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The Effect of Governance Quality on International Logistics Performance*

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Abstract

Purpose - This study investigates the direct effects of national governance quality on international logistics activities. The results provide practical insights for different stakeholders such as policymakers and offer detailed recommendations for improving national governance quality in projects aimed to enhance cross-border logistics operations.
Design/methodology/approach - To test the hypotheses, a multivariate linear regression model using the ordinary least squares estimator is applied to 166 countries covering six periods: 2007, 2010, 2012, 2014, 2016, and 2018.
Findings - All national governance indicators have a significant positive influence on the performance of cross-border logistics operations. At the dimensional level, government effectiveness, legal systems, anti-corruption efforts and regulatory quality have a greater impact than democracy and a stable political environment on all dimensions of logistics performance.
Research implications or Originality - This study sheds light on how the quality of governance directly affects trading logistics. It advises governments to enhance governance quality and nurture a supportive institutional environment to improve transnational logistics proficiency. It also provides a better understanding of the institutional backgrounds of international logistics companies in target countries before their performance plans.

Keywords: Governance Quality, International Logistics Performance, Logistics Performance Index, Worldwide Governance Indicators, World Development Indicators
JEL Classifications: F13, F18, F23, F62, H11

Ⅰ. Introduction

Originating from military contexts, the term "logistics" has expanded to include the management of the efficient flow of goods, services, and information across industries. The advent of modern logistics technologies has significantly improved the speed and efficiency of operations, thereby fostering increased cross-border trade. The establishment of global value chains, aiming to lower labour costs, access new markets, and leverage global learning, has further

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underscored the vital role of international logistics and heightened its impact on economic growth (Coe, 2017). Consequently, competition in logistics capabilities has intensified, leading various stakeholders such as shippers, freight forwarders, and terminal operators to strive for efficiency within the logistics value chain, maximize throughput, and provide services that meet demands at high speed and low cost (Memedovic et al., 2008).

Meanwhile, governments primarily engage in globalization and international business to enhance their economic development and global position. They strive to maintain a mutually beneficial relationship while safeguarding their domestic economy and national security against undesirable elements, such as illegal goods or overwhelming inflows of foreign products into local markets (Hill, 2017). Hence, governments enact different protective policies, such as import−export regulations, tariff systems, and anti-dumping measures for international trading activities. Moreover, national disparate factors such as culture, geography, and national focal development plans can lead to differences in the quality and style of government systems among countries.

Thus, international logistics operations adhere to the regulations of each nation participating in the process and the international systems. The complexity of an institutional environment can hinder international logistics performance (LP). According to Hausman, Lee and Subramanian (2013), delays in the entire process could arise because of procedural red tape and stoppages at ports and border crossings. Saldanha and DeAngelo (2022) state that a combination of regulatory trade barriers, the effectiveness of the legal system within the institutional environment, and corrupt behaviours could impede international LP, particularly the timeliness of international shipments. Guner and Coskun (2012) conclude that social factors such as political risks and the democracy index have a greater correlation with cross-border logistics activities rather than economic factors.

By leveraging data from 166 countries spanning over six periods, this study investigates the direct effect of individual governmental implementations on LP under the global scope. While existing academic literature has explored the relationship between governmental initiatives and international logistics (Cho and Lee, 2017; Hollweg and Wong, 2009; Koh et al., 2018; Soh, Wong and Tang 2021), the direct relationship between them has not been investigated extensively (Arvis et al., 2018). Further, this study comprehensively examines all six Worldwide Governance Indicators (WGI), thereby providing a comprehensive and detailed analysis of governmental influence and ranking each dimension of governance quality based on its impact on international logistics operations.

The findings illustrate a positive and significant relationship at different levels between governance indicators and LP in general and specific dimensions. Particularly, the effectiveness of governmental practices shows the most outstanding effect on international logistics outcomes. These findings provide practical insights into the causal relationship between governance and logistics and provide valuable implications for stakeholders to enhance logistics operations.

The remainder of this paper is organized as follows: a review of previous research and theoretical background, research methodology, data analysis and results, and conclusions.

II. Related Research

2.1 LP and Economic Growth

Logistics is an essential bridge connecting countries and international markets. Arvis et al. (2018) find that countries with good LP can reap more benefits from globalization. Korinek and Sourdin (2011) and Martí, Puertas and García (2014) underscore the strong connection between superior trade logistics and increased bilateral merchandise trade, especially for complex goods affecting transportation fluidity. Gani (2017) infers that all six dimensions of the LP Index (LPI) positively impact export volumes, while customs and international shipments significantly influence import volumes. Trade facilitation, broadly defined as a set of policies aimed at enhancing LP, can boost trade performance significantly (Felipe and Kumar, 2012; Hertel and Mirza, 2009; Portugal-Perez and Wilson, 2012). According to RAIMBEKOV et al. (2023), the growth of LPI has a positive effect on the bilateral trade flow.

