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The Determinants of Global Value Chain Participation in Developing Seafood-Exporting Countries

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Abstract: Global value chain (GVC) participation has played a significant role in boosting the trade gains of both developed and developing seafood-exporting countries over the past three decades. In addition, the extent of GVC participation has become the most important platform for addressing gains from trade in developing seafood-exporting countries to ensure that their participation enhances economic growth. Recent studies on GVC participation in developing countries have highlighted the importance of domestic institutions. However, the literature is silent on the quality of the domestic institutions–GVC participation nexus. This paper aims to investigate the determinants of GVC participation and the effect of the quality of domestic institutional governance on seafood-exporting developing countries' GVC participation indices. Using the Hausman–Taylor (HT) estimator and the system generalised method of moments (GMM) dynamic panel data methodology to examine seafood export data from 32 countries from 2009 to 2018, we find that economic potential drives backward GVC participation, while low forward participation might not only lead to lower gains from trade, but also limit countries to the supply of primary seafood products with little value addition. In addition, the quality of domestic institutional governance constrains GVC participation. Overall the results indicate that the quality of domestic institutional governance matters for the GVC participation of seafood-exporting developing countries.

Keywords: GVC participation; seafood; system generalised method of moments; Hausman–Taylor; governance; developing countries

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1. Introduction

Seafood exports from developing countries are increasingly integrated into the global seafood market, mainly through global value chains (GVCs). Over the past two decades, the demand for seafood production and processing has increased the number of participating states and territories in the seafood GVC from 200 in 2014 to 221 in 2020 [1,2]. The increasing wave of bilateral trade agreements driven by trade liberalisation plays a significant role in expanding global trade, thereby facilitating GVC participation through the removal of trade barriers, advances in information and communication technologies, and falling transportation costs. With the rise of GVCs, there is now a substantial body of literature indicating that through GVC participation, firms are provided with essential opportunities to access international markets. Furthermore, participating countries can specialise in core tasks, access higher-quality and sophisticated inputs, benefit from new ideas, and transfer technology to stimulate productivity growth and expand the scale of exports [3–5].

In recent years, the seafood GVC has intensified, involving more developing seafood-exporting economies, and covering a broad spectrum of products. This has opened a plethora of opportunities for developing countries to integrate into the global economy through backward and forward linkages. Participating countries can build productive capacity and competitiveness at a lower cost, resulting in derivable benefits, including job creation and poverty reduction, which enhance economic prosperity in countries heavily

participating in GVCs [6]. However, while developed countries have higher participation rates, representing 85% of GVCs in 2014, GVC participation in African and South Asian countries has been very low [7]. Such participation is generally limited to the provision of primary inputs for further processing, with little value addition [8].

Seafood-exporting developing countries have different levels of involvement, as evidenced by the extent of export processing. While some countries export more processed seafood, indicating higher engagement in GVCs—e.g., South Africa, Namibia, and Indonesia—countries such as Madagascar, Tanzania, and the Gambia have more unprocessed seafood exports, indicating little-to-no value addition [9]. What, then, causes different levels of GVC participation in seafood-exporting developing countries? Recent developments on the drivers of GVC participation have led to global studies of GVC enablers in several sectors. These studies highlight factor endowment, foreign direct investment (FDI), market size, labour costs, and tariffs as the main enablers of GVC participation [10,11]. While the literature provides evidence from other sectors, little or no attention is paid to the seafood industry in developing countries. Furthermore, while extant literature focuses on value chain governance driven by lead firms in the seafood value chain, the quality of domestic institutional governance related to the integration of countries into GVCs is neglected. Studies have focused on traceability and ecolabelling [12–15]. Broadly, governance here refers to policies to assure the authenticity of seafood exports, protect endangered species, and reduce the likelihood of illegal seafood exports. However, because the captive value chain governance structure constrains developing countries to a narrow range of tasks, such as simple assembly, captive firms depend on the lead firm for complementary activities such as design, logistics, and process–technology upgrading [16,17]. Therefore, it is crucial to investigate the role of domestic institutional governance in facilitating GVC participation.

Developing countries have distinct GVC governance patterns due to the quality of their domestic institutions [18], which significantly impact GVC participation. The author of [19] identified the importance of functioning domestic institutions to escape captive value chains. Therefore, this study seeks to investigate the effects of developing seafood-exporting countries' institutional governance on GVC participation. Furthermore, we examine the impact of influential determinants of GVC participation in seafood-exporting developing countries by applying a GMM econometric model and the Hausman–Taylor estimator to data from 32 seafood-exporting countries.

