Economic Growth and Stimulating Private Business Investment in Infrastructure by Assessing Its Need

Tatiana Palei*, Elina Gurianova, Svetlana Mechtcheriakova and Marat Safiullin

Kazan Federal University, Kazan, Russian Federation

Abstract: Global statistics indicate increasing in private investors' activity. Instead of the debate about the growing infrastructure needs and adequacy of funding to meet, the more urgent is the search for more effective mechanisms to attract investment in infrastructure assets. The chief objective of the study is to analyze the demand for infrastructure services to ensure the activities of organizations forming the priority clusters in the region, made for orientation on the existing industry need in the infrastructure support plans formation, concerning the construction financing of transport and other Infrastructure on a parity basis for economic growth. It is determined that the quality of transport connections play a vital role. It was established, that in all studied clusters, there is a tendency to increase transport services demand. Given the results, the petrochemical cluster enterprisestrochemical cluster is ready to finance transport infrastructure from the profits (perhaps on a matching base state) to remove the constraints of its industrial growth. For marginal assessment of investments into the development of a transport complex efficiency, the regression model "investments - profit" is received. It is suggested that with the growth of the industry, its profit is increasing at a rapid pace, each additional ruble of investment brings higher returns.

Keywords: Infrastructure, demand, investment, industry, Economic Growth.

INTRODUCTION

Industrial Infrastructure is an essential element of the economic system. The basic concept of public infrastructure management is the advanced (preventive) satisfaction of demand for infrastructure services by economic actors and the population (Topchy, 2018).

The methodology for the development and modernization of industrial Infrastructure is reflected in a large number of papers: Topchy, D.V. (2018), Agénor, P.-R., and Alpaslan, B. (2018). The economic growth dependence on production infrastructure is considered in the writings of Aschauer, D.A. (1989), Justman M (1995). All these studies prove that Infrastructure is an effective factor in production.

The following papers are devoted to the effectiveness of investment in infrastructure assessment: Aigbokan B. E. (1999), Arrow and Kurz (2013), and Kaban, *et al*. (2019). In this area of research, the multicollinearity of final product output and infrastructure capital requires attention. Since GDP growth makes it possible to invest in Infrastructure, on the other hand, infrastructure development provides economic growth.

The attention to the impact of Infrastructure on regional development has been paid in the writings of Seethepalli, *et al*. (2008), Straub, *et al*. (2008), and Chizhevsky, *et al*. (2019). They highlighted the positive effects of infrastructure investment in the regions, such as increased labor migration, improved quality of life, and facilitated access to markets.

An Interesting approach to assessing the relationship between infrastructure dynamics and industrial productivity and profitability was demonstrated by Shah (1990), Gu & Macdonald (2009). The same aspect, but with a focus on assessing the impact of transport infrastructure on the industrial sector in Germany, has been considered by Stephan (1997). «Using time-series cross-section data from the manufacturing sector of the 11 Bundesländer from 1970 to 1993, he examined the impact of road infrastructure on private production applying three different approaches; i.e., a Cobb-Douglas production function, a translog production function and a growth accounting approach. He found that road infrastructure is significant for production in the manufacturing sector. Moreover, he found that variations between the Bundesländer are more important for explaining the Infrastructure's contribution to production than variations across years» Stephan (1997). Boopen (2006), Button (2012) estimated multiplier effects of regional transportation infrastructure on regional economies.

Demand forecasting errors and the ownership of Infrastructure were discussed by Button, and Chen (2014), and Enggartyasti, and Caraka, (2017). Calabrese (2008) paid attention to strategic communication for privatization, public-private partnerships and private participation in infrastructure

*Address correspondence to this author at the Kazan Federal University, Kazan, Russian Federation; E-mail: ammarmahdi2020@gmail.com

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projects. An interesting debate of how inadequate provision of public Infrastructure and services affects private investment; we can find in the paper of Reinikka & Svensson (1999).

The above-mentioned publications consider specific mechanisms and instruments of spatial interaction between enterprises of different types of economic activities with infrastructure industries. However, identifying the required amount of infrastructure investment and its sources is still not a fully studied, complex, and relevant problem.

