The role of logistics, transportation and integration on economic growth among Central Asian countries

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Abstract: This study examines the economic growth among Central Asian countries. There are rich natural resources and convenient location among Eastern and Western countries, however the rate of economic growth is low. There 3 low-income countries which are Afghanistan, Kyrgyz Republic and Tajikistan. As well as, Uzbekistan is only country which should cross 2 countries to go sea directly. But it should not be problem to develop. The improvement logistics, transportation and integration among these countries can help to achieve economic growth and it also influences to world economy after pandemic.

Keywords: logistics, transportation and integration, Economic growth, Asian economy, transportation infrastructure, FDI.

I. Introduction

For achieving economic growth logistic infrastructure, transportation and integration are playing main role for economic growth. But in our world, there are 44 countries which cannot reach sea directly and this situation influences the transection cost and growth of their economy. Dave Donaldson and Richard Hornbeck (2013) studied counties' market access increases when it becomes cheaper to trade with another counties. K.Ganesh, S.C.Lenny Koh, A.Saxena and R.Rajesh (2011) investigated the logistic management as critical activities of businesses and forms the crux of entire dealing. Khadaroo and Seetanah (2008) examined the relationship between transport infrastructure and economic growth for Mauritius from 1950 to 2000. By using the dynamic time series in a vector error correction model, they found that infrastructure development actually increases accessibility and reduces costs. Williamson (2004) formulated 10 macroeconomic policies which are (1) fiscal discipline, (2) reorientation of public expenditures, (3) tax reform, (4) financial liberalization, (5) unified and competitive exchange rates, (6) trade liberalization, (7) openness to FDI, (8) privatization, (9) deregulation, and (10) secure property rights.

Williamson also paid attention to trade liberalization and it influences to openness to FDI, and it influences other macroeconomic policies.

Moreover, transport system and logistics are being looked as essential components improving the territorial attractiveness of developing countries, as well it influences other part of their economy which are FDI, trade openness and economic growth. In fact, logistics and transportation is very closely and fills each other. It will perfectly companies when types of transportation and logistics are connected beyond roads, highway networks, waterways and railways. As well, companies would invest paving to improve transport system for enabling their companies to be more competitive and this factor shows its effective results to developing economics. Interestingly, some authors researched about the effect of transportation to economic growth. Authors discussed what kind of connections there is between economic growth and transportation and statistical results and analyzing showed that transport infrastructure and logistics are future of modern economic and society. They have major effects to achieve economic and social development.

Modernization infrastructure is looked as being critical to future economic competitiveness and crucial to accommodating expanding populations. Esfahani and Ramírez (2003) confirmed the positive impact that infrastructure development has on the gross domestic product (GDP) of a country and discussed that the benefits of infrastructure development surpass the cost of services and the impact thereof on GDP. Kumo (2012) said that the aim of ASGI-SA is to initiate programs to reduce poverty and unemployment, in addition to its mandate to improve economic growth.

The role of transportation, logistics and integration is very important in Central Asian countries which are Afghanistan, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan. Convenient location and rich resources can develop these countries, however the rate of growth of Central Asian countries are low and 3 low-income countries are located in this zone which are Afghanistan, Kyrgyz Republic and Tajikistan. As well as, Uzbekistan is one of country which should cross 2 countries to go sea. Only way for improving Central Asian countries is integration, transportation and logistics. If we focus on the logistics performance index of Central Asian countries for quality of trade and transport-relate infrastructure, Uzbekistan had highest index with 2,57, Kazakhstan, Kyrgyz Republic, Turkmenistan and Tajikistan had relatively 2,55, 2,38, 2,23 and 2,17. Afghanistan had the lowest index with 1,81. However, in developed countries which are Austria, China, Korea Republic, Switzerland and USA, these indexes are at least 1.5 times bigger than Central Asian countries.[1]

II. Literature review.

[1] World Bank Indicator.

Researchers always argue about different drivers of economic growth in developing countries. They consist of innovation, R&D, technologies, energy consumption, FDI, international trade, logistics, transportation (e.g. K.Ganesh, S.C.Lenny Koh, A.Saxena, R.Rajesh, 2011; Mohammad Mafizur Rahman, 2021). Modern economists including transportation and logistics main factors to achieve economic growth. Transportation includes roads, ports, railways, runways and airports. Transportation and logistics create new job places and will attract FDI flows to developing counties. Logistics and transportation are filling each other and in our modern society we cannot select each other.

