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UNLOCKING INCLUSIVE GROWTH: THE NEXUS OF DIGITALIZATION, FORMALIZATION, AND GLOBAL VALUE CHAINS

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Abstract

This study explores the nexus of digitalization, formalization, and global value chain (GVC) participation, providing critical insights into inclusive growth. Despite the importance of the nexus, common notions regarding the positive effects of digitalization on enterprise formalization and GVC participation have been inferred without sufficient empirical support, while few studies have examined the reciprocal impact of formalization on GVC participation. Utilizing probit and tobit estimations with cross-sectional firm-level data from the World Bank's Enterprise Surveys spanning 28 Asia and the Pacific countries and approximately 20,000 small and medium-sized enterprises (2008–2018), the findings reveal that enterprises adopting digital connectivity, such as email or website technologies, are more likely to operate formally. Formalization not only facilitates GVC participation but also deepens such engagement. This underscores the pivotal role of digitalization and formalization in enabling meaningful GVC involvement. Based on the estimated results, the policy priority should be policy measures enhancing informal enterprises' fundamental digitalization as they are cost-effective and can concurrently promote the formalization of enterprises and their GVC participation. In addition, policy measures that foster labor productivity and formalization can be implemented as supporting policies.

Keywords: digitalization, firm-level analysis, formalization, global value chains, informal enterprises

JEL Classification: D21, F14, L26, O17, O24

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1. INTRODUCTION

According to the Transition from the Informal to the Formal Economy Recommendation No. 204 (ILC 2015: 4), an informal economy refers to “all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements.” Economic units in the informal economy involve units with employees, units run by individuals working on their own account (either self-employed persons or units with the help of contributing family workers), and cooperatives and social and solidarity economy units. Accordingly, informal enterprises¹ are typically characterized by labor-intensive and low-productivity activities with little growth potential as they have limited access to financial resources and government support. Informal enterprises contribute significantly to economic activity and employment, particularly in developing countries (ILO 2018; Narula 2018).

In Asia and the Pacific, small and medium enterprises (SMEs) represent over 97% of businesses (APEC 2020), which predominantly belong to the informal sector (Andrade, Bruhn, and McKenzie 2015; Bruhn and McKenzie 2014; Cusolito, Safadi, and Taglioni 2016). The International Finance Corporation (2012) estimates that 80%–90% of SMEs are concentrated in the informal sector. For instance, 83.4% of South Asian enterprises are informal enterprises (ILO 2018). Similarly, informal enterprises dominate African economies in employment and production (ILO 2018). Estimates of the shares of informal enterprises in the total number of enterprises are as high as 70% or more in Sri Lanka (de Mel, McKenzie, and Woodruff 2013) and Brazil (Ulyssey 2015). Even though the informal sector is considered one of the economic driving forces for developing economies, especially in the early stage of development, the prevalence of informal enterprises and the informal sector in general possibly hinders long-run economic growth due to insufficient aggregate productivity and inefficient resource allocation. Therefore, the size of the informal sector is expected to shrink along with the development of the formal sector and the overall economy. Nevertheless, recent statistics tell a different story. Informal enterprises are prevalent in urban and rural areas of both developing and developed economies (ILO 2018).

The rapid development of global value chains (GVCs) introduces opportunities and challenges to informal enterprises. GVC participation can benefit informal enterprises, including access to financial resources, capabilities and competitiveness enhancement, market expansion, and product quality improvement (Korwatanasakul and Paweenawat 2020). Despite all the benefits, the informal sector remains underrepresented in the GVCs (Cusolito, Safadi, and Taglioni 2016; Ganne and Lundquist 2019), as informality is one of the critical constraints preventing enterprises from participating. Amidst the continuous advancement of the industrial revolution known as “Industry 4.0,” digital technologies have gained unprecedented importance in driving industrial and economic progress. Through the reduction of compliance costs and productivity enhancement, the digitalization of enterprises may facilitate the transition of informal enterprises to the formal sector. While digitalization, formalization, and GVC participation are acknowledged as significant factors, the impact of digitalization on enterprise formalization has been insufficiently explored in previous research. Furthermore, assertions regarding the beneficial influence of formalization on GVC participation lack

¹ Due to limited data, this study focuses on economic units that employ hired labor and partially on units owned by individuals working on their own account. With narrow coverage of economic units in the informal economy, this study opts to use “informal enterprise” throughout the study, reflecting that formalization is only limited to business registration. In other words, in this study, informal enterprises mainly refer to businesses that are not formally registered with the government.

adequate empirical substantiation. This deficiency stems partially from the scarcity of firm-level data, particularly in developing nations. Consequently, many studies have employed available aggregate data sources to address these concerns.

The existing body of literature also underscores a complex relationship between formalization and participation in GVCs, which has environmental and social implications. Formalization is associated with positive environmental outcomes due to increased compliance with regulations (ILO 2022), while GVC participation presents both challenges and opportunities, including the need for sustainable practices (Golgeci, Makhmadshoev, and Demirbag 2021). Moreover, formalization and GVC participation have social impacts on job security, fair wages, job creation, skills development, and economic diversification (ILO 2022). This nuanced understanding emphasizes the need for tailored policies that harness the positive aspects of formalization and GVC participation while mitigating potential negative externalities, thus paving the way for sustainable and inclusive economic development.

Against this backdrop, in the broader context of sustainable development and inclusive growth, the study aims to address two research questions that disentangle the relationship between digitalization, formalization, and GVC participation. Firstly, does digitalization affect enterprise formalization? Secondly, does formalization support enterprises in joining the GVCs? In other words, this study examines the impact of digitalization on formalization and the effect of formalization on GVC participation at the firm level. This study argues that digitalization helps enterprises facilitate the process of formalization, while formalization further supports enterprises in participating smoothly in the GVCs. The primary estimation techniques involve probit and tobit estimations conducted at the firm level, utilizing pooled cross-sectional data from the World Bank's Enterprise Surveys. Covering 2008 to 2018, the dataset encompasses approximately 20,000 SMEs from 28 Asia and the Pacific countries.

This study provides three notable contributions to the current body of literature and discussions in both academic circles and policy debates concerning digitalization, formalization, and GVCs. Firstly, investigations in this field enhance comprehension of the role of digital technologies and formalization in enabling participation in GVCs, a domain that remains predominantly unexplored. Secondly, it operates at the firm level on a global scale – a rarity in this field – leveraging unexplored firm-level data to account for critical heterogeneity in digitalization and formalization. Finally, this study extracts policy insights from the results, assisting businesses in optimizing the advantages of digitalization and formalization, thereby fostering sustainable and inclusive growth on a broader scale.

