alternative scenarios for future development. The methodology is based on a multifactor econometric approach, including correlation and regression analysis, using statistical data for the period 2012–2025. The study evaluates the influence of key factors such as investment volume, number of localization projects, number of enterprises in special economic zones, export volume, and labor productivity on the volume of localized industrial production. The results reveal a strong correlation between the selected factors and production outcomes, indicating that localization significantly contributes to industrial growth. The developed econometric model demonstrates high reliability and can be effectively used for forecasting. Based on the model, three development scenarios—pessimistic, baseline, and optimistic—are proposed for the period 2026–2030. The findings confirm that the effective implementation of localization strategies, combined with innovation and export-oriented policies, can substantially increase production efficiency and reduce import dependence. The study concludes that localization serves as an important driver of economic development and provides a practical framework for strategic planning in industrial sectors.

**Keywords:** Small business, import geography, import dependence, import substitution, sustainable development, modernization, diversification.

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## Introduction

In the modern global economy, localization and import substitution are re-emerging as important strategies for ensuring economic stability and stimulating the development of business entities. Import substitution is defined as replacing previously imported goods with domestic analogues through localization. This process is often associated with strengthening the national economy and preventing risks related to rising import prices and disruptions in supply chains [1]. Localization also implies the placement of production processes within national borders to reduce dependence on foreign components and technologies [2].

The main reason for business entities to adopt these strategies is to enhance competitiveness and ensure long-term sustainability. In many sectors, especially mechanical engineering, automotive industry, and high-tech industries, localization is not only a policy requirement but also a strategic tool for value creation [3]. By developing

domestic production capabilities, business entities can reduce risks associated with international sanctions, exchange rate fluctuations, and geopolitical instability.

This article analyzes how localization functions as a catalyst for economic growth, the specific strategies applied by firms and governments, and the barriers that must be overcome to fully realize the potential of import-substituting production.

### Literature Review

Import substitution, as an economic concept, can be studied as a system of economic relations aimed at replacing imported goods [4]. In Latin America, early “development styles” focused on substituting consumer goods before transitioning to capital goods to reduce external vulnerability and utilize underemployed labor. Historically, import substitution was viewed as a mechanism to bridge the gap between private and social returns. For example, local content requirements are theorized to create “entry externalities,” where the social benefits of domestic supplier development exceed the private costs incurred by firms.

In the modern “innovative economy,” the focus has shifted toward organizing industrial production that integrates advanced technologies [5]. The theoretical framework emphasizes “industrial self-sufficiency,” where countries aim to establish full technological cycles to protect intellectual property and promote scientific creativity. This transition requires moving from declarative import substitution to a program-based approach involving measurable targets and technological upgrading [6].

The economic justification for localization is also based on the synergy between import substitution and export orientation. Research on China’s high-tech sector shows that firms achieve the highest growth when domestic substitution is combined with export-oriented strategies to reach global scale [7].

### Materials and Methods

The study employs various scientific methods, including analysis and synthesis, comparative analysis, statistical analysis, as well as graphical and tabular representation.

Under current globalization conditions, the most effective way to ensure sustainable economic growth in Uzbekistan is to utilize internal capabilities, i.e., to produce imported finished goods domestically and further develop local industry [8]. In this regard, priority is given to measures based on the principle of “studying domestic market demand – analyzing imports – identifying resource bases – developing and implementing new projects,” which allows effective use of existing potential and the establishment of new production capacities.

The volume of products produced through localization by business entities is considered as a production factor. Accordingly, the relationships between the resulting indicator and influencing factors are analyzed within the framework of a production model. In this model, the production process, production factors, and output are regarded as the main economic categories.

During the research process, a multifactor analysis was conducted by considering the change in the volume of localized production as an endogenous variable and examining its variation under the influence of key factors (resources). The volume of localized industrial production was defined as the dependent variable. The influencing factors were determined through expert analysis involving leading specialists from the Ministry of Economy and Finance of the Republic of Uzbekistan [9].

