

The Influence of Supply Chain Management on the Economic Dynamics of the Region in Comparison with Traditional Factors

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Abstract— The paper substantiates the need to study issues that discover the features of the influence of region's supply chain management on its macroeconomic dynamics through the prism of economic and mathematical analysis. This will allow us to form a new vector for constructing models of economic growth and to localize an inclination of applying qualitative methods of analysis in this area of research towards quantitative approaches to the analysed processes and phenomena. In this regard, the main goal of this work is to develop methodological tools to assess the impact of supply chain management on the dynamics of regional economic growth, as well as to form mechanisms for a comparative analysis of the influence of the region's reputation with traditional factors that activate macroeconomic generation. The Republic of Tatarstan acts as an object of study. The subject of the study is a methodological toolkit for assessing the impact of a region's reputation on the parameters and dynamics of investment processes. A key feature of the study is the proposed version of the comparative analysis of traditional and non-traditional factors (the latter include supply chain management in this work) that trigger mechanisms of investment growth in the regional economic system. On the basis of the developed methodology for the formalized assessment of the region's supply chain management, the authors have constructed models that evaluate the level of the comparative impact of reputation on the processes of generating investments in fixed assets. It is advisable to use the developed methodological approaches when developing new models of economic growth under conditions of increased importance and the role of intangible production factors. According to the results of the study, we have proved that the region's supply chain management plays one of the leading roles along with traditional basic factors that trigger the mechanisms of intensification of investment activity. Moreover, as the calculations show, the importance of reputation for the matter of activating investment

processes is even slightly more noticeable than such an important indicator as the "Balanced financial result of economic entities"..

Keywords— supply chain, investments in fixed assets, traditional factors of production, intangible factors of production, economic growth.

1. Introduction

Despite recent advancements made in the theory and practice of facility location decisions, a gap exists in understanding how these decisions are influenced by regional geographies and their respective supply chain capabilities. As economic development agencies recognize the value inherent in location-specific and geographically concentrated supply chain capabilities, this research explores how these affect regional prosperity and economic development. The fourth industrial revolution, where intangible factors of production begin to play a crucial role in the economic growth of national systems, gains momentum and predetermines new mechanisms and parameters for the development of socio-economic systems. The traditional factors of the material-resource nature generated macroeconomic dynamics within the framework of the previous fifth technological mode are not as effective as before. In this regard, the attention of the scientific community is increasingly beginning to concentrate on the search and justification of factors that would have a significant impact from the point of view of emerging new realities in the context of a paradigm shift in economic development.

Modern economic conditions characterized by a high level of globalization and the development of an open society determine now a special type of competitive environment, where the most important factor determining success in the struggle for the resources involved is the reputation of the regions, limited by the economic, social, political, institutional and other kinds of territory potential.

This approach is especially significant in the current economic conditions, where the struggle for leadership between territories, countries, and regions is formed largely in the information space, which, in turn, determines their supply chain management and, as a consequence, the potential for economic growth. Today,

companies with a high level of reputation are characterized by the highest capitalization. If the capitalization of companies was concentrated earlier in the sphere of real industrial production exclusively, now the digital environment, along with traditional factors, is also actively forming the development potential of business entities.

No less important is the application of this approach in the context of the coronavirus pandemic that is being developed in 2019/2020 and substantially adjusting the dynamics of economic development of the vast majority of the states and individual regions in the world. As the practice of self-isolation has shown, traditional material factors of production are far from the most important now. The most important development driver providing, *inter alia*, access to a stable path of socio-economic growth is the availability of sufficient supply chain management of the regions in terms of generating opportunities to overcome and / or localize the threats of the COVID-19 spread. The ability of a state and its individual territorial units to minimize the consequences of the infection's spread forms the corresponding image component, which subsequently and inevitably affects both the speed of economic recovery and the strengthening of supply chain management. The last ensures the growth of the potential for economic dynamics in the medium and long term.

In other words, the primary factors that ensure economic development at the present stage are not so much material factors of production (more precisely, far from material factors of production), but non-material ones expressed, *inter alia*, in the presence of the ability of a socio-economic system to withstand emerging development threats. In fact, this ability largely determines the supply chain management, which subsequently forms the dynamics and efficiency of economic growth at the meso- and at the macro level.

In these conditions, their reputation becomes a priority tool for the development of both regional and national economies. In this regard, factors such as the expectations of economic agents regarding the prospects for their sustainable development in the territorial and economic space of a region in the face of risk and uncertainty begin to play an important role here.