2.1. Transportation. Mohammad Ali Mosaberpanah and Sina Darban Khales (2013) investigated that transportation infrastructure is important component of economic growth and it requires responsibilities. When transportation is efficient, they create social and economic opportunity and this influence better to other parts which are markets, employment and investment. In addition, authors mentioned that efficient transport system decreases economic costs, while inefficient transport system increases costs. Marek Ogryzek, Daria Adamska-Kmiec and Anna Klimach (2020) studied sustainable transport system in modern society. They reported that sustainable transportation focuses on planning, politics and high technologies. Sustainable transportation reduces travels and crosses, so it impacts the price of goods and services. Many economists mention that transportation system reduces costs and creates opportunities to businesses and enterprises. Elena Kulipanova (2012) indicated the role of geographically location of countries to economic growth. In her mentions, landlocked states have disadvantages in economic growth due to higher transport costs, because these countries require cross few countries. While, costal countries can reach major markets after crossing sea and ocean. Main Report of World Bank for China (2014) reported the influence of transportation to households and individuals. Transportation may cause other components which are energy consumption, trade openness and urbanization. This connection is linked each other and when there will be some kind of problems, it impacts other macroeconomic components. Corinne Blanquart and Martin Koning (2017) investigated the benefits of transportation infrastructure to economics of country. They said that building and reconstructing transportation creates more job places. For example, in High-Speed 2 train which is projected to connect London and North England, 22,000 jobs might be created directly or indirectly. Oualid Kherbach and Marian Liviu Mocan (2016) said that an essential component of business competitiveness is in the correct design and implementation of transport strategies, with greater or less impact, depending on the type of businesses and the transportation might represent from one third to two thirds of general costs of logistics. As well as, they mentioned that the importance of issue for involving the transportation and its effects on the logistics id improved in the

aspects of outsourcing and employing operators. Moreover, Dave Donaldson and Richard Hornbeck (2013) studied impact of transport system on American economy from 1870-1890, and they investigated that the type of transportation is also impact to productivity. Authors noted the improvements of internal roads and waterways would mitigate losses from railways. This means that the type of transportations also influences to the effectiveness and process of economy.

2.2. Logistics. Logistics is getting essential element in developing countries' economy. The globalization and the development of the economy logistics is an important tool in the creation of single market. Well-organized logistics in markets has high advantages over other economies. Improving logistics infrastructure may cause competitiveness of companies and it also effects to rising market share. Ronald H. Ballou (1997) wrote that logistics is essential because it creates value for firm's consumers, suppliers and stakeholders. The term of value in logistics means terms of "time" and "place". Products and services have little value or no value when consumers can not possess their products and services when (time) and where (place) they want to consume them. To many firms around the world, logistics has been becoming essential value-adding process for people and economy. As well, other economists note the importance of logistics in unemployment sector in the economy, and employees will have permanent place of work. Prajogo D and Olhager J (2012) investigated highly integrated logistics in modern society and economics. Authors noted highly integrated logistic processes include dynamically coordinated business processes either within and outside the organizational boundaries. It helps businesses to widening their capacity and creating new job places. Improving logistic borders will effect the increasing employment rate and trade openness. K.Ganesh, S.C.Lenny Koh, A.Saxena and R.Rajesh (2011) mentioned that logistics means the management of material, service, information and capital flows. It includes the increasingly complex information, communication and control systems required in modern's business environment. Economists continued their opinion with that logistics is the future of modern society. In fact, during the Pandemic logistics and transportation have not been stopped, but ethics of attitude changed. George Thiers and Leon McGinnis (2011) studied modern logistic system and found that every small improvement in Global supply chains and logistics have large effects to society. This helps to explain the sustaining strong interest in logistics systems modeling and analysis. If companies want to enhance their opportunities, firstly they should improve their logistic system. Logistics is useful for improving quality, competitiveness and capacity.