The following indicators were selected as key factors:

- volume of investments attracted for localization
- number of projects implemented under localization programs
- number of enterprises operating in special economic zones
- export volume of localized industrial products

- labor productivity in the industrial sector (thousand UZS per worker)

The selected factors were tested for their relationship with the dependent variable using various econometric methods, including the correlation coefficient, Granger causality test, Augmented Dickey-Fuller test, and Phillips-Perron test [10].

### Results

The data on dependent and influencing factors for the period 2012–2025 were obtained from the open database of the Statistics Agency under the President of the Republic of Uzbekistan. Each indicator was organized into separate tables.

**Table 1.** Indicators of the volume of localized industrial production and factors influencing its change.

Years	Volume of localized industrial production, billions of soums (Y)	Volume of investments attracted for localization, billions of soums (X <sub>1</sub> )	Number of projects implemented under the localization program, units (X <sub>2</sub> )	Number of enterprises operating in special economic zones, units (X <sub>3</sub> )	Volume of exports of localized industrial products, million USD (X <sub>4</sub> )	Labor productivity in the industry, thousand soums per employee (X <sub>5</sub> )
2012	8675,1	2017,2	1115	532	239,8	39400,2
2013	11798,9	2961,7	1101	678	309,5	40029,7
2014	3113,3	1349,8	486	604	347,6	47628,3
2015	4809,7	1622,4	478	786	401,3	54727,1
2016	6145,8	1967,8	695	846	425,7	62066,9
2017	9860,6	2200,1	799	960	512,4	81462,7
2018	14999,4	2537,7	714	929	457,8	130534,5
2019	21750,7	2914,3	839	1022	549,7	177071,5
2020	15335,3	3952,7	1427	1066	192,9	203780,2
2021	30126,4	4618,6	1938	1305	411,0	242158,0
2022	49303,9	5179,4	2310	1738	871,9	302279,9
2023	82799,9	5811,2	2647	2097	1073,5	367094,7
2024	110 199,1	6064,5	2789	2185	1136,3	435746,9
2025	112 046,6	7056,3	2912	2367	1450,4	508401,6

The units of measurement of the resulting and influencing factor indicators extracted in the table above were first converted to natural logarithmic indicators [11].

From the results of the regression analysis using the Eviews10 software package, a linear logarithmic trend model is formed by extracting the coefficients of the regression model to determine the situation.

Based on localization, a multifactor econometric model of the change in industrial production volume and its influencing factors was developed and the following regression equation was constructed [12].

$$\ln Y = 1,759 \cdot \ln X_1 + 0,099 \cdot \ln X_2 - 0,934 \cdot \ln X_3 + 0,73 \cdot \ln X_4 + 0,264 \cdot \ln X_5 - 6,187$$

**Table 2.** Trend models of industrial production volume and influencing factor indicators based on localization and forecast indicators for 2026-2030.

Indicators and their factor models	Forecast indicators				
	2026	2027	2028	2029	2030

Volume of localized industrial production, $Y = \frac{X_1^{1,759} \cdot X_2^{0,099} \cdot X_4^{0,73} \cdot X_5^{0,264}}{X_3^{0,934} \cdot e^{6,187}}$	60128,3	66695,2	73263,2	79031,4	86273,7
Volume of investments attracted for localization, billion soums $x_1 = 310,319 \cdot t + 518,969$	5173,8	5484,1	5794,4	6104,7	6415,0
Number of projects implemented under the localization program, units $x_2 = 107,108 \cdot t + 404,835$	2011	2119	2226	2333	2440
Number of enterprises operating in special economic zones, units $x_3 = 126,771 \cdot t + 12,286$	1914	2041	2167	2294	2421
Volume of exports of localized industrial products, million US dollars $x_4 = 55,537 \cdot t + 58,60$	891,7	947,2	1002,7	1058,3	1113,8
Labor productivity in the industrial sector, thousand soums per 1 worker $x_5 = 24533,48 \cdot t - 54354,0$	313648,2	338181,7	362715,2	387248,6	411782,1