To the best of our knowledge, this paper provides the first evidence of the determinants of GVC participation in seafood-exporting countries, using a quantitative approach. The novelty of this paper is that it extends previous research by estimating the extent of involvement and conducting an econometric analysis of possible determinants. The closest contribution to our study is [20], which used a dataset of firms located in Vietnam to establish that firms who adopt international quality standards are more integrated into GVCs, and are more productive than those operating outside the value chain. While Nguyen [20] primarily focused on the determinants of market access in GVCs using a qualitative approach, our study attempts to fill the gap in the literature by identifying the most influential variables that determine GVC participation in seafood-exporting developing countries—including institutional governance—using a quantitative approach.

This study contributes to the empirical literature in two ways. First, we employ a quantitative approach to measure and quantify developing seafood-exporting countries' involvement in GVCs through the backward and forward linkages introduced in [21]. Secondly, we estimate the drivers of GVC participation using an econometric model. This study is relevant for two reasons: First, the determinants of GVC participation could have important implications for future industrial upgrading policies. For example, unprocessed seafood exports can be a catalyst to strengthen industrial upgrading initiatives to enhance gains from trade. Second, knowledge of the drivers of GVC participation could assist policymakers in designing and implementing effective policies.

Existing research emphasises the importance of GVC participation for the economic growth of emerging economies by evaluating GVC governance in terms of transaction costs [22,23]. Consequently, governance in GVCs is driven by three primary factors: the complexity of information and knowledge transfer required to sustain a particular transaction, the extent to which information can be codified, and the capabilities of actual and potential suppliers in relation to the requirements of the transaction—specifically, knowledge and supplier skills [24]. The governance structure influences the degree of control in the value chain. Firms in captive chains increasingly face strict production rules and regulations which, in turn, influence the extent of GVC participation in developing countries with fewer capabilities. Nonetheless, [18] argues that firms with the right domestic conditions to absorb and assimilate new technology will benefit from GVC participation despite the captive governance structure.

While research on the determinants of GVC participation is nascent and growing, a few empirical studies have identified some governance and non-governance factors that drive participation in the seafood GVC. Recent studies [13,25–27] provide strong evidence that non-governance factors such as certification standards, intensification, supply chain transformation, and policy are key drivers of GVC participation in the seafood trade. Notable studies reveal that governance factors such as traceability [12,28], ecolabelling [29], certification standards [14], and polycentric governance [30] play vital roles in countries participating in the seafood value chain. The authors of [31], using panel data from 100 countries, found that factor endowment, liberal trade policies, FDI inflows, and domestic institutional capacity are crucial determinants of GVC participation. Moreover, the impact of these drivers has a greater significance in determining participation than products. Although these drivers do not necessarily enhance participating countries' economies [11], governance-based factors can influence the drivers and dictate the gains from trade by participating countries in the seafood GVC trade.

Governance-based factors consider traceability and certification standards as drivers of the seafood GVC. Previous studies have investigated the role of governance principally in response to illegal and unregulated fishing, stock sustainability, fraud, mislabelling, and unreported fishing [29,32–36]. Using a qualitative methodology and a sample of 30 exporters and traders between 2016 and 2017, [28] showed that enforced traceability dictated by the European IUU regulations enhances GVC participation. Specifically, export quality was determined primarily via backward participation, leading to the higher export performance of Indonesian seafood exports. Consequently, [13] found that traceability is not driven by the need for acceptance, market access, or a price premium for traceable products, but rather is contingent on the internal practices of the Indonesian seafood marketers. The author of [29] showed that a positive relationship exists between transparency, traceability, and seafood labelling. However, while [37] found that transparency has a negative effect on stock sustainability and consumer perception of the value chain in EU countries, [29] found that transparency and labelling positively impact the seafood value chain in developing countries.

Recent studies deriving insight from extant economic theories observe that mislabelling matters for GVC participation. For instance, the high demand and value of the products, coupled with the prospect of financial gains, lead to fraudulent substitution of labels, as observed in the Turks and Caicos Islands [34]. Similarly, [38] offers evidence that mislabelling may be due to the inability to enforce traceability and authenticity. Specifically, the results suggest that exploitation and conservation policies explain mislabelling. However, once controlled for, the GVC is undisrupted.

On the non-governance factors, domestic price and trade liberalisation have been identified as important drivers of GVC participation in seafood value chains. For example, [25] investigated the impact of domestic prices on the integration of Namibian seafood into the global seafood trade. The study used data from between 2008 and 2016, and a hedonic model. The authors found that Namibian seafood exporters receive higher export revenue due to the globalisation of the seafood trade. Their study suggests that domestic price posi-

