ISSN: 2278-3369

International Journal of Advances in Management and Economics
Available online at: www.managementjournal.info

REVIEW ARTICLE

REVIEW ON METHODS AND TOOLS IN GLOBAL VALUE CHAINS ANALYSIS

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Abstract: Global Value Chains (GVCs) have recently had an impact on the dynamics of globalization; it is necessary to understand how goods and services are developed, produced, and distributed over various sites and stages in a globalized economy. The analysis of GVCs encounters challenges due to the limited availability of comprehensive data on the arms-length and intra-firm imports and exports carried out by multinational companies, which frequently wield substantial influence on GVC. This paper aims to present an updated review of the GVC analysis tools and methods, as well as how these approaches and applications are used when GVC's are implemented in various Countries. The different scopes and required datasets for the different methods and applications used to map and quantify this phenomenon are then examined. The theoretical foundations and practical applications of mapping methodologies for GVC are also discussed. Finally, the paper expresses the linkage between Global Value Chain and benchmarking methods to achieve continual enhancement, evaluating an organization's plans and performance in comparison to leading organizations, both within and outside of the industry in order to obtain a guiding path towards improvement and the best possible integration along GVC.

Keywords: *Global Value Chain, mapping methods, international trade, import-export networks, benchmarking.*

Article Received: 14 Oct. 2023 **Revised: 24 Oct. 2023** **Accepted: 29 Oct. 2023**

INTRODUCTION

Global Value Chains (GVCs) have recently had an impact on the dynamics of globalization; it is widely acknowledged as a transnational production-sharing organization [1]. A Global Value Chain (GVC) refers to the dispersal of the economic process over multiple nations. As a result, organizations employ a strategy of specialization whereby they concentrate on a certain task and abstain from producing the entire product [2]. According to Baldwin and Venables [3], the concept of a Global Value Chain (GVC) pertains to the consecutive series of stages encompassed in the manufacturing process of a particular product or service, wherein each phase contributes to the overall value of the end result. The procedure encompasses both

physical modifications and the implementation of various services [4]. Keeping up with different methods and applications is essential if countries want to profit from globalization, as GVCs and new tools and methods are constantly evolving.

Understanding the Global Value Chain (GVC) is necessary to comprehend how goods and services are developed, produced, and distributed over various sites and stages in a globalized economy. Methods and tools play a critical role in carrying out successful GVC analysis by providing researchers, decision-makers, and businesses with the tools they need to gather, process, and interpret complex data and information. By using these techniques, stakeholders can increase economic performance and competitiveness by better understanding how GVCs work, spotting opportunities for expansion, addressing problems, and making educated decisions. Several academic research papers on Global Value Chains (GVCs) employ input-output data sources, such as the World Input-Output Tables(WIOT) or the OECD inter-country I-O model, to evaluate value added and identify noteworthy clusters at a sectoral level [5; 6].

Oftentimes, these statistics are integrated with data on international trade. One advantage of utilizing this methodology is the capacity to determine the extent of supplier chains and discern the nations that offer value along these chains. Moreover, a wide range of measures has been developed to evaluate the degree of global integration, specialization, and fragmentation within Global Value Chains (GVCs). Amador and Cabral [7] argue that it is possible to identify and monitor different indicators of country or industry involvement in Global Value Chains (GVCs) across a specific time frame.

The domain of quantitative analysis in the context of business is relatively new, although there is a significant collection of qualitative case studies available on Global Value Chains (GVCs). These studies possess the capacity to identify precise contexts in which academics in the field of information systems can integrate concepts from different theoretical frameworks and provide useful contributions to innovation policy. Broadly speaking, the approaches employed in the field of Industrial Sociology, as well as the concepts of clusters and Global Value Chains (GVC), bring attention to different phenomena and variables. However, all three of these areas of study are relevant to the domains of innovation, social policy, and economic policy. The incorporation of several techniques will facilitate the assessment of the key aspects that contribute to the advancement of inventive capability in distinct regions of the European Union.

Moreover, this will facilitate an analysis of the influence of Global Value Chains on several consequences, encompassing but not restricted to the advancement of human capital, productivity levels, economic expansion, sustainability, and the alleviation of poverty. The application of open and extensive data, in conjunction with novel data science approaches, is widely acknowledged as a driving force for substantial transformations in the realm of socioeconomic policy and research [8]. Furthermore, these improvements have also exhibited their potential in transforming business management and decision-making processes.

The utilization of quantitative data would also yield benefits in the context of cluster and Global Value Chain (GVC) studies. Input-output data, which illustrate inter-industry trade, are frequently published by statistical agencies, albeit with significant delays.

The analysis of Global Value Chains (GVCs) Review on Methods and Tools in Global Value Chains analysis encounters challenges due to the limited availability of comprehensive data on the arms-length and intra-firm imports and exports carried out by multinational businesses, which frequently wield substantial influence on GVCs. At this juncture, the investigation and implementation of alternate sources of extensive data, along with innovative approaches for organizing and analyzing unstructured data, can provide substantial support.

This paper aims to present an updated review of GVC analysis tools and methods, as well as how these approaches and applications are used when GVCs are implemented in various countries.

To forecast macroeconomic developments and determine whether policy can influence GVCs, it is imperative to have a correct understanding of GVCs to predict changes in their future dynamics. Section 2 illustrates the main data sources that can be used for the analysis of the GVC and applied by the main methodologies explained in the following section 3, highlighting the potential and challenges in measuring and mapping the GVC. Section 4 exposes the possible applications of GVCs in the current international socio-economic context and section 5 highlights the useful connection between the analysis of GVCs and the different benchmarking methods to support industries in the analysis of their processes and in identify the best possible insertion into the GVC.

DATA SOURCES OF THE GLOBAL VALUE CHAINS ANALYSIS

One of the major data sources for the Global Value Chain analysis is the flow of goods and services by considering the intermediate inputs. The products or services that are intermediate in nature will then be processed or sold. This may be the most logical way to describe the global network of trade given the enormous proportion of these intermediate inputs [9]. Because secondary classifications like the UN Broad Economic Categories or the Harmonized System of Merchandise can be cross-checked with databases like COMTRADE, differentiating intermediate tangible goods from final goods is relatively simple.

However, the case of services is more complicated, and much has relied on guesswork [10]. Although possible double counting can cause a potential bias, the flow of intermediate inputs has a clear advantage over more aggregated approaches, such as the input-output model, as it provides very precise and detailed information on the pattern of specialization of each country [9]. In Fig. 1-2, Escaith [9] demonstrates the purchase of inputs using trade-in intermediate goods data by IDE-JETRO for the Asia Pacific region [11]. Furthermore, Escaith and Inomata [12] show the evolution of industrial networks in the Asia-Pacific region.