The purpose of our research is to identify the existing demand for infrastructure services from manufacturers and to determine the possibility of attracting them as co-investors in infrastructure projects. In order to verify statistical methods of research, we use the method of the survey of the heads of more than 60 large enterprises of the Tatarstan Republic (Russian Federation), which provide 48% of GRP.

According to the objective, our purpose is through a survey to rank the factors that influence the placement of productive forces in the context of clusters. We are going to identify trends in demand for transport services and, through correlation-regression analysis of shares of transport costs in output and prime cost, to determine which cluster is ready to finance the development of transport infrastructure from profit (on a parity basis with the state possibly) in order to remove the restrictions of its industrial growth. Additionally, we intend to present an original marginal assessment of the investment efficiency of the transport complex.

METHODS

In the frame of the demand review for infrastructure support services from organizations that form priority clusters in the Tatarstan Republic (Russian Federation), we interviewed managers of more than 60 large enterprises that provide 48% of GRP. Clusters broke down the information obtained from the survey. Thus, we have determined the significance of the various factors that influence the distribution of productive forces. We found that the importance of factors depends on the stage of the production cycle and the stage of the business process (Table **1**).

The survey results convince us of the high importance of infrastructure factors at all stages of production and distribution. The importance of the factor that affects the distribution of productive forces depends on the specific territory and the specific enterprise, the nature of the products' resource intensity, and the stage of development of the organization.

In industrial and investment policy-making, management and specialists of enterprises and organizations, representatives of executive and municipal authorities, need to analyze the factors that influence the distribution of productive forces and allocate the most important for a specific territory and a specific enterprise, considering its location. Table **2** shows the results of the survey of representatives of different clusters of the Tatarstan Republic on the importance of various factors for the success of their business. As a result, infrastructure factors are of great

Table 1: Significance of Factors Depending on the Stage of the Business Process (in Descending Order)

Factor	Main business processes	Logistics	Advertising and sales	R & D	Final rating
Opportunities of infocommunications	2	1	1	2	1
Stability in the political sphere	3	5	2	1	2
Energy supply	1				3
Transport availability		2			4
Labor costs	4	4	3		5
Transportation costs		3			6
Favorable social situation				3	7
No shortage in the labor market	5			4	8
Distance from the airport			4		9
Favorable economic environment			5		10
Scientific and innovation capacity in the region				5	11

Table 2: Assessing the Importance of Cluster-Based Placement Factors

Clusters Placement factors (in descending order)	Aircraft Industry	Automotive	Power Generation	Oil and Gas Chemical complex	Agro-industrial complex	Total
Energy supply	5	2	2	1	1	1
Opportunities of infocommunications	2	1	1	*5*		2
Labor costs	1	3	5			3
No shortage in the labor market	3		4	2		4
No shortage of raw materials					2	5
Stability in the political sphere	4	4	3	4	3	6
Shift work is available				3		7
Transport availability					5	8
tax system		5				9
Arrangement near the markets					4	9

importance. While the role of transport costs is reduced in the evolution of transport and communication technologies, the importance of the quality of transport infrastructure (pavements, availability of international airports, high-speed rail lines) is not reduced. In addition, experts note that more and more enterprises of the republic experience restrictions in transport infrastructure development.

To explore the need for transport infrastructure a correlation and regression analysis of the share of transport costs in output and prime cost of production for 2008-2019 years was carried out. An empirical basis for the analysis is the statistical observation of the Tatarstan Republic in the form No.1-DS "Information on the added value of the enterprise", which we systematized with the attribution of enterprises to a particular cluster.

RESULTS AND DISCUSSION

Consequently, we concluded that in all the clusters there is a tendency to increase the demand for transport services (Figures **1-4**).

An interesting "statistical fork" was identified in the petrochemical cluster (see Figure **4**).

With the growth of demand for transport infrastructure services, a situation of inadequate

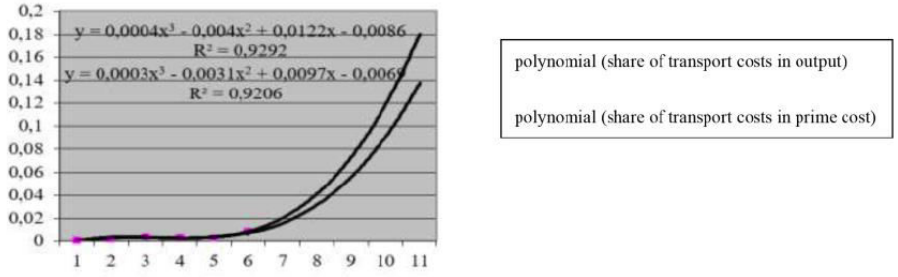

Figure 1: Nature of demand for transport services in the energy cluster.

