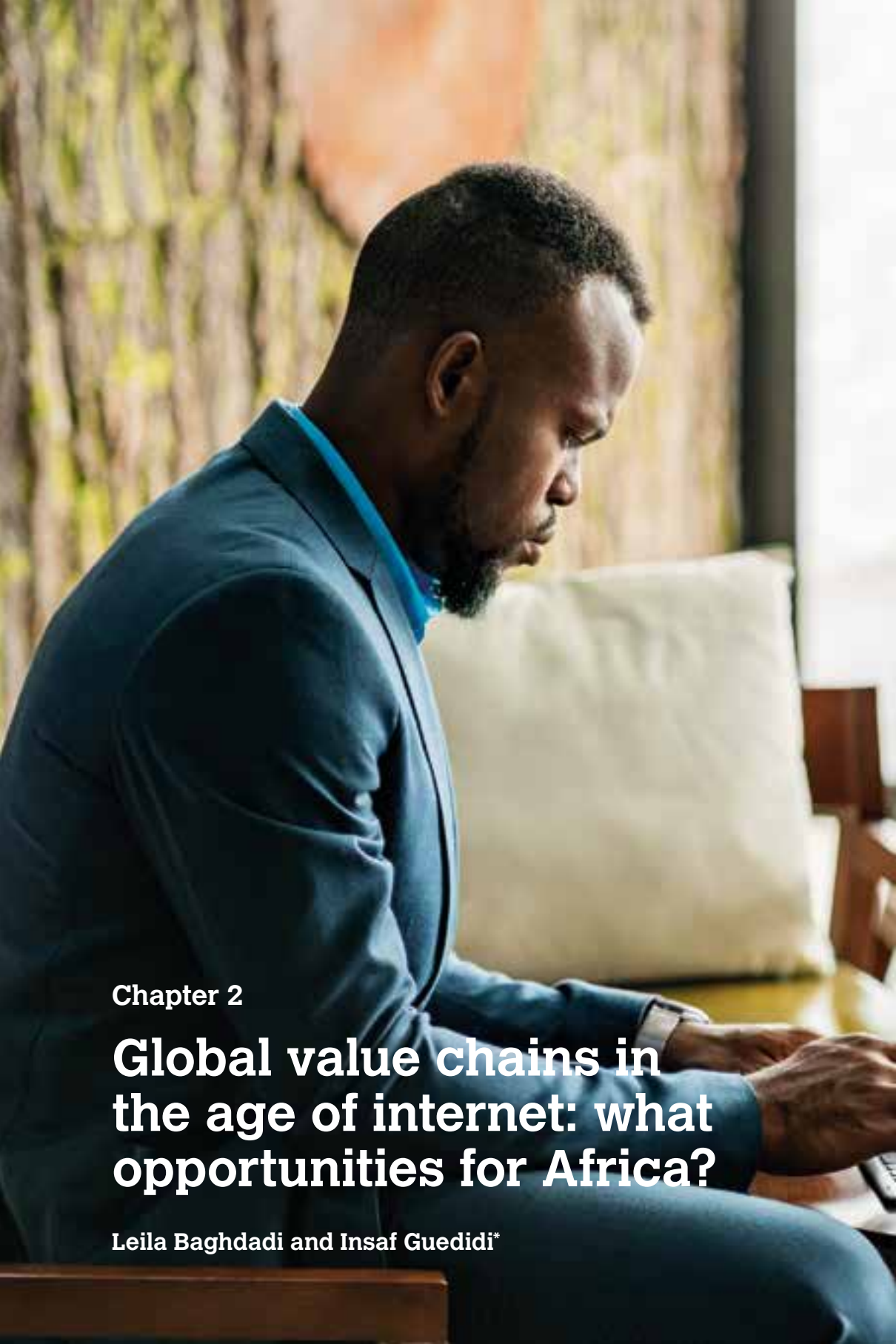
SECTION 2

Strategic directions and policy implications for developing countries



Chapter 2

Global value chains in the age of internet: what opportunities for Africa?