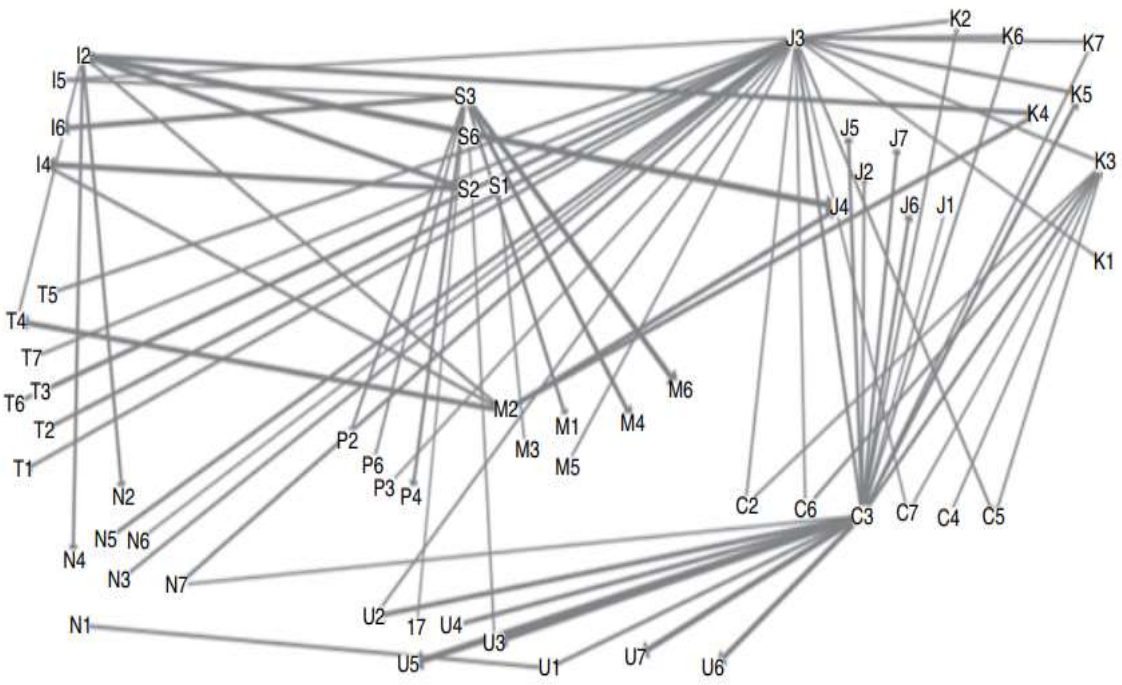

Figure 1: Graph of intermediate inputs trade by industries in selected Asia- Pacific reporters, 2008 [1]
Source: Adapted from Escaith, 2014 [9]

[1] Letters denote the reporting economy (C: People's Republic of China; I: Indonesia; J: Japan; K: Korea; M: Malaysia; N: Taipei, China; P: Philippines; S: Singapore; T: Thailand; U: USA) and numbers the sectors (1: Agriculture; 2: Mining; 3: Manufacturing; 4: Electricity, gas and water; 5: Construction; 6: Trade and transport; 7: Other services).

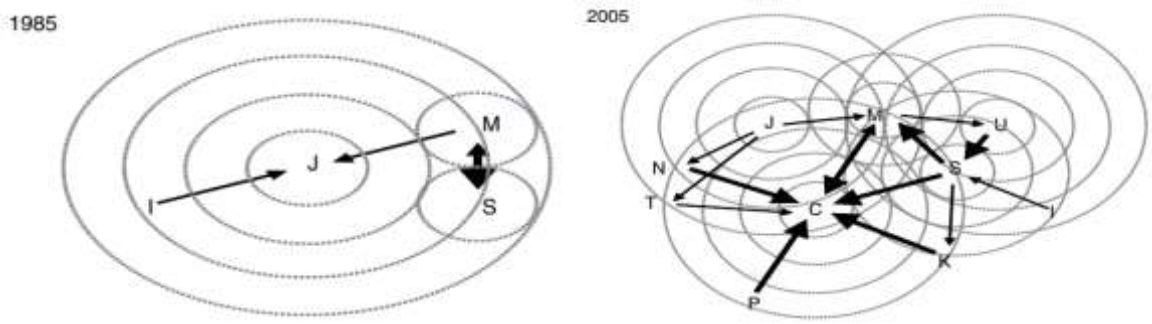

Figure 2: Evolution of Asia-Pacific intra-industry network, 1985–2005
Source: Adapted from Escaith and Inomata [12], same notes as Figure 1.

The second dataset for the Global Value analysis is the value-added approach with which scholars can assess the net economic contribution of each sector or country at a more aggregated sectoral level (Fig.3) [13]. International input-output tables (IIO), which have the advantage of displaying both direct and indirect sectoral linkages, are the foundation for estimating the value-added content of trade [9]. While traditional trade statistics are adequate when analyzing a specific product type, the supply-use table canbe particularly beneficial as it can provide information on value-added components such as employee remuneration or net operating surplus.

Recently, OECD introduced a new trade flow database of value-added products based on international production and trade networks in the context of the Global Value Chain. The Inter-Country Input Output (ICIO) model connects input-output tables of 58 countries and represents 95% of the world output. At the same time, Bilateral Trade Database by Industry and End-Use Category (BTDIxE) captures the flow of intermediate inputs across countries and industries. Unlike previous research based on input-output data for a limited context, the OECD ICIO database allows an enhanced GVC analysis with almost complete detailed transactions among industries and countries, although this dataset is not free from any assumptions or gaps.

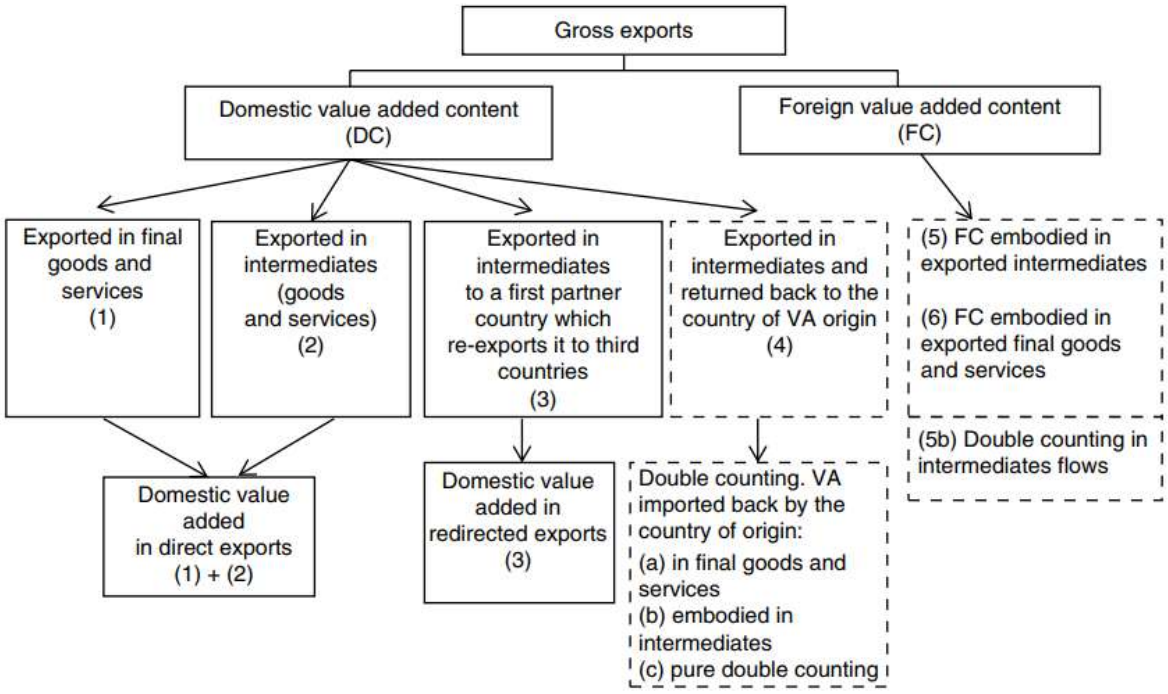

Figure 3: Decomposition of gross exports into their value-added components
Source: Adapted from Koopman et al. [13]