2. LITERATURE REVIEW

This section provides a comprehensive overview of the existing research and theoretical frameworks related to informal enterprises, digitalization, formalization, and GVC participation. The discussion is structured into two main subsections: 1) characteristics, causes, and costs of informal enterprises; and 2) the nexus between digitalization, formalization, GVC participation, and inclusiveness. The section summarizes what has been discovered and identifies the gap in the existing literature, laying the groundwork for the subsequent analysis and discussion in this study. It also discusses the contributions of the current research in addressing the existing literature gap.

2.1 Informal Enterprises: Characteristics, Causes, and Costs of Informality

Most previous studies have observed the characteristics of informal enterprises and the informal sector and identified common causes of informality among enterprises. Informal enterprises are generally characterized by labor-intensive and low-productivity activities with little growth potential due to the lack of financial access and government services such as legal protection and business promotional programs. According to the definition of informal enterprises adopted by the ILC (2015: 4), the most straightforward characteristic of informal enterprises is that they are unregistered and unregulated by the government and, therefore, pay no taxes (Swaminathan 1991; Garcia-Murillo and Velez-Ospina 2017; Narula 2019). Informality limits informal enterprises' access to financial resources, legal protection, knowledge capital, and the international market (McGahan 2012; Garcia-Murillo and Velez-Ospina 2017; Koshy 2019; Narula 2019). With regard to labor, informal enterprises are operated by only one or a few persons, usually family members or casual workers (Garcia-Murillo and Velez-Ospina 2017; Koshy 2019; Narula 2019). Both employers and employees tend to be less educated and less skilled and have limited access to formal training and a decent working environment compared with those in the formal sector (Becker 2004; Garcia-Murillo and Velez-Ospina 2017; Koshy 2019). A low level of education and skills, in turn, translate to minimum income and wages significantly lower than those of the formal sector (El Mahdi and Amer 2005; Narula 2019). Informal enterprises rely not only on low-skilled labor but also on indigenous technology, unsophisticated equipment, and weak organizational and managerial expertise (Swaminathan 1991; Becker 2004; Garcia-Murillo and Velez-Ospina 2017; Koshy 2019; Narula 2019). Therefore, informal enterprises are also associated with low productivity and labor-intensive activities. These characteristics constrain informal enterprises' growth and market expansion (Garcia-Murillo and Velez-Ospina 2017; Kathuria, Raj, and Sen 2013; Koshy 2019) while jeopardizing enterprises' existence due to their vulnerabilities in terms of capacities and capital. However, another strand of literature, primarily based on case studies in Africa and South Asia, observes knowledge generation and innovation activities among different actors within the informal sector and between the formal and informal sectors (e.g., Links, Hart, and Jacobs 2014; Ramoroka, Jacobs, and Mangqalaza 2014; Kumar 2014). Previous studies, such as those of Olomi and Urassa (2016) and Vishwanath (2001), positively argue that informal enterprises are considered the first step in the development of entrepreneurship, whereas others (e.g., Onyima and Ojiagu 2017) posit that informal enterprises are the way of survival of small business and not a choice.

Understanding the nature of informal enterprises helps identify the causes of informality, which can be categorized into four areas: awareness, business nature, capability, and incentive. Amuedo-Dorantes (2004) and Koshy (2019) point out that the absence of awareness of the advantages of operating in the formal sector (e.g., accessibility to capital and government support programs) partly explains the existence of informal enterprises, while the business nature of specific enterprises, including seasonality and illegality, also prevents those enterprises from moving to the formal sector. Furthermore, informal enterprise characteristics such as high labor intensiveness and low productivity are considered obstacles to formalization. Enterprises with insufficient capability in finance, technology, and human resources, mainly digital, financial, and accounting literacy, find difficulties in moving toward the formal enterprise sphere (OECD 2017; Koshy 2019). The last key factor preventing informal enterprises from formalization is the lack of incentives. When the marginal benefits of formalization (e.g., growth potential) are smaller than its marginal costs

(e.g., compliance costs and taxes), informal enterprises opt to remain in the informal sector (Cusolito, Safadi, and Taglioni 2016; Onyima and Ojiagu 2017). As most informal enterprises are driven by necessity and operate close to subsistence levels, they have low productivity and growth ambitions, translating into low marginal benefits of formalization (ASEAN Secretariat 2019). Moreover, informal enterprises believe that operating formally can be more expensive due to high registration and compliance costs generated from taxes, a complex registration process, excessive regulation, and administrative burdens (Cebula 1997; Dennis and Pliego Ramos 2016; Dobson and Ramlogan-Dobson 2012; Ganne and Lundquist 2019). The marginal costs of formalization can be even greater, particularly in developing economies where governments are less efficient and less transparent and do not provide a clear and reasonable taxation regime and sufficient public services, or investment programs to support informal enterprises or SMEs in general (ASEAN Secretariat 2019; Botero et al. 2004; Friedman et al. 2000; Johnson et al. 2000; Straub 2005).

Even though operating in the informal sector may benefit enterprises in terms of flexibility and tax evasion, being an informal enterprise comes with significant costs. Informal enterprises have limited access to several growth opportunities, including application to standards and licenses, financial services, government subsidies and business development services, public bidding and procurement, and technological upgrading (Farazi 2014; Koshy 2019). Due to inadequate financial resources and technology, informal enterprises have low productivity and operate inefficiently (Farazi 2014; Perry et al. 2007). Busso, Fazio, and Levy (2012) estimate that allocating resources from informal enterprises to formal enterprises would make the resources worth 28% more, owing to resource misallocation in the informal sector. The issue of production efficiency, in turn, prevents informal enterprises from participating in the GVCs and international markets (Ganne and Lundquist 2019; Koshy 2019) and negatively affects aggregate productivity and the gross domestic product (GDP) level (Busso, Fazio, and Levy 2012; La Porta and Shleifer 2008). The International Monetary Fund (IMF) (2017) finds that, in Mexico, GDP could be raised by 125% when allocating resources, e.g., capital and labor, more efficiently between the formal and informal sectors.

2.2 The Nexus between Digitalization, Formalization, Global Value Chain Participation, and Inclusiveness

The awareness of digitalization's role in promoting enterprises' formalization and the relevant mechanisms and benefits, particularly business expansion and technological upgrading, has barely been raised in the existing literature, with few empirical studies. This section presents the current discussions on the role of digital technology in formalization, the relationship between formalization and GVC participation, and the underlying mechanisms.