tively affects GVC participation, and could affect stock sustainability and economic growth. The authors of [39] found trade liberalisation and agreements to be important drivers. Contrary to [39], [40] found that trade liberalisation could cause overexploitation and environmental harm. This suggests that trade liberalisation could have a limiting effect on GVC participation. The authors of [41] used a Cox model to investigate the impact of trade policies on seafood exports from 27 developing countries between 2004 and 2016. They found that trade policies have a positive impact on trade duration. This finding suggests that trade-related policies enhance GVC participation in seafood exports from developing countries. In contrast to the above evidence, which indicates the possibility of a positive relationship between trade policies and GVC participation, other studies [42] find that a lack of policies strengthening infrastructure and storage facilities has a negative impact on the quality of exports, thereby limiting the GVC participation of low- and middle-income countries. The authors of [43] used an input–output (I–O) econometric methodology to investigate the impact of GVC participation on global seafood consumption. They found backward linkages, measured as the biomass production crucial to sustaining domestic production. However, they found a negligible effect on export quality. The authors of [20] found that internal processing standards reflecting technological development significantly determine the Vietnam *pangasius* industry's export quality. This implies a higher probability of GVC participation, and suggests that export upgrading positively impacts GVC participation, as in [44], where stakeholders were found to play a significant role in the functional upgrading of exports.

Conversely, an ethnographic study [45] asserted that participating in luxury seafood value chains leads to the socioeconomic downgrading of the Philippine seafood exports due to weak institutions and financial constraints. The authors of [46] reported that the effect of GVC participation on seafood productivity is higher in seafood firms with backward linkages through access to funds. They asserted that firms achieved better export performance and competitiveness by utilising the mediating effect of funds.

Despite the plethora of studies, the extant literature on the determinants of GVC participation fails to examine the institutional governance in the seafood GVC. Given the peculiarities of governance in African economies, external governance modalities could obscure our understanding of the determinants of GVC participation in developing countries' seafood industries, including Namibia. Although previous studies have neglected the different governance indicators, the authors of [10] employed other variables, such as market size (GDP), FDI openness, population, and policy variables such as tariffs and the rule of law, to investigate the determinants of GVC participation; thus, their study is limited. Moreover, previous studies failed to see the asymmetries in GVC participation. It is essential to understand the effects of domestic institutional governance and provide policy to enhance gains from the seafood trade of developing countries. Therefore, this study bridges this gap by investigating the determinants of GVC participation in seafood-exporting developing countries, and includes variables of institutional governance in determining the GVC participation in developing countries. The remainder of this paper is structured as follows: Section 2 presents the materials and methods; Section 3 discusses the econometric setup and identification strategy; Section 4 presents the results; and Section 5 concludes with policy recommendations.

2. Materials and Methods

2.1. Data and Variable Description

This study used two main databases: the UNCTAD-Eora Multi-Region Input–Output (https://worldmrio.com/unctadgvc/com, accessed on 24 February 2022) database, covering 189 countries for 26 sectors from 1990 to 2018, and the UNTRADE map (http://www.trademap.org, accessed on 24 February 2022). For the study, we used a sample of 32 developing seafood-exporting countries from 2009 to 2018 (see Appendix Table A1). The seafood sector of developing countries is crucial for economic growth and development, and needs to be studied as a key driver enabling countries to achieve the Sustainable

Development Goals (SDGs) [47]. This is the rationale for including these countries in this study. Developing countries reported different levels of GVC participation over the period [10], necessitating the choice of the period to explain the determinants of GVC participation. The variables regarding GDP per capita, financial development, investment in R&D, profit tax rate, and GDP growth rate were extracted from the World Development Indicators (https://databank.worldbank.org/source/world-development-indicators, accessed on 27 February 2022) for 10 years (2009–2018). Governance was accounted for by using data on six indicators (government effectiveness, control of corruption, political stability, regulatory quality, the rule of law, and voice and accountability) sourced from the World Bank's Worldwide Governance Indicators (WGI) database (https://databank.worldbank.org/source/worldwide-governance-indicators, accessed on 8 March 2022). Variables' names, descriptions, and sources are shown in Table 1.

Table 1. Definitions of variables and data sources.

Variables	Definition	Data Source
Dependent Variable		
GVC_{it}	GVC participation index	UNCTAD-Eora database (2018)
Explanatory Variables		
GDP_{ig}	GDP per capita (proxy for economic potential). Data are in constant-price USD (millions) (2009–2018)	WDI database 2021
INT_{ik}	Investment in R&D (proxy for innovation) as a percentage of GDP	WDI database 2021
FIN_{ik}	Financial development. Domestic credit provided by the financial sector (% of GDP) as a proxy for access to credit.	WDI database 2021
GOV_{ik}	Governance (proxy for institutional quality) using seven indicators: control of corruption, political stability, voice and accountability, government effectiveness, absence of violence, the rule of law, and regulatory quality. The data are measured on a scale of −2.5 to 2.5	WGI database 1996–2020
PRT_{ik}	Profit tax rate (proxy for FDI attractiveness). The data are expressed as a % of commercial profits	WDI database 2021
LIB_{ik}	Trade freedom (proxy for trade liberalisation)	Index of economic freedom – Heritage Foundation 2021. Available at http://www.heritage.org, accessed on 20 April 2022.
FDI_{ik}	Foreign direct investment (net inflows % of GDP)	WDI database 2021

Note: WDI (World Development Indicators); WGI (Worldwide Governance Indicators).