If the linear logarithmic model is expanded to the power level, a nonlinear econometric model representing the volume of localized industrial production is obtained:

$$Y = \frac{X_1^{1,759} \cdot X_2^{0,099} \cdot X_4^{0,73} \cdot X_5^{0,264}}{X_3^{0,934} \cdot e^{6,187}}$$

Based on these trend models, prospective indicators of changes in the volume of localized industrial production in 2026-2030 and a list of the most convenient models for calculating them were presented (Table 2).

### Discussion

Trend models determined on the basis of multifactor correlations allow for the prediction of changes in the main indicators of industry activity in the future period, taking into account errors in certain places under the influence of selected factors. In the course of the study, changes in the volume of localized industrial production are used to determine forecast values for the future period under the influence of 5 main factors [13].

At the verification stage of econometric modeling, the model developed under the influence of specific factors and the significance of its parameters were checked in four directions:

- the quality of the model was assessed using the multiple correlation coefficient and the coefficient of determination;
- the significance of the model was assessed using the approximation error and Fisher's criterion;
- the reliability of the model parameters was assessed using the Student criterion;
- the conditions for the implementation of the "least squares method" were checked using the Durbin-Watson criterion, that is, the presence of the degree of autocorrelation or multicollinearity in the constructed trend model was assessed.

The dynamics of the analyzed series is usually a sample of long-term series, for the econometric model we have determined, 14-year time series were used. Therefore, it is extremely important to comprehensively check and assess the reliability of econometric models obtained on the basis of correlation-regression analysis [14].

The parameters determined in the process of this regression analysis and the significance of the model were calculated using the main evaluation indicators developed in the program (Table 3).

The analysis carried out on the basis of the software package shows that the correlation of the resulting factor with the influencing factors is  $r=0,9966$ , and the coefficient of determination is  $R^2=0,9786$ . This indicates that the influencing factors and the resulting factor have a high density of correlation, and the residuals, which are the differences between the calculated indicators and the real indicators, also have a dense connection.

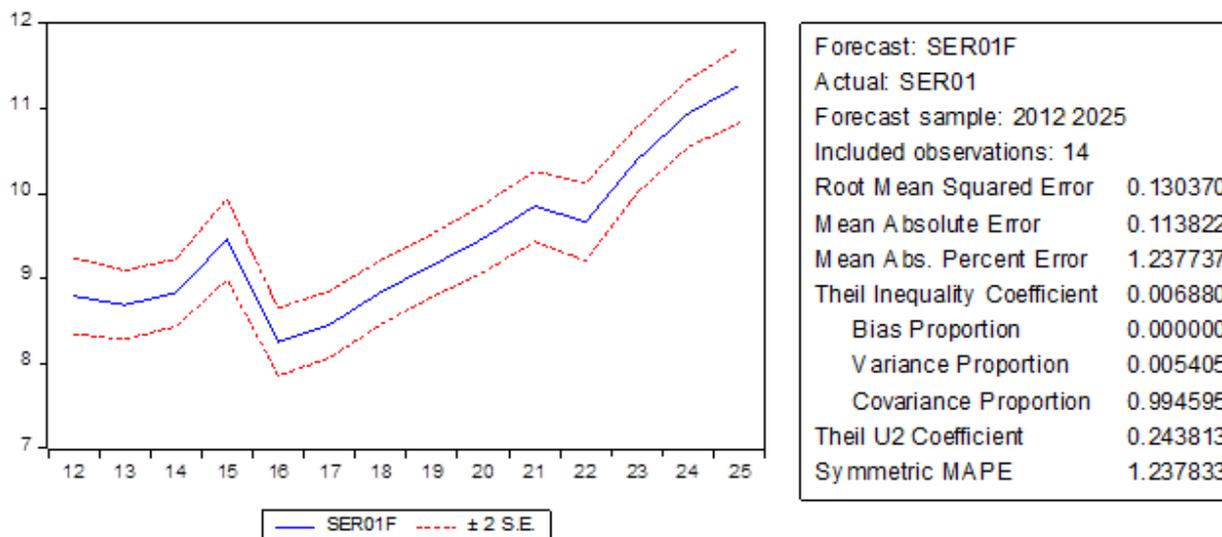
**Table 3.** Correlation characteristics of selected factors by industry size based on localization and main indicators of the quality of the structured factor model.