The last yet more promising data source can come from the link between trade and business statistics. Although attractive in many ways, trade statistics in a value-added approach cannot avoid criticism for its data gaps and aggregation bias. Trade data can be misrepresented when compiling intermediate trade flow statistics. Furthermore, the heterogeneous nature of different firms and different positions in GVCs inevitably lead to aggregation bias in creating a common dataset.

Sturgeon [14] suggests a cutting-edge discussion on firm-level data and compilation strategies based on EUROSTAT in an effort to avoid these flaws. Firm-level data collection frequently entails specialized surveys, which are inescapably expensive, taxing, and statistically more difficult.

The activities of the firm, its corporate structure, its labor force, its product information, etc., as well as other data already gathered by national administrations, however, can offer reasonably cost-effective methods for obtaining a detailed understanding of the trade activity.

METHODOLOGIES FOR ANALYSING GLOBAL VALUE CHAINS (GVCs)

The Global Value Chain concept's theoretical underpinnings emphasize the complex interplay of factors influencing how production is structured globally. The dynamics of contemporary international trade, the function of multinational corporations, and the elements influencing economic growth and competitiveness in a globalized economy have all been explained using this framework.

Countries participate in Global Value Chains by leveraging their strategic advantages and competencies; developing countries often utilize their low cost of labor and production to enter the value chain, while advanced nations engage in the ideation and post-production stages of the chain by making use of their superior knowledge endowments. Once part of the chain, countries seek to upgrade their position by moving up to higher value activities or expanding their functions. The socioeconomic institutional framework of the country into which the value chain is embedded as well as the relationship between key stakeholders including firms, workers, industry organizations and government agencies influence the nature of its participation [15]. Antràs [16] argues that the GVC activity is uneven in the world as regions like Europe, East Asia etc. are actively engaged in GVCs whereas the involvement of other regions like Latin America and Africa is much less. Measuring counties' participation in GVCs has been challenging for researchers.

The customs data, an authoritative source of information regarding trade flows across countries, provides only the information on where the goods and services were produced and where these have been traded to. The problem in using this information is that they do not provide details on which all countries have contributed value to it and whether the importing countries entirely consume it or if they export it to others after adding value to it.

In 2017, Borin and Mancini [17] discussed two distinct methodologies for measuring value added in bilateral trade: the “source-based approach”, which focuses on the place where the value added originates, and the “sink-based approach”, which considers the country that finally absorbs it in final demand. The last one follows the domestic value-added (VA) in exports from direct importers to final demand and gives the top eight global exports priority. To determine how its evolution since the mid1990s has impacted the long-term relationship between global demand and global trade, a measure of GVC-related trade that is calculated using a source-based methodology is also included.

Following “sink-based approach”, Borin and Mancini [18] presented another methodology of GVC called Value-Added (VA) accounting using Inte-County Input-Output (ICIO) tables to account for trade flows at the bilateral and sectoral level between countries. National input-output data and trade statistics are combined in ICIO tables like WIOT, OECD-WTO TiVA, or EORA to track cross-country and cross-sector interconnections. They serve as an essential statistical toll for macroeconomics analysis

that considers the global production's fragmentation. Study by Humphrey et al. [19] identified the impact of supply-chain trade, which includes trading of finished goods like food, clothing, and shoes within the GVC for international trade.

Thus, the theoretical foundations such as transaction cost economics, knowledge-based and resource-based theories of the firm which are concerned with the competitiveness of firms in the global economy. In the literature review, specific methodologies and application are covered in more detail. Numerous researchers have studied in-depth the methodologies and applications used to map the theoretical foundations of GVCs, and they have significantly contributed to the advancement of GVCs in areas like the theoretical foundations, methodologies, applications, and mapping.

The term Global Value Chain refers to phases of activities that businesses and employees carry out to bring products or services from the point of conception to the point of use, recycling or reuse. Among these activities are those related to production, processing, assembly, distribution, marketing, finances, and consumer services. The increasing participation of businesses and industries in GVCs results in a more equitable distribution of value-added among various social groups that is established and captured domestically [20].

The origin of global strategy is traced back to the 1960, when large multinational corporation began treat their cross-border operation as domestic ones [21]. Crucial element of global strategy entails considering all aspects of an organization holistically, including suppliers, production sites, markets and competitors. Global strategy provides a firm-to-network perspective on MNEs, whereas GVC emphasizes the role of MNEs from a network to firm perspective. Todeva and Rakhmatullin [22] claim that GVC captures the globalization and production fragmentation processes as they are speeding up.

The value chain may begin with one firm or may be divided among several firms, regardless of the locations. Value chains are governed by two fundamental principles: specialization and the division of labor among businesses, as well as the interconnected capabilities between businesses that allow the flow of link resources and value-added across borders.

Major Approaches to the Global Value Chains Framework

The dynamic industry model developed by Melitz [23] which examines the export decisions of heterogenous firms indicate that only efficient firms are able to enter the export market and gain from by expanding their market shares and profits, while less productive ones are forced out of the international market. The presence of entry costs prevents firms of smaller size and productivity from entering the market [24; 25; 26].

Bamber et al. [27] supports this view in stating that it is challenging for firms to sustain their presence in GVCs as GVCs in the present world are highly dynamic, consolidated around a few strong firms, and place high demands on the participating firms. Wherever the firm is positioned in the value chain, it needs to have a minimum quality and reliability to participate in it. Besides these, in order to stay relevant, it needs to constantly revise its strategies to improve the supply chains.

Firms that engage both in import and export can be a part of the global network. For greater clarity, one can go deeper and observe product-level transactions. If a firm's import constitutes intermediate goods, while its export is largely final products, it can be safely assumed that the firm is using foreign-value added in its export-oriented production and hence is a participant in the global value creation network.

However, such a micro-level analysis is possible only if the customs data of all the countries are linked as it would otherwise be impossible to distinguish between firms that import intermediate goods for use in production vis-a-vis for re-export.

Kee and Tang [28] examine the extent of the domestic value addition in exports of Chinese firms to understand the reasons for China defying the global trend of declining domestic content in exports. The authors find that the domestic content in the exports as a proportion of gross exports is rising across all

industries in China and with respect to all the trading partners of China. They find that trade liberalization and deeper engagement with GVCs increased the substitution of domestic for imported inputs in production processes of individual exporters which reduced the cost share of foreign content in exports. According to them, declining relative prices and increasing variety of domestic inputs vis-a-vis foreign goods, caused by a larger presence of foreign export processing firms and declining input tariffs drove this process.

