

## Global Value Chains: Sourcing Strategies for Resilience amidst COVID-19

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## I N F O

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## A B S T R A C T

COVID-19 has profoundly impacted the already vulnerable pharmaceutical, agricultural, and food supply chains, leading to disruptions in their sourcing processes. Hence, it is crucial to emphasize the universal imperative of enhancing resilience in Global Value Chains across various industries in today's interconnected global economy. It seeks to explore how the COVID-19 pandemic has impacted GVCs and influenced the availability of critical resources. We have investigated the repercussions of the COVID-19 pandemic on Global Value Chains due to its widespread disruption of supply chains, which has posed immediate challenges for businesses and necessitated resilience strategies. Our research reveals a consistent relationship between impact levels observed in domestic and international contexts. Changes in domestic impact levels closely align with those observed abroad, indicating a robust positive correlation. This correlation emphasizes the interdependence of sourcing challenges across both domestic and international spheres. We propose near-shoring as a management strategy by integrating regional market trends alongside digital transformation to optimize supply chain resilience, enabling businesses to cope with fluctuations in markets and take advantage on new possibilities.

**1. Introduction**

Global Value Chains are influenced by procurement which refers to the full processes of sourcing, purchasing, and processing transactions for products and services (Gibbon, P., Blair, J., & Ponte, S., 2008). While terminologies like procurement, sourcing, and purchasing are frequently used reciprocally inside many businesses, they all reflect different aspects of the overall procurement system (Baily, P., Farmer, D., Crocker, B., Jessop, D., & Jones, D., 2008; Johnson, F., Leenders, M. R., & Flynn, A.E. 2021). Logistics deals with the transportation, storing, and management of products once they have been purchased (Mangan, J., & Lalwani, C., 2016). Sourcing, an element of procurement, is concerned with early phases of the procurement lifecycle, which include all actions previous to the actual obtaining of an item or service, such as supplier identifying and market research (Bozarth, C., Handfield, R. & Das, A., 1998). Figure 1, illustrates the procurement process as a continuous cyclical sequence is grounded in scholarly findings and contributions of authors Benton Jr., W.C. (2020); Mena, C. & Stevens, G., (2010); Botta-Genoulaz V., Campagne, J., Lerrena, D., & Pellegrin, C., (2013); Basu, R. & Wright, J.N., (2010). The procurement process is the foundation of this graphic, underlining the importance of connections in procurement operations. The cyclical flow of arrows connecting each phase suggests a repetitive and adaptive nature; after completing an evaluation, the process typically returns to market research for improving strategies based on past outcomes and changing market conditions, emphasizing the constantly shifting and changing nature of procurement, which necessitates constant enhancement and adjustment. For example, market research

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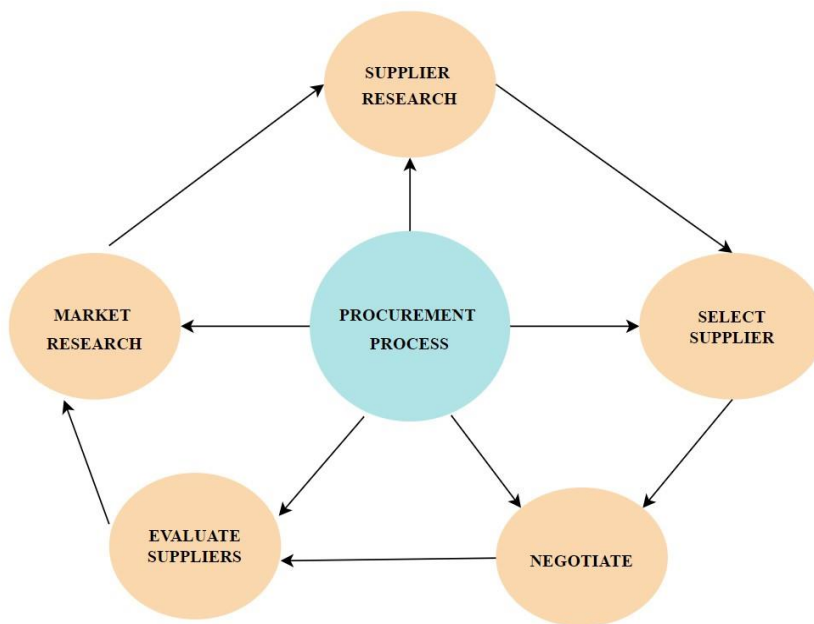
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is necessary for understanding market dynamics, emphasizing the need to analyze trends, prices, and the availability of goods and services. The next step, which proceeds clockwise, involves identifying possible suppliers and evaluating supplier attributes internationally. The next step is to pick the most suitable provider according to the insights obtained through previous research and evaluations. When a supplier is identified, negotiations begin, which include conversations about terms, price, and contractual details. The cycle finishes with a quarterly evaluation of supplier performance to guarantee ongoing quality and operational efficiency.