Regarding the correlation between LP, national performance, and growth, Korinek and Sourdin (2011) conclude that improving logistics is a growth-promoting strategy since trade promotes development. Civelek, Uca and Çemberci (2015) emphasize that a country's logistics capability determines how competitiveness and wealth are related. Çemberci, Civelek and Canbolat (2015) infer that improvement in international shipments, tracking and tracing, and timeliness can elevate a country's rank in the Global Competitiveness Index. HE (2020) concludes that the development of logistics is favorably correlated with economic expansion. Saidi et al. (2020) stress the positive bidirectional relationships among economic growth, foreign direct investment (FDI) inflows, and transport infrastructure in developing countries. Luttermann, Kotzab and Halaszovich (2020) also conclude that infrastructure and international shipments have a positive effect on trade volume, whereas timeliness, tracking and tracing have a positive effect on FDI inflow.

2.2 Governance Quality

2.2.1 Governance and Economic Development

An effective governance system is a vital factor in economic development. Han, Khan and Zhuang (2014) deduce that despite the different dependencies between specific dimensions of governance and a country's stage of development, the relationship between better governance, faster economic growth, and higher income levels is well-established empirically. Noja et al. (2019) conclude that public administration dimensions influence economic development, support for research and development, and socioeconomic credentials, particularly poverty alleviation.

Governance quality also influences FDI flows. Bissoon (2012) suggests that better governance can boost a country's income level, which indirectly positively impacts FDI inflows. Jadhav and Katti (2012) conclude that government effectiveness and regulatory quality have a significantly positive effect on attracting FDI inflows, whereas political stability, voice and accountability, and the control of corruption have a negative effect. Zubair and Khan (2014)

suggest that political stability is a major factor in economic progress in Pakistan, while Absadykov (2020) finds that the control of corruption is the strongest indicator of Kazakhstan's economic growth.

2.2.2 Governance and Corruption

Corruption is a failure of the government system and a symptom of fundamental economic, political, and institutional scourge (Bissoon, 2012). However, the effects of corruption on economic growth remain controversial in academic research. Some research portrays corruption as a "grease-the-wheels" strategy to expedite a decision made by a slow bureaucracy and to circumvent ineffective legislation (Méon and Weill, 2010), while others claim that corruption negatively affects economic growth (Grabova, 2014; Habib and Zurawicki, 2002; Swaleheen, 2011). Aidt, Dutta and Sena (2008) indicate that the effect of corruption on economic growth is conditional on the quality of the political institution: corruption negatively impacts growth when the political institution is of high quality, and vice versa. Haw, Kueh and Ling (2020) support this result by uncovering a U-shaped relationship between corruption and economic growth, in which corruption can indirectly promote development until a certain threshold hinders growth.

High-quality governance is an effective way to control the effects of corruption. Dzhumashev (2014) suggests that applying effective anti-corruption policies can simultaneously lower the incidence of corruption and foster growth. Pulok and Ahmed (2017) report that institutional reforms and enhancement in public awareness of corruption can reduce corruption, thus improving economic development in Bangladesh. Bissoon (2012) finds that to reduce the level of corruption, efforts to enforce anti-corruption legislation are insufficient, and reforming economic policies, institutions, and incentives should be emphasized concurrently.

2.3 LP and Governance

While national governance and LP both play important roles in a country's development, the relationship between them has only been established to a certain extent. Shepherd and Hamanaka (2015) claim that the relationship between the public and private sectors in trade logistics is mutual and undeniable. Hollweg and Wong (2009) add that in an environment characterized by fewer trade barriers, the logistics industry demonstrates superior performance. According to Gupta and Goh (2012), cumbersome customs inspections and processes, a lack of coordination between national government agencies and cross-border regulations, and arbitrary rulings can hamper international trade within ASEAN countries. Yoo (2016) suggests that reasonable charges, appropriate tax systems, and comprehensive measures can release logistics barriers in Korea for Chinese and Japanese companies. Cho and Lee (2017) indicate that efficient customs processing and logistics connections can enhance overseas direct purchases. Soh, Wong and Tang (2021) find that institution plays a role in the connection between LP and inward FDI and that formulating a better, tighter policy system is not enough to enhance logistics efficiency and effectiveness unless the policy is implemented effectively.