Reputation activity forms a whole set of prospects for the development of territories due to persistent positive or, conversely, negative expectations of counterparties interacting with them regarding their own development opportunities. Meanwhile, it is important to note that the study of this question mainly focuses on the micro level. There is a very large number of works revealing the effectiveness of the development of companies within the framework of the reputation economics theory.

Researchers actively studying the reputation of companies should include Mehmet Arslan (Istanbul University), [1-4] and others, who are well-known

scientists and founders of original approaches to the study of assessing the impact of a firm's reputation on its development dynamics. Russian researchers should include [5-7].

As for studies that discover and present an assessment of the impact of reputation on regional development, there is clearly a lack of works. Meanwhile, in our opinion, and as we have already mentioned, such issues are extremely significant within the framework of the transition of the national economy to a new technological mode (sixth) both from a scientific and a practical point of view.

2. METHODS

Relying on the scientific works presented above, as well as on a number of other Russian and foreign studies on this topic, this paper presents an attempt to measure or quantify not only the degree of influence of the region's supply chain management on the parameters of its key macroeconomic indicators, but also to provide a comparative analysis of such effects in comparison with the basic traditional factors of economic dynamics. It is also important to note that the study is based on works on the methodology of formalized assessment of the supply chain management of territories previously developed and published by the authors [8-12].

In general, based on an analysis of existing approaches to understanding the concept of "reputation", we can formulate the following author's definition: "Reputation (supply chain management) is an intangible institutional resource (asset) of an economic agent that provides its competitive advantages in the market by generating various signals for consumers characterizing its qualitative and quantitative development parameters and ensuring the firm's performance" [13].

In this regard, it seems to be an extremely important and urgent task for the theory of reputational economics to solve the problems posed through the prism of using methods of economic and mathematical modelling and designing the processes under study. However, the transition to a new research format requires, first of all, formalizing and developing tools to quantify supply chain management, which undoubtedly belongs to the category of intangible assets.

In order to localize this scientific and methodological problem, an attempt is made in this study to develop the appropriate tools, allowing not only to quantify the estimates characterizing the dynamics of the region's supply chain management, but also to carry out an analysis of its impact on regional economic development based on the construction of appropriate models.

The algorithm for evaluating and constructing time series characterizing the values and dynamics of the region's supply chain management is presented below in a concentrated form:

Step 1. Grouping the global information space by the level of reflection of the region's reputation background

Step 2. Grouping the global information space by the degree of signal generated either at the macro- or meso- scale (federal / regional information sources).

Step 3. Determining the list of search queries that form representations (image) about the reputation

of the territory (region) (Figure 1) and revealing the essence of the analysed process. At the same step, a procedure is carried out that estimates the number of queries requested by users regarding the analysed object within the estimated time period $p(x_i)$.

The reputation of the region is assessed based on 5 key sub-indices.

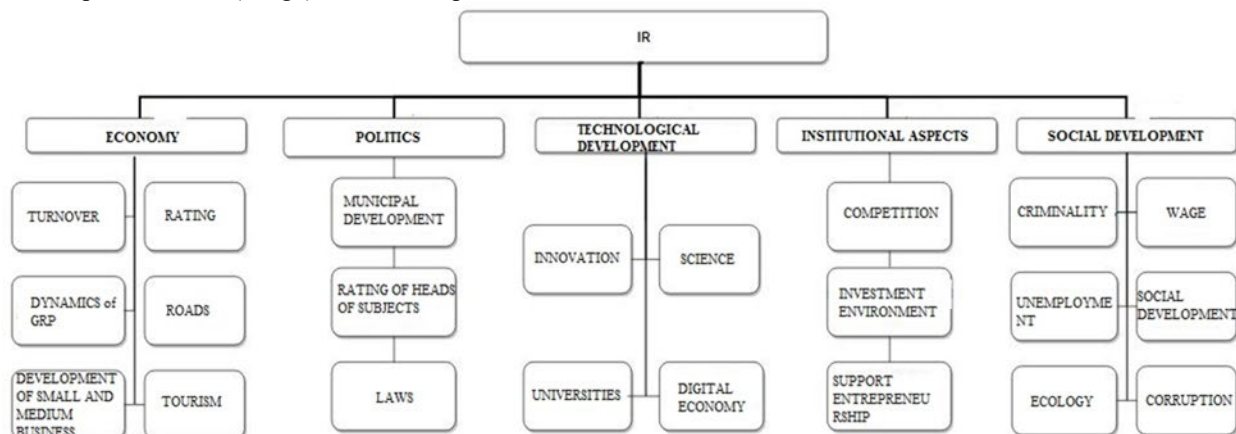


Figure 1 - The system of search queries that form representations (image) about the reputation of the territory (region)

Step 4. Identification and determination of the repository containing information retrieval systems participating in the analysis procedure in order to assess the popularity and relevance of each of them.