III. Research design

3.1. Sample characteristics. We identified and selected 5 countries which are Afghanistan, Kazakhstan, Kyrgyz Republic, Tajikistan and Uzbekistan. All countries

which we selected are located in Central Asia, Turkmenistan was not mentioned because of no enough data. We used two data sources which are World Bank and World Investment Record. we took time between 2010 and 2018. We used panel data to identify our econometric results and we strongly balanced panel data.

3.2. Model specification. The relationship between transportation and logistics are significantly correlated each other. We examined exogenous factors which have influence on transportation and logistics. Our studies show that transportation and logistics are macroeconomic basics of Central Asian countries. In table 1, we gave descriptions of variables and their measurement.

Table 1

Description and measurement of variables

Variable	Description	measurement
Y	Gross Domestic Product	(current US$)
GDP pc	Gross Domestic Product per capita	(current US$)
FDI	Foreign Direct Investment	net inflows (BoP, current US$)
L	Labor Force	Number of people
T	Transportation	Kilometers of road
LG	Logistics	Logistics performance index: Overall
U	Urbanization	% of total population

General production function is modelled that

$$Y = (FDI; L; T; LG; U)$$

where Gross Domestic Product Y is related with Foreign Direct Investment (FDI), labor force (L), transportation (T), logistics (LG), and urbanization (U).

We utilized log-transformation of variables, as follows:

$$\ln Y_{t,i} = \beta_0 + \beta_1 lnFDI_{t,i} + \beta_2 lnL_{t,i} + \beta_3 lnT_{t,i} + \beta_4 lnLG_{t,i} + \beta_5 U_{t,i} + \varepsilon_{t,i}$$

where Y is natural-log of GDP, $lnFDI$ is natural-log of Foreign Direct Investment inflows, lnL represents natural-log of labor force, lnT shows natural-log of transportation, $lnLG$ indicates natural-log of logistics, and lnU shows natural-log of urbanization. The subscript t = 1, 2, …., 10 denotes time period. β indicates coefficients and ε represents standard error of econometric modelling. i reperesents country of in our modelling.

In calculating transportation and logistics, we utilized following models:

$$lnT_{t,i} = \beta_0 + \beta_1 lnY_{t,i} + \beta_2 GDPpc_{t,i} + \beta_3 lnFDI_{t,i} + \beta_4 lnL_{t,i} + \beta_5 lnLG_{t,i} + \beta_6 lnU_{t,i} + \varepsilon_{t,i}$$

$$lnLG_{t,i} = \beta_0 + \beta_1 lnY_{t,i} + \beta_2 GDPpc_{t,i} + \beta_3 lnFDI_{t,i} + \beta_4 lnL_{t,i} + \beta_5 lnT_{t,i} + \beta_6 lnU_{t,i} + \varepsilon_{t,i}$$

Identifying Foreign Direct Investment, we made model:

$$lnFDI_{t,i} = \beta_0 + \beta_1 lnY_{t,i} + \beta_2 GDPpc_{t,i} + \beta_3 lnT_{t,i} + \beta_4 lnL_{t,i} + \beta_5 lnLG_{t,i} + \beta_6 lnU_{t,i} + \varepsilon_{t,i}$$

In making our model, we entered and calculated other factors. However, the influence role of Foreign Direct Investment, transportation, logistics, labor force and urbanization are higher for achieving economic growth than other factors in Central Asian countries.

IV. Results and discussion.

Table 2 describes correlation between explanatory variables in our data. In our variables have positive relationship. Gross Domestic Product, GDP per capita, Foreign Direct Investment, Logistics, Urbanization, Transportation and Labor Force are correlated both positively and significantly. Furthermore, they all have positive linkages with exogenous variables.

Table 2

Correlation

Variable	FDI	GDP	GDP pc	logistics	urbanization	transportation	logistics
FDI	1						
GDP	0.6839	1					
GDP pc	0.2432	0.1470	1				
logistics	0.4560	0.4078	-0.0807	1			
urbanization	0.8232	0.8097	0.3629	0.4990	1		
Transportation	0.7425	0.6711	0.4032	0.4162	0.9482	1	
Labor force	0.3349	0.8139	-0.0510	0.1924	0.5428	0.4889	1

If we see table 3, we calculated influences variables in Model-1. The role of FDI is always essential among Central Asian countries and countries focus on the attractiveness of FDI. In our model, we identified that the role of GDP has positively and significantly effect on FDI. Our results show that a magnitude of 1.12 means that economic growth rise 1.12%, when GDP increase 1%. The effect of transportation and labor force have positive and significant at 1% level. There are not significant effect of GDP pc and logistics on FDI, and we did not include urbanization in our model.