Dependent Variable: Industrial scale of production based on localization, LnY				
Method: Least Squares				
Date: 03/20/26 Time: 10:11				
Sample: 2012-2025				
Included observations: 14				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
The volume of investments attracted for localization, LnX <sub>1</sub>	1,759585	0.486019	3.620404	0.0068
The number of projects implemented under the localization program, LnX <sub>2</sub>	0,099595	0.244714	0.406987	0.6947
The number of enterprises operating in special economic zones, LnX <sub>3</sub>	-0,933625	0.332228	2.810197	0.0228
The volume of exports of localized industrial products, LnX <sub>4</sub>	0,729605	0.172406	4.231895	0.0029
Labor productivity in the industrial sector, LnX <sub>5</sub>	0,264248	0.146249	1.806839	0.1084
The total impact of random factors, ε	-6,187356	0.980198	6.312352	0.0002
R-squared	0.978611	Mean dependent var		9.433571
Adjusted R-squared	0.965242	S.D. dependent var		0.925066
S.E. of regression	0.172464	Akaike info criterion		-0.379734
Sum squared resid	0.237950	Schwarz criterion		-0.105852
Log likelihood	8.658135	Hannan-Quinn criter.		-0.405086
F-statistic	73.20386	Durbin-Watson stat		1.856147
Prob(F-statistic)	0.000002			

The value of the Fisher criterion for the endogenous factor in the identified model is 73.2039, and its significance is 0.000002. This constructed trend model can be used in practice in terms of its significance. The quality of the model was assessed using the Akiake information criterion (-0.38), the Schwarz criterion (-0.11) and the Hannan-Quinn criterion (-0.41) in the software package. The values of these criteria also indicate that the trend model can be used in practice.

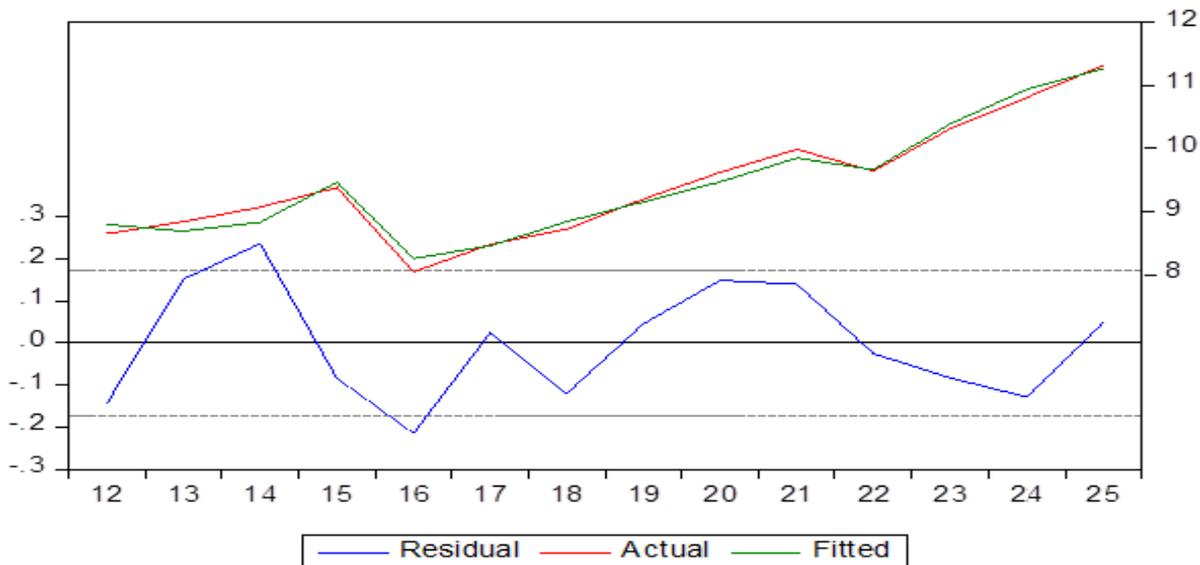
The Durbin-Watson (DW) criterion, which allows determining the presence of autocorrelation or multicollinearity in the constructed econometric model, is 1.86, and considering that the optimal threshold is around 2.0, it can be seen that the level of autocorrelation in the model is almost non-existent.