Uca, İnce and Sümen (2016) find that LP can induce a relationship between perceived corrup-

tion and foreign trade volume. Seabra, Flores and Gomes (2016) infer that corruption negatively affects the throughput of containers and that anti-corruption efforts in the port industry can strengthen a nation's reputation among foreign investors and traders. Wong and Tang (2018) and Larson (2020) also support the idea that corruption could grind LP to a halt. Saldanha and DeAngelo (2022) discover that there is no grease-the-wheels effect in international shipment operations, as the timeliness of international shipments can be negatively impacted; however, Koh et al. (2018) posit that the effect still lingers in LP in Asia.

LP and governance have an undeniable relationship. However, these studies have limitations in terms of the time, areas, and even certain dimensions of logistics and governance quality. Moreover, few studies have investigated the direct relationship between governance and logistics operations. This research is conducted to cover these shortcomings by investigating the effect of national governance quality on LP in a detailed manner, from a global perspective.

Based on the literature review, it is possible to hypothesize that despite the nuances among government systems, all the dimensions of governance quality generally act as an instrument supporting international LP.

Ⅲ. Methodology

3.1 Sample and Data

The dataset is collected from secondary data sources, including the Logistics Performance Index (LPI), Worldwide Governance Indicators (WGI), and World Development Indicators (WDI) for 2007, 2010, 2012, 2014, 2016, and 2018, across 166 countries. According to Larson (2020), secondary data are published publicly by organizations worldwide, ensuring high internal validity.

This dataset provides information on international LP, governance quality as well as economic and social development at a national level. Missing values for any variable in any year are excluded. The dataset includes 921 records (166 countries) over six years. The countries are also divided into four areas based on the geographic classification of the World Bank: East Asia, South Asia, the Pacific, Europe, Central Asia, Africa, and America (North America, Latin America, and the Caribbean). Countries according to areas are summarized in Panels A and B of 〈Table 1〉.

Table 1. Sample and Data Set

Panel A: Sample Distribution by Region

Region	Frequency	Percentage
East Asia, South Asia, and the Pacific	160	17%
Europe And Central Asia	278	30%
Africa	337	37%
America	146	16%
Total	921	100%

Panel B: Number of Countries by Region

Region	Number of Countries
East Asia, South Asia, and the Pacific	28
Europe And Central Asia	48
Africa	64
America	26
Total	166

3.2 Research Method

3.2.1 Research Design

Because the period of the panel data is short ($1 < T < 7$), dynamic and nonstationary panel data methods are not suitable for this dataset (Baltagi, 2021; Koh et al., 2018). Therefore, a regression model for the panel data using the ordinary least squares estimator was used to control for unobserved variables that were not included in the model (Wooldridge, 2010).

The main research model is shown in Equation (1). The dependent variable is LP proxied by the overall LPI and its six indicators, while the test variable is country governance proxied by WGIs. The variables were transformed into a natural logarithmic form to standardize the measurement and control for heteroscedasticity (Koh et al., 2018). Moreover, according to (Kaufmann, Kraay and Mastruzzi, 2011), the six dimensions of the WGIs are highly correlated. To avoid multicollinearity and to investigate the impact of each WGI indicator on each dependent variable, the governance indicators are regressed individually with the overall LPI and each LPI component. Control variables are included in the model to analyze the actual effects of the WGI.

$$LPi = \alpha + \beta i \cdot WGIi + \Sigma(Control) + \varepsilon i \quad (1)$$

3.2.2 Variables

Dependent variables (international LP)

The dependent variables from Equation (1) are the natural logarithm forms of the overall international LPI (*OLPI*) and its six factors. The international LPI is an index aggregated by the World Bank biannually since 2007 through a worldwide questionnaire of global freight forwarders and express carriers regarding the LP of eight foreign nations where their company conducts its operations and those with which it engages in trade; it acts as an interactive assessment tool (ranging from 1 [*extremely low*] to 5 [*extremely high*]) to evaluate countries' trade facilitation and logistics quality. To reduce the dimensionality of the dataset, the World Bank constructs an overall international LPI using principal component analysis (PCA) of six dimensions:

[1] Customs (*CU*): Speed, simplicity, and predictability of customs clearance at border control agencies in the process of import-export activities

[2] Infrastructure (*INFRAS*): The condition of infrastructure related to trade and transport, such as information technology and communication, and physical infrastructure
[3] International shipments (*IS*): The ease of arranging international shipments to foreign countries at a competitive price
[4] Service quality (*LQ*): The expertise and quality of logistics service suppliers such as transport operators and customs brokers
[5] Tracking and tracing (*TT*): The possibility and ease of accessing the status of consignments during transportation
[6] Timeliness (*TIME*): Frequency of delivery of shipments meeting scheduled or expected delivery times.