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Abstract

This chapter analyses the impact of the internet on global value chains (GVCs) in Africa. We investigate the effect of internet adoption on forward participation and backward participation of African countries in GVCs. We conduct the estimations using country-level data from the United Nations Conference on Trade and Development (UNCTAD) Eora GVC database and firm-level data from the World Bank's Enterprise Survey. We test whether internet adoption facilitates the participation of Africa in GVCs at the country level and the firm level. We find that internet use and internet infrastructure are more important for African firms and African countries in terms of forward GVC participation. To conclude, empirical results show that the internet increases GVC participation in Africa. African countries and firms need to improve internet infrastructure in order to make the best of integration into GVCs.

** The contents of this chapter are the sole responsibility of the authors and are not meant to represent the position or opinions of the WTO or its members.*

Introduction

The amount of cross-border bandwidth used increased by 148 times between 2005 and 2017 (McKinsey Global Institute, 2019). These flows of information helped firms to be closer to consumers and suppliers. Firms with a high rate of digital adoption tend to reduce their physical presence in partner countries. This is due to the newly acquired ability to create virtual global teams through digital platforms (McKinsey Global Institute, 2016). Currently, digitalization and technology evolution notably reduce trade costs as they simplify transactions across borders, thus generating more trade. The internet and electronic systems help eliminate unnecessary processes in customs declaration and customs clearance. For instance, recent estimations show that online submissions of customs documentation decreased time spent at the border by more than 70 per cent for both imports and exports (WTO, 2018).

The next wave of digital technologies, such as digital platforms and logistics technologies (among others), could further decrease trade costs. Digital platforms help buyers and sellers from around the world to meet and exchange goods and services, thus lowering their search costs. Logistics technologies through the use of robotics, artificial intelligence and Internet of Things (IoT) applications could decrease shipping and customs processing time by 16 to 28 per cent. They could potentially boost overall trade by 6 to 11 per cent by 2030 (McKinsey Global Institute, 2019). Thus, a greater use of digital technologies is likely to reduce trade costs, empower trade and increase GVC participation in both developed and developing countries.

Empirical evidence supports this positive impact of digitalization and the internet on trade flows. For instance, Sousa (2018) presents evidence that the IoT is changing the way industries perform through creating new opportunities and transforming production processes. Osnago and Tan (2016) indicate that countries are more likely to exchange goods and services among themselves when both exporters and importers have high internet adoption rates. Moreover, Vemuri and Siddiqi (2009) show that the availability of the internet for business transactions significantly enhances trade flows. Lin (2015) demonstrates that a 10 per cent increase in internet users increases exports by 0.2 to 0.4 per cent. Freund and Weinhold (2004) conclude that bilateral trade flows are enhanced by a high level of internet connectivity. The authors find that a 10 per cent increase in the number of web hosts increases exports by 0.2 percentage points. Likewise, Rodríguez-Crespo and Martínez-Zarzoso (2019) investigate the impact of the internet on bilateral exports of 120 countries for the period 2000–2014. They use the percentage of internet users as an indicator of information and communications technology (ICT) and product complexity to segment countries based on their degree of knowledge. They show that ICT has a positive and significant impact on exports when trade flows are within countries with low product complexity. Liu and Nath (2012) also find that the use of the internet positively and significantly affects trade in emerging markets.