Step 5. Analysis and systematization of data revealing the estimates of users of the global information environment with respect to the estimated search queries (in accordance with the data presented in Figure 1) forming representations regarding the reputation of the analysed object.

Step 6. Calculation of the integral values of sub-indices characterizing the supply chain management of the region

Step 7. Calculation of the integral index of the region's supply chain management.

A more detailed description of the research methodology is presented in the works previously published by the authors. [14]

Undoubtedly, it is necessary to state that the methodological approach proposed in the present work for quantitatively measuring the reputation of a territory can carry elements of discussion and subjectivity, like any other new method. However, in our opinion, the components of supply chain management used in the calculations are essentially capable of determining the integral value of the reputation of the territory. Meanwhile, recognizing the potential for expanding these components, the developed methodological approach has all the necessary resources for optimization and improvement.

3. RESULTS AND DISCUSSION

In accordance with the stated research concept, a model was constructed where the role of the endogenous factor is played by investment in fixed assets (I), and the role of exogenous factors is played by the system of indicators shown below:

S - Savings in deposits and securities;

R - Weighted average interest rate in the financial capital market;

E - Balanced financial result of business entities;

K - Weighted average rate of the national currency;

P - Interest rate on credit and deposit operations

IPC - Consumer Price Index, %, to the previous year, US \$

IRC – Supply chain index.

In order to build additive and multiplicative models for the analysed time series, the seasonal factor was eliminated (in particular, seasonal variations were found for series I).

Further, a regression model on the basis of the data obtained and their systematization was constructed; it meets all the signs of the statistical significance of its coefficients (including procedures for eliminating multicollinearity between the analysed time series) (Formula 1). According to the results of the model construction, it included three exogenous factors that have a high level of connection with the endogenous parameter (Investments in fixed assets) and at the same time are characterized by a weak correlation

between themselves.

The final version of the resulting model is presented below:

$$Y=90011.8+9656.09x_1+0.326x_2+541.79x_3$$

(Formula 1)

Where:

YY- Investments in fixed assets, billion rubles

X1 - Index of the region's supply chain management;

X2- Balanced financial result of business entities, billion rubles

X3 - National currency rate, rubles / dollar.

Table 1 shows the main estimates and parameters of the statistical significance of the obtained equation, the determination coefficient of which is 0.89; the parameters of t-statistics and P-Values fully satisfy the necessary criteria.

Table 1 - The main estimates and parameters of the statistical significance of the resulting equation

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t-statistic</i>	<i>P-value</i>
Y intersection	90011.80	8208.62	10.96	6.57176 E-10
Supply chain management Index	9656.09	8193.22	6.17	0.02
Balanced financial result	0.32	0.09	3.57	0.001
The official exchange rate of the US dollar against the rouble, at the end of the period, RUB / USD	541.79	197.26	2.74	0.01

4. SUMMARY

The estimates obtained demonstrate a very noticeable, if not dominant, contribution of the region's supply chain management to the formation of investment processes. For example, an increase of X1 per unit generates a quarterly increase in investment in fixed assets by 20.024.45 million rubles. Given that the total volume of investments in the Republic of Tatarstan per quarter (according to the data for 2019) is about 200 billion rubles, and it is methodologically predetermined that the range of fluctuations in the time series characterizing supply chain management is from -2 to 2 [14], reaching the maximum IRC values by the region can generate fixed capital investment growth of 40 billion rubles (about 20% of the total), and vice versa, if the value of the region's reputation index reaches its minimum level.

It is also important to note that the proposed methodological toolkit for the quantitative measurement of the supply chain management of territories with the subsequent assessment of its impact on macroeconomic parameters forms a new vector for constructing prognostic models of economic growth based, among other things, on the consideration of intangible production factors.

5. Conclusion

In conclusion, we want to note that this study is an attempt to strengthen the position of formalized approaches to the study of the posed scientific and

practical problem against the background of the overwhelming predominance of high-quality approaches to the study of regional supply chain management. Undoubtedly, the constructed models and algorithms for measuring reputation can and should continue to look for directions for their optimization and calibration. However, as shown by the assessments, despite that the proposed toolkit is to a certain extent primary and elementary, its application in practice forms the potential for understanding the sensitivity of regional economic systems to their reputation activity. This, in turn, opens up new prospects for the interpretation of the analysed processes and new opportunities for holding discussion platforms on this topic.

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