2.2.1 The Role of Digitalization and its Mechanisms

Digitalization provides an unprecedented opportunity to facilitate the formalization of informal enterprises through the adoption of digital innovation and technology, such as artificial intelligence solutions, bookkeeping applications, e-commerce platforms, and the Internet of Things (IoT), among others. Affecting both the costs and benefits of formalization, these digital tools help informal enterprises address barriers to formalization, reducing costs of compliance, enhancing firm and worker productivity, and therefore prompting the enterprises to adopt gradual formalization. In addition, the government can also utilize digital platforms and tools to facilitate the process of

formalization, e.g., by simplifying registration procedures and providing capacity-building and investment support through digital platforms (ASEAN Secretariat 2019; ILO 2020; Olomi and Urassa 2016). Even though more analysis is needed, evidence suggests that the impact of digitalization on formalization could be considerable.

As the formalization process mainly involves informal enterprises and the government, the literature has examined the mechanisms of digital technology in formalization from both perspectives. In terms of informal enterprises at the country level, Garcia-Murillo and Velez-Ospina (2017) suggest that the size of the informal sector is negatively correlated with the number of broadband subscriptions. Enterprises with digital technologies are likely to operate their business formally. At the firm level, digital technology smooths informal enterprises' transition to the formal sector through two main mechanisms, namely the reduction of compliance costs and productivity enhancement. First, digitalization encourages formalization by reducing various costs associated with the formalization process, such as search and information costs (Aslam and Shah 2017; Onyango et al. 2014) and logistics costs (Kumar and van Welsum 2013; Onyango et al. 2014). The government also plays a significant role in lowering compliance costs shouldered by informal enterprises. As the ASEAN Secretariat (2019) and Krichewsky-Wegener (2020) concur, the digitalization of financial services as well as public services and administration makes compliance cheaper and more straightforward for informal enterprises while helping them address the informality issue. For instance, in 2015, Chile launched the *Escritorio Empresa* (Business Desk) platform to streamline and simplify administrative procedures. The platform covers various services, e.g., enterprise registration, license and titling applications, public funding and contract applications, and patent registration (OECD 2016). Implementing the M-Pesa cashless payment system in Kenya structurally reformed the informal sector and offered easier ways for informal enterprises to register (Krichewsky-Wegener 2020). The IMF, African Department (2020) finds that a training program on online banking offered in Benin induced a 16.3% increase in the number of registrations by informal enterprises. Moreover, in Mexico, to support informal enterprises in moving to the formal sector, tablets equipped with software related to taxation were distributed to enterprises through the *Tabletas Concanaco* program (Krichewsky-Wegener 2020). Besides the cost benefits, digitalization also raises firm and worker productivity and the competitiveness of informal enterprises. Digital innovation and technology help encourage real-time responses, facilitate business operations and management, ease payments and business transactions, and assist in gaining access to financial resources and government services (ASEAN Secretariat 2019; Krichewsky-Wegener 2020; Kumar and van Welsum 2013). Through both mechanisms, digitalization is a basis or entry point for formalization.

2.2.2 Formalization, Global Value Chain Participation, and Inclusiveness

The existing literature presents two observations of the relationship between formalization and GVC participation. On the one hand, informality is considered one of the critical constraints that prevent enterprises from GVC participation because the primary condition of GVC participation is to meet the international standards and requirements from foreign or "headquarter" multinational enterprises (MNEs) and global markets, which typically impose high costs for technical upgrading and implicitly demand formalization of enterprises (Cusolito, Safadi, and Taglioni 2016; Ganne and Lundquist 2019; Korwatanasakul and Paweenawat 2020; OECD 2017). Unless enterprises are formalized, it is difficult for them to enter the GVCs, especially for those enterprises that prevail in the downstream parts of the GVCs and low-income economies. Informal enterprises can take advantage of formality to penetrate new markets and segments, especially international markets, while having more and better

opportunities to meet greater diversity and choice in the supply of intermediate goods and innovation (ASEAN Secretariat 2019; Onyango et al. 2014). On the other hand, informal enterprises may join the GVCs by providing cheap labor to MNEs. Previous studies (e.g., Grant and Oteng-Ababio 2012; Meagher 2013; Murphy 2007; Narula and Pineli 2019) show the positive effects of the integration of informal enterprises into the GVCs, such as technological upgrading, expanding job creation, income improvement, and better market access. Utilizing the informal-formal nexus, informal enterprises involved in the GVCs may move up the value chains and towards formality (Narula 2019).

The existing literature, therefore, implies the nexus between formalization, GVC participation, and inclusiveness as it reveals a complex relationship between the environmental and social implications of formalization and GVC participation. Formalization is associated with favorable environmental outcomes as formalized enterprises tend to adhere more strictly to environmental regulations, resulting in reduced pollution and improved adherence to sustainability standards (ILO 2022). In regard to GVC participation, there exists a mix of challenges and opportunities (Golgeci, Makhmadshoev, and Demirbag 2021). Although long-distance transportation within GVCs may increase greenhouse gas emissions, participating firms are encouraged to adopt sustainable practices to meet global standards. Furthermore, GVC participation is linked to enhanced resource utilization efficiency as enterprises optimize production processes, thus reducing waste and promoting more efficient resource use. As regards social aspects, formalization is connected to job security and equitable wages, while GVC participation is associated with job creation, skills enhancement, and economic diversification (Grant and Oteng-Ababio 2012; ILO 2022; Meagher 2013; Murphy 2007; Narula and Pineli 2019). This nuanced perspective underscores the necessity of tailored policies that leverage the positive aspects of formalization and GVC participation while mitigating potential negative externalities, ultimately fostering sustainable and inclusive economic development.

To summarize, what has been discovered so far is as follows: (1) high labor intensiveness, low productivity, limited growth potential, and little access to financial resources and government support are among the most common characteristics of informal enterprises (Koshy 2019; OECD 2017); (2) business nature, lack of awareness, capability, and incentive are the leading causes of informality (e.g., Cusolito, Safadi, and Taglioni 2016; Onyima and Ojiagu 2017); (3) being an informal enterprise comes with significant opportunity costs (e.g., Farazi 2014; Koshy 2019); (4) among a limited number of empirical studies, it is claimed that digital technology facilitates the process of formalization by reducing compliance costs and improving enterprise and worker productivity (ASEAN Secretariat 2019; ILO 2020; Olomi and Urassa 2016). (5) while formalization is considered a prerequisite for participating in the GVCs, studies show that informal enterprises may join the GVCs without formalization (e.g., Grant and Oteng-Ababio 2012; Meagher 2013; Murphy 2007; Narula and Pineli, 2019). Common notions regarding the positive effects of digitalization on formalization and those of formalization on GVC participation have been inferred without sufficient empirical support. This is partly due to the absence of firm-level data, particularly in developing economies. Therefore, the majority of studies have been compelled to utilize existing aggregate data sources to investigate these issues.