**Figure 1:** Flowchart of the Procurement Process with Emphasis on Supplier Selection. **Source:** authors' illustration derived from scholarly work of Benton Jr., W.C. (2020); Mena, C. & Stevens, G., (2010); Botta-Genoulaz V., Campagne, J., Lerrena, D., & Pellegrin, C., (2013); Basu, R. & Wright, J.N., (2010).



In the realm of supply network studies, there has been a predominant focus on organizational characteristics from the buyer's perspective (Coluccia, B., Agnusdei, G.P., Miglietta, P.P., & De Leo, F., 2021). However, with the onset of the COVID-19 pandemic, there arises a pressing need to delve into the supply side, particularly in examining the impacts on sourcing. Amid the uncertainties brought forth by the COVID-19 era, there has been a notable shift towards behaviors that foster relational governance initiatives among stakeholders within Agricultural Value Chains (AVCs) (Kumari, S., Venkatesh, V.G., Deakins, E., Mani, V., & Kamble, S., 2023). This shift towards enhanced collaboration not only promotes self-reliance but also contributes positively to productivity and sustainability within the agricultural sector. Various industries were impacted by the COVID-19 pandemic, an example of this is the pharmaceutical supply chains where they experienced precipitated critical shortages of medical suppliers worldwide, prompting countries to implement export restrictions and bolster domestic production efforts. This has, in turn, exacerbated the global scarcity of essential personal protective equipment (PPE) (Gereffi, G., 2020). In response to the COVID-19 shocks, Global Flexible Value Chains (GFVCs) have showcased their competitiveness by demonstrating dynamic capabilities, thereby fostering resilience (Ali, I., Arslan, A., Chowdhury, M., Khan, Z., & Tarba, S.Y., 2022). Firms engaged in collaborations with both domestic and global partners have exhibited greater resilience compared to those solely reliant on global partnerships. Furthermore, the export-oriented supply chain has displayed commendable resilience, attributed to investments and innovations by large agro-industrial companies. While the traditional domestic supply chain has responded by enhancing its online marketing strategies. (Van Hoyweghen, K., Fabry, A., Wade, I., & Maertens, M., 2021) Despite the COVID-19 disruptions prompting companies to explore alternative supply sources, the impact on reshoring manufacturing activities to industrialized countries remains limited. Instead, factors such

as escalating costs in emerging economies, uncertainties surrounding trade policies, and advancements in automation continue to influence significantly (Bacchetta, M., Bekkers, E., Piermartini, R., Rubinova, S., Stolzenburg, V., & Xu, A., 2021). A rise in investments aimed at developing „micro-supply chains”, which feature compact, decentralized, and agile „mini operating models”. These models entail flexible supplier contracts and relationships, along with manufacturing located closer to the post of purchase (Panwar, R., Pinkse, J., & De Marchi, V., 2022). The influence of COVID-19 on global value chain performance is evident across various dimensions, including trade obstacles, raw material availability, service accessibility, transportation disruptions, and shifts in sales channels (Eurostat, 2021). These disruptions have repeated throughout global trade networks (Raj, A., Mukherjee, A.A., de Sousa Jabbour, A.B.L. & Srivastava, S.K., 2022), impacting operations upstream and downstream in supply chain processes (Bertolozzi-Caredio, D., Severini, S., Zinnanti, C., Rustom, R., Santono, E. & Bubbico, A., 2023). This study explores the complexity of global supply networks, particularly under unpredictable circumstances such as the COVID-19 pandemic. It aims to enhance both academic and managerial understanding of how such disruptions impact the ability of companies to acquire raw materials across different regions and severity levels of disruption. Given the complexities observed in the global supply chains during periods of unpredictability (for instance COVID-19), the research questions are built:

- *Is there a relationship between the impact levels observed domestically and abroad?*
- *How has the sourcing strategy affected the decision-making in the post-COVID-19 era?*

### 3. Material and Method

Data for this study was sourced from Eurostat’s experimental statistics ‘International Sourcing’. It was specifically retrieved on January 18, 2024, from the Eurostat website (<https://ec.europa.eu/eurostat>). Additional details regarding data collection methods, participant’s demographics, and other relevant information are available at the dataset [https://ec.europa.eu/eurostat/cache/metadata/en/iss\\_esms.htm](https://ec.europa.eu/eurostat/cache/metadata/en/iss_esms.htm). The dataset, titled ‘Enterprises by type of trade barrier due to COVID-19 level of impact and NACE Rev.2 Activity aggregate-experimental statistics’, was chosen for its comprehensive coverage of the difficulties enterprises faced during the pandemic. This dataset categorizes companies based on the severity of the impact of COVID-19 on their operations, specifically regarding the acquisition of raw materials and intermediate goods from suppliers both domestically and internationally. The severity levels identified are Severe, Moderate, Low, and None. We organized this data into contingency Table 1, and to quantify the impact more precisely, we applied proportional weighting methods as visualized in table 2.

$$\text{Weight domestic (or abroad)} = \text{domestic (or abroad) impact} \div \text{no. of total domestic companies (or abroad)}$$

$$\text{Weight domestic (or abroad)} = \text{domestic (or abroad) impact} \div \text{no. of total companies (domestic +abroad)}$$

This approach helped clarify the relative severity of challenges faced by enterprises in each country compared to the total impact observed across all countries. We then converted these weighted figures into percentages, which represent the proportion of each country’s enterprise sourcing difficulties relative to the total global enterprise sourcing challenges. These percentages highlight the specific contributions of enterprises from each country to the global difficulties in sourcing raw materials during the pandemic. In Table 3, illustrates a correlation matrix, which is a table that shows the correlation coefficients between multiple variables in a dataset. The values in the matrix represent correlation coefficients, which can range from -1 to 1. A correlation coefficient of 1 indicates a perfect positive correlation, meaning that as one variable increases, the other variable increases proportionally. A correlation coefficient of -1 indicates a perfect negative correlation, meaning that as one variable increases, the other variable decreases proportionally. A correlation coefficient of 0 indicates no linear correlation between the variables (Schober. P., Boer, C., & Schwarte, L.A., 2018; Babbie, E., 2020). To analyze and visualize the data we used Microsoft Excel 2010 and R Studio 4.2.2.

#### 4. Results

The Table 1 illustrates the distribution of sourcing impacts across various countries, distinguishing between domestic and abroad sourcing locations. It presents the number of instances categorized under different impact levels (Moderate, Low, Severe, None) for each country. Included in the analysis are eight countries: Italy, Portugal, Hungary, Poland, Bulgaria, Latvia, Finland, and Sweden. The dataset comprises a total of 131 601 companies across these countries. The distribution of companies across impact levels, reveals varying degrees of sourcing challenges. A total of 24 095 companies are classified under the 'Moderate' impact level, 26 602 companies fall into the 'Low' impact category. 13 568 companies are categorized as experiencing 'Severe' impact. And the majority, with 67 336 companies, exhibit 'None' of the specified impacts. Furthermore, the selection of these countries was based on their representation of both Eastern and Western regions, ensuring a diverse geographic scope for comparative analysis. Additionally only publicly available data was utilized, ensuring transparency and accessibility in the study's methodology. Some key descriptive observations derived from the dataset are: Italy, Poland, and Sweden exhibit the highest total of companies analyzed among the countries; the prevalence of the 'None' impact level is consistent across all countries and sourcing locations; Italy and Poland demonstrate notable disparities in impact distribution between domestic and abroad sourcing, suggesting varying sourcing challenges in different contexts.