Firms' participation in Global Value Chains has been improving with development in production technology and ICT (Information Communication Technology). The production technology used in final goods and services also affects firms' participation in GVCs, especially in developing countries as it helps reduce firms' entry costs. It determines the governance structure of GVCs and hence influences the benefits that the participants derive from their linkages. While standardized production technologies help firms reduce their spending on Rand, it increases the supply of homogenous goods in the domestic market and limits technology transfer. On the contrary, technologies that encourage product modification and interaction with other producers in the economy boost transfer of technology and consequently the upgrading of products [29].

Besides this, ICT also determines firms' participation in GVCs. Firm-level data from World Bank Enterprise Survey indicates that having a website on the internet boosts firms' participation in the value chain. Internet access enables firms to increase their exports by reducing search costs and decreasing distance barriers as well [30].

Even in the early 20th century, there were fragmented production activities and outsourcing practices [31], but it's important to consider the causes of the various scales of the phenomenon of global fragmentation. De Backer and Miroudot [32] propose three explanations for the increased production fragmentation: recent technological advancements in telecommunication and transportation, more globally oriented regulatory frameworks, and developing Asian nations. The recent decrease in trading costs may be the main cause of the fragmentation of products. Trade costs for products typically consist of land transport and port expenses, freight and insurance costs, tariffs and duties, as well as all other markups incurred by parties involved in importing, wholesaling, and retailing. In the case of service, it is customary to consider communication costs as trade costs as well as coordination costs. Therefore, the breathtaking development in telecommunication technologies has a great influence on scaling up production fragmentation.

Another important driver for production fragmentation is the trade and investment liberalization. As aforementioned, political and institutional aspects have always played an important role in global economics and especially the value chain, and therefore, regulatory reforms for liberalization can explain the advance of production fragmentation along with the technological development in transportation and telecommunication. Lastly, increased demand from Asian countries has also played a great role in recent changes in the Global Value Chain.

Therefore, it is necessary to consider what can be the proper level of analysis of the GVC framework to enhance the understanding of the global phenomena. Although the GVC literature claims the importance of business function as they include various activities along the supply chain [33]. Also, scholars still debate whether this international fragmentation is mainly regional or global [34]. This line of debate helps to understand how important regional trade is among global fragmentation, especially those that take place within groups of adjacent countries and trade blocs. This is important as it can provide insights into the relevant policies on regional trade. Aside from assessing the proportional relevance of regional and global fragmentation, precise fragmentation analysis improves the understanding of the Global Value Chain.

Methodologies Adopted by the Global Value Chains: Measuring and Mapping

Measuring GVC-level performance is a difficult undertaking due to the enormous complexity of the fine-sliced, multi-layered, geographically distributed network, as well

as the diverse and sometimes divergent aims of its members. The sustainability of the GVC over time functioned as an indicator of governance efficiency and could thus be viewed as the ultimate GVC performance outcome. Future research can expand on this metric and suggest new approaches for lead businesses in GVCs to analyze network performance. Depending on the sector, effective GVC management necessitates a combination of various strategies and technologies. In measuring the importance of GVCs in more precise terms, it is necessary to understand the following three factors of Global Value Chains: share of exports, production stages, and position of a participating country. The share of export refers to the extent to which countries are involved in a fragmented production of final goods.

Hummels et al. [35] was one of the earliest to use the input-output tables to document the vertical linkages of 14 countries in the world. By vertical linkages, the authors mean vertical specialization, which implies specialization of countries in specific point of production, depending on intermediate goods' imports to facilitate exports of final goods. They use the measure of vertical specialization as imported input content in a country's export by decomposing the export in to foreign and domestic value-added shares (VS). Arguing that [35]'s formula significantly underestimates the share of value added in exports of China, later, Koopman et al. [36] propose a new measure for computing domestic and foreign value-added shares in a country's exports (VS1).

They argue that this measure has more importance in computing as the processing exports are more prevalent nowadays. This measure is based on the understanding that input sourcing and production technology are different for domestic consumption and normal exports. Noting that the assumptions of 1) uniformity in the use of imported inputs in domestic, as well as export-oriented production, and that 2) imports are fully foreign-sourced proposed by [35] are violated when there are processing exports and when multiple countries export intermediate goods, Koopman et al. [37] present a unified framework that incorporates all the existing measures of vertical specialization and value addition while accounting for trade of intermediate goods between nations.

Baldwin and Lopez [38] distinguish between importing to export (I2E), importing to produce (I2P), and Value-Added Trade (VAT). While I2P incorporates intermediate goods used in the production of both traded and non-traded sectors, I2E considers only the import content in exports. Value-added trade is a more accurate measure as it eliminates the problem of double counting in intermediate trade channels.

Banga [39] argues that a country can link to the GVCs either through forward linkages, where it provides inputs to other countries for manufacturing goods and services for exporting or through backward linkages, where it imports overseas inputs for producing goods and services for exporting.

The country's involvement in GVCs can be studied through the shares of that country in entire value added generated by backward and forward linkages. Besides these, Jones [40] and Bartelme et al. [41] attempt to measure domestic linkages by estimating the output multiplier associated with domestic sectors' intermediate goods. Wang et al. [42] develop an accounting framework that disaggregate gross trade flows at the sector level, bilateral level or bilateral sector levels.

This framework helps decompose gross exports, including value added from exports, foreign, and domestic that returns home country, and double-counted intermediate trade, into its various components. Wang et al. [43] introduce two indices to measure GVC participation based on backward and forward linkages. The first one is the ratio of domestic valued added from a country-sector's GVC activities of downstream firms to the total value added of that country-sector. The second index measures the share of value addition through upstream firms in the country-sector's total production of goods and services. These indices are improvements on the existing measures as they reflect not only the foreign content in intermediate imports, but also the domestic factor content that has come back through trade to the home country for final consumption.

Another prominent measure of domestic linkage is by Kearney [44].

The Kearney reshoring index ultimately captures the amount of foreign- imported inputs in manufacturing. The index calculates the changes in the import ratio of manufacturing year by year. However, the length of GVCs, which indicate the number of production stages, should also be considered. This is necessary alongside vertical specialization as both VS and VS1 do not provide any information on the actual length of value chains. In the literature, an average propagation length indicator or a weighted average of the length of the production can be adopted [45; 46]. Depending on the economic cycle, the level of fragmentation, and the unit of analysis, this measure for the GVC length can vary.

Furthermore, the distance to ultimate demand gives useful information about a country's position in the value chain. Upstream nations, for example, deal mostly with raw materials or intangible commodities, whereas downstream countries engage in more assembly operations or service-based specialization. Industries which sell significantly large share of their products to other sectors (who consequently sell them to final consumers) and very little directly to consumers are considered to be relatively upstream.