Digitalization could particularly empower trade flows of developing countries through reducing trade costs. The World Trade Organization (WTO) estimates

that the reduction in trade costs resulting from technology diffusion and regulatory policies could increase developing countries' share in global trade up to 57 per cent by 2030 (WTO, 2018). Clarke and Wallsten (2004) find that higher exports to developed countries are associated with higher internet penetration rates in developing countries. In addition, Abeliansky and Hilbert (2017) find that the quality of ICT services (measured by bandwidth speed) has a larger impact on exports of developing countries than does the extent of ICT services (measured by the number of telephone and internet subscriptions), while the reverse is true for developed countries.[1]

The advent of digitalization is particularly important for GVCs in both developed and developing countries. Trade costs tend to cumulate in GVCs. Parts and components are combined in different countries before being turned into final goods. The time and cost involved in border crossings have a large impact on production costs, since products cross borders several times. Hinson and Adjasi (2009) indicate that the internet plays a major role in reducing the cost to export in Africa. In addition, technology emerges as a key factor in lowering trade costs in international production networks (Amador and Cabral, 2016; WTO, 2018). Recent studies link integrating global production networks with adopting more digital technologies. In this respect, Lanz et al. (2018) argue that manufacturing small and medium enterprises' (SMEs) participation in GVCs in developing countries is enhanced by improving internet connectivity (measured by whether a firm has a website). The authors also find that the quality of ICT infrastructure, measured by fixed broadband subscriptions, is associated with SMEs' participation in GVCs. Marcolin and Squicciarini (2018) highlight how a highly skilled workforce and ICT adoption shape the way countries integrate and position themselves in GVCs. The availability of skilled workers is critical to the expansion of non-routine jobs that has gone hand in hand with recent technological change. Authors define non-routine jobs as occupations that give workers a degree of independence. They decide what activity to do and plan their time and tasks. Such workers are able to adopt and use technologies in tasks related to GVCs where time is important (ESCWA, 2017) and costs are high (Muradov, 2017).

"Digital platforms help buyers and sellers from around the world to meet and exchange goods and services."

The adoption of digital technologies plays an important role in shaping cross-border activities of multinational enterprises (MNEs) (Gestrin and Staudt, 2018). Cadestin et al. (2018) indicate that cross-border activities of MNEs lead to more fragmentation of production. A great part of global production networks within GVCs belongs to MNEs. As the world is digitalizing, the costs of coordination and production are falling. Therefore, MNEs tend to execute more business and production activities in different countries. For instance, Lanz et al. (2018) find that small firms participate

more in GVCs in countries with good ICT infrastructure. They indicate that affordable and high-quality access to the internet improves firms' production activities by connecting those firms to GVCs.

Connection to GVCs can take place through forward linkages or backward linkages. Forward GVC participation refers to domestically produced inputs used in third countries' exports, while backward participation refers to the use of foreign inputs in domestic production (De Backer and Miroudot, 2013). Siedschlag and Murphy (2015) indicate that the form of engagement in international activities (forward versus backward) has implications for the level of profitability. They argue that European firms' engagement in GVCs is linked to their productivity and innovation performance. Therefore, it is important to study the impact of the internet on forward GVC participation and backward GVC participation.

"Digitalization could particularly empower trade flows of developing countries through reducing trade costs."

Several studies on the relationship between gross trade and the internet have been carried out (Hinson and Adjasi, 2009; Lin, 2015; Osnago and Tan, 2016; etc.), but research on the impact of the internet on trade in the era of GVCs is limited. Moreover, few studies have empirically addressed the question of the impact of digital connectivity on GVCs in African countries. This study aims to fill this gap by examining the effect of the internet on forward and backward linkages, with a focus on Africa.

We explore both country- and firm-level dimensions. In the remainder of the chapter, we look at both country-level and firm-level results, and then present our conclusion.

Internet and participation of countries in GVCs

1. Model specification and data

We study the impact of internet connectivity on the GVC participation of African countries in terms of backward and forward linkages. The model used includes internet infrastructure, proxied by Broadband in the model, and internet connectivity, proxied by Internet Use, as explanatory variables. Following the empirical model used by Shepherd (2016) and Cheng et al. (2015) in their country-level analyses, we use a measure of GVC participation as the dependent variable in the regression.