Test variable (Governance metric)

The test variables are each of the six WGIs aggregated by the World Bank since 1996. Based on their definitions of governance, these six governance indicators are constructed and divided into three clusters:

[1] 1st cluster: The procedure for selecting, monitoring, and replacing administrations:
- Voice and accountability (*VA*): capture the approach of a country's citizens in selecting their government, how freely citizens can speak and associate, and how independent the media is
- Political stability and absence of violence/terrorism (*PV*): reflect the consciousness of the possibility of government destabilization or overthrow in the case of politically motivated violence, including terrorism

[2] 2nd cluster: The ability of the government to effectively issue and enact sound policies:
- Government effectiveness (*GoE*): reflects the perception of the condition of public services and civil service, and its independence from political pressures; the quality and credibility of the government in issuing policies; and applying and committing to such policies
- Regulatory quality (*RQ*): measures the consciousness of the government's capacity to plan and implement qualified policies and regulations that enhance and encourage private sector development

[3] 3rd cluster: The respect for institutions governing economic and social interactions between citizens and the state:
- The rule of law (*RL*): measures the perceptions of citizens for trusting and complying with the rules of society, especially related to the enforcement of contracts, private property rights and protection, confidence in the police force and judicial system, and the possibility of crime and violence
- Control of corruption (*CC*): reflects the consciousness of corruption situations in public power in both petty and grand forms and the simultaneous acquisition of states by elites and private interests

These six indicators are synthesized from over 30 existing data sources reporting the perception and experiences of various respondents including citizens, entrepreneurs, and experts in

the public, both private and NGO sectors all over the world by using the Unobserved Components Model technique. According to Noja et al. (2019) and Absadykov (2020), *WGI* is the most commonly used variable to measure governance quality. The range of these indicators is from (-2.5) to (+2.5), and a natural logarithm is used to standardize the score, following the Equation

Control variables

Five control variables are considered. Ports represent the number of ports with container liner services available in a country. A higher number of such ports could indicate increased logistics activity, especially in countries with coastlines because they possess greater trading opportunities than landlocked nations. The presence of ports with container liner services can also exert a strong influence on governance, such as cooperation with the private sector to manage port activities, particularly affecting policies aimed at enhancing LP (Monios, 2015). Data on the number of ports with container liner services were collected from World Port Source. Owing to the large variance among coastal and landlocked countries, it is transformed using the Equation $ports = \ln(no.\ of\ Port_{i,t} + 1)$ in which $no.\ of\ Port_{i,t}$ is the number of ports with container liner services in country i in year t.

LaborControl, expressed in Equation (2), is computed as the total labor force of country i in year t divided by the total population of that country in the same year:

$$LaborControl = \frac{Total\ Labor\ Force}{Total\ Population} \quad (2)$$

in which the total labor force and population are collected from the World Development Indicators (WDI). *LaborControl* proxies labor, which is a condition of macroeconomic stability and thus can impact trade and investment activity in a country (Luttermann, Kotzab and Halaszovich, 2020). Labor is also a crucial factor in logistics and supply chain activities because its capabilities can drive the likelihood of logistics and act as a catalyst for national and international trade (Sergi et al., 2021).

GDPPCGR is the decimal annual gross domestic product per capita growth rate collected from WDI data. It is included as a control variable because GDP per capita is an index that illustrates the health and development of an economy (Noja et al., 2019). Finally, dummy variables for the year and geographic region of the country (*YearDummy* and *AreaDummy*) are included to control for the effects of time and region.

Ⅳ. Results and Discussion

4.1 Descriptive Statistics

Descriptive statistics of the data are presented in 〈Table 2〉. The mean of *OLPI* is 1.031. *TIME* has the highest mean score (1.169), followed by *TT* (1.031), *IS* (1.023), *LQ* (1.007),

INFRAS (0.966), and *CU* (0.953). Regarding the WGIs, *RQ* had the highest mean value of 1.041, followed by *GoE* (1.035), *CC* (1.014), *RL* (1.012), *VA* (0.998), and *PS* (0.959).

4.2 Correlation Matrix

〈Table 3〉 presents the Pearson correlations between the variables. The LP dimensions (*CU*, *INFRAS*, *IS*, *LQ*, *TT*, *TIME*) are all significantly and positively correlated with each other and *OLPI* ($p < .01$). The correlation matrix illustrates that the test variables (*VA*, *PS*, *GoE*, *RQ*, *RL*, *CC*) are all significantly positively correlated with the respondent variable *OLPI*, ($p < .01$).