A related concept, 'down-streamness' categorizes industries based on their relative use of value-added inputs vis-à-vis intermediate goods in their production process. Industries that use disproportionately large quantities of intermediate inputs and also inputs from industries that use large shares of intermediate goods for their production are classified as downstream [46]. Though these measures were conceptualized at the industry-level, they have been simplified to make country-industry comparisons and compute the average up-streamness and down-streamness of countries [47]. In [48] and [49] authors have computed them at the country-industry level using data from Global Input-Output Tables.

Johnson and Noguera [50; 51] introduce a metric to measure interlinkages in the value chain- value added of a nation which is absorbed overseas as a share of gross exports. In a comprehensive study analyzing the content of value-added in trade across four decades of high and middle-income countries, Johnson and Noguera [51] observe a large and increasing degree of world economy's production fragmentation reflected by a decline in value addition as a ratio of exports by approximately 10% overall and 20% for manufacturing sector worldwide. Pahl and Timmer [52] extend the work of Johnson and Noguera [51] to a larger sample of sectors and diverse countries. They infer that substitution of foreign inputs for domestic goods drives the decline in value added content in exports of manufacturing sectors.

They also identify that almost all countries engage in vertical specialization, with three distinct waves of vertical integration wherein their value-added content as a proportion of exports saw a decline. Although these trade statistics are supposed to provide objective economic phenomena and relevant indicators, the structural changes, and measurement issues may bias the current economic situation.

As indicated in Inkpen and Tsang's [53; 54] conceptual discussion of social capital, networks and knowledge transfer, the topic is surely a challenging as well as fruitful one. A number of empirical studies have looked at knowledge dispersion and transfer in a GVC, however knowledge management has largely been explored in terms of upgrading, technological catch-up, and advancing up the value chain by peripheral enterprises and strategic partners.

The value chain analysis process can be carried out using a variety of methodologies and techniques: Todeva and Rakhmatullin [22] developed five data sources/tools to assess each country's position in the value-added chain in the combined GVCs. The TiVA database, which is based on the OECD/WTO table for national Input-Output, came in first place. TiVA was developed to offer a more precise understanding of Global Value Chains and the interconnections between national production systems.

In the second place, there is UNCTAD-Eora-MRIO GVC database which is an international company that deals with trade, investment, and development-related issues.

This company frequently releases studies, data, and reports on global trade and economic growth. UNCTAD-Eora-MRIO GVC are global multi-region input-output (MRIO) database which is designed to provide detailed information on economic activities and interdependencies between regions and industries.Followed by the IDE-JETRO database which is established by the Institute of Development Economics.

This database contains a wealth of economic and trade-related information about Asian countries and regions, data on various economic indicators, trade statistics, foreign direct investment. GTAP database which is developed by Center for Global Trade Analysis in Purdue University's Department of Agricultural Economics. It is used to covers a wide range of countries and regions, sectors of the economy, and various economic variables. It typically contains information on more than 140 countries and regions, nearly the entire globe.

Finally, the World Input-Output Tables (WIOT) which are useful illustration of a particular kind of economic database. The WIOT are useful economic databases that offer a thorough and in-depth depiction of the connections between countries and industries in the global economy. They are employed by economists, decision-makers, researchers, and companies to analyze and comprehend the dynamics and structure of economic activities on a global and national level. These tables offer comprehensive details on the international and domestic flows of goods and services between various economic sectors.

Going into even more detail, mapping Global Value Chains (GVCs) refers to the process of identifying and analyzing the various stages and activities involved in the production of goods and services on a global scale. The GVCs are mapped to assist regions in several ways, including capability audits, identifying new growth opportunities, putting their industrial revival and innovation strategies into practice, and developing their smart specialization strategy for securing inter-regional collaborative advantage and sustainable growth [22]. Because it is challenging to map Global Value Chain and a data intensive process, it frequently requires cooperation between businesses, governmental organizations, and international organizations. This process is made easier and offers real-time visibility into value chain dynamics to the use of cutting-edge technologies like data analytics and supply chain management software.

The mapping of GVCs is based on four fundamental principles: a geographical factor which shapes Global Value Chains (GVCs), manufacturing and supply networks that span many nations; international specialisation, interconnectedness, technology and innovation and corporate governance. Countries and businesses turn to concentrate on the jobs or pursuits where they have a competitive edge.

The productivity and cost-efficiency that can result from specialization are both increased. These variables can have a significant influence on how products and services are created, sourced, and delivered globally, an input-output structure that explains how raw materials are transformed into finished goods, a governance structure that explains how the value chain is managed, and an institutional context in which the industry value chain is embedded are among the factors.

Challenges in Measurement

Accurate measurement of participation of countries, especially developing countries in Global Value Chains involves some practical challenges. It is difficult to measure the value of certain services and intangible activities, particularly those services which contribute to trade in tangible commodities such as in-house RandD expenditure [55; 56]. Since these are often not available in country-level or international statistical databases, researchers are forced to impute their value by undertaking individual surveys and ground-level reports, which may be a tedious process [16].

Another data-related difficulty is pertaining to the lack of distinction between trade in intermediate and final goods in international trade statistics [57]. This creates difficulties in distinguishing between domestic vis-a-vis foreign value added in exports, thus making it impossible to determine accurately the technological capabilities of participating countries. There also arises a problem due to the aggregated nature of the input-output

table. Since these tables are aggregated sectorally, they do not capture the GVC activities within sectors. Finally, for participation in GVC to be translated into real development and economic catch-up by developing countries, the benefits from the process should be distributed in the local economy, something which does not often happen. In many cases, MNCs in developing countries who are involved in international trade have very few linkages in the domestic economy that can facilitate technology transfer and knowledge spillovers [58].

APPLICATIONS OF GLOBAL VALUE CHAINS

Global Value Chains are widely used and have a big impact on different parts of global business, trade, and the economy. One of the many applications is trade policy, which considers factors like tariffs or trade agreements that influence the various production stages within the GVC. Then comes logistics and trade facilitation, which concentrate on improving border, customs, and transport infrastructure while ensuring that GVCs operate effectively.

In addition, there are other factors like business taxation, investment, regulation of business services, innovation in industry, adherence to international standards, and a more general business environment that encourages entrepreneurship. To ensure the seamless flow of goods and services across borders, businesses in GVCs must adhere to international quality and safety standards. These standards must be adhered to by nations and businesses in their production procedures.

To fully utilize the value-added decompositions of bilateral trade, the Organisation for Economic Cooperation and Development (OECD) trade in value-added Inter-Country Input-Output (ICIO) Tables and the World Input-Output Database (WIOD) are used. According to [17], the breakdown of bilateral export flows provides useful information on the downstream organization of the production networks of the involved countries. However, in addition to the global total, these researchers considered the eight biggest exporters in the world (China, US, Germany, Japan, UK, France, Italy, and Korea), as well as the four main destination regions (Europe, NAFTA, Latin America, and Asia-Pacific). It was further explained that, while Germany played the same role within Europe, China served as the centre of factory production in Asia. Countries and organizations can use a variety of strategies and tools to take part in and profit from GVCs. Trade policies and agreements are essential instruments for advancing international trade and economic cooperation. Each country is free to establish its own trade policies, which may include laws, fees, restrictions on imports and exports, and other restrictions on the movement of goods and services across national borders [59].