At the country level, the estimation is based on the following specification, including country and year fixed effects:

$$GVC_{it} = \alpha + \beta_1 \text{Broadband}_{it} + \beta_2 \text{Internet Use}_{it} + \beta_3 \text{Broadband}_{it} \text{ x Africa}_i$$

$$+ \beta_4 \text{Internet Use}_{it} \text{ x Africa}_i + \beta_5 Z_{it} + \nu_l + \mu_t + \varepsilon_{it}$$

GVC_{it} denotes backward participation (expressed by foreign value added (FVA)) and forward participation (expressed by indirect value added (DVX)), all in logs.

Z_{it} is a control variable that captures gross domestic product (GDP) per capita. Broadband indicates fixed broadband subscriptions. Internet Use is a measure of the percentage of individuals using the internet. Africa_i is a dummy variable representing whether or not country i is in Africa; Broadband_{it} x Africa_i and Internet Use_{it} denote the interaction terms between internet connectivity variables and the Africa dummy. v_i and μ_t denote country and year fixed effects, respectively. ε_{it} is the error term.

The analysis of global production networks at the country level is based on data from the UNCTAD-Eora GVC database. Data from 1990 to 2017 are generated from Eora Multi-Region Input-Output tables (MRIOs), data for 2016–2017 are provisional results, and data for 2018–2019 are estimated based on the International Monetary Fund (IMF) World Economic Outlook.[2]

GVC indicators by country are from the UNCTAD-Eora GVC database. The data covers 175 countries and the years 1990 to 2018. DVX and FVA are measured in US dollars.

Regarding ICT variables, fixed broadband subscriptions (per 100 people) come from the International Telecommunication Union (ITU), including public internet subscriptions (TCP/IP connections) at speeds equal to, or greater than, 256 kbit/s. This includes cable modem, DSL, fibre-to-the-home/building, other fixed (wired)-broadband subscriptions, satellite broadband and terrestrial fixed wireless broadband for both residences and organizations.

Another ICT indicator is the percentage of the population using the internet via computer, mobile phone, personal digital assistant, gaming machines, digital TV, etc., also from the ITU.

The control variable used at the country level is GDP per capita. Data on GDP per capita are taken from the World Development Indicators database.

2. Results

This section presents our main results at the country level. We estimate the empirical model with Ordinary Least Squares (OLS). Table 1 presents the results of the estimated equation where the dependent variable is in log. GDP per capita, a proxy for a country's level of economic development, has a positive sign. Thus, the more developed an economy is, the more likely it is to participate in GVCs.

The Broadband and Internet Use variables have a positive and significant impact on participation in GVCs, with slightly higher coefficients related to backward participation (proxied by FVA exports) than for forward participation. This shows that internet connectivity enhances countries' participation in GVCs. These results are in line with results in Lin (2015), Liu and Nath (2012) and Osnago and Tan (2016). For African countries, however, broadband appears to be important for backward linkages, but not for forward linkages (coefficient is insignificant). A 10 per cent increase in internet use in Africa increases backward GVC participation by 3.74 per cent and forward GVC participation by 10.7 per cent.

Table 1: GVC participation and internet, country-level analysis with OLS

Variables	(1) Backward Participation (log FVA)	(2) Backward Participation (log FVA)	(3) Forward Participation (log DVX)	(4) Forward Participation (log DVX)
Broadband	0.0221***		0.0149***	
	(0.000737)		(0.00135)	
Africa × Broadband	0.0129**		0.0115	
	(0.00545)		(0.00996)	
Internet Use		0.00966***		0.00749***
		(0.000317)		(0.000413)
Africa × Internet Use		0.00374***		0.0107***
		(0.000943)		(0.00123)
Log GDP per capita	0.811***	0.899***	1.025***	1.109***
	(0.0155)	(0.0148)	(0.0284)	(0.0193)
Constant	7.153***	6.107***	5.579***	4.606***
	(0.133)	(0.119)	(0.243)	(0.155)
Observations	2,523	3,934	2,523	3,934
R-squared	0.768	0.796	0.535	0.741
Country Fixed Effects (FE)	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

Note: Robust standard errors are in parentheses.
* p < 0.1
** p < 0.05
*** p < 0.01

A firm-level dimension to GVCs in the age of internet

1. Model specification and data

We apply a regression with Broadband (as a proxy for internet infrastructure) and Internet Use (as a proxy for internet connectivity) variables to assess the impact of internet connectivity on GVC participation in terms of backward and forward linkages. We specify the empirical model and use data following Lanz et al. (2018) for the firm-level analysis.

