

The Impact of Logistics Performance on Participation in Global Value Chains in Arab Countries

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تأثير الأداء اللوجستي على المشاركة في سلاسل القيمة العالمية في الدول العربية

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Summary: The study aims to measure the impact of logistics performance on participation in global value chains in Qatar, Kuwait, Oman, Algeria, Tunisia, and Morocco during the period from 1996 to 2020. The effects on participation in global value chains were examined through two approaches; the first approach is the effects on forward links. The second effect is on participation in global value chains through backlinks. The impact of logistical performance was measured by looking at the impact of container port traffic and air transport, in addition to the impact of economic variables related to explaining the phenomenon, such as per capita GDP, foreign direct investment, and economic freedom. Econometric models were relied upon using dynamic approaches estimated through the bias-corrected method of moments. The study concluded that container port traffic has positive effects on participation in global value chains through backward and forward links, as well as a more profound impact on forward links. Foreign direct investment also contributes to deepening the participation of Arab countries in global value chains through forward links. The results also underscore the importance of economic growth as a promoter of deeper integration into the global economy through global value chains across forward and backward linkages.

Keywords: Participation in global value chains; Forward linkages; Backward linkages; Container port traffic; Logistical performance.

Jel Classification Codes : F60; O14; L91.

ملخص: تستهدف الدراسة قياس أثر الأداء اللوجستي على المشاركة في سلاسل القيمة العالمية في كل من قطر الكويت عمان والجزائر وتونس والمغرب خلال الفترة من 1996 إلى 2020. تم فحص التأثيرات على المشاركة في سلاسل القيمة العالمية عبر مدخلين، المدخل الأول التأثيرات على الروابط الأمامية والتأثير الثاني على المشاركة في سلاسل القيمة العالمية من خلال الروابط الخلفية. وقد تم قياس أثر الأداء اللوجستي من خلال النظر في أثر حركة الحاويات في الميناء، النقل الجوي. بالإضافة إلى أثر المتغيرات الاقتصادية المكملة لتفسير الظاهرة مثل نصيب الفرد من الناتج المحلي الإجمالي، الاستثمار الأجنبي المباشر والحرية الاقتصادية. تم الاعتماد على نماذج القياس الاقتصادي باستخدام المقاربات الديناميكية المقدرة من خلال طريقة العزوم المعممة للتحيز المصحح. وقد خلصت الدراسة إلى وجود آثار إيجابية لحركة الحاويات في الميناء على المشاركة في سلاسل القيمة العالمية عبر الروابط الخلفية والروابط الأمامية، ويتأثير أعمق على الروابط الأمامية. كما أن الاستثمار الأجنبي المباشر يساهم في تعميق مشاركة الدول العربية في سلاسل القيمة العالمية عبر الروابط الأمامية. كما تؤكد النتائج على أهمية النمو الاقتصادي كمعزز للاندماج الأعمق في الاقتصاد العالمي من خلال سلاسل القيمة العالمية عبر الروابط الأمامية والخلفية.

الكلمات المفتاح: المشاركة في سلاسل القيمة العالمية، الروابط الأمامية، الروابط الخلفية، الأداء اللوجستي، حركة الحاويات في الميناء.

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I- Introduction :

At the present time of globalization, production processes have taken the form of international and global networks, which have become more structurally complex and geographically dispersed. As a result, the value added—generated geographically and internationally—is distributed in multiple and interrelated stages of production. Richard Baldwin described the transformation of international trade between the 20th and 21st centuries as "we have moved from trade that helps sell goods and services to trade that helps to manufacture goods and services." Baldwin argues that countries integrated into the global economy through trade and financial liberalization mechanisms, as well as less advanced states, have benefited from the dynamic effects of liberalization, becoming essential links in international production networks, often referred to as global value chains or global supply chains.

Global value chains are the cornerstone of international trade and economic development. Therefore, companies, states, and territories are trying to improve their position within the value chain, strengthen their roles within these networks, and raise the added value of such participation through the adoption of different economic policies and the adoption of different instruments and mechanisms that would achieve this goal. In this context, the efficiency and reliability of logistics systems are essential determinants that demonstrate the potential to contribute to maximizing and increasing the impact and benefits of participation in global value chains .