These rules are made to protect domestic industries, uphold national security, or achieve various political and economic goals. Countries often negotiate and enter into trade agreements with one another. These agreements can be bilateral (between two countries), regional (involving several countries in a single region), or multilateral (involving many countries). Major trade agreements include the World Trade Organization (WTO) agreements, the European Union's Single Market, and the North American Free Trade Agreement (NAFTA, now known as the United States-Mexico-Canada Agreement or USMCA). These involve a group of neighboring countries within a specific region. They promote trade and economic cooperation among member countries. An example is the European Union (EU) Single Market, where EU member states have eliminated many trade barriers among themselves. These rules are made to protect domestic industries, uphold national security, or achieve various political and economic goals. They may result in greater economic expansion, the creation of jobs, and improved consumer access to a wider range of goods and services.

However, they may also encounter opposition and difficulties because of their effects on domestic industries, labor laws, and environmental issues. In both national and international contexts, there is frequently discussion about how to strike a balance between protectionism and trade policy liberalization. Reducing trade barriers, tariffs, and non-tariff barriers can encourage

foreign investment and participation in GVCs. Hofstetter et al. [60], Lema et al. [61] buttress on the implementation of co-evolution between the Global Value Chains (GVCs) and Innovation systems (IS) approach, mostly for the developing countries participating in the value-added chain through learning and innovation process. Thus, local firms are however directly involved in the Global Value Chains and innovation system (GVCs-IS) coevolutionary relationships.

It was further investigated by these researchers that the flows between the innovation systems and the local firms could provide specialised skills and knowledge, extension services such as metrology, standard certifications or incubation services, financial resources, and local research inputs mainly based on adaptations of existing knowledge. Therefore, both GVCs and IS coevolution relationships are two complementary tools for sustainable economic growth and development in the global economy [61; 62].

This combination will help in enhancing the socio-economic practices in developing countries, which comprises the low- and middle-income countries. It's also important to note that GVCs in the same industry appear to be structured differently across nations. Countries need to identify the sectors or industries where the country has a competitive advantage.

This entails assessing elements like infrastructure, technological prowess, natural resources, and labor skills. Nations and organisations would draw up a detailed map of the value chains in the target industries. This can be done by understanding the flow of goods, services, and information between nations and businesses as well as the various production stages, from raw material extraction to final product assembly. Firms and governments strategically incorporate these applications into their operations to participate successfully in the Global Value Chain, boost efficiency, decrease costs, and offer products and services that match the expectations of a diversified and interconnected global market. By applying, for example, TiVA (Trade in Value Added) businesses can acquire insights into Global Value Chains, economic interdependencies, and trade linkages which enables businesses to trace their supply networks across several nations and sectors. This help in mapping and identifying the source of value contributed at various stages of production and provides transparency, allowing businesses to understand the geographical distribution of activities within their supply chains. Meeting regulatory requirements and consumer demands for products with ethical sourcing and environmental responsibility may depend on this transparency.

Additionally, to be aware of the value added to their exports at every stage of production. This information directs export strategies, highlighting the potential advantages of focusing on markets or modifying product compositions to meet market demands. It also helps to identify areas where new technologies can be introduced or where countries can work together to increase productivity and competitiveness.

A LINK BETWEEN GVCS AND BENCHMARKING

The link between benchmarking and GVCs is evident in their mutual goal of optimizing value creation, efficiency, and competitiveness across multiple stages and actors. By applying benchmarking practices to each stage of the value chain, Countries can identify areas for improvement, implement best practices, and ensure smooth coordination and integration among different participants. This ultimately enhances the overall performance of the GVC, leading to improved products, streamlined processes, and increased competitiveness in the global marketplace.

There are many different types of benchmarking that fall into three primary categories: internal, competitive, and strategic. Internal benchmarking is a process in which a corporation or organization examines its own operations to identify the best technique or approach for carrying out a certain activity [63]. By turning inwards during internal benchmarking, a business only tries to get knowledge from its own organisational structure. The purpose of internal benchmarking is to identify the

parts of a company that are performing well and analyze the procedures that make them more effective than other locations [64]. After it is complete, internal benchmarking starts by choosing a performance metric that a company wants a certain division of the business to reach.

To remain internationally competitive firms must sustain a high rate of internal learning that both refines current practices and adopts new ones. The company will focus on external benchmarking activities once they know their own strengths and weaknesses. Competitive benchmarking collects information from several companies in the sector [65].

This type of benchmarking involves measuring the performance, products, and services of an organization against its direct or indirect competitors in its own industry business and to identify trends relevant to the business [66].

Though it is not an easy task, because some organisations do not make their information public and it will be difficult to obtain such information. In competitive benchmarking different strategies and methods that makes the business successful are evaluated and how they are being applied. The second element being looked in competitive benchmarking involve evaluating present and historical data to identify the trend and arrival. Strategic benchmarking addresses long-term outcomes of the business. The focus of strategic benchmarking is on how businesses compete with other business. This type of benchmarking examines the methods that the companies are doing to achieve success. Most businesses employ this kind of benchmarking methodology [67] to identify their strength and their weaknesses.

Strategic Benchmarking helps companies improve their operations without recreating the wheel. The process and speed of change can be accelerated due to the fact business owners can compare with other employers and follow through with good decisions [67].

Strategic benchmarking yields other benefits such as identifying customer trends, determining potential opportunities, and positioning the business as an industry authority.

Industrial Benchmarking

Industrial benchmarking is a strategic process that organizations use to compare and evaluate their performance against industry standards and best practices to identify areas for improvement, set performance goals, and drive continuous improvement. It entails meticulously measuring and analysing key performance indicators (KPIs) across multiple operational aspects, including, among others, productivity, quality, cost, efficiency, safety, and customer satisfaction. By comparing themselves to other businesses within the same industry or even across industries, organizations receive valuable insights into their own strengths and weaknesses and are able to identify opportunities to enhance their competitiveness.

Typically, the benchmarking of industries involves multiple steps. The initial stage entails defining the scope and objectives of the benchmarking exercise, as well as selecting the specific areas or processes to be benchmarked. This may include production processes, supply chain management, marketing strategies, or customer service. Once the focal areas have been determined, data collection can commence.

This may entail gathering information from both internal and external sources, such as company records and performance metrics, industry reports, market research, and competitor analysis. The subsequent step is to identify suitable benchmarking partners or companies that demonstrate best practices or superior performance in the selected areas. These partners may be competitors, industry leaders, or even firms from unrelated industries that have implemented innovative strategies or produced remarkable results.

The collected data is then compared to the performance metrics of the benchmarking partners and analysed to identify performance gaps, improvement opportunities, and potential best practices to implement. After the analysis has been completed, organizations can develop action plans to resolve the identified gaps and enhance their performance. This may entail instituting process changes, adopting new technologies, revising strategies, or

enhancing employee skills via training and development initiatives. It is essential to prioritize opportunities for development based on their potential impact and practicability, considering the organization's resources and capabilities. Benchmarking is not a one-time activity, but rather an ongoing process that requires constant monitoring and modification.