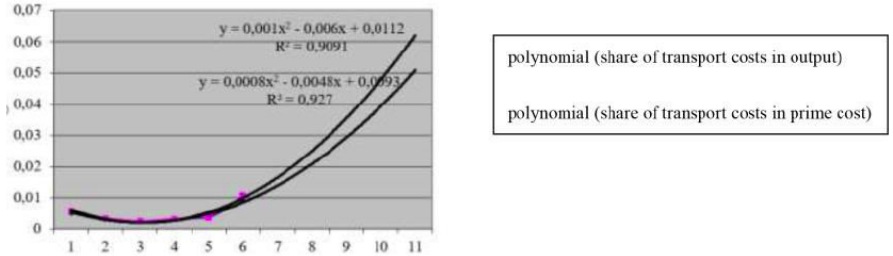

Figure 2: Nature of demand for transport services in the engineering production cluster.

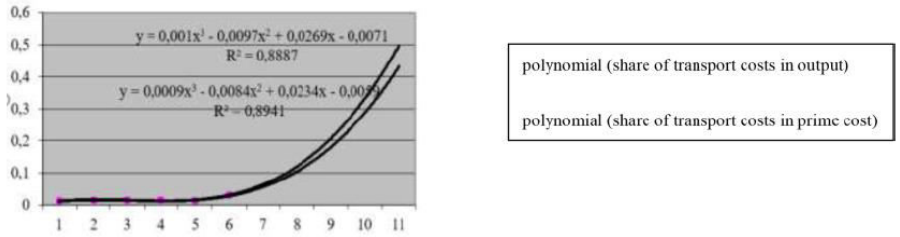

Figure 3: Nature of demand for transport services in the.

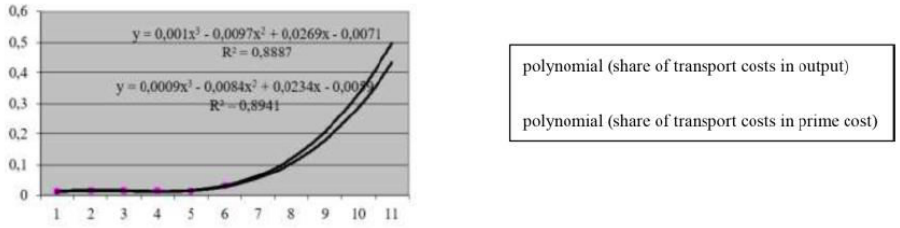

Figure 4: Nature of demand for transport services in the agro-industrial cluster.

satisfaction is expected in a year. In other words, the current state of transport infrastructure will not meet a developing cluster's needs. It is necessary to invest in its development. The fact that the share of transport costs in the prime cost becomes negative indicates that cluster enterprises are theoretically ready to finance the development of transport infrastructure from profit (possibly on a parity basis with the state) to remove the restrictions on their industrial growth (Figure **5**).

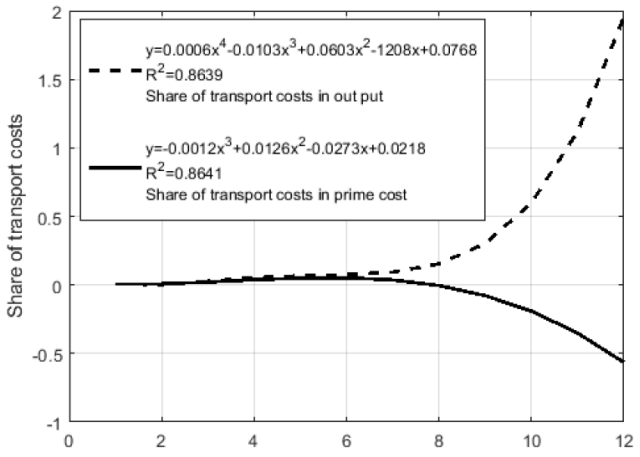

Figure 5: Nature of demand for transport services in the petrochemical cluster.