In response to the identified gaps and constraints, this study investigates the connections between digitalization and formalization and formalization and participation in GVCs at the firm level. It utilizes pooled cross-sectional data spanning from 2007 to 2019, encompassing over 50,000 enterprises worldwide. To the best of the author's awareness, this study represents the inaugural endeavor to conduct empirical analyses

and utilize firm-level data in these specific research domains. As a result, the study contributes to establishing solid conclusions regarding the influence of digitalization on enterprise formalization, alongside the impact of formalization on participation in GVCs at the firm level. It underscores the advantages and significance of digitalization and formalization while offering pertinent policy suggestions to bolster the formalization process.

3. METHODOLOGY

3.1 Data

The analysis is carried out on an individual firm basis, utilizing aggregated cross-sectional data sourced from the World Bank's Enterprise Surveys. The data cover approximately 20,000 SMEs from 28 Asia and the Pacific countries from 2008 to 2018. Building upon the works of Urata and Baek (2020), Korwatanasakul (2020), Korwatanasakul and Paweenawat (2020), and Korwatanasakul (2023), this study formulates two metrics for measuring GVC involvement: the GVC participation dummy and the GVC participation index. Firms can participate in the GVCs directly and indirectly through different patterns of engagement in foreign trade (Table 1). Based on these patterns, the GVC participation dummy signifies whether firms are involved in GVCs. In contrast, the GVC participation index is derived by multiplying the proportion of exports to total sales by the proportion of foreign input to total input. Each indicator is used in different estimation models, including probit and tobit estimations. Table 2 provides summary statistics.

Table 1: Patterns of Global Value Chain Participation

								7
		1	2	3	4	5	6	GVC Firm (5+6)
Sales	Domestic	O	O	X	O	X	O	O/X
	Exports	X	X	O	O	O	O	O
Inputs	Domestic	O	O	O	O	O	O	O
	Imports	X	O	X	X	O	O	O

O = Yes; X = No; GVC = global value chain.

Note: Columns 1–6 represent: 1) firms with domestic procurement and sales; 2) firms with input imports, domestic procurement, and domestic sales; 3) firms with domestic procurement and exports; 4) firms with domestic procurement, domestic sales, and exports; 5) firms with exports, input imports, and domestic procurement; and 6) firms with domestic procurement and sales, input imports, and exports, respectively.

Source: Author, based on Korwatanasakul (2023).

3.2 Research Method

Based on the previous studies discussed in the literature review section (e.g., Becker 2004; Garcia-Murillo and Velez-Ospina 2017; Koshy 2019; Narula 2019; Swaminathan 1991), the study formulates the first probit model estimating the likelihood that a firm with specific attributes, such as digital connectivity, types of ownership, etc., will be categorized into one of two potential binary outcomes: a formal or informal firm:

$$\Pr(\text{Formalization}_{ict} = 1 | Z_{ict}) = \theta(\beta_0 + \beta_1 \text{Digitalization}_{ict} + \beta_2 X_{ict} + \gamma_c + \sigma_k + \mu_t + \epsilon_{ict}). \quad (1)$$

Here, $Formalization_{ict}$ indicates whether a firm is formally registered, while $Digitalization_{ict}$ is proxied by the adoptions of email or website of firm i in country c and year t . X_{ict} represents a set of control variables: labor productivity, foreign ownership, internationally recognized quality certificate, credit access, and GVC participation (GVC participation dummy and GVC participation index). Robust standard errors are employed, and the estimation model incorporates fixed effects for country, industry, and time, represented by γ_c , σ_k , and μ_t , respectively. ϵ_{it} is the disturbance term.

Table 2: Summary Statistics

Variable	Definition of Variables	Observations	Mean	Standard Deviation
Formalization	The dummy variable indicates whether a firm is formally registered.	19,823	0.9299	0.2553
GVC participation	Equals one if the establishment participates in GVCs and zero otherwise. The GVC participation dummy indicates whether a firm joins GVCs based on the firm's patterns of direct and indirect engagement in foreign trade through sales and input procurement.	15,234	0.1296	0.3359
GVC participation index	The GVC participation index is calculated by multiplying the ratio of exports to total sales and the ratio of foreign input to total input.	15,233	0.0250	0.1203
Email	Equals one if the establishment uses email to communicate with clients or suppliers and zero otherwise.	19,673	0.6897	0.4626
Website	Equals one if the establishment has its own website and zero otherwise.	19,779	0.4131	0.4924
Labor productivity	The logarithm of labor productivity based on the value added (calculated as the difference between sales and raw material expenses) a worker within a firm generates on average.	16,037	13.603	2.6217
Foreign ownership	The share of equity owned by a foreign firm (%).	19,775	3.8275	17.4542
Certificate	Equals one if the establishment owns an internationally recognized quality certificate and zero otherwise.	19,580	0.3073	0.4614
Credit access	Equals one if the establishment has a line of credit or loan from a financial institution and zero otherwise.	19,121	0.3256	0.4686

GVC = global value chain.

Source: Author, based on Korwatanasakul (2023).

On the other hand, building upon Korwatanasakul (2023), the second probit model (Table 4 Columns 1–4) examines whether formalization affects the probability of engagement in the GVCs. The estimation model is as follows:

$$\Pr (GVC\ participation_{ict} = 1|Z_{ict}) = \theta(\beta_0 + \beta_1 Formalization_{ict} + \beta_2 X_{ict} + \gamma_c + \sigma_k + \mu_t + \epsilon_{ict}). \quad (2)$$

Similarly to the first probit model, $Formalization_{ict}$ indicates whether a firm is formally registered, whereas $GVC\ participation_{ict}$ refers to the GVC participation dummy. Following Korwatanasakul (2023), X_{ict} represents a set of control variables, including $Digitalization_{ict}$ and others defined above. The estimation model incorporates fixed effects for country, industry, and time, as well as the disturbance term, represented by γ_c , σ_k , μ_t , and ϵ_{it} , respectively. Robust standard errors are also used in the estimation.