Organizations should routinely review and revise their benchmarking data to ensure that it remains pertinent and reflects the current state of the industry. Additionally, they should monitor their progress over time, comparing their performance to the initial benchmarking results and assessing the efficacy of their improvement initiatives. A production function illustrates the maximum output that can be obtained from a given set of inputs that are utilized as efficiently as feasible.

According to Data Envelopment Analysis (DEA), one method for determining a firm's efficiency is to compare its observed output level to the output determined by the production function. Let $X = (x_1, x_2,..., x_n)$ denote a vector of n inputs (e.g., labor, equipment, space) consumed by a business; y the observable output, and $f(X)$ the production function. In mathematical terms, the firm's output efficiency is $y/f(X)$ [68].

CONCLUSION

Scholars from a variety of fields have gathered an outstanding body of research on GVCs to far, but this work is currently marked by a number of knowledge gaps. These gaps create interesting prospects for GVC researchers, and we hope that our assessment will help to shape a more comprehensive GVC research agenda. We proposed a comparative institutional framework for GVC analysis and outlined a number of unresolved concerns.

At the GVC level, we must perform meticulous GVC mapping, identifying the connections between each crucial component of the GVC's structural and strategic governance. The latter point is especially important given the political climate today. It is the social responsibility of GVC researchers to present an accurate picture of GVCs that illustrates the fundamental and irreversible interconnectedness of the modern global economy as opponents of globalization increasingly - and irrationally - blame GVCs for the decline of public goods and the rise of global public bads.

Learning and knowledge transfer in Global Value Chains in the main business are less studied. Future research can look at the pathways via which information moves in a GVC in several directions, as well as specific behaviors in different areas of the network that help or hinder these processes. Given the quick technical and environmental changes, members of a GVC must keep their expertise up to date.

Organizational procedures that were formerly cost-effective may no longer be so. The amount to which GVC members can update such old information or procedures, individually or collectively, impacts the GVC's performance or even long-term survival.

To support the necessary updates along the GVCs, benchmarking plays an important role, as the systematic process utilized with the purpose of achieving continual improvement, evaluating an organization's plans and performance in comparison to leading organizations, both within and outside of the industry. In this way, industry can chart a guiding path towards improving performance and the best possible integration along its GVC.

ACKNOWLEDGEMENTS

This research has benefited from researchers' mobility funding by the CatChain project under grant agreement No. 778398—Marie Skłodowska Curie Action H2020-MSCA-RISE-2017.

REFERENCES

1. V. Gunnella, A. Al-Haschimi, K. Benkovskis, F. Chiacchio, B. Di Lupidio, M. Fidora, S. FrancoBedoya, and E. Frohm, The impact of global value chains on the euro area economy (Occasional Paper Series n° 221). European Central Bank, 2019.
2. World Bank, World development report 2020: Trading for development in the age of global value chains. International

Bank for Reconstruction and Development/The World Bank, 2020.

3. R. Baldwin, and A. J. Venables, Spiders and snakes: Offshoring and agglomeration in the global economy. Journal of International Economics, 90(2), 2013, 245-254.
4. R. Kaplinsky, Global value chains: Where they came from, where they are going and why this isimportant. Innovation, Knowledge, Development Working Papers, 68, 2013, 1–28.
5. E. Dietzenbacher, B. Los, R. Stehrer, M. Timmer, and G. De Vries, The construction of world input–output tables in the WIOD project. Economic systems research, 25(1), 2013, 71-98.
6. N. Yamano, N. Ahmad, The OECD's Input–Output Database — 2006 Edition. STI Working Paper 2006/8. OECD.
7. J. L. Amador, and S. Cabral, Global value chains: Surveying drivers and measures, 2014.
8. L. Einav, and J. Levin, The data revolution and economic analysis. Innovation Policy and theEconomy, 14(1), 2014, 1-24.
9. H. Escaith, Mapping Global Value Chains and measuring trade in tasks. In Asia and global production networks, Edward Elgar Publishing, 2014, 287-337.
10. S. Miroudot, R. Lanz, and A. Ragoussis, Trade in intermediate goods and services. New York: TheFree Press, 2009
11. S. Inomata (ed.), Asia Beyond the Global Economic Crisis: The Transmission Mechanism of Shocks, Edward Elgar Publishing, 2011.
12. H. Escaith, and S. Inomata, Geometry of Global Value Chains in East Asia: The role of industrial networks and trade policies. Global Value Chains in a Changing World, Edited by Deborah K. Elms and Patrick Low, Fung Global Institute (FGI), Nanyang Technological University (NTU) and World Trade Organization (WTO), 2013.
13. R. Koopman, W. Powers, Z. Wang, and S. J. Wei, Give credit where credit is due: Tracing value added in global production chains, National Bureau of Economic Research (No. w16426), 2010.
14. T. Sturgeon, Global Value Chains and economic globalization: towards a new measurement framework. EUROSTAT, 2013.
15. G. Gereffi, (1994). The Organization of Buyer-Driven Global Commodity Chains: How US Retailers Shape Overseas Production Networks, Commodity chains and global capitalism, 1994, 95-122.
16. P. Antràs, Conceptual Aspects of Global Value Chains. The World Bank Economic Review, 34(3),2020, 551-574.
17. A. Borin, and M. Mancini, Follow the value added: Tracking bilateral relations in Global Value Chains, 2017.
18. A. Borin, and M. Mancini, Measuring what Matters in Global Value Chains and Value-Added Trade. World Bank Policy Research Working Paper, 8804, 2019.
19. J. Humphrey, E. Todeva, E. Armando, and E. Giglio, Global Value Chains, business networks, strategy, and international business: Convergences. Revista Brasileira de Gestão de Negócios, 21, 2020, 607-627.
20. S. Ponte, G. Gereffi, and G. Raj-Reichert, Introduction to the Handbook on Global Value Chains (GVCs). Social and Political Science, 2019.
21. P. Pananond, G. Gereffi, and T. Pedersen, An integrative typology of global strategy and Global Value Chains: the management and organization of cross-border

activities. Global Strategy Journal, 10(3), 2020, 421-443.