Table 2. Descriptive Analysis (N=921)

Variable	Mean	Std.Dev	Min	25%	Median	75%	Max
OLPI	1.031	0.199	0.192	0.884	1.005	1.171	1.441
CU	0.953	0.220	0.105	0.799	0.916	1.108	1.437
INFRAS	0.966	0.249	0.095	0.790	0.925	1.143	1.491
IS	1.023	0.188	0.201	0.890	1.021	1.167	1.443
LQ	1.007	0.216	0.223	0.847	0.984	1.157	1.462
TT	1.031	0.223	0.000	0.873	1.019	1.195	1.477
TIME	1.169	0.184	0.318	1.041	1.160	1.314	1.568
VA	0.998	0.380	-0.300	0.739	1.065	1.297	1.554
PS	0.959	0.455	-0.693	0.806	1.064	1.278	1.512
GoE	1.035	0.353	-0.592	0.813	1.041	1.302	1.682
RQ	1.041	0.362	-0.334	0.821	1.049	1.308	1.655
RL	1.012	0.353	-0.430	0.782	0.980	1.281	1.635
CC	1.014	0.342	0.178	0.780	0.974	1.266	1.695
Port	1.163	0.939	0.000	0.693	1.099	1.792	3.807
COAST	0.775	0.418	0.000	1.000	1.000	1.000	1.000
LaborControl	0.441	0.092	0.180	0.380	0.450	0.508	0.763
GDPPCGR	0.026	0.054	-0.245	0.008	0.024	0.045	1.218

Table 3. Pearson Correlation Matrix (N=921)

	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	*OLPI*	1															
2	*CU*	.945**	1														
3	*INFRAS*	.959**	.925**	1													
4	*IS*	.929**	.845**	.860**	1												
5	*LQ*	.970**	.911**	.934**	.879**	1											
6	*TT*	.954**	.873**	.892**	.860**	.920**	1										
7	*TIME*	.923**	.822**	.845**	.828**	.868**	.873**	1									
8	*VA*	.579**	.578**	.555**	.521**	.556**	.558**	.526**	1								
9	*PS*	.477**	.492**	.472**	.430**	.447**	.445**	.427**	.546**	1							
10	*GoE*	.806**	.787**	.798**	.734**	.774**	.755**	.734**	.693**	.670**	1						
11	*RQ*	.765**	.752**	.748**	.700**	.725**	.724**	.702**	.779**	.616**	.892**	1					
12	*RL*	.790**	.789**	.785**	.707**	.761**	.741**	.708**	.746**	.706**	.939**	.905**	1				
13	*CC*	.760**	.772**	.760**	.669**	.737**	.711**	.669**	.727**	.685**	.909**	.843**	.943**	1			
14	*LaborControl*	.538**	.521**	.526**	.486**	.515**	.514**	.498**	.344**	.561**	.609**	.539**	.567**	.574**	1		
15	*GDPPCGR*	-.086**	-.074*	-.121**	-.058	-.085**	-.081*	-.067*	-.028	-.007	-.033	-.052	-.051	-.053	-.005	1	
16	*Port*	.524**	.468**	.522**	.473**	.525**	.515**	.478**	.260**	.095**	.374**	.317**	.332**	.328**	.215**	-.055	1

Note: *p < .1, **p < .05; ***p < .01.

4.3 Main Regression Results

〈Table 4〉 reports the regression analysis result among the governance metrics and overall international LP. All the test variables have a significantly positive effect on *OLPI* ($p < .01$), which supports the hypothesis. Specifically, *GoE* has the highest coefficient of 0.340, followed by *RL*; *CC*; *RQ*; and *VA* with coefficients of 0.316; 0.300; 0.288; and 0.177, respectively. *PS* shows the lowest effect among governance indicators with a coefficient of 0.094.

The results imply that qualified governance positively impacts overall cross-border LP. Particularly, government effectiveness, characterized by a strong commitment to public services and civil service independence from political pressures, significantly influences LP outcomes. A business environment characterized by a fair and transparent legal system and a low level of corruption can minimize risks and foster faster operations in goods transportation for logistics companies. Policies and regulations supporting private sector development also facilitate cross-border logistics.

Moreover, the evaluation of LPI relies on the feedback of international forwarders and logistics officers who directly interact with authorities and are responsible for transporting goods. Thus, good governance directly mitigates risks and boosts confidence among international logistics companies, enabling them to better control their logistics processes, and enhance operational capabilities and success in the global landscape. These findings are consistent with those of previous studies (Shepherd and Hamanaka, 2015; Uyar, Fernandes and Kuzey, 2021).