At the firm level, the model is specified as follows:

$$GVC_{ijkt} = \alpha + \beta_1 \text{Broadband}_{ijt} + \beta_2 \text{Internet Use}_{ijt} + \beta_3 \text{Broadband}_{ijt} \text{ x Africa}_{ij}$$

$$+ \beta_4 \text{Internet Use}_{ijt} \text{ x Africa}_{ij} + \beta_5 \text{Website}_{ijt} + \beta_6 X_{ijt} + v_i + \mu_k + \theta_t + \varepsilon_{ijt}$$

The dependent variable GVC_{ijkt} proxies GVC participation in terms of backward linkages (measured by the share of imports in total material inputs) and forward linkages (measured by the share of sales that were known to be

exported by a third party), for firm i in country j at year t of industry k.

Africa_{ij} is a dummy variable representing whether or not firm i is in Africa. Broadband_{ijt} x Africa_{ij} and $\text{Internet Use}_{ijt}$ x Africa_{ij} denotes the interaction terms between Africa and internet variables. Website_{ijt} is a dummy variable indicating whether the firm has a website or not. X_{ijt} represents a set of control variables including the manager's experience (in years) and foreign ownership. ν_i, μ_k and θ_t are country, industry and year fixed effects, respectively. Finally, ε_{ijt} denotes the error term. At the firm level, data on GVC participation are from the World Bank Enterprise Surveys (WBES), which cover the years 2006 to 2018 for 133 countries. While the data cover a wide span of years, countries appear only between one to three times in the data during the period covered, and we do not know how many times a surveyed firm appears in the dataset. Therefore, we run regressions using first the full sample and second including only the latest survey of each country for robustness check purposes. Only manufacturing industries are considered.

ICT variables are the same as explained in the previous section. In addition, we use a dummy variable that indicates whether the establishment has its own website or not. At the firm level, the control variables include the number of years of experience of the company's top manager and the percentage of the firm owned by private foreign individuals, companies or organizations. These data are taken from the WBES.

2. Results

We are interested in comparing the impact of internet use and internet infrastructure on forward GVC participation and backward GVC participation at the firm level. We estimate the empirical model with OLS. Table 2 and Table 3 display the firm-level results.

Table 2 shows the results of the estimated equation. The dependent variable is backward participation proxied by the share of inputs of foreign origin in a firm's total material inputs. Columns 1–3 are estimation results for the whole data sample (all surveys). Columns 4–6 are separate regressions using the last sample for each country and firm (last survey) to do a robustness check.

Our control variables, foreign ownership and manager's experience, have a positive and significant impact on the share of imported inputs.

The Internet Use variable is insignificant. However, Broadband has a positive and significant coefficient. Thus, internet infrastructure proxied by Broadband increases a firm's share of imported inputs. Also, having a website helps firms integrate into GVCs through backward linkages.

Our main variables of interest are the interaction terms between internet connectivity variables and the Africa dummy variable. The interaction term between the Africa dummy and Broadband is insignificant. However, the interaction term between the Africa dummy and Internet Use is positive and significant. This indicates that a higher rate of internet penetration is associated with a higher share of foreign imported inputs in firms' total inputs (backward GVC participation).

Table 3 contains the estimation results of firms' forward linkages. We use the share of indirect exports as the dependent variable to proxy forward linkages. Columns 1–3 are estimations for the whole data sample (all surveys). For robustness check purposes, columns 4–6 are regressions using the last sample for each country and firm (last survey).

The relationship between Internet Use and forward participation in GVCs is insignificant, and Broadband has a negative sign. Firms with websites are associated with a significantly higher share of indirect exports.