2.2. Methods

In order to achieve the objectives of this study, three processes were used, including the GVC participation index, two-step dynamic GMM, and Hausman–Taylor estimation techniques. First, we used the model proposed in [21] to estimate the GVC participation in the seafood industry in the countries of interest. The quantitative input–output analytical approach is superior to qualitative approaches such as the supply chain management framework, partial equilibrium, and gravity models, since it avoids the problem of "double counting" in conventional trade data. Furthermore, it provides a better idea of the gap between value-added and gross trade, without overestimating the value-added content of exports [48]. The GVC participation index has become a popular econometric tool for quantifying a country's overall involvement in GVCs through backward and forward participation [49–51]. The two components of the index reflect the upstream and downstream links in global production chains.

Individual economies participate in global value chains by importing foreign inputs to produce the goods and services they export (backward GVC participation), and by

exporting domestically produced inputs to partners responsible for the downstream production stages (forward GVC participation). Backward GVC participation is the ratio of a country's total gross exports to its "foreign value-added content of exports" (see definition in Section 2.2.1). In global value chains, this is the "Buyer" or sourcing perspective, where an economy imports intermediates to produce its exports. Forward GVC participation is the share of a country's domestic added value that is used as an intermediate input in other countries' value-added exports. It measures the domestic added value of inputs sent to third economies via supply chains for further processing and export. This is the perspective of the "Seller" or supply-side participant in the GVC. Furthermore, it simultaneously measures the trade-in value added by considering the share of foreign and domestic added value in exports. Second, we employed the system generalised method of moments (GMM) to address the issue of endogeneity caused by omitted variable bias, control for autocorrelation, and heteroskedasticity [52–54]. The dynamic nature of the variables and the ability to evaluate distinct effects of the independent variables on GVC participation while controlling for the regressors' endogeneity motivated this method. Furthermore, this approach accounts for variation in time-series data and unobserved country-specific effects [55]. The Arellano–Bond autocorrelation test [56] was applied to check the validity of the set of instruments. In addition, the Sargan test [57] was used to identify the constraints in the presence of heteroskedasticity with the associated t-value, which tests the validity of the instrumental variables accepted as valid instruments for all evaluated equations. Finally, the Hausman–Taylor estimator was used because some explanatory variables were time-varying and others were time-invariant. In addition, some explanatory variables were correlated with individual effects that were not observed. In these instances, the Hausman–Taylor estimator is more efficient than the within estimator, because it permits the inclusion of time-invariant regressors [58].

2.2.1. Capturing GVC Participation

The measure of a country's overall involvement in GVCs can be simultaneously captured, accounting for backward and forward participation. Following [21,49], we define the extent of GVC participation of a country i in sector s and period t as follows:

$$GVC\ Participation_{i,s,t} = \frac{FIVA_{i,s,t} + DEVX_{i,s,t}}{GRE_{i,s,t}} \quad (1)$$

where $FIVA_{i,S,t}$ is the share of foreign added value used in a country's seafood exports, $DEVX_{i,S,t}$ is the share of a country's domestic added value that enters as inputs in the export of other countries, and $GRE_{i,s,t}$ is country i's gross seafood exports. Equation (1) allows us to capture the participation as the "buyer" or "seller". Therefore, it means that a larger value indicates active participation. It also reveals the extent of backwards and forward involvement, with larger values of $\frac{FIVA_{i,s,t}}{GRE_{i,s,t}}$ indicating higher engagement through backward participation, while $\frac{DEVX_{i,s,t}}{GRE_{i,s,t}}$ indicates higher engagement through forward participation. Export is restricted to products with a six-digit level of processing according to the Harmonised System (HS) nomenclature (HS 304 and HS 305) to capture the effects of value addition.

To compute the backward and forward indicators of GVC participation, we used the EORA MRIO database, which provides information on the domestic and foreign shares of intermediates in one unit of output. Using the UNCTAD notations, the information was translated into an I–O matrix as follows:

$$\begin{aligned} x &= T + y \\ x &= Ax + y \\ x &= (I - A)x = y \\ x &= (I - A)^{-1} y = Ly \end{aligned} \quad (2)$$

where x is the gross output, T is the intermediate demand, y is the final demand, I is the identity matrix, A is the technical coefficient matrix, and L is the Leontief inverse. Following the framework proposed in [59,60], we proceeded to estimate the added value embodied in gross trade flow. First, we obtained the Leontief matrix by dividing the identity matrix (I) by the gross output (x). Secondly, the value added per unit of output was obtained by summing across the rows of the (A) matrix and subtracting all of the elements on the diagonal of the square matrix from an identity matrix. We estimated the trade in value added (Tva) by multiplying the two components L and Vas, along with the diagonalised row vector of the total gross exports matrix (X). Having estimated the Tva, backward participation $FIVA_{i,s,t}$ was obtained from the sum of the rows of the Tva matrix, while $DEVX_{is,,t}$ was obtained from the column of the Tva matrix, excluding the diagonal terms, and is given as follows:

$$\begin{bmatrix} Tva^{11} & \dots & Tva^{1n} \\ \vdots & \ddots & \vdots \\ Tva^{n1} & \dots & Tva^{nn} \end{bmatrix} = \begin{bmatrix} Vas^{1} & \dots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \dots & Vas^{n} \end{bmatrix} \begin{bmatrix} L^{11} & \dots & L^{1n} \\ \vdots & \ddots & \vdots \\ L^{n1} & \dots & Tva^{nn} \end{bmatrix} \begin{bmatrix} X^{1} & \dots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \dots & X^{n} \end{bmatrix} \quad (3)$$

2.2.2. Empirical Model and Estimation Technique

Theoretical research on the determinants of GVC participation has highlighted the importance of governance [22,60]. Previous studies [8,31] presented political stability and the rule of law index as proxies for governance, and other variables such as FDI and infrastructure as critical determinants of GVC participation. For this study, governance is adjusted to include three indicators (control of corruption, government effectiveness, and regulatory quality) as proxies for good governance. Following extant studies [31,61], the GMM structure is modelled as follows:

$$GVC_{it} = \beta_0 + \beta_1 GVC_{it-1} + \beta X_{it} + \varepsilon_{it} \quad (4)$$

where $GVC_{i,t}$ is the dependent variable, and represents the GVC participation index; X_{it} is the vector of independent variables for country i at time t; β is a coefficient representing the responsiveness of the respective variables, and ε is an error term that includes country- and time-specific attributes. In addition, the GVC participation index is included with time lags to mitigate the likelihood of reverse causality arising from the probability that countries with greater processed seafood exports establish links within the GVC and, therefore, dominate the chain. In addition to the role of mitigating reverse casualty and omitted variables, the lagged GVC participation index accounts for the time effects of knowledge and technology spillovers on export upgrading. The Hausman–Taylor structure is expressed as follows:

$$GVC_{it} = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \Omega_1 Z_{1it} + +\Omega_2 Z_{2it} + \mu_i + \varepsilon_{it} \quad (5)$$

where X_{1it} is a vector of time-varying variables assumed to be uncorrelated with μ_i, X_{2it} is a vector of time-varying variables assumed to be correlated with μ_i, Z_{1it} is a vector of time-invariant variables assumed to be uncorrelated with μ_i, Z_{2it} is a vector of time-invariant variables assumed to be correlated with μ_i, X_{1it} and Z_{1it} are time-invariant instruments that are not correlated with μ_i, μ_i is the time-invariant component of the error term, and ε_{it} is the error term.

3. Results

3.1. The Extent of GVC Participation by Seafood-Exporting Countries

Figure 1 shows the forward and backward GVC participation for the period 2009 to 2018. The highest forward participation is observed in countries with higher levels of GDP, such as Namibia, South Africa, Argentina, India, and Brazil. This means that outputs from these countries are used as intermediaries in international markets. As expected, many

countries—such as Maldives, the Gambia, and Turkey—have lower or negligible levels of forward participation compared to other countries.

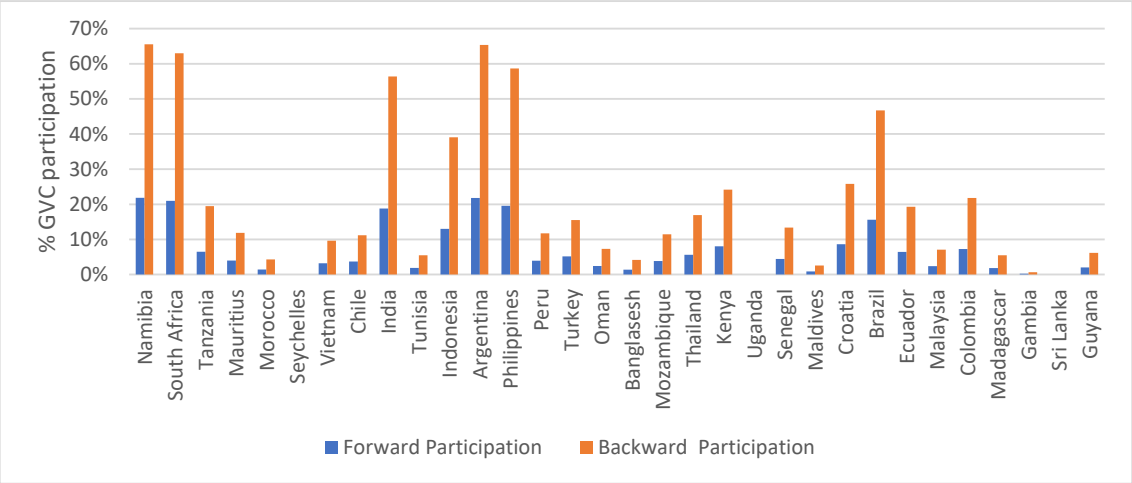

Figure 1. Forward and backward GVC participation (2009–2018). Source: UNCTAD–Eora Multi-Region Input–Output (https://worldmrio.com/unctadgvc/, accessed on 24 February 2022) database.