Table 4. Main Regression Results (N = 921); Dependent Variable: OLPI

Test variable	*VA*		*PS*		*GoE*		*RQ*		*RL*		*CC*	
Coefficient/t	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*
Intercept	0.383	13.99***	0.517	18.54***	0.481	21.54***	0.452	19.53***	0.502	22.37***	0.486	20.85***
VA	0.177	14.53***										
PS			0.094	8.14***								
GoE					0.340	24.71***						
RQ							0.288	22.78***				
RL									0.316	24.39***		
CC											0.300	22.07***
LaborControl	0.675	13.85***	0.566	9.59***	0.206	4.33***	0.343	7.29***	0.251	5.32***	0.272	5.53***
GDPPCGR	-0.172	2.29**	-0.197	2.44**	-0.131	2.03**	-0.116	1.74*	-0.119	1.83*	-0.124	1.84*
Port	0.083	18.50***	0.097	20.63***	0.062	15.46***	0.071	17.50***	0.067	16.73***	0.070	17.15***
Year dummy	Included		Included		Included		Included		Included		Included	
Area dummy	Included		Included		Included		Included		Included		Included	
Adjusted R^2	0.641		0.587		0.735		0.718		0.732		0.712	
Highest VIF	2.494 (Africa)		2.371 (Africa)		2.353 (Africa)		2.354 (Africa)		2.366 (Africa)		2.352 (Africa)	

Note: *p < .1, **p < .05; ***p < .01.

4.4 Regression Analysis at the Dimensional Level

〈Table 5〉 presents the regression analysis results for each of the six LP dimensions. The results indicate that all the dimensions of governance quality have a significantly positive effect on all six factors ($p < .01$). The findings reveal that *GoE* exerts the strongest influence on all dimensions of the LP. The effect is greater for *INFRAS* (0.427), *CU* (0.393), and *LQ* (0.349) than for *TT* (0.345), *IS* (0.297), and *TIME* (0.274). An effective governance in which authority agencies commit properly to their policies, free from political pressure can support the development of logistics facilities, speed up a transparent and traceable clearance process at the ports, and enhance the quality of logistics service.

RL exhibits the second highest coefficients in all six dimensions, with the highest occurring with *CU* (0.382), *INFRAS* (0.397), and *LQ* (0.328). Logistics operations rely heavily on agreements formed within the legal frameworks of the parties involved to safeguard their rights. Therefore, countries with robust rule-of-law systems characterized by effective contract enforcement, impartial judicial procedures, and adherence to legal principles in citizen-government interactions foster confidence among logistics professionals and enhance overall LP, particularly infrastructure, customs clearance, and logistics services.

CC is the third significantly strong regressor on *CU*, *INFRAS*, *LQ*, and *TT* (0.378, 0.383, 0.318, and 0.305, respectively), while *RQ* is the third one on *IS* and *TIME* (0.255 and 0.237, respectively). The result for the level of corruption supports the "sand the wheels" hypothesis that corruption prevents the efficiency of logistics operations, especially for clearance processes, public infrastructure, logistics services, and tracking and tracing activities. Firms may need to make extra payments to bureaucrats to accelerate the process at the border, or public facilities may be invested less because of corruption in proposal bidding. These issues could add to logistics costs, prevent the provision of logistics services at competitive prices, and cause delays in lead times. Contrastingly, the results with *RQ* suggest that an institutional capacity that formulates and implements clear, transparent, consistent, and predictable regulations to private sectors can promote dynamic and competitive economic conditions. This, in turn, enables logistics companies to offer competitive pricing to customers and adhere to agreed-upon schedules effectively.

VA and *PS* demonstrate positive associations with all six dimensions of LP, albeit with relatively lower coefficients than the other indicators. Thus, governments that listen to and promptly respond to their citizens' opinions facilitate processes at various stages, potentially supporting the development of logistics processes at different levels. Political stability prevents the disruption of supply chains, enabling logistics companies and manufacturers to operate fluently. For instance, the conflict between Russia and Ukraine impacts not only the two countries involved but also other nations reliant on Russian transportation, leading to increased transportation costs and logistical difficulties (Simchi-Levi and Haren, 2022).

Moreover, WGIs seem to have a greater impact on supply chain inputs (*CU*, *INFRAS*, and *LQ*) than on outputs (*IS*, *TT*, and *TIME*). This result implies that effective governance can act as a supply chain facilitator that provides qualified inputs to the chain and leads to efficient outcomes related to time, cost, and reliability of supply chain performance.

Adjusted R-Square runs from 0.479 to 0.735 throughout all separated equations matching

with the six dimensions of governance that can conclude that test variables and control variables can explain around 47.9%-73.5% of the fluctuation of the respondents, in this case, international LP and its indicators. Moreover, The VIF, which is a measure of the extent of multicollinearity between predictor variables in regression analysis, is less than 3 in all regression models. This suggests that the problem of multicollinearity is highly unlikely to occur.