The positive coefficients for the interaction terms between internet variables and the Africa dummy show that the effect of Internet Use and internet infrastructure (Broadband) on forward linkages is stronger if the country is an African country. This suggests that actions to improve ICT infrastructure and to adopt more technologies would help improve the region's position in GVCs.

Forward integration and foreign ownership are positively related, as displayed in Table 3. However, the coefficient for Manager Experience is statistically insignificant.

Table 2: Backward GVC participation and internet, firm-level analysis with OLS

Variables	(1) All surveys	(2) All surveys	(3) All surveys	(4) Last survey	(5) Last survey	(6) Last survey
Broadband	0.287*** (0.0927)			0.414*** (0.0277)		
Africa × Broadband	-1.024 (1.125)			2.918*** (0.203)		
Internet Use		0.0160 (0.0374)			0.154*** (0.0107)	
Africa × Internet Use		0.351*** (0.0969)			0.274*** (0.0203)	
Website			9.223*** (0.302)			7.423*** (0.420)
Foreign Ownership	0.206*** (0.00597)	0.212*** (0.00597)	0.193*** (0.00595)	0.299*** (0.00890)	0.298*** (0.00905)	0.287*** (0.00897)
Manager Experience	0.144*** (0.0126)	0.140*** (0.0126)	0.129*** (0.0124)	0.263*** (0.0184)	0.251*** (0.0186)	0.280*** (0.0182)
Constant	10.29*** (2.854)	8.166* (4.839)	108.8*** (9.474)	-5.817*** (0.365)	-6.307*** (0.371)	-0.876** (0.383)
Observations	54,519	54,965	55,690	26,583	26,202	26,950
R-squared	0.258	0.257	0.269	0.114	0.112	0.109
Country FE Year FE Industry FE	Yes Yes Yes	Yes Yes Yes	Yes Yes Yes	No No Yes	No No Yes	No No Yes

Note: Robust standard errors are in parentheses.
* p < 0.1
** p < 0.05
*** p < 0.01

Table 3: Forward GVC participation and internet, firm-level analysis with OLS

Variables	(1) All surveys	(2) All surveys	(3) All surveys	(4) Last survey	(5) Last survey	(6) Last survey
Broadband	-0.0832* (0.0428)			0.0553*** (0.0130)		
Africa × Broadband	1.629*** (0.466)			-0.0709 (0.0825)		
Africa × Internet Use		0.368*** (0.0480)			0.0142* (0.00833)	
Website			0.842*** (0.142)			1.006*** (0.174)
Foreign Ownership	0.0312*** (0.00336)	0.0323*** (0.00337)	0.0293*** (0.00335)	0.0482*** (0.00521)	0.0499*** (0.00535)	0.0466*** (0.00522)
Manager Experience	-0.00509 (0.00557)	-0.00534 (0.00551)	-0.00616 (0.00551)	-0.00609 (0.00742)	-0.00731 (0.00738)	-0.00423 (0.00724)
Internet Use		0.00128 (0.0182)			0.0203*** (0.00487)	
Constant	40.82*** (1.263)	30.82*** (2.152)	-0.186 (21,713)	0.124 (0.148)	0.0426 (0.146)	-0.879*** (0.262)
Observations	61,420	61,867	62,565	31,997	31,615	32,348
R-squared	0.050	0.052	0.050	0.017	0.019	0.017
Country Fixed Effects (FE)	Yes	Yes	Yes	No	No	No
Year FE	Yes	Yes	Yes	No	No	No
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors are in parentheses.
* p < 0.1
** p < 0.05
*** p < 0.01

Africa appears to have better performance in connecting to GVCs through forward linkages than through backward linkages (see Table 2). This is in line with the fact that African firms are connected to GVCs largely through providing inputs to firms in other regions for further processing (Foster-McGregor et al., 2015). For example, North Africa integration in global production networks is due to forward participation (Del Prete et al., 2017).