3.2. Drivers of GVC Participation

Table 2 presents the descriptive statistics for the full sample. We can observe that the potential economic proxy—GDP per capita (GDP_{ig})—has the highest mean of 34.83, followed by foreign direct investment (FDI) (FIN_{ik}) at 25.97 and, lastly, investment in R&D (INT_{ik}), averaging 0.33. The maximum and minimum values for the variables are between 131 and 0.22, respectively. The standard deviation (SD) is 24.39, 0.11, 1.52, and 8.80 for GDP per capita, investment in R&D, governance, and foreign direct investment, respectively, indicating variation in the samples. The skewness has positive values for GDP per capita, foreign direct investment, and investment in R&D, indicating a positively skewed distribution. The quality of institutional governance (GOV_{ik}) has a mean of 6.6, and varies between 2.7 and 8.6.

Table 2. Summary statistics.

Variables	Mean	SD	Min	Max	Variance	Skewness	Kurtosis	Obs
GVC_{it}	9.583	0.895	7.520	10.713	0.80	−3.273	2.035	212
GDP_{ig}	34.834	24.391	6.598	131.130	594.93	1.147	4.782	266
LIB_{ik}	33.478	9.395	16.785	55.821	98.26	0.745	2.793	187
PRT_{ik}	7.727	2.049	2.498	9.807	4.20	−1.024	3.033	227
FIN_{ik}	5.690	1.589	3.290	8.720	2.52	0.610	1.922	227
INT_{ik}	0.336	0.118	0.220	0.490	0.01	0.340	1.238	248
GOV_{ik}	6.614	1.526	2.795	8.679	2.33	−0.744	2.613	217
FDI_{ik}	25.970	8.807	1.873	57.990	77.56	0.914	4.733	262

Authors' estimations.

Table A2 in the Appendix presents the correlation test results between GVC participation and its lag. The results indicate persistence as the lagged dependent variable tends to 1. This implies that developing countries are involved in GVCs, and can self-select into GVCs via quality improvements. Therefore, the system GMM estimator is best suited to deal with heterogeneity, endogeneity from reverse causality, and heteroskedasticity [55].

The diagnostic tests of the models were satisfactorily consistent with the theoretical expectations. The AR (2) statistic, which measures the second-order serial correlation, was not significant. We failed to reject the Hansen test for over-identifying restrictions, and concluded that our set of instruments is valid. The Sargan test for over-identifying restrictions could not be rejected; hence, the instruments are valid, and can be used in the model.

Table 3 presents the results of the Hausman–Taylor estimation and the two-step system GMM for the determinants of GVC participation in the 32 seafood-exporting countries.

Table 3. System GMM estimation.

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**	**Model 7**
$I.GVC_{it}$	0.679 *** (0.058)	0.850 *** (0.010)	0.0863 (0.015)	0.976 *** (0.017)	0.907 *** (0.025)	0.848 *** (0.038)	0.939 *** (0.040)
GDP_{ig}	−0.087 ** (0.014)	−0.004 *** (0.000)	−0.003 *** (0.000)		−0.003 *** (0.000)	−0.004 *** (0.000)	−0.002 * (0.000)
LIB_{ik}	0.714 *** (0.480)						0.003 ** (0.004)
PRT_{ik}	0.0249 *** (0.087)		0.028 *** (0.006)	0.020 ** (0.006)	0.036 ** (0.011)		
FIN_{ik}	0.0781 *** (0.632)			0.007 (0.005)	0.044 *** (0.012)		
INT_{ik}	0.9814 *** (0.458)	0.890 *** (0.217)	0.649 *** (0.126)			0.934 *** (0.389)	
GOV_{ik}	−0.914 *** (1.514)	−0.06 *** (0.008)				−0.054 * (0.018)	−0.079 *** (0.016)
FDI_{ik}	0.067 *** (0.0047)			0.008 *** (0.002)	0.002 (0.003)		0.074 *** (0.013)
Observations	108	108	108	108	108	105	105
Instruments		13	13	13	13	13	13
AR (2)		0.046	0.054	0.053	0.032	0.044	0.054
Hansen $p-$alue		0.554	0.594	0.532	0.459	0.350	0.009
Sargan $p-$value		0.145	0.118	0.004	0.089	0.049	0.081

The dependent variable is the lagged GVC participation index; ***, **, and * indicate $p < 0.01$, $p < 0.05$, and $p < 0.1$, respectively. SYS GMM: robust standard errors in parentheses (Windmeijer correction); HT: standard errors (robust) in parentheses. Source: Authors' estimations.