Table 5. Main Regression Results (N = 921); Dependent Variable: Six Factors of LP

Panel A: Dependent Variable = *CU*

Test variable	*VA*		*PS*		*GoE*		*RQ*		*RL*		*CC*	
Coefficient /t	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*
Intercept	0.247	7.54***	0.411	12.40***	0.367	13.40***	0.333	11.84***	0.391	14.61***	0.371	13.65***
VA	0.214	14.72***										
PS			0.126	9.19***								
GoE					0.393	23.31***						
RQ							0.338	22.01***				
RL									0.382	24.71***		
CC											0.378	23.88***
Control variables	Included		Included		Included		Included		Included		Included	
Adjusted R^2	0.582		0.527		0.676		0.663		0.691		0.682	
Highest VIF	2.494 (Africa)		2.371 (Africa)		2.353 (Africa)		2.354 (Africa)		2.366 (Africa)		2.352 (Africa)	

Panel B: Dependent Variable = *INFRAS*

Test Variable	*VA*		*PS*		*GoE*		*RQ*		*RL*		*CC*	
Coefficient /t	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*
Intercept	0.178	5.07***	0.334	9.52***	0.289	10.25***	0.255	8.55***	0.315	11.12***	0.294	10.11***
VA	0.204	13.09***										
PS			0.120	8.22***								
GoE					0.427	24.61***						
RQ							0.348	21.36***				
RL									0.397	24.31***		
CC											0.383	22.55***
Control variables	Included		Included		Included		Included		Included		Included	
Adjusted R^2	0.623		0.583		0.731		0.702		0.728		0.713	
Highest VIF	2.494 (Africa)		2.371 (Africa)		2.353 (Africa)		2.354 (Africa)		2.366 (Africa)		2.352 (Africa)	

Table 5. Continued

Panel C: Dependent Variable = *IS*

Test Variable	*VA*		*PS*		*GoE*		*RQ*		*RL*		*CC*	
Coefficient /t	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*
Intercept	0.467	15.68***	0.582	19.64***	0.551	21.40***	0.525	20.01***	0.569	21.69***	0.556	20.57***
VA	0.151	11.36***										
PS			0.080	6.53***								
GoE					0.297	18.75***						
RQ							0.255	17.77***				
RL									0.263	17.37***		
CC											0,240	15.24***
Control variables	Included		Included		Included		Included		Included		Included	
Adjusted R^2	0.522		0.479		0.607		0.595		0.591		0.566	
Highest VIF	2.494 (Africa)		2.371 (Africa)		2.353 (Africa)		2.354 (Africa)		2.366 (Africa)		2.352 (Africa)	

Panel D: Dependent Variable = *LQ*

Test Variable	*VA*		*PS*		*GoE*		*RQ*		*RL*		*CC*	
Coefficient /t	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*
Intercept	0.335	10.71***	0.473	14.95***	0.436	16.52***	0.408	14.83***	0.457	17.37***	0.441	16.37***
VA	0.182	12.07***										
PS			0.091	6.96***								
GoE					0.349	21.50***						
RQ							0.287	19.12***				
RL									0.328	21.62***		
CC											0.318	20.27***
Control variables	Included		Included		Included		Included		Included		Included	
Adjusted R^2	0.605		0.554		0.689		0.665		0.690		0.677	
Highest VIF	2.494 (Africa)		2.371 (Africa)		2.353 (Africa)		2.354 (Africa)		2.366 (Africa)		2.352 (Africa)	

Panel E: Dependent Variable = *TT*

Test Variable	*VA*		*PS*		*GoE*		*RQ*		*RL*		*CC*	
Coefficient /t	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*
Intercept	0.352	10.77***	0.497	14.99***	0.460	16.21***	0.429	14.92***	0.481	16.99***	0.465	15.95***
VA	0.192	13.18***										
PS			0.093	6.77***								
GoE					0.345	19.73***						
RQ							0.301	19.17***				
RL									0.324	19.84***		
CC											0.305	17.92***
Control variables	Included		Included		Included		Included		Included		Included	
Adjusted R^2	0.592		0.538		0.660		0.654		0.661		0.641	
Highest VIF	2.494 (Africa)		2.371 (Africa)		2.353 (Africa)		2.354 (Africa)		2.366 (Africa)		2.352 (Africa)	

Panel F: Dependent Variable = *TIME*

Test Variable	*VA*		*PS*		*GoE*		*RQ*		*RL*		*CC*	
Coefficient /t	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*	*β*	*t*
Intercept	0.619	21.84***	0.726	25.69***	0.698	28.24***	0.673	26.87***	0.714	28.60***	0.703	27.21***
VA	0.142	11.22***										
PS			0.068	5.83***								
GoE					0.274	17.99***						
RQ							0.237	17.34***				
RL									0.247	17.16***		
CC											0.223	14.77***
Control variables	Included		Included		Included		Included		Included		Included	
Adjusted R^2	0.549		0.505		0.622		0.614		0.612		0.586	
Highest VIF	2.494 (Africa)		2.371 (Africa)		2.353 (Africa)		2.354 (Africa)		2.366 (Africa)		2.352 (Africa)	

Note: *p < .1, **p < .05; ***p < .01.