We form a trend of changes in the volume of localized industrial production within the limits of statistical error of  $\pm 2$  and evaluate the indicators expressing the significance of this trend (Figure 1).



**Figure 1.** Changes in the volume of localized industrial production within  $\pm 2$  statistical error limits in 2012-2025.

Figure 1 shows that the Teil inequality coefficient is 0.0069, the Teil U2 coefficient is 0.2438, the Bias ratio is 0, the variation ratio is 0.0054, the covariance ratio is 0.9946, and the symmetric MAPE is 1.238, which indicates that the constructed model is within the required ranges. In particular, considering that the limit for symmetric MAPE is up to 10 percent, it can be seen that the level of estimation error is less than the specified limit, i.e. MAPE:  $1.238 < 10$ .



**Figure 2.** Graph of residual, actual and structured model values of localized industrial production.

Along with the above, it is also appropriate to use a graph of residual, actual, and constructed model values to evaluate the model of change in the volume of localized

industrial production under the influence of factors that are considered the most important in the localization of industrial production (Figure 2).

The graph in Figure 2 shows that, although the level of fluctuation between the residual indicators calculated based on the residual model and the actual values is high, the difference between the actual indicators and the graph of indicators calculated based on the structured model is insignificant.

These model and forecast indicators serve as the basis for developing alternative scenarios for the development of plans and strategies for the localization of production in industrial sectors, including import-substituting and export-oriented business entities in the near future in the short and medium term. It has been proven that if business entities in the sector use the indicators of the resulting factor and the factor influencing its development used in this developed model to form their own plans and programs in this direction, then checking the forecast based on the established criteria can lead to high efficiency of the results [15].

### Conclusion

Based on the results of the assessment of the localization of industrial production based on multi-factor models and the analysis of target indicators based on alternative scenarios, the following conclusions were summarized:

Based on the above factorial relationships, development scenarios were developed based on the impact of factors on the volume of localized industrial production, which is considered the final indicator of the indicators considered the most important for the localization of industrial production:

1) according to the first (pessimistic) scenario, it was determined that the volume of localized industrial production could decrease from 82799.9 billion soums in 2026 to 79031.4 billion soums in 2030. This does not allow achieving the tasks set for the reforms.

2) the second (baseline) scenario was implemented based on the relationships between the factors affecting the localization process and the volume of localized industrial production, assuming the effective use of existing potential. According to calculations, the volume of localized industrial production will increase by about 4.2% over the next 2026-2030 years, reaching 86273.7 billion soums.

3) The third (optimistic) scenario involves the effective use of the country's existing industrial potential and the successful implementation of the tasks set out in the regulatory and legal documents adopted by the government in this regard, the development of new competitive advantages based on the improvement of human capital, scientific and technical potential, and the institutional environment. According to it, the volume of localized industrial production will increase by about 14.6% over the period 2026-2030, reaching 94901.1 billion soums.

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