In addition, the tobit model (Table 4, Columns 5–8) estimates the effect of formalization on the level of GVC participation through the following model specification:

$$\begin{aligned}
 GVCindex_{ict}^* &= GVCindex_{ict}^*, \text{ if } 0 < GVCindex_{ict}^* < 1 \\
 GVCindex_{ict}^* &= 0, \text{ if } GVCindex_{ict}^* \leq 0 \\
 GVCindex_{ict}^* &= 1, \text{ if } GVCindex_{ict}^* \geq 1 \\
 GVCindex_{ict}^* &= \beta_0 + \beta_1 Formalization_{ict} + \beta_2 X_{ict} + \gamma_c + \sigma_k + \mu_t + \epsilon_{ict}. \quad (3)
 \end{aligned}$$

Except for $GVCindex_{ict}^*$, all variables are the same as those specified in Equation (2). $GVCindex_{ict}^*$ refers to the degree of GVC participation, calculated as the product of the ratio of exports to total sales and the ratio of foreign input to total input. Robust standard errors are employed, and the estimation model incorporates fixed effects for country, industry, and time, represented by γ_c , σ_k , and μ_t , respectively. ϵ_{it} is the disturbance term.

4. RESULTS AND DISCUSSION

4.1 The Effects of Digitalization on Formalization

The estimation results in Table 3 indicate the set of determinants of formalization. The digitalization variables, i.e., email and website, show a statistically significant positive effect on formalization, and their coefficients are robust across different model specifications (Columns 1–4). As digital technologies such as emails and websites may help informal enterprises reduce compliance costs and enhance productivity, enterprises with digitalization tend to have a higher probability of being formalized (e.g., Aslam and Shah 2017; Kumar and van Welsum 2013; Onyango et al. 2014). As regards the control variables, labor productivity, internationally recognized quality certification ownership, and credit access are statistically significant and positively affect formalization. Their estimated coefficients are robust across different model specifications. Enterprises with higher labor productivity have greater capabilities to streamline and standardize their business operations and, therefore, a higher probability of operating in the formal sector. This is consistent with the arguments highlighted by, for example, the ASEAN Secretariat (2019), Krichewsky-Wegener (2020), and Kumar and van Welsum (2013) in the literature review section. Similarly, enterprises with an internationally recognized quality certificate and credit access are more likely to be formally registered since they can comply with laws and regulations. Hence, certificates and credit access are also determinants of formalization. In contrast, foreign ownership does not affect the probability of formalization.

4.2 The Effects of Formalization on Global Value Chain Participation

Table 4 shows that formalization has a statistically significant positive relationship with GVC participation in probit and tobit estimations. In other words, formalization enables enterprises to participate in the GVCs (GVC participation dummy, Columns 1–3) and increase GVC participation (GVC participation index, Columns 4 and 6). The findings are consistent with existing studies positing that, through formalization, enterprises can upgrade their capabilities to meet international standards and requirements (e.g.,

Cusolito, Safadi, and Taglioni 2016; Ganne and Lundquist 2019; Korwatanasakul and Paweenawat 2020; OECD 2017). As the coefficients of GVC participation in Table 3 do not show statistically significant effects on formalization, the results confirm the absence of reverse causality in the relationship between formalization and GVC participation. Digitalization also plays a vital role in promoting GVC participation and the level of GVC participation. The estimated coefficients of digitalization are robust across all model specifications. Compatible with existing studies (e.g., Korwatanasakul 2020, 2023), digital connectivity, such as emails and websites, possibly improves enterprises' productivity and work efficiency through other channels beyond formalization. In addition, labor productivity, foreign ownership, certification, and credit access are also statistically significant and robust across different specifications. All four factors contribute to a higher probability and level of participation in the GVCs. This is consistent with Korwatanasakul and Paweenawat's (2020) and Urata and Baek's (2020) findings. Enterprises with foreign ownership, internationally recognized quality certificates, credit access, or high labor productivity have greater competitiveness and productivity. Hence, they are ready to join the GVCs.

Table 3: The Effects of Digitalization on Formalization
(Probit Estimation)

Dependent Variable	Formalization			
	GVC Participation: GVC Participation Dummy		GVC Participation: GVC Participation Index	
	(1)	(2)	(3)	(4)
Email	0.258*** (0.0493)		0.266*** (0.0491)	
Website		0.178*** (0.0531)		0.188*** (0.0530)
GVC participation	0.130 (0.0809)	0.148* (0.0802)	0.215 (0.261)	0.251 (0.264)
Labor productivity	0.0408*** (0.0155)	0.0488*** (0.0152)	0.0405*** (0.0154)	0.0487*** (0.0151)
Foreign ownership	−0.000594 (0.00135)	−0.000373 (0.00134)	−0.000422 (0.00127)	−0.000181 (0.00125)
Certificate	0.110* (0.0606)	0.102* (0.0608)	0.118* (0.0605)	0.111* (0.0606)
Credit access	0.130*** (0.0462)	0.144*** (0.0460)	0.133*** (0.0462)	0.148*** (0.0460)
Constant	0.699 (0.430)	0.623 (0.427)	0.710* (0.429)	0.633 (0.427)
Observations	11,407	11,502	11,407	11,502

GVC = global value chain.

Note: ***, **, and * signify that coefficients are statistically significant at the 1%, 5%, and 10% levels, respectively. Robust standard errors are presented in parentheses. All regressions encompass fixed effects for industry, country, and time.

Source: Author.

Table 4: The Effects of Formalization on Global Value Chain (GVC) Participation
(Probit and Tobit Estimations)

Dependent Variable	GVC Participation Dummy (Probit Estimation)			GVC Participation Index (Tobit Estimation)		
	(1)	(2)	(3)	(4)	(5)	(6)
Formalization	0.240*** (0.0858)	0.171* (0.0909)	0.205** (0.0879)	0.215** (0.0928)	0.150 (0.0988)	0.175* (0.0952)
Email		0.791*** (0.0546)			0.778*** (0.0621)	
Website			0.551*** (0.0408)			0.571*** (0.0442)
Labor productivity	0.0627*** (0.0135)	0.0334** (0.0141)	0.0451*** (0.0138)	0.0861*** (0.0144)	0.0598*** (0.0149)	0.0692*** (0.0147)
Foreign ownership	0.585*** (0.0407)	0.512*** (0.0412)	0.443*** (0.0427)	0.571*** (0.0430)	0.504*** (0.0434)	0.428*** (0.0452)
Certificate	0.207*** (0.0355)	0.172*** (0.0364)	0.182*** (0.0361)	0.183*** (0.0381)	0.148*** (0.0390)	0.159*** (0.0389)
Credit access	0.0627*** (0.0135)	0.0334** (0.0141)	0.0451*** (0.0138)	0.0861*** (0.0144)	0.0598*** (0.0149)	0.0692*** (0.0147)
Constant	-2.467*** (0.576)	-3.114*** (0.529)	-2.430*** (0.570)	-3.161*** (0.712)	-3.678*** (0.666)	-3.194*** (0.712)
Observations	11,581	11,459	11,554	11,581	11,459	11,554

GVC = global value chain.