To get additional incentives to invest in transport development, we analyzed the expected profitability of these investments. Based on correlation-regression analysis of data for 10 years, we have established dependence of profit received by transport enterprises (in comparable prices) on passenger and cargo turnover.

$$Pr = e^{-16,87} * PT^{1,55} * CT^{0,87}$$

Where Pr –Profit received by transport enterprises of the Tatarstan Republic;

CT– Cargo turnover by economic sectors;

PT – Passenger turnover by modes of transport.

The model shows that the growth of cargo turnover of transport enterprises of the Tatarstan Republic is quite effective - if its growth is 1%, the profit of transport enterprises increases by 1.55% on average. Passenger transport is less efficient. To achieve an adequate level of return on investment, the cost of investment would need to be reduced by an average of 13 %. A margin assessment of the investments in transport enterprises effectiveness can be implemented on the basis of the investment-profit regression model construction: $y = 1688,2*e^{0,0001x}$

Where x – Investments in the industry in dynamics,

y – The amount of profit of the transport complex enterprises.

The function is exponentially increasing. Thus, we conclude that the profit of enterprises in the industry increases with acceleration, depending on the growth of investment volume, that is, each next invested ruble brings a greater return (Table **3**).

In fact, here is a multiplier effect. The profit of investors in the transport industry of the Tatarstan Republic will be relatively small with a small amount of

Table 3: Dependence of the Profit of Transport Enterprises on the Volume of Investments

The volume of investment, million rubles	1000	1500	2000	2500	3000
Marginal profit from an additional ruble of investment, rubles.	0,46	0,86	1,25	2,06	3,39

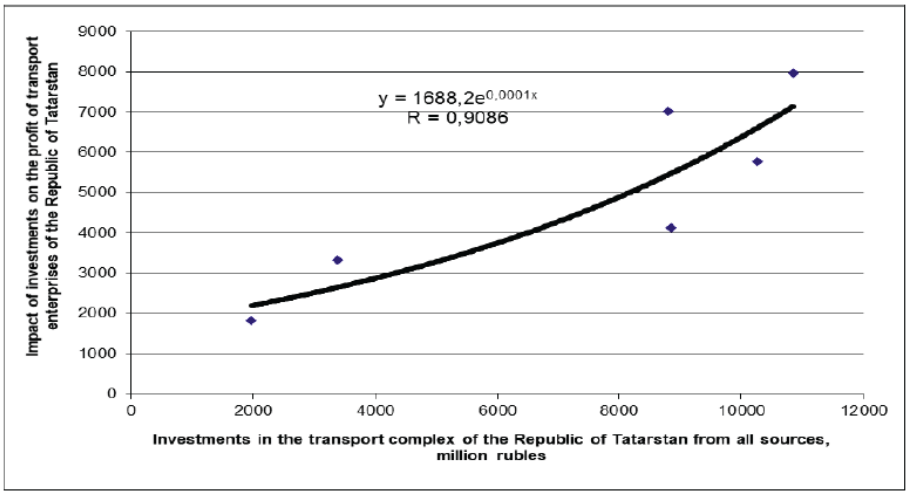

Figure 6: Impact of investments on the profit of transport enterprises of the Tatarstan Republic.

investment. For example, with an annual investment volume of 5 billion rubles. It will make an average of 0,28 rubles for each subsequent ruble of investment. If the volume of investment reaches 25 billion rubles, it will grow to 2,06 rubles per ruble of investment (Figure **6**).

CONCLUSION

Nowadays, given the necessity for infrastructure support services from organizations that form priority clusters in the Tatarstan Republic (Russian Federation), we interviewed the managers of above 60 large enterprises to analyze Economic Growth and stimulate Private Business Investment in Infrastructure by evaluating Its demand.

To summarize it should be noted that major investment projects are the most profitable for investors in the transport and road complex of the Tatarstan Republic, including public-private partnerships and budget projects. They can form the base for accompanying small investment projects, performing a multiplicative function.

The demand analysis method was tested in preparing the government program "Development and deployment of productive forces of the Tatarstan Republic based on the cluster approach until 2020 and for the period up to 2030".

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