This article attempts to test the relationship between logistics performance and participation in global value chains and provides an analysis based on a combination of theoretical frameworks and empirical evidence. We measure this impact by taking into account a range of logistical performance indicators, including container traffic at ports and air transport, as well as the effects of FDI, economic freedom, and GDP per capita, which pertain to market size.

This research also identifies the concept of participation in global value chains by focusing on forward and backward linkages. Forward linkages indicate the domestic value added that other countries' exports reflect, underscoring the country's role as a global market supplier. By contrast, backward linkages capture foreign value added in a country's imports, reflecting its integration into global production networks as consumers of intermediate goods and services. Together, they provide a robust framework for assessing the depth and breadth of State participation in global value chains .

Accordingly, the research aims to highlight the role of logistics performance in influencing participation. We assess the relationship between logistics performance and participation in global value chains by analyzing empirical evidence and testing it in the case of a group of Arab States. The implications of policies will be considered when making policy recommendations in support of the impact of logistics performance on participation in global value chains. The sample study includes a group of Arab States, namely Qatar, Kuwait, Oman, Algeria, Tunisia, and Morocco, from 1996 to 2020.

1.1. The relationship of logistical performance to participation and upgrading in global value chains from the perspective of previous empirical studies:

The focus of numerous studies on integration, participation, and upgrading in global value chains has varied. These have focused on the characterization and diagnosis of the nature of global value chains and their regulatory mechanisms through the analysis of trade in tasks and fragmented production. Global value chains concentrate and place states and enterprises within their production stages (Grossman & Rossi-Hansberg, 2008; Timmer et al., 2014). Gereffi et al. (2005) discuss the governance of global value chains. Companies participating in supply chains make regulatory decisions (Antràs, Chor, 2013). Upgrading, functional specialization, and value creation within global value chains (Kordalska, Olczyk, 2023; Stöllinger, 2022; Liu et al., 2022; Gereffi, 2019; Rungi, Del Prete, 2017; Szalavetz, 2017). Chikhun et al., 2023; Raluca, Robu, 2023, discuss participation and upgrading in value chains, development, and competitiveness.

The emergence of global value chains has opened new avenues for development and industrialization. However, new evidence shows that not all countries have benefited from participation in global value chains. (Kummritz et al., 2017). The specific characteristics of each country were essential for the level of integration, participation, and economic upgrading in global value chains. Studies have focused research in this area to examine economic determinants and phenomena affecting levels of participation in global value chains. Researchers have examined the impact of economic and trade freedom on integration and participation in global value chains (Fernandes et al., 2022; Agnès, 2022; Lwesya, 2022; Rupert et al., 2021; Siregar et al., 2020; Barbero, Rodriguez, 2020; Kummritz et al., 2017). Xiaobo et al. 2023; Agnès, 2022; Nadeem et al., 2020 conducted an analysis on the effects of institutional quality on participation and upgrading in value chains.

According to Trung et al. (2020), global value chains (GVCs) are the driving force behind the evolution of manufacturing, especially in value-added industries. He sees Abdullahev et al. (2022). Income levels positively correlate with the degree of participation in manufacturing through backward linkages of global value chains. Marilia et al. (2020) suggested that upgrading global value chains was associated with a shift to higher value-added phases, which could have positive spillover effects in terms of technology and productivity.

Note that trade facilitation and logistical performance influence and determine the level of participation and integration into value chains. Thus, a series of studies focused on analyzing the

relationship between factors associated with logistical performance and value chains. Lwesya (2022) found that improved infrastructure connectivity and strengthened institutional governance reduce trade costs and encourage increased investment and diversification of products and services. This suggests that a comprehensive approach involving infrastructure development and institutional strengthening could lead to deeper economic upgrading in regions participating in global value chains. Coe (2014) also concluded that logistics services and the logistics industry play a strategic role in global industries, understand their political economy within global production networks, and promote understanding of global economic trends.

Given the direct relationship between logistics performance and global value chains, Paulius and Renata (2023) consider the efficiency of logistics services critical to the international flow of trade and cost reduction. Logistics performance is a crucial determinant of the global supply chain. The development of logistics performance positively impacts exports, highlighting the importance of logistics services in increasing export growth. While adequate logistics capacities are critical for countries to benefit from globalization and universal value chains, their development and provision vary from country to country. (Medidović et al. 2008). Hausman et al. (2013) noted that improved logistical performance (time, cost, and reliability) would increase bilateral trade and improve state competitiveness in the global economy. The study by Zaninović and Bugarčić (2023) confirmed the positive effects on the global value chain.

