Who Controls the Digital? Value Chains and the Challenges of Connectivity for East African Firms

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Abstract

In recent years, internet connectivity has greatly improved across the African continent. This paper examines the consequences that this shift has had for East African firms that are part of global value chains (GVCs). Prior work yielded contradictory expectations: firms might benefit from connectivity through increased efficiencies and improved access to markets, while they might also be further marginalized through increasing control of lead firms.