**Table 1: Country-wise Distribution of Sourcing Impact (Descriptive Data) Source: Eurostat, 2021**

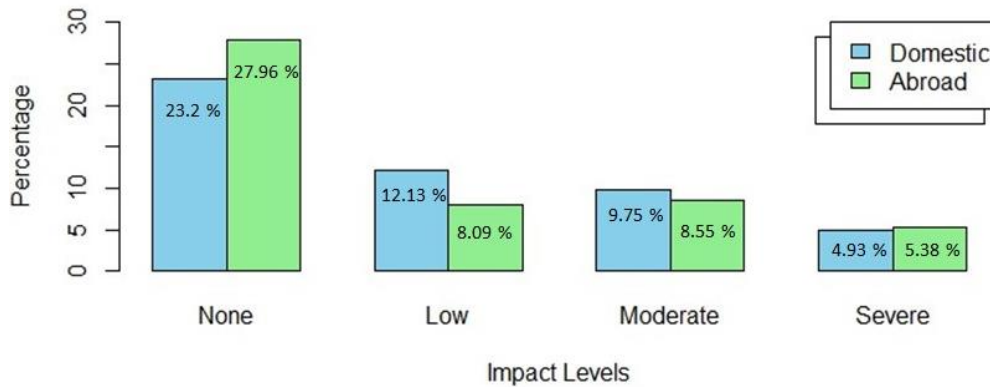
Country	Sourcing	Moderate	Low	Severe	None	Total
Italy	Domestic	5,187	5,837	2,720	9,712	23,456
Italy	Abroad	4,001	3,883	2,488	13,077	23,449
Portugal	Domestic	1,433	1,445	729	1,807	5,414
Portugal	Abroad	1,520	1,055	818	2,021	5,414
Hungary	Domestic	928	929	240	1,980	4,077
Hungary	Abroad	875	580	529	2,062	4,046
Poland	Domestic	3,341	3,207	2,171	8,497	17,216
Poland	Abroad	2,562	1,924	2,228	10,502	17,216
Bulgaria	Domestic	781	1,141	284	2,323	4,529
Bulgaria	Abroad	622	692	469	2,746	4,529
Latvia	Domestic	248	474	110	827	1,659
Latvia	Abroad	274	327	166	892	1,659
Finland	Domestic	310	1,055	74	3,176	4,615
Finland	Abroad	494	757	169	3,266	4,686
Sweden	Domestic	609	1,873	157	2,214	4,853
Sweden	Abroad	910	1,423	216	2,234	4,783
<b>Total</b>		24,095	26,602	13,568	67,336	131,601

As shown in Table 2, for domestic sourcing, the highest proportion of impact is observed in the 'None' category, accounting for 46.39 % of the total domestic category. This indicates that nearly half of the companies involved in domestic sourcing experience no impact. In contrast, for abroad sourcing, the proportion of impact categorized as 'None' is significantly higher, constituting 55.94 % of the total abroad impact. This suggests that a larger portion of companies engaged in abroad sourcing encounters no impact compared to domestic sourcing. Following, the 'None' category, both domestic and abroad sourcing experience impact levels categorized as 'Low', 'Moderate', and 'Severe'. In the case of domestic sourcing, the impact levels are distributed as follows: 'Low' constitutes 24.25%, 'Moderate' accounts for 19.50%, and 'Severe' represents 9.85%. Conversely, for abroad sourcing, the distribution of impact levels shows a slight variation: 'Low' comprises 16.18%, 'Moderate' stands at 17.11%, and 'Severe' is at 10.77%.