Conclusion

Technology diffusion among African countries reduces the time required to import and reduces trade costs, a critical issue for participation in GVCs where goods cross borders several times. Access to the internet also can save time and money by facilitating coordination and monitoring across firms. Therefore, African countries are able to seize more opportunities from digitalization.

This study shows that internet use and internet infrastructure are important for countries engaging in international production networks. From a trade perspective, ICT plays a key role in countries as well as in firms. We analyse the effect of

internet adoption on forward participation and backward participation in GVCs. Globally, internet variables tend to have a larger impact on increasing backward participation than they do for forward participation. However, this is not the case for African countries, for whom internet connectivity has a stronger influence on forward participation in GVCs than on backward participation.

We conclude that African countries and firms in Africa need to improve ICT infrastructure and increase internet penetration to reap more benefits from participating in GVCs at different production levels. Internet use seems to fuel both forward and backward linkages. Increasing internet adoption and improvement of internet infrastructure offer several opportunities to African countries and firms to better participate in GVCs.

Endnotes

[1] The dataset covers 122 countries over the period 1995–2008.

[2] More details about the UNCTAD-Eora GVC database and its methodological background are described in Casella et al. (2019). Aslam et al. (2017) and De Backer and Miroudot (2013) provide more details on the calculations of value-added indicators for GVCs.

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Comments

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The emergence of global value chains (GVCs) has major policy implications for economic growth in Africa. As Baldwin (2011) pointed out, two consequences are particularly germane for developing countries. On the one hand, GVCs have created an avenue through which countries can industrialize at a much earlier stage of development as producing firms choose to off-shore fragments of the production value chain to countries where labour is cheaper or where other locational advantages confer a competitive cost advantage on the whole value chain.

However, a second consequence is that, in a world of GVC-dominated trade in which production is allocated to the location with the lowest cost, countries that try to industrialize through the high tariffs and restrictive import-substitution policies prevalent in the pre-1990 period are unlikely to reduce their costs to the point where they can be competitive in global markets. Said differently, GVCs raise the penalties to countries that seek to expand exports by raising tariffs and import-substitution policies that would aspire to build competing production networks; high border barriers will likely result only in high-cost local production and slow growth. In general, a good working presumption is that the more technologically sophisticated the product is (or production process), the greater the role of the brand name, and the greater is the market share for the lead firm, the more difficult it is for new entrants to gain entry into the final market or supply networks without direct association with the value chain.

A third consequence is the rising importance of connectivity to GVCs, the subject of this chapter. "Global value chains in the age of internet" examines the role of internet connectivity – proxied through the number of internet connections as backbone infrastructure and the percentage of population using the internet – in spurring African trade and in particular trade in value chains. It provides compelling aggregate evidence that the connectivity via the internet is playing an important role in export development of African countries, particularly the participation in GVCs. In analysing broad sectors, the chapter also presents evidence that internet use and infrastructure are particularly important for "high-tech manufacturing" as well as "high-tech services" exports. This comports with Dollar's findings for world trade that "the higher the technology (knowledge) intensity of a sector, the more significant the increase of complex GVC activities" (2019, p. 1).

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As the chapter notes, internet-based digitization presents African firms with new opportunities to lower trade costs across a range of activities, particularly in speeding delivery times; technology can thus reduce the cumulative costs of delays and administrative procedures as products cross borders. In East Africa, for example, transport costs typically add 30 to 50 per cent to the transit times from Mombasa (Kenya) to Kampala (Uganda) and Kigali (Rwanda). These transport times and transit costs have fallen substantially over the last decade, through a combination of digital technologies in logistics and policy reforms (Kunaka et al, 2018).

The findings that enhanced ICT stimulates the emergence of value chains to a greater extent than trade outside of value chains are persuasive as much from a theoretical perspective as from the chapter's empirics. It stands to reason that firms operating in regional value chains and GVCs would benefit from common technologies controlling standards, parts and software platforms less readily available among exporters and importers in arms-length market transactions. In value chains with more integrated governance structures among the five Gereffi et al. (2005) types[1] – say intra-firm trade and captive hierarchical trade – these benefits are likely to be even larger.