Note: ***, **, and * signify that coefficients are statistically significant at the 1%, 5%, and 10% levels, respectively. Robust standard errors are presented in parentheses. All regressions encompass fixed effects for industry, country, and time.

Source: Author.

4.3 Policy Discussion

The findings from Tables 3 and 4 underscore the transformative potential of embracing digital technologies in fostering enterprise formalization. Notably, the results reveal a reciprocal relationship, indicating that digitalization and formalization act as mutually reinforcing factors, propelling enterprises towards greater engagement in GVCs and elevating the depth of their participation in these chains. This implies that bolstering digitalization efforts can catalyze concurrent advancements in formalization and GVC participation facilitated through analogous channels and mechanisms. The strategic enhancement of digitalization by governmental bodies emerges as a powerful lever for driving formalization and expanding GVC involvement. This, in turn, heightens environmental compliance and contributes substantively to the ethos of inclusive and sustainable growth. The entry of more enterprises into the formal economy, as facilitated by the symbiotic relationship between digitalization and formalization, is in line with contemporary research (Golgeci, Makhmadshoev, and Demirbag 2021; ILO 2022), signaling a promising avenue for policy interventions geared towards fostering economic development with a keen focus on environmental responsibility and social inclusivity.

In the estimation models, digitalization is proxied using basic digital technologies, including emails and websites. Despite their technological simplicity and low investment costs, emails and websites have robust effects on enterprise formalization and GVC participation. The multiple effects of digitalization and its low prices imply the cost-effectiveness of policy measures in this area. Nevertheless, SMEs in Asia and the Pacific demonstrate insufficient digital readiness overall, with notable gaps between their current levels and the digital readiness frontier across various domains such as finance, supporting infrastructure, and labor capability, despite relatively strong adoption rates in telecommunications and email usage; however, their adoption of websites remains low, highlighting areas for improvement in digitalization (Korwatanasakul 2023). To facilitate the transition of informal enterprises to the formal sector, policymakers may initially offer or guarantee enterprises access to basic digital technology, which requires devices (e.g., computers and tablets), digital applications (e.g., email applications and website creator applications), enabling digital infrastructure and environment (e.g., access to electricity and the Internet), and digital know-how or literacy (e.g., knowing how to use emails in business communication and how to create a company website).

Even though the effects of labor productivity are weaker than those of digitalization in all estimation models, upgrading labor productivity can be considered one of the practical policy options to promote formalization and GVC participation. Several policy measures possibly improve labor productivity, including: increasing investment in infrastructure, particularly telecommunications and digital innovation; reforming tax and welfare to improve work incentives; improving the quality of education and training, especially in terms of digital literacy and future skills; and enhancing the quality of public healthcare, among others.

The other policy option derived from the estimated results in Table 4 is formalization. Policy measures, especially those that use digitalization to foster formalization, promote GVC participation. Formalization not only helps enterprises avoid costs associated with informality, as suggested in the literature (e.g., Farazi 2014; Koshy 2019), but also benefits them from the gains through GVC participation. While recognizing that formalization is a complex issue that requires a synergy of different policy domains, policymakers may promote registration through better business environment reform, such as a simplified legal regime and business registration, and the reduction of barriers to formality and the GVCs, among others (OECD 2020; Van Doorn 2018). This would reduce registration and compliance costs for the existing informal enterprises and prospective entrepreneurs. Furthermore, policymakers may emphasize the benefits of formalization to businesses, particularly regarding GVC participation. Based on informal enterprises' real needs and voices, the government may provide measures to facilitate access to capacity-building and support programs funded by the government, ensure financial accessibility, and guarantee tax incentives for informal enterprises that move into the formal economy.

To summarize, the priority should be policy measures that enhance enterprises' basic digitalization as they are cost-effective and can concurrently promote enterprises' formalization and GVC participation. In addition, policy measures that improve labor productivity and formalization may be implemented as supporting policies. The discussion also underscores the critical link between digitalization, formalization, and inclusive growth, highlighting their role in reducing informality, enhancing participation in GVCs, improving productivity and competitiveness, and creating opportunities for economic empowerment. By enabling informal enterprises to transition into the formal sector and facilitating their integration into GVCs, digitalization and formalization contribute to a more inclusive economic environment where all businesses can

compete on an equal footing. Moreover, by improving productivity and competitiveness through adopting digital tools and formalized operations, enterprises, especially SMEs, can access global markets, technology, and know-how, leading to increased job creation, income generation, and poverty reduction. Overall, the discussion reveals the importance of digitalization and formalization in driving inclusive growth by ensuring that the benefits of economic development are shared more equitably across different social and economic groups.

5. CONCLUSION

In conclusion, this research contributes significantly to the discourse on sustainable and inclusive economic development by shedding light on the intricate relationships between digitalization, formalization, and GVC participation. The study addresses a critical gap in the literature, challenging commonly held notions without robust empirical support and expanding the understanding of the impact of formalization on GVC participation. The broader significance of this research lies in its implications for policymaking strategies aimed at fostering sustainability and inclusivity.

The estimated results show that enterprises with digital connectivity, i.e., the adoption of email or websites, are more likely to operate in the formal sector. Furthermore, this study finds that formalization enables enterprises not only to participate in GVCs but also to increase the level of GVC participation. Thus, the findings underscore the importance of digitalization and formalization in facilitating enterprises' GVC participation.

The policy implications drawn from these results underscore the urgency and effectiveness of prioritizing basic digitalization measures. Policymakers interested in sustainable and inclusive economic development can simultaneously leverage these cost-effective measures to promote formalization and GVC participation. The study encourages a holistic approach, recommending additional policies that support labor productivity and formalization as complementary strategies.

While acknowledging the possible endogeneity issue, particularly in the relationship between digitalization and formalization, the study serves as an essential starting point for more comprehensive investigations. The identified limitations, particularly the lack of comprehensive data on digitalization, formalization, and GVC participation, highlight the need for future research and data improvement. This research signals the importance of expanding the scope of variables, e.g., the digitalization of production and sales procedures, formalization beyond business registration, and different types of GVC participation and value chains.

Future research endeavors should focus on improving data quality and handling the endogeneity issue. Qualitative studies and country-specific analyses can offer valuable insights and cross-validation of findings. Furthermore, exploring the roles of business models and stages in the value chain will contribute to a more nuanced understanding of the relationships between formalization, GVC participation, and integrated digital structures. Given the significant influence on larger and formalized (registered) firms, future research could potentially focus on the subsample of nonregistered firms and find matches based on firm characteristics, such as industry and labor productivity.