4.5 Additional Tests

WGIs are highly correlated with each other (Kaufmann, Kraay and Mastruzzi, 2009). Uyar, Fernandes and Kuzey (2021) suggest that a synthesized measure of governance quality can be a useful predictor of international LP. Following this notion, the six WGIs are combined into a single variable using Principal Component Analysis (PCA). The results show that the Kaiser-Meyer-Olkin value equals 0.888 and Bartlett's test of sphericity equals 7264.357 (df

= 15, p < .01), suggesting that the data are adequate for conducting PCA. The eigenvalue is 4.897 (one-factor level), with a cumulative percentage of 81.61%, which means that this extracted factor could explain 81.61% of the variance in the six WGI indicators. A reliability test based on Cronbach's alpha value shows a result of 94.8%, which implies that the internal consistency is excellent.

The regression model using the aggregated factors on overall international LP is re-run to re-investigate the effect of government on international LP. The results provide qualitatively similar implications to the main results, further support for the interpretations.

V. Conclusions

5.1 Summary of Findings

This study provides a comprehensive understanding of the influence of multidimensional governance on international logistics efficiency, marking a detailed investigation across the global context over an extensive period. The results supplement the empirical evidence in the theoretical framework of the strong influence of government intervention on the efficiency and achievement of the private sector, especially in logistics. Testing the effects of governance metrics (*WGIs*) on overall LP (*OLPI*) and its dimensions reveals a detailed picture of the causal correlation between governance and proficiency in logistics operations.

These findings demonstrate the key role of effective governance in supporting logistics operations in general and its aspects, particularly, the proficiency of government employees, the transparency of public service; and a fair and transparent legal system. Moreover, contrary to prior suggestions linking perceived corruption to streamlined bureaucratic interactions, this study reveals that long-term corruption can impede logistics efficiency. The more effective the anti-corruption efforts of a country, the higher the evaluation that international logistics officers give off the country's LP. The democratic level and stable political environment of a country also fluent logistics activities, support logistics performance overall and at individual indicators despite their lighter influence. Overall, all these indicators show a greater impact on the input group of the supply chain than on the output group.

5.2 Implications

This study has important implications for policymakers and practitioners in the logistics industry as it emphasizes the significance of good governance in achieving high-quality LP. With the knowledge of the positive influence of logistics performance on growth (Civelek, Uca and Çemberci, 2015; HE, 2020; Korinek and Sourdin, 2011; Luttermann, Kotzab and Halaszovich, 2020; Saidi et al., 2020), to enhance the overall national logistics capability and facilitate an increased international trading volume, governments and policymakers should prioritize improving governance quality, particularly enhancing the effectiveness of government, building a supportive legal system, keeping corruption level at the low level, optimizing the input of the logistics and supply chains. By creating a supportive political environment for logistics

operations, positive outcomes can be anticipated, including the ability to arrange competitively priced shipments compared to other countries, improved tracking and tracing activities, and timely logistics processes.

The paper also provides a comprehensive insight into the relationship between government quality and logistics performance to logistics stakeholders such as carriers, and forwarders, particularly in foreign settings. Thus, logistics companies can better assess the risks associated with government systems while operating in specific countries. They anticipate potential delays in document processing and account for additional payments to bureaucrats. In countries with effective government systems, logistics enterprises can offer competitive pricing to customers, thereby enhancing their market position. Logistics companies can actively monitor their operation and strategies to respond to changes in governance quality, allowing them to maintain competitiveness in the global market. They can also make informed decisions regarding investing in certain markets or expanding their operations to other countries.

5.3 Limitations

Although this study provides crucial empirical evidence of the causal relationship between governance quality and LP, it has some limitations. The unit of measurement is the country level under a worldwide sample, which can limit the observation of underlying mechanisms such as political processes and technology application, the latter of which is becoming critical to LP regardless of country.

Future research could expand the scope of the investigation, such as testing the effect of governance on LP while including other economic development indices. Another potential direction is environmental, social, and governance (ESG). Despite the market's increasing emphasis on environmental protection and social responsibility, the LPI does not include this dimension as part of the measure. Exploring the impact of eco-friendly strategies, such as green logistics and ESG activities on LP, may prove valuable.

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