Two readily undertaken extensions of the Baghdadi chapter would be worth pursuing if data are available: (i) extending the analysis back to 2000 would extend the time horizon underpinning the chapter; and (ii) undertaking the analysis worldwide would illuminate the particularities of African trade.

The chapter implicitly prompts questions that could form a larger research agenda about value chains in Africa. De Melo and Twum (2020) have shown that, despite efforts of the regional economic communities (RECs), regional value chains remain only incipient. Regional value chains in the East African Community (EAC), for example, amount to only 1.7 per cent of total gross exports, a sharp contrast with the Association of South East Asian Nations (ASEAN) (17.2 per cent) and the Southern Common Market (MERCOSUR) (4.6 per cent). The Southern African Development Community (SADC) performs only marginally better with 3 per cent included in regional value chains. The authors' definition of GVCs requires that a product crosses two borders. Were they to use a one-border criterion, the numbers in Africa's regions would no doubt be higher. Even with their stringent definition, Sub-Saharan Africa increased its participation in GVCs comparing 2015 with 1990 from some 34 per cent of trade to nearly 40 per cent.

In contrast to East Asia, African trade in GVCs was discernibly more centred on forward GVC integration, that is, its exports were disproportionately used by importing countries to produce for export. For example, Ugandan maize would be used by Kenyan food processors to export to third markets. This pattern differs from East Asia, where much of the GVC integration was backward (that is, the countries' exports included a large share of imported value added). Moreover, in contrast to Asia, *extra-regional* value chains were much more important to Africa than *intra-regional* value chains. These patterns merit further research.

This discussion underscores the need to improve internet usage and infrastructure throughout the region as a building block to effective use of GVCs for growth. In the last decade alone, the installation of a vast network of fibre optic cable has ushered in new levels and speeds of connectivity. Simultaneously, smartphone usage is spreading across the continent, and the green shoots of 5G technology are slowly sprouting up in different parts of Africa. Digitization is revolutionizing logistics and unleashing productivity gains in transport of goods. Services exports – whether tourism, call centres or business services – are inextricably bound up with an increasing reliance on internet-based technologies.

But to fully translate these technologies into increased exports and rising incomes, policies must go beyond internet infrastructure. Trade policy has to keep pace with communication and digitization policy: policymakers have to reduce border barriers, including tariffs, non-tariff barriers and restrictive rules of origin as well as other barriers to competition in transport and communication. To that end, the African Continental Free Trade Area (AfCFTA), the Tripartite Free Trade Agreement and efforts to deepen the regional agreements hold enormous promise.

Endnotes

[1] GVCs differ in degrees with respect to the extent of market competition within the chain, barriers to access to the final market and the control exerted by the lead firm (over technology, product specifications and branding). Gereffi, Humphey and Sturgeon (2005) distinguish five general types of GVCs, each with a different "governance" and role of firms:

- Market-driven chains in which both buyers and suppliers have multiple sources of transactions, the price is fully market determined and the cost of switching to new partners is low; an example is commodity markets.
- Modular chains in which suppliers produce to the specification of the buyers using generic technology; an example is many apparel chains.
- Relational value chains in which interactions between buyers and sellers are mutually dependent, usually have sustained involvement over time, and are based on family or ethnic ties that tend to cement business relationships; these forms of collaboration are particularly common among companies in Chinese Taipei that operate in production chains.
- Captive chains in which the lead firm controls a highly differentiated product, the key technologies and/or product standards; suppliers have little incentive to move outside the production chain to work with the competitors; leading electronic firms such as Apple have these types of supplier relationships.
- Hierarchical chains in which the buyer-supplier relationship is internal to the firm; auto companies have many suppliers that are internal to the firm; all intrafirm trade falls into this category.

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