REFERENCES

- Amuedo-Dorantes, C. 2004. Determinants and Poverty Implications of Informal Sector Work in Chile. *Economic Development and Cultural Change* 52(2): 347–368.
- Andrade, G. H., M. Bruhn, and D. McKenzie. 2015. A Helping Hand or The Long Arm of Law? Experimental Evidence on What Governments Can Do to Formalize Firms. *World Bank Economic Review* 30 (1): 24–54.
- ASEAN Secretariat. 2019. Policy Guideline on Digitalisation of ASEAN Micro Enterprises: Harnessing Digital Transformation to Promote the Formalisation of Micro Enterprises. Adopted by ASEAN Economic Ministers (AEM) at the 51st AEM Meeting, Bangkok, Thailand.
- Asia-Pacific Economic Cooperation (APEC) 2020. *Small and Medium Enterprises*. <https://www.apec.org/Groups/SOM-Steering-Committee-on-Economic-and-Technical-Cooperation/Working-Groups/Small-and-Medium-Enterprises>.
- Aslam, A., and A. Shah. 2017. Taxation and the Peer-to-Peer Economy. In *Digital Revolutions in Public Finance*, edited by A. Gupta, M. Keen, A. Shah, and G. Verdier. Washington, DC: International Monetary Fund.
- Becker, K. F. 2004. *The Informal Economy*. Stockholm: Swedish International Development Cooperation Agency. <https://www.sida.se/contentassets/ff689029b9a5479ebc8688bbe521600e/13925.pdf>.
- Botero, J., S. Djankov, R. La Porta, F. Lopez-de-Silanes, and A. Shleifer. 2004. The Regulation of Labor. *Quarterly Journal of Economics* 119(4):1339–1382.
- Bruhn, M. and D. McKenzie. 2014. Entry Regulations and the Formalization of Microenterprises in Developing Countries. *World Bank Research Observer* 29(2): 186–201.
- Busso, M., M. Fazio, and S. Levy. 2012. (In)Formal and (Un)Productive: The Productivity Costs of Excessive Informality in Mexico. IDB Working Paper Series, No. IDB-WP-341, Washington, DC: IDB. <https://publications.iadb.org/bitstream/handle/11319/4047/%28In%29Formal%20and%20%28Un%29Productive%3A%20The%20Productivity%20Costs%20of%20Excessive%20Informality%20in%20Mexico.pdf?sequence=1>.
- Cebula, R. 1997. An Empirical Analysis of the Impact of Government Tax and Auditing Policies on the Size of the Underground Economy: The Case of the United States, 1973–1994. *American Journal of Economics and Sociology* 56: 73–186.
- Cusolito, A. P., R. Safadi, and D. Taglioni. 2016. Inclusive Global Value Chains – Policy Options for Small and Medium Enterprises and Low-Income Countries. OECD/World Bank.
- De Mel, S., D., McKenzie, and C. Woodruff. 2013. The Demand for, and Consequences of, Formalization among Informal Firms in Sri Lanka. *American Economic Journal: Applied Economics* 5(2): 122–150.
- Dennis, M. J., and J. M. Pliego Ramos. 2016. Simplified Company: Creating an Enabling Legal Environment for Micro-, Small-, and Medium-sized Enterprises: Simplified Incorporation and Registration. *Arizona Journal of International and Comparative Law* (Tucson, Arizona) 33: 71–92.
- Dobson, S., and C. Ramlogan-Dobson. 2012. Inequality, Corruption and the Informal Sector. *Economics Letters* 115(1): 104–107.

- El Mahdi, A., and M. Amer. 2005. Egypt: Growing Informality, 1990–2003. In *Good Jobs, Bad Jobs, No Jobs: Labor Markets and Informal Work in Egypt, El Salvador, India, Russia, and South Africa*, edited by T. Avirgan, J. Bivens, and S. Gammage. Washington, DC: Economic Policy Institute.
- Farazi, S. 2014. Informal Firms and Financial Inclusion: Status and Determinants. Policy Research Working Paper No. 6778, World Bank, Washington, DC: World Bank.
- Friedman, E., S. Johnson, D. Kaufman, and P. Zoido-Lobaton. 2000. Dodging the Grabbing Hand: The Determinants of Unofficial Activity in 69 Countries. *Journal of Public Economics* 76: 459–492.
- Ganne, E. and K. Lundquist. 2019. The Digital Economy, GVCs and SMEs. In *Global Value Chain Development Report 2019: Technological Innovation, Supply Chain Trade, and Workers in a Globalized World*, edited by D. Dollar, E. Ganne, V. Stolzenburg and Z. Wang (pp. 121–140). Geneva: World Trade Organization
- Garcia-Murillo, M. and J. A. Velez-Ospina. 2017. ICTs and the Informal Economy: Mobile and Broadband Roles. *Digital Policy, Regulation and Governance* 19(1): 58–76.
- Golgeci, I., D. Makhmadshoev, and M. Demirbag. 2021. Global Value Chains and the Environmental Sustainability of Emerging Market Firms: A Systematic Review of Literature and Research Agenda. *International Business Review* 30(5): 101857.
- Grant, R., and M. Oteng-Ababio. 2012. Mapping the Invisible and Real ‘African’ Economy: Urban E-waste Circuitry. *Urban Geography* 33(1): 1–21.
- International Finance Corporation (IFC). 2012. Enterprise Finance Gap Database. Washington DC: World Bank.
- International Labour Conference (ILC). 2015. Transition from the Informal to the Formal Economy Recommendation No. 204. Geneva: ILC.
- ILO. 2018. *Women and Men in the Informal Economy: A Statistical Picture*. 3rd edition. Geneva: ILO.
- . 2020. Transitioning to the Formal Economy through Technology, or E-formality. ILO webpage. <https://www.ilo.org/employment/areas/e-formality/lang-en/index.htm>.
- . 2022. *A Double Transition: Formalization and the Shift to Environmental Sustainability with Decent Work*. Geneva: ILO.
- International Monetary Fund (IMF). 2017. Mexico: Selected Issues and Analytical Notes. IMF Country Report, No. 17/347. Washington, DC: IMF.
- IMF. African Department 2020. 3. Digitalization in sub-Saharan Africa. In *Regional Economic Outlook*, April 2020, sub-Saharan Africa: COVID-19: An Unprecedented Threat to Development. Washington, DC: IMF.
- Johnson, S., D. Kaufmann, J. McMillan, and C. Woodruff. 2000. Why Do Firms Hide? Bribes and Unofficial Activity after Communism. *Journal of Public Economics*, 76: 495–520.
- Kathuria, V., R. S. N. Raj, and K. Sen. 2013. The Effects of Economic Reforms on Manufacturing Dualism: Evidence from India. *Journal of Comparative Economics* 41(2013): 1240–1262.