**Table 2:** Comparison of Impact Levels between Domestic and Abroad Sourcing **Source:** Authors' calculations derived from Eurostat data, 2021

Total for Domestic		Total companies			
	65,819			131,601	
Impact	Total of the impact for Domestic Sourcing	Nr. of companies impacted / total of number of companies domestic	Converted to % (Domestic)	Domestically compared with total dataset	Converted to % (Domestic)
None	30,536	0.4639	46.39	0.2320	23.20
Low	15,961	0.2425	24.25	0.1213	12.13
Moderate	12,837	0.1950	19.50	0.0975	9.75
Severe	6,485	0.0985	9.85	0.0493	4.93
Total for Abroad		Total companies			
	65,782			131,601	
Impact	Total of the impact for Abroad Sourcing	Nr. of companies impacted / total of number of companies abroad	Converted to % (Abroad)	Abroad compared with total dataset	Converted to % (Abroad)
None	36,800	0.5594	55.94	0.2796	27.96
Low	10,641	0.1618	16.18	0.0809	8.09
Moderate	11,258	0.1711	17.11	0.0855	8.55
Severe	7,083	0.1077	10.77	0.0538	5.38

Furthermore, the Figure 2 represents a comparison of the percentage distribution of impact levels between domestic and abroad sourcing. The impact levels include 'None', 'Low', 'Moderate', and 'Severe'. The blue bars represent the percentage distribution for domestic sourcing, while the green bars represent the percentage distribution for abroad sourcing. Each bar corresponds to one of the impact levels, and the height of the bars indicates the percentage of companies impacted at each level. The comparison between domestic and abroad sourcing reveals that while both encounters the highest impact in the 'None' category, abroad sourcing exhibits a notably higher proportion of companies experiencing no impact compared to domestic sourcing. Additionally, while the distribution of impact levels follows a similar trend between the two sourcing methods, the percentages vary, indicating potential differences in the severity of sourcing challenges experienced domestically versus abroad. Domestically, the "None" category has an effect level of 23.20%, but abroad, this percentage is 27.96%. The "None" impact level is more widespread abroad than domestically, implying that sourcing globally is less of a concern abroad. Furthermore, the "low" category is at 12.13% locally and 8.09% abroad. The "Low" effect level is more prevalent locally than overseas, indicating that such effects are felt more strongly in the domestic setting. Meanwhile, the "Moderate" impact is 9.75% locally and somewhat lower (8.55%) abroad. This suggests that "Moderate" effects occur slightly more frequently domestically than abroad, although the difference is not as apparent as in the "Low" impact category. Furthermore, the "Severe" impact is 4.93% locally and somewhat higher (5.38%) internationally. The "Severe" effect level is more prevalent abroad than it is locally, which suggests that severe sourcing is more common or has greater implications when sourced abroad.



**Figure 2:** Impact Levels comparison domestic vs. abroad sourcing. **Source:** Based on authors' calculations.

The Table 3 shows the correlation coefficients between two variables: 'Domestic' and 'Abroad'. The correlation coefficient between 'Domestic' and itself is always 1, as it represents the correlation of a variable with itself, which is perfect positive correlation. Similarly, the correlation coefficient between 'Abroad' and itself is also 1, indicating perfect positive correlation. The value 0.95 represents the correlation coefficient between 'Domestic' and 'Abroad'. A correlation coefficient close to 1 suggests a strong positive correlation between the two variables. In this case, it indicates a high degree of positive correlation between the impact levels observed domestically and those observed abroad. This suggests that as the impact level increases or decreases domestically, it tends to increase or decrease similarly abroad, and vice versa. Overall, this correlation matrix indicates a strong positive correlation between the impact levels observed domestically and abroad.