Table 3

Panel data

variables	FDI	GDP	transportation	logistics
FDI	1	.1245+ (0.054)	.0163 (0.770)	-.0034 (0.916)
GDP	1.12*** (0.000)	1	-.5480*** (0.000)	.0945+ (0.091)
GDP pc	-.0255 (0.203)	.0083 (0.316)	.0066 (0.341)	-.0086* (0.024)

Transportation	.7003*** (0.000)	-.8124*** (0.000)	1	.0561 (0.147)
logistics	-.0869 (0.916)	.0786 (0.827)	-.1840 (0.536)	1
urbanization		4.3*** (0.000)	4.66*** (0.000)	
Labor force	-1.44*** (0.000)	.9589*** (0.000)	.4741** (0.001)	-.1249 (0.117)
N	44	43	43	44
R^2	0.7492	0.9314	0.9503	0.3068

Note: values are estimated with significant levels, ***, **, *, and + at 1%, 5%, 10% and more 10%.

In model 2, we identified effect of GDP as dependent variable. The effect of FDI has significant and positive effect on FDI with 0.1245. As well as, urbanization and labor force have positive and significant effect on GDP, 4.3% and 0.9589% respectively. Transportation has negative effect on GDP with -0.8124%.

In model 3, results show that transportation as a dependent variable in Model 3. Urbanization and labor force have positively and significant effect on transportation, 4.66% and 0.4741% respectively. But GDP has negative and significant effect on transportation with -0.5480%.

Finally, in Model-4, we found that logistics infrastructures in the Central Asian countries depend a lot on economic growth at 1% level. An augmentation of more 10% in GDP does in turn rise logistics by 0.0945%. Furthermore, GDP pc has negatively affects on logistics. When GDP pc decrease 10%, it causes to rise 0.0945% of GDP pc. GDP has negative effect on logistics with -0.0086.

V. Conclusion.

This study has investigated the relationship among economics growth, FDI, logistics and transportation in Central Asia between 2010 and 2018 (9 years). We did a panel data for Central Asian countries. Our results show that transportation system, logistics, urbanization, labor force and FDI are the most effective drivers achieving economic growth for Central Asian countries.

Transportation infrastructure is one of the main problems in Central Asian countries. Countries are not available using sea or ocean ports rightly and it will impact negatively transport cost. But improving railway and highway system able to solve this problem. As well as, countries should select countries for creating and improving corridors transporting goods. Re-arranging taxation system and reducing paper works also impact rising integration and decreasing transport costs.

Improving logistics infrastructure will increase economic potential. Firstly, reducing the share of government and liberalizing economy will more useful increasing logistics. When the share of government will be bigger than private sector

in economy, the level of productivity will less. Especially, the share of public sector is higher than private sector in Central Asian countries. As well as, government should give a hand by financial and legal side.

Furthermore, the level of human capital, technology and political risks also plays main role in improving transportation and logistics. There should be well-educated staffs and high quality technologies, it will rise the quality of working. As well, political and social stability is being essential part of developing transportation and logistics. For example, un-stability situation in Afghanistan is affecting negatively to other countries. Because, Afghanistan is the biggest corridor for Central Asian countries.

References

1. A. Moyano, J. M. Coronado, and M. Garmendia (2016). How to Choose the Most Efficient Transport Mode for Weekend Tourism Journeys: An HSR and Private Vehicle Comparison. The Open Transportation Journal, 2016, 10, (Suppl-1, M8) 84-96

2. C. Blanquart, M. Koning (2018). The local economic impacts of high-speed railways: Theories and facts. HAL Id: hal-01859467.https://hal.archives-ouvertes.fr/hal-01859467

3. C. Blanquart and M. Koning (2017). The local economic impacts of high-speed railways: theories and facts. Eur. Transp. Res. Rev. 1-14.