22. E. Todeva, and R. Rakhmatullin, Industry Global Value Chains, connectivity and regional smart specialisation in Europe. An Overview of Theoretical Approaches and Mapping Methodologies (No. JRC102801). Joint Research Centre (Seville site), 2016
23. M. J. Melitz, The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity. Econometrica, 71(6), 2003, 1695-1725.
24. P. Antras, and E. Helpman, Global sourcing. Journal of Political Economy, 112(3), 2004, 552-580.
25. L. Halpern, M. Koren, and A. Szeidl, Imported Inputs and Productivity. American Economic Review, 105(12), 2015, 3660-3703.
26. P. Antras, T. C. Fort, and F. Tintelnot, The margins of global sourcing: Theory and evidence from us firms. American Economic Review, 107(9), 2017, 2514-2564.
27. P. Bamber, K. Fernandez-Stark, G. Gereffi, and A. Guinn, Connecting Local Producers in Developing Countries to Regional and Global Value Chains. OECD Trade Policy Papers, No. 160, OECD Publishing, Paris, 2014.
28. H. L. Kee, and H. Tang, Domestic Value Added in Exports: Theory and Firm Evidence from China. American Economic Review, 106(6), 2016, 1402-36.
29. D. Dollar, Technological Innovation, Supply Chain Trade, and Workers in a Globalized World. Global Value Chain Development Report, World Trade Organisation, 2019.
30. R. Lanz, K. Lundquist, G. Mansio, A. Maurer, and R. Teh, E-commerce and developing countrySME participation in Global Value Chains (No. ERSD-2018-13). WTO Staff Working Paper, 2018.
31. B. Ohlin, Interregional and international trade, 1967.
32. K. De Backer, and S. Miroudot, Mapping Global Value Chains, 2014.
33. G. Gereffi, and K. Fernandez-Stark, Global Value Chain analysis: a primer. Center on Globalization, Governance and Competitiveness (CGGC), Duke University, North Carolina, USA, 2011.
34. B. Los, M. P. Timmer, and G. J. de Vries, How global are Global Value Chains? A new approach to measure international fragmentation. Journal of Regional Science, 55(1), 2015, 66-92.
35. D. Hummels, J. Ishii, and K. M. Yi, The Nature and Growth of Vertical Specialization in World Trade. Journal of International Economics, 54(1), 2001, 75-96.
36. R. Koopman, Z. Wang, and S. J. Wei, How Much of Chinese Exports is Really Made in China? Assessing Domestic Value-Added when Processing Trade is Pervasive (No. w14109). National Bureau of Economic Research, 2008.
37. R. Koopman, Z. Wang, and S. J. Wei, Tracing Value-Added and Double Counting in Gross Exports. American Economic Review, 104(2), 2014, 459-94.
38. R. Baldwin, and J. Lopez-Gonzalez, Supply-chain trade: A Portrait of Global Patterns and Several Testable Hypotheses. The World Economy, 38(11), 2015, 1682-1721.
39. R. Banga, Linking into Global Value Chains is not Sufficient: Do you Export Domestic ValueAdded Contents? Journal of Economic Integration, 2014, 267-297.
40. C. I. Jones, Intermediate Goods and Weak Links in the Theory of Economic Development. American Economic Journal: Macroeconomics, 3(2), 2011, 1-28.

41. D. Bartelme, and Y. Gorodnichenko, Linkages and economic development (No. w21251). National Bureau of Economic Research, 2015.
42. Z. Wang, S. J. Wei, and K. Zhu, Quantifying International Production Sharing at the Bilateral and Sector Levels, (No. w19677), National Bureau of Economic Research, 2013.
43. Z. Wang, S. J. Wei, X. Yu, and K. Zhu, Measures of Participation in Global Value Chains and Global Business Cycles, (No. w23222), National Bureau of Economic Research, 2017
44. Kearney, Global Pandemic Roils 2020 Reshoring Index, Shifting Focus from Reshoring to RightShoring. Chicago, IL, 2021.
45. E. Dietzenbacher, and I. Romero, Production chains in an interregional framework: Identification by means of average propagation lengths. International Regional Science Review, 30(4), 2007, 362-383.
46. T. Fally, Production Staging: Measurement and Facts, Boulder, Colorado, University of Colorado Boulder, 2012, 155-168.
47. P. Antràs, and D. Chor, On the Measurement of Upstreamness and Downstreamness in Global Value Chains. World Trade Evolution: Growth, Productivity and Employment, 2018, 126-194.
48. R. E. Miller, and U. Temurshoev, Output Upstreamness and Input Downstreamness of Industries/Countries in World Production. International Regional Science Review, 40(5), 2017, 443-475.
49. T. Fally, and R. Hillberry, A Coasian model of international production chains. Journal of International Economics, 114, 2018, 299-315.
50. R. C. Johnson, and G. Noguera, Accounting for Intermediates: Production Sharing and Trade in Value Added. Journal of International Economics, 86(2), 2012, 224-236.
51. R. C. Johnson, and G. Noguera, A Portrait of Trade in Value-Added over Four Decades. Review of Economics and Statistics, 99(5), 2017, 896-911.
52. S. Pahl, and M. P. Timmer, Patterns of Vertical Specialisation in Trade: Long-Run Evidence for 91 Countries. Review of World Economics, 155(3), 2019, 459-486.
53. A. C. Inkpen, and E. W. Tsang, Social capital, networks, and knowledge transfer. Academy of management review, 30(1), 2005, 146-165.
54. A. C. Inkpen, and E. W. Tsang, Reflections on the 2015 decade award-Social capital, networks, and knowledge transfer: An emergent stream of research, 2016.
55. A. G. Goswami, A. Mattoo, and S. Sáez (Eds.), Exporting Services: A Developing Country Perspective. World Bank Publications, 2012.
56. T. Sturgeon, and G. Gereffi, Measuring Success in the Global Economy: International Trade,Industrial Upgrading, and Business Function Outsourcing in Global Value Chains. C. Pietrobelli and Rasiah (eds.), Evidence-Based Development Economics, 2012, 249-80.
57. G. Gereffi, and J. Lee, Why the World Suddenly Cares about Global Supply Chains. Journal of Supply Chain Management, 48(3), 2012, 24-32.
58. G. Gereffi, and T. Sturgeon, Global Value Chain-Oriented Industrial Policy: The Role of Emerging Economies. Global Value Chains in a Changing World, 2013, 329-360.
59. M. F. Raei, A. Ignatenko, and M. Mircheva, Global value chains: what are the benefits and why do countries participate?. International Monetary Fund, 2019.

60. J. S. Hofstetter, A. M. McGahan, B. S. Silverman, and B. D. Zoogah, Sustainability and Global Value Chains in Africa: Introduction to the Special Issue. Africa Journal of Management, 8(1), 2022, 1-14.
61. Lema, R. Rabellotti, and P. Gehl Sampath, Innovation trajectories in developing countries: Coevolution of Global Value Chains and innovation systems. The European Journal of Development Research, 30, 2018, 345-363.
62. R. Jurowetzki, R. Lema, and B. A. Lundvall, Combining innovation systems and Global Value Chains for development: Towards a research agenda. The European Journal of Development Research, 30, 2018, 364-388.
63. M. Kozak, Destination benchmarking: Concepts, practices and operations, CABI, 2004.
64. K. S. Bhutta, and F. Huq, Benchmarking–best practices: an integrated approach. Benchmarking: An International Journal, 6(3), 1999, 254-268
65. M. Kozak, and M. Rimmington, Benchmarking: destination attractiveness and small hospitality business performance. International Journal of Contemporary Hospitality Management, 10(5),1998, 184-188.
66. W. M. Lankford, Benchmarking: Understanding the basics. The Coastal Business Journal, 1(1), 8, 2002.
67. C. Bogan, Benchmarking Best Practices, McGraw Hill, 1994.
68. M. Schefczyk, Industrial benchmarking: A case study of performance analysis techniques. International Journal of Production Economics, 32(1), 1993, 1-11.