**Table 3:** Correlation Matrix **Source:** Authors' calculations based on Eurostat, 2021

	DOMESTIC	ABROAD
DOMESTIC	1	
ABROAD	0.974612437	1

## 5. Discussions

Table 1 illustrates the distribution of companies across various impact levels, shedding light on the sourcing challenges confronting businesses in these countries. The data underscores that a significant portion of companies struggle with sourcing challenges, with the majority experiencing low or moderate impacts. Notably, a considerable proportion of companies report no noticeable impact, hinting at a nuanced landscape of sourcing challenges where some entities face more severe impacts than others. Further analysis presented in Table 2 and Figure 1 suggests that while both domestic and abroad sourcing entail varying impact levels, abroad sourcing may offer distinct advantages in terms of risk mitigation and resilience. This observations points to several contributing factors, including diversification of sourcing networks, the implementation of resilience strategies, geographic variability, and the presence of well-coordinated supply chains characterized by transparent relationships and clear communication channels Meissner, J.L & Griffin, T.. Additionally, industry-specific characteristics play an important role in shaping the severity of sourcing challenges, underscoring the need for more sustainable sourcing (Schneider, L. & Wallenburg, C. M., 2012). Moreover, the positive correlation between domestic and abroad impact levels underscores a consistent link between sourcing challenges. This correlation can be attributed to various factors, such as global market dynamics and events that impact businesses regardless of their geographical location.

This suggests that changes or trends observed domestically are highly likely to correspond with similar changes or trends observed abroad, which can be valuable for decision-making in sourcing strategies. For instance, shifts in global demand induced by events like the COVID-19 pandemic have affected companies both domestically and abroad (Marinov, M.A., 2020). Additionally, the complex interdependencies within global supply chains mean that disruptions or alterations in one segment can affect the other parts of supply chains, affecting operations across borders (Mishra, R., Singh, R.K., & Subramanian, N., 2022). Furthermore, the adoption of similar strategies or business models by companies operating in diverse regions contributes to the observed correlation, as these strategies may result in comparable impacts on business operations, revenues, or profitability, irrespective of geographical boundaries. The pandemic underscored the importance of agility, innovation, and sustainability across industries, prompting companies to rethink traditional business models and possibility to embrace digital transformation to thrive in an increasingly volatile and uncertain global landscape (Niaz, M., 2022). The COVID-19 pandemic posed significant challenges to various industries, including electronics, apparel, automotive, agriculture, food industry, and pharmaceuticals (Sonawane, R., 2020). For instance the challenges in electronics industry confronted severe disruptions in its supply chain, primarily stemming from Asian manufacturing hubs like China, due to factory closures and logistical hurdles. Moreover, shifts in consumer demands patterns significantly impacted sales of electronic devices, such as smartphones and laptops. Similarly, the apparel and textile sector grappled with substantial disruptions in manufacturing and distribution, marked by factory closures, canceled orders, and changing consumer preferences away from non-essential clothing items. Furthermore, the pharmaceutical sector encountered unprecedented demand for COVID-19 treatments and vaccines, resulting in supply chain disruptions and manufacturing bottlenecks, alongside delays in regulatory approvals and clinical trials, hampering product development timelines. In order to adopt the challenges electronics manufacturers swiftly diversified their supply chains to diminish reliance on single sourcing points and mitigate future risks. Some companies expedited the adoption of digital technologies for remote work and collaboration, while others reconfigured production lines to manufacture essential medical equipment (Joglekar, N., Parker, G., & Srail, J.S., 2020). Apparel companies diversified their product portfolios to encompass protective gear like face masks and medical gowns. Certain manufacturers repurposed production facilities to fabricate vital medical supplies, while others explored digital platforms for direct-to-consumer sales and virtual fittings. Automakers optimized their inventories, diversified their suppliers, and built closer collaboration with key partners. Meanwhile Pharmaceutical companies collaborated with government agencies, academic institutions, and industry partners to explore research and development (R & D) efforts for COVID-19 therapeutics and vaccines, leveraging digital technologies for remote clinical trials, telemedicine consultations, and enhanced supply chain visibility (Puślecki, Ł., Dąbrowski, M., & Puślecki, M., 2021). Furthermore, the surge in demand for remote work and online learning solutions presented opportunities for companies producing telecommunications devices, laptops, and networking equipment. Moreover, the pandemic underscored the impative of investing in research and development for healthcare technologies and digital health solutions. Apparel companies that embraced digital transformation and agile manufacturing processing were better poised to adapt to evolving market dynamics and consumer preferences (Haider, R., 2023).