Model 1 presents the results of the Hausman–Taylor estimation. The results reveal that the coefficient on the GVC participation is slightly lower for the Hausman–Taylor estimator, while the coefficients of GOV_{ik} and LIB_{ik} are marginally higher for the latter. The coefficient of FIN_{ik} is also higher in the case of the Hausman–Taylor estimator. The most pertinent difference is that the variables of interest (GOV_{ik} and LIB_{ik}) retain statistical significance. The lag of GVC participation is the dependent variable. As expected, the lag of GVC participation and investment in R&D are the most significant drivers of GVC participation. The GDP per capita has a negative but significant impact. Model 2 presents the results of the impact of investment in R&D on GVC participation in the presence of economic potential. It investigates whether countries that invest in innovation experience higher levels of GVC participation based on financial performance. INT_{ik} is significant and has a positive coefficient, thus confirming that investment in R&D enhances GVC participation [34]. Institutional governance quality has a negative and significant impact on GVC participation in all models reported in Table 3. The profit tax rate has a positive and significant impact on the specifications reported in Models 3, 4, and 5. This suggests that the ability of the seafood sector to attract FDI enhances GVC participation. Trade liberalisation significantly impacts GVC participation in Model 6. This confirms that the removal of tariff and non-tariff barriers—especially in international trade—plays a critical role in GVC participation [31].

3.3. Robustness Checks

The effect of investment in R&D on GVC participation is debated in the literature. Some studies [62,63] argue that the impact of investment in R&D is positive, while others [64] argue that investment in R&D has a negative effect on GVC participation. Nevertheless, investment in R&D could vary depending on the quality of domestic institutional governance. If investment in R&D is affected by poor governance, participation could be low. In Model 6, we control for investment in R&D to check whether the results obtained in Model 7 are due to omitted investment in R&D. The estimated coefficient for governance is still negative and significant, which implies that weak governance limits GVC participation.

Furthermore, it is argued that the availability of funds influences GVC participation in developing countries [65]. Following this argument, it could be that the unavailability of funds is due to the domestic governance structure. In Model 6, we control for financial development. The estimated coefficient for governance is still negative and significant. This implies that governance is a crucial determinant of GVC participation.

4. Discussion

An analysis of the extent of GVC participation of seafood-exporting developing countries found that the forward participation, measured as the share of domestic value added in the exports, was low (Table A3). Over the 10-year period, the forward participation ranged between 0% and 21%, while the backward participation ranged between 5% and 65% (see Figure 1). The current extent of involvement in GVCs highlights how the gains from trade in these countries are driven primarily by backward participation. One possible explanation for the low forward participation could be that developing seafood-exporting countries engage in low-value-added activities. As shown in [10], developing countries' forward participation is mostly in the supply of primary inputs and, hence, might not benefit from integration into GVCs through this channel to improve gains from trade.

According to the non-governance drivers of GVC participation, all indicators were negative except for investment in R&D and foreign direct investment. These results corroborate the findings of [10] and [61] regarding the determinants of GVC participation in developing countries. GVC participation is negatively impacted by the GDP per capita, indicating that the low level of economic development constrains GVC participation. As stated in [66], the higher the GDP, the greater the insertion into GVCs; however, this is only observed when incomes exceed USD 22,000. In countries with low GDP per capita, forward integration into GVCs is negligent. One main reason for the low integration is the industrial structure of the seafood industry. Most of these countries have a low share of seafood manufacturing in GDP, consequently increasing backward participation and reducing forward participation. Among the governance indicators, the profit tax rate and trade liberalisation can be discussed due to the importance of foreign direct investment attractiveness and trade policy to GVC participation. The results reveal that the significant positive impact of both indicators on GVC participation highlights the importance of the potential for GVC participation at higher levels of trade freedom (trade liberalisation) and improved profit tax rates (a proxy for FDI attractiveness).

The findings also indicate that the quality of domestic institutional governance restricts GVC participation. In contrast to previous studies that have focused on traceability and ecolabelling in seafood value chains [13,14], corruption, political stability, voice and accountability, government effectiveness, absence of violence, the rule of law, and regulatory quality are significant factors that can impact seafood GVC participation. According to a previous study [29], mislabelling had the greatest potential of all the governance measures to ensure traceability and authenticity. Therefore, improving institutional governance—especially accountability in seafood regulatory institutions—is vital.