According to Ojala et al. (2008), effective transport, customs, and competitive logistics services are essential for developing countries to communicate with global value chains, facilitate international trade, and reduce poverty. Many states have absorbed this importance, with states like Korea prioritizing improving logistics services such as transport, tracking, and timing to promote international trade in the world economy (Wahyu et al., 2022). The Raluca (2023) study confirms that logistics performance plays a crucial role in sharing and scaling up global value chains. Luisa Rivera-Basques (2022) identified impact and relevance entry points, where the level of logistical performance represents a significant part of the degree of participation across backward linkages in global value chains. Taguchi (2021) confirmed this result; improved logistical performance in the host country correlates with participation in global value chains through backward linkages in ASEAN economies. A study by Wahyu et al. (2022) also found a quantitative correlation between logistics performance and backward linkages in global value chains, where logistics performance represents 70–80 percent of participation. Hiroyuki et al.'s (2021) experimental assessment also

confirms a quantitative correlation between participation in backward linkages (backward GVC) and the logistical performance in the host country. The Abdullahev Erkin study (2022) also highlights a positive relationship between backward linkages and logistical performance.

Several empirical studies highlight the significance of port infrastructure and its impact on maritime traffic, trade, and participation in global value chains. This is the conclusion of Arbia and Halli (2023). Seaports' competitiveness relies heavily on the performance and logistical efficiency of their port infrastructure. Hebatallah et al. (2021) Improved port infrastructure leads to improved logistical performance and increased maritime trade. Moreover, it can lower transportation expenses and enhance supply security (Xubei, Luo., Xuejiao, Xu. 2018). Therefore, improving the quality of port infrastructure is necessary to keep seaports competitive and to support participation in global value chains (Rihab et al., 2023).

These studies indicate that improvements in logistical performance enhance supply chain management, marketing, and economic growth, which are critical for effective participation in global value chains, with varying impacts depending on the country's current capacity and growth rates. Thus, from the perspective of the empirical studies presented, efficient logistical performance is essential for effective participation in global value chains.

III– Methods and Materials:

1. Study variables and database:

We examined the effects on participation in GVCs through two points: the first effect on forward linkages and the second impact on participation in GVCs through backward linkages. We measured the impact of logistics performance by taking into account container traffic at the port and air transport. We also considered the influence of economic factors like per capita GDP, foreign direct investment (FDI), and economic liberty.

The UNCTAD-Eora Global Value Chain Database provided forward GVC and backward linkages, while World Bank databases provided container port traffic, GDP, and FDI data. We extracted air transport data from the UNCTAD database. The Heritage Foundation provides economic openness.

2. Methods:

To find out how logistical performance affects participation in GVCs, we want to use the bias-corrected method of moment from Breitung et al. (2022) to estimate a dynamic model. This method fixes the simple bias of GMM estimates of difference, which were created by Arellano and Bond (1991). The estimates from the bias-corrected method of the moment can effectively absorb persistent and indiscriminate effects, address homogeneity issues, and handle autoregressive models with high delays. Consequently, they provide more robust estimates in terms of efficiency compared to the bias method of the moment.

IV- Results and discussion :

1. The first model: Participation in global value chains via backward linkages (DVA):

The dynamic model's estimates show that container port traffic has a positive impact on participation in global value chains through backward links. This means that increasing traffic at container ports by 1% leads to a 0.036% rise in participation levels through backlinks. The estimation results also show that the per capita GDP has a significant positive effect on participation in global value chains via backward linkages; a 1% increase in per capita GDP leads to a 0.294% increase in participation via backward linkages.

The estimation results also show that air freight's effect on backlinks is not statistically significant. This suggests that the variable does not contribute to explaining changes in global value chain participation levels through backlinks. Also, the results showed that foreign direct investment had a positive effect on backlinks, while economic freedom had a negative effect. Unfortunately, both variables do not explain backlink changes because the effect is not statistically significant.