In response to the second research question, which question how sourcing strategies have affected decision-making in the post-COVID-19 period, overall, business have adjusted their objectives by commonly choosing resilience above efficiency in order to cope with risks by diversifying suppliers and improving inventory levels (Ionescu, A., Iordache, A.M.M., Mironescu, A.A., & Cârstea, V. G., 2023; Alam, M. F. B., Tushar, S. R., Ahmed, T., Karmaker, C. L., Bari, A. M., de Jesus Pacheco, D. A., ... & Islam, A. R. M. T., 2024). Moreover, the current period has noticed a shift favoring localized value chains (Vargas-Hernández, J. G., 2023) as businesses seek to lessen the risks associated with global supply networks. Furthermore, the usage of technological advances such as Artificial Intelligence (AI), the Internet of Things (IoT), and Blockchain have increased after COVID-19, enhancing visibility and coordination throughout Global Value Chains (GVCs) (Senturk, S., Senturk, F., & Karaca, H., 2023). At the same time, there has been an encouraging trend towards fostering more collaborative and transparent partnerships with suppliers to cope more effectively with disruptions. To become resilient against future shutdowns, business are decentralizing production across various

locations. Moreover, Global Value Chain operations are becoming more focused on the assessment and management of risks, resulting in the creation of more comprehensive emergency and preparedness strategies (Hong, Z., & Zahid, R. A., 2023). Strategies such as 'near-shoring' have become popular, with businesses relocating operations closer to consumer locations to ensure quicker and more punctual delivery (Pinto, C., 2023). In aggregate, these developments are pushing the restructuring of GVCs, seeking a balance between efficiency and risk reduction, in addition to global integration and local flexibility (Stojčić, N., & Matic, M., 2024). Overall, the pandemic served as a signal for reimagining and restructuring global value chains and global supply networks (Gölgeci, I., Gligor, D. M., Bayraktar, E., & Delen, D., 2023) which is constantly evolving and transforming.

## 6. Conclusion and Recommendation

In summary, our findings suggest a consistent connection between the impact levels observed domestically and internationally. This strong positive correlation implies that sourcing challenges are interconnected across domestic and international settings, suggesting that factors such as market dynamics, and supply chain disruptions similar effects regardless of location. Recognizing this correlation is vital for businesses to effectively manage and mitigate sourcing risks globally. Furthermore, the pandemic accelerated the adoption of digital technologies across various industries. Companies that have adopted digital transformation strategies have a greater opportunity to capitalize on new possibilities that arise. This increased ability to adapt and innovate has resulted in greater resilience throughout their global value chains. Furthermore, by integrating advanced technology and digital processes into their operations, businesses can mitigate disruptions, at the same time respond to changing situations in the market, and continue their supply chains across several locations. It additionally results in more secure and productive operations, even amid obstructions. Moreover, the strategic partnership and collaborations allowed companies to leverage collective expertise and resources to overcome obstacles. The high correlation coefficient between Domestic and Abroad (approximately 0.97) underscores the strong positive relationship between impact levels observed domestically and internationally. This suggests that changes or trends observed domestically are highly likely to align with those observed abroad, offering valuable insights for sourcing strategy decisions. We recommend that the integration of market trends across various regions, along with implementation of digital transformation, points out the strategic value of near-shoring. It not only strengthens supply chain resilience but also guarantees that businesses are better positioned to cope with market turbulence and capitalize on emerging opportunities in a more integrated way.

### Conflict of interest

The authors declare no conflicts of interest.

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