4. D. Donaldson, R. Hornbeck (2013). Railroads and American economic growth: a "Market access" approach. Working Paper 19213. http://www.nber.org/papers/w19213.

5. E. Kulipanova (2012). International Transport in Central Asia: Understanding the Patterns of (Non-)Cooperation. Working paper. NO.2

6. H. S. Esfahania, M, T, Ramırez (2003). Institutions, infrastructure, and economic growth. Journal of development economics. Pp. 443 – 477.

7. G. Thiers, L. McGinnis (2011). Logistics systems modelling and simulation. https://www.researchgate.net/publication/254050194

8. Azmi, N. Abdul Hamid, Md Nasarudin Md Hussin, Nik Ibtishamiah (2017). Logistics and supply chain management: The importance of integration for business processes. Journal of Emerging Economies & Islamic Research. Vol. 5, No. 4. 73 – 80.

9. Kenneth Button (2015). Transportation Economics: Some Developments Over the Past 30 Years. Journal of the Transportation Research Forum, Vol. 45, No. 2 (Summer 2006), pp. 7-30.

10. K. Sharipbekova, Z. Raimbekov (2018). Influence of Logistics Efficiency on Economic Growth of the CIS Countries. European Research Studies Journal Volume XXI, Issue 2, pp. 678-690.

11. K. Ganesh, S.C. Lenny Koh, A. Saxena and R. Rajesh (2011). Logistics Design and Modelling - A Simulation Perspective. Logistics and Supply Chain Management (LSCM) Research Group.

12. Khadaroo, A. J., Seetanah, B. (2008). Transport infrastructure and foreign direct investment. Journal of International Development. 22, 103–123.

13. Kumo, W. L. (2012). Infrastructure investment and economic growth in South Africa: A Granger causality analysis. (Working paper No. 160) African Development Bank.

14. M. Ogryzek, D. Adamska-Kmiec and A. Klimach (2020). Sustainable Transport: An Efficient Transportation Network—Case Study. Sustainability 2020, 12, 8274. www.mdpi.com/journal/sustainability

15. M. A. Mosaberpanah, S. Darban Khales (2013). The Role of Transportation in Sustainable Development. 441-448. Conference Paper. https://www.researchgate.net/publication/255991703

16. M. M. Rahman (2021). The dynamic nexus of energy consumption, international trade and economic growth in BRICS and ASEAN countries: A panel causality test. Journal of Energy.

17. O. Kherbacha, M. L. Mocana (2015). The importance of logistics and supply chain management in the enhancement of Romanian SMEs. Procedia - Social and Behavioral Sciences 221. 405 – 413.

18. Prajogo D, Olhager J (2012). Supply Chain Integration and Performance: The Effects of Long-Term Relationships, Information Technology and Sharing, and Logistics Integration. International Journal of Production Economics. Pp. 514-522.

19. Ronald H. Ballou (2007). "The evolution and future of logistics and supply chain management", European Business Review, Vol. 19 Iss 4 pp. 332 – 348

20. R. H. Ballou (1997). Business logistics – importance and some research opportunities. Invited Paper. V.4, n.2, p. 117-129

21. Regional Economic Impact Analysis of High-Speed Rail in China. 2014. Main Report. World Bank.

22. Sung Tae Kim, Hong-Hee Lee, Taewon Hwang (2020). Logistics integration in the supply chain: a resource dependence theory perspective. International Journal of Quality Innovation. https://doi.org/10.1186/s40887-020-00039-w.

23. Avazov Nuriddin, Azimova Lola, Saidjon Khayitov(2021). The Impact of the Digitalization Process and Investment on the Structural Changes of the Economy. ISSN: 2237-0722 Vol. 11 No. 4 (2021) 25.06.2021

24. V. Anca (2019). Logistics and supply chain management: an overview. Studies in Business and Economics no. 14(2). 209-215.

25. Williamson, J. (2004). Practitioners of development. In the Washington Consensus as Policy Prescription for Development. World Bank.

26. Wolfensohn Center for Development at the Brookings Institution and the Carnegie Endowment for International Peace, in partnership with the Asian Development Bank and the Central Asia Regional Economic Cooperation Program (2007). Integrating Central Asia into the World Economy: The Role of Energy and Transport Infrastructure.