- Korwatanasakul, U. 2020. Global Value Chains, Digitalisation, and Digital Readiness: A Firm-level Analysis with a Focus on Asian Small and Medium-sized Enterprises. In *Digitalisation, Trade, and Geopolitics in Asia*, edited by M. Dane. Tokyo: the Konrad-Adenauer-Stiftung's Regional Program on Social and Economic Governance in Asia SOPAS.
- Korwatanasakul, U. 2023. The Role of Digitalization in Firms' Global Value Chain Participation in Asia and the Pacific. In *Digital Transformation for Inclusive and Sustainable Development in Asia*, edited by S. Bera, Y. Yao, A. Palit, and D. B. Rahut. Tokyo: ADBI.
- Korwatanasakul, U. and Paweenawat, S. W. 2020. Trade, Global Value Chains, and Small and Medium-Sized Enterprises in Thailand: A Firm-Level Panel Analysis. ADBI Working Paper 1130. Tokyo: Asian Development Bank Institute.
- Koshy, P. 2019. Integration into Formal Enterprise Space: Challenges and Opportunities for Informal Sector Entrepreneurs. MPRA Paper 95346, University Library of Munich, Germany.
- Krichewsky-Wegener, L. 2020. *Digital Transformation in the Informal Economy: Opportunities and Challenges for Technical and Vocational Education and Training in Development Cooperation. Background Materials on TVET – Volume 1*. Bonn: Deutsche Gesellschaft für Internationale Zusammenarbeit GIZ GmbH.
- Kumar, H. 2014. Dynamic Networks of Grassroots Innovators in India. *African Journal of Science, Technology, Innovation and Development* 6(3): 193–201.
- Kumar, K., and D. van Welsum. 2013. Knowledge-Based Economies and Basing Economies on Knowledge:– Skills a Missing Link in GCC Countries. Research Report RR-188-GCC, The RAND Corporation, Santa Monica, CA.
- La Porta, R., and A. Shleifer. 2014. Informality and Development. NBER Working Paper No. 20205, June 2014.
- Links, A. L. M., T. Hart, and P. Jacobs. 2014. The Dynamics of Local Innovations among Formal and Informal Enterprises: Stories from Rural South Africa. *African Journal of Science, Technology, Innovation and Development* 63: 175–184.
- McGahan, A. 2012. Challenges of the Informal Economy for the Field of Management. *Academy of Management Perspectives* 26(3): 12–21.
- Meagher, K. 2013. Unlocking the Informal Economy: A Literature Review on Linkages Between Formal and Informal Economies in Developing Countries. Wiego Working Paper No 27. Cambridge: Women in Informal Employment: Globalizing and Organizing (WIEGO).
- Murphy, J. T. 2007. The Challenge of Upgrading in African Industries: Socio-Spatial Factors and the Urban Environment in Mwanza, Tanzania. *World Development* 35(10): 1754–1778.
- Narula, R. 2018. An Extended Dual Economy Model: Implications for Emerging Economies and their Multinational Firms. *International Journal of Emerging Markets* 13(3): 586–602.
- . 2019. Enforcing Higher Labour Standards within Developing Country Value Chains: Consequences for MNEs and Informal Actors in a Dual Economy. *Journal of International Business Studies* 50: 1622–1635.

- Narula, R., and A. Pineli. 2019. Improving the Developmental Impact of Multinational Enterprises: Policy and Research Challenges. *Journal of Industrial and Business Economics* 46(1): 1–24.
- Olomi, D. R. and G. Urassa. 2016. Towards Inclusive Formalisation of the Informal Economy. Paper presented at REPOA Annual Research Workshop, 7th April 2016.
- Onyango, R., R. Ongus, F. Awuor, and C. Nyamboga. 2014. Impact of Adoption and Use of Mobile Phone Technology on the Performance of Micro and Small Enterprises in Kissi Municipality, Kenya. *World Journal of Computer Application and Technology* 2(2): 34–42.
- Onyima, J. K. and N. C. Ojiagu. 2017. Digital Technology and Formalization of Informal Businesses: A Case of African Traditional Spiritualists. *International Journal of Academic Research in Business and Social Sciences*, 711: 599–609.
- Organisation for Economic Co-operation and Development (OECD). 2016. Regulatory Policy in Chile: Government Capacity to Ensure High-Quality Regulation, OECD Reviews of Regulatory Reform, OECD Publishing.
- . 2017. Enhancing the Contributions of SMEs in a Global and Digitalized Economy. Meeting of the OECD Council at Ministerial Level, Paris, 7–8 June 2017.
- . 2020. *Formalisation of Micro Enterprises in ASEAN: Policy Insight*. Paris: OECD.
- Perry, G., W. F., Maloney, O. S. Arias, P. Fajnzylber, A. D. Mason, and J. Saavedra-Chanduvi. 2007. *Informality: Exit and Exclusion*. Washington DC: World Bank.
- Ramoroka, K. H., P. Jacobs, and H. Mangqalaza. 2014. Actor Networks and Innovation Activities among Rural Enterprises in a South African Locality. *African Journal of Science, Technology, Innovation and Development* 6(3): 185–191.
- Straub, S. 2005. Informal Sector: The Credit Market Channel. *Journal of Development Economics* 78(2): 299–321.
- Swaminathan, M. 1991. Understanding the “Informal Sector”: A Survey. WIDER Working Papers (1986–2000) 1991/095. Helsinki: UNU-WIDER.
- Ulyssey, G. 2015. Firms, Informality and Development: Theory and Evidence from Brazil. Rede de Economia Aplicada REAP Working Paper 76, March 2015.
- Urata, S. and Baek, Y. 2020. The Determinants of Participation in Global Value Chains: A Cross-Country, Firm-Level Analysis. ADBI Working Paper 1116. Tokyo: Asian Development Bank Institute.
- Van Doorn, J. 2018. Step By Step to Formalization. <https://iloblog.org/2018/12/14/step-by-step-to-formalisation/>.
- Vishwanath, T. 2001. Informal Economy: Safety Valve or Growth Opportunity. Presented at the Linking Work, Skills, and Knowledge: Learning from Survival and Growth International Conference, Interlaken, Switzerland, 10–12 September 2001; pp. 10–12.