Regarding the impact of container port traffic, these ports play a crucial role in the logistics and supply chain networks that underpin global trade. The efficiency and capacity levels of these ports influence the speed and cost of goods transportation, both of which are crucial for the smooth operation of global value chains. An increase in container traffic at ports typically indicates increased handling capacity and possibly improved efficiency, which facilitates more broad and efficient participation in global value chains.

This result indicates that the increase in the volume of container units handled by port facilities, which includes an increase in commercial activity and the port's logistical capacity, is considered to have an important impact on the back-end participation in global value chains. This finding indicates that improvements in port infrastructure and efficiency enhance the integration of

the Arab countries under study into global value chains. The quality of port infrastructure improves efficiency and handling capacity, leading to increased container traffic volume and flow. This, in turn, encourages more foreign companies to use the port, allowing access to intermediate goods for local production within global value chains.

Container traffic in ports also promotes better connectivity, increasing Arab countries' access to global markets. This connection makes it easier and more cost-effective to import the necessary inputs for the required production processes within global production networks. Import operations run more smoothly and swiftly. Improvements in port infrastructure can also enhance competitiveness in industries that are part of global value chains.

The study confirms that the development of a robust local logistics network, connecting the port to global production centers, enhances the efficiency and ease of trade movements. This, in turn, leads to lower costs and shorter lead times, thereby attracting multinational companies to the country. This country becomes an important link within global production networks and value chains. Targeting foreign companies in nearby regional markets is one strategy. These countries attain competitive and price advantages due to their superior logistical capabilities. All of this encourages the importation of intermediate goods, which represent background participation in value chains.

The study confirms that, while infrastructure plays a crucial role in facilitating the container movement process and enhancing communication with foreign markets, it is equally important to prioritize improving the quality of customs procedures. This approach not only simplifies customs procedures but also reduces their burden by reducing paperwork and implementing digital trade platforms. These are measures that would enhance the participation of Arab countries in global value chains.

The results of this study underscore the importance of economic growth as a promoter of deeper integration into the global economy through global value chains. Economic growth and increased economic activity result in a rise in aggregate demand, which creates an incentive to participate in global value chains by importing intermediate inputs to meet the increase in demand. The market's breadth also allows it to benefit from economies of scale advantages. This increases the attractiveness of these countries for hosting stages of international production. This results in the need to import productive goods and intermediate materials necessary for such stages of production. A higher GDP also translates into more resources available for investment. This allows countries to

invest in infrastructure, education, technology, and labor training, making them more attractive locations for foreign companies to establish production facilities that use and integrate intermediate goods within certain stages of production.

2. The second model: Participation in global value chains via forward linkages (FVA):

The findings show that container port traffic has a statistically significant positive effect on forward participation in global value chains. This means that increasing container port traffic by 1% leads to an increase in forward linkages by 0.047%.

The estimates also show that foreign direct investment (FDI) has a positive impact on forward linkages; for every 1% increase in FDI, there is a 0.051% rise in participation in GVCs across forward linkages. As for the impact of the per capita GDP on forward participation in global value chains, the results show a significant positive effect, as a 1% increase in the per capita GDP leads to an increase in forward linkages by 0.214%. The effect of air freight and economic openness is not statistically significant, meaning that the two variables do not contribute to explaining the changes occurring in the levels of forward linkages.

Forward linkages express the links between a particular industry or sector and the downstream industries that supply it with outputs. More forward links in global value chains indicate a deeper connection between industries and the production chain, which extends beyond their immediate economic environment and supplies inputs for subsequent stages of production and distribution.

Increased trade volume closely links to improved container traffic at ports, enabling countries to export more goods and thereby increase their participation in global markets. The increase in export volume leads to economies of scale and increases the efficiency of production and distribution networks. Besides, achieving competitiveness makes it easier to access international markets, as efficient ports boost this competitiveness by lowering shipping and logistics costs. Better port facilities enable faster delivery times and lower transaction costs, making the country more attractive for international business and encouraging local companies to participate more deeply in global value chains.

The result also confirms the influence of per capita GDP and economic growth on participation in global value chains. Economic growth contributes to putting Arab economies in a better position to participate in different stages of production within global value chains, including

forward linkages, which involve activities closer to the final consumer. Countries with higher GDPs usually tend to have competitive advantages in certain industries or sectors. This competitiveness enables it to attract investment, foster innovation, and integrate more deeply into global value chains by providing high-quality inputs, services, or final goods. Conversely, boosting the state's economic size, as measured by per capita GDP, contributes to a rise in trade exchange volume.