The sensitivity analysis of investment in R&D and domestic credit provided by the financial sector revealed that the quality of domestic institutional governance has the greatest impact on GVC participation. The analysis revealed that the omission of investment

in R&D resulted in a negative impact of governance on GVC participation. In addition, increasing domestic funding also resulted in a negative impact of governance on GVC participation. Therefore, despite the efforts to increase domestic support for developing countries' seafood sectors, poor institutional governance still limits GVC participation. A study of two developing seafood-exporting countries revealed that it is difficult for developing nations to obtain Marine Stewardship Council (MSC) certification, hindering their export performance [67]. Nevertheless, developing nations can improve the quality of domestic governance by controlling corruption, enhancing regulatory quality, promoting accountability, and enforcing the rule of law. Moreover, managerial and non-managerial measures should be implemented to ensure accountability and compliance in order to mitigate the negative effects of poor domestic governance on GVC participation. These measures could discourage corrupt practices and promote honesty and transparency.

5. Conclusions and Policy Recommendations

Participation in global value chains has played a significant role in boosting trade gains, particularly in developing nations. Previous studies have emphasised the significance of backward and forward participation as well as domestic institutions for achieving sustainable gains from trade; however, seafood-exporting countries have varying degrees of integration into global value chains. In addition, as the primary driver of trade gains, the extent of integration into GVCs has been the most important platform for addressing gains from the global seafood trade. Consequently, the present study examines the impact of the quality of domestic institutional governance on GVC participation. We specifically examined the extent of the forward and backward participation, and the determinants of GVC participation of seafood-exporting developing countries.

Our results indicate that the extent of GVC participation—particularly backward participation—is related to economic potential. In addition, low forward participation might result in lower trade gains and limit countries to supplying unprocessed seafood products. Our findings on governance factors have policy implications, especially with regard to the quality of domestic institutional governance. Inadequate domestic governance could be a limiting factor to GVC participation. Hence, policies that inhibit a country's participation in GVCs could be reformed to enhance the integration and improve gains from the seafood trade. Achieving this would require exerting efforts towards gaining better participation and market access through good governance, such as the development of programmes aimed specifically aimed at fighting bribery and extortion, training programmes and disciplinary procedures to ensure staff adherence, proper remuneration of agents, transparency, and non-governance complements such as investment in R&D and foreign direct investment. Other policy recommendations include strengthening seafood institutions. For example, [67] shows that in the case of Kerala, India and the Gambia, West Africa, weak domestic institutions are very significant in explaining the lack of MSC certification and, hence, GVC participation. In mitigating this, institutions have been established with new management structures to coordinate MSC certification procedures and support applications for certification. Since institutions are crucial for MSC certification, the following recommendation is made: that developing countries should consider other non-managerial measures such as policies for addressing stock sustainability, overfishing, and the impact of enhanced fishing on the wider ecosystem.

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Appendix A

Table A1. List of countries in the estimations.

List of Countries			
Namibia	Chile	Turkey	Croatia
South Africa	India	Mozambique	Brazil
Tanzania	Tunisia	Thailand	Ecuador
Mauritius	Indonesia	Kenya	Malaysia
Morocco	Argentina	Uganda	Colombia
Seychelles	Philippines	Senegal	Peru
Vietnam	Madagascar	Maldives	Bangladesh
Oman	Guyana	The Gambia	Sri Lanka

Table A2. Power correlation matrix. Author's estimations.

	lgdpc	L.lgdpc
lgdpc	1.0000	
L.lgdpc	0.9963 (0.0000)	1.0000

Author's estimations.

Table A3. Value-added decomposition of exports.

Countries	Backward Participation (2011–2020)	Forward Participation (2011–2020)	Countries	Backward Participation (2011–2020)	Forward Participation (2011–2020)
Namibia	327,537	109,179	Bangladesh	20,786	6929
South Africa	314,859	104,953	Mozambique	57,346	19,115
Tanzania	97,451	32,484	Thailand	84,462	28,154
Mauritius	59,148	19,716	Kenya	120,848	40,283
Morocco	21,502	7167	Uganda	0	0
Seychelles	0	0	Senegal	66,693	22,231
Vietnam	48,074	16,025	Maldives	13,051	4350
Chile	55,751	18,584	Croatia	129,220	43,073
India	281,851	93,950	Brazil	233,472	77,824
Tunisia	28,494	9498	Ecuador	96,645	32,215
Indonesia	195,272	65,091	Malaysia	35,414	11,805
Argentina	326,781	108,927	Colombia	109,042	36,347
Philippines	293,275	97,758	Madagascar	27,483	9161
Peru	58,646	19,549	The Gambia	3344	1115
Turkey	77,386	25,795	Sri Lanka	0	0
Oman	36,541	12,180	Guyana	30,651	10,217

Source: Authors' estimations, based UNCTAD-Eora database (2018).

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