In this context, foreign direct investment has a significant impact because it enables the deep integration of Arab economies into global markets. Investments by multinational companies usually result in the process of integrating and linking local companies within the international supply chains of these global companies. This will maximize local companies' participation in global production networks and link them to global markets. In some cases, foreign direct investment resulted in the transfer of technology and knowledge from foreign investors to local companies. This transfer often occurs through forward linkage sharing, whereby local firms acting as suppliers acquire new technologies, management techniques, and business processes that enhance their productivity and competitiveness.

Finally, we note that the effects of FDI on forward linkages vary significantly across sectors. In sectors where technology and skills are crucial, such as electronics, pharmaceuticals, and high-tech industries, the benefits are usually more pronounced compared to more labor-intensive sectors such as textiles or agriculture. It is necessary to consider the long-term sustainability of FDI-led growth in global value chains. This involves assessing environmental impacts, ensuring fair labor practices, and promoting sustainable growth.

V- Conclusion:

This study aimed to measure the impact of logistics performance on Arab countries' participation in global value baskets. The study concluded that container port traffic has a positive impact on participation in global value chains through backward and forward links, with a deeper impact on forward links. Foreign direct investment also contributes to deepening the participation of the Arab countries under study in global value chains through forward links. The results also underscore the importance of economic growth as a promoter of deeper integration into the global economy through global value chains across forward and backward linkages.

The positive impact of container port traffic also highlights the importance of logistical capabilities and infrastructure development in contemporary economic dynamics. Therefore, it is

important for the Arab countries under study, which seek to enhance their role in global value chains, to benefit from policies that support port facility expansion and modernization, in addition to broader initiatives aimed at facilitating trade and improving logistics. This approach enhances participation in global value chains, both through backward and forward linkages.

The positive relationship between per capita GDP and front-end participation in global value chains also emphasizes the importance of economic development, competitiveness, and trade integration in shaping economic and trade relations and defining the role of Arab countries in the international economy and the nature of these roles. By effectively harnessing these dynamics, countries can improve their prospects for sustainable growth and development in an increasingly interconnected world.

To maximize the benefits of FDI, policymakers need to create enabling environments that attract it. This includes maintaining a stable macroeconomic environment, ensuring political stability, and developing adequate infrastructure. In addition, policies to enhance workforce skill levels and improve technological capabilities can help maximize the benefits derived from forward linkages. Finally, policymakers can use the results to formulate strategies that promote economic development and integration into global value chains. This includes investing in education and infrastructure to enhance human capital and communication, implementing trade policies that facilitate access to international markets, and promoting a business environment conducive to attracting foreign direct investment.

- Appendices:

Appendice 1: Estimation results of the Model FVA:

lfva	Coefficient	Robust std. err.	z	P> z	[95% conf. interval]	
lfva L1.	.799931	.048377	16.54	0.000	.7051138	.8947481
lair	-.0125631	.019392	-0.65	0.517	-.0505707	.0254444
lship	.0474019	.023212	2.04	0.041	.0019073	.0928965
lfdi	.0511926	.0310554	1.65	0.099	-.0096749	.11206
lgdppercapita	.2142782	.0954258	2.25	0.025	.0272471	.4013093
leconomicfreedom	.0317031	.192032	0.17	0.869	-.3446727	.4080788
_cons	.1661631	.8236379	0.20	0.840	-1.448137	1.780464

Source: STATA 17.0

Appendice 2: Estimation results of the Model DVA:

ldva	Coefficient	Robust std. err.	z	P> z	[95% conf. interval]	
ldva L1.	.7414227	.0429724	17.25	0.000	.6571983	.8256471
lair	.0095818	.0173715	0.55	0.581	-.0244657	.0436294
lship	.0365615	.0169372	2.16	0.031	.0033651	.0697579
lfdi	.0167531	.0338017	0.50	0.620	-.049497	.0830033
lgdppercapita	.2940136	.0758196	3.88	0.000	.14541	.4426172
leconomicfreedom	-.0269709	.1506521	-0.18	0.858	-.3222437	.2683018
_cons	1.232598	.7395553	1.67	0.096	-.2169037	2.6821

Source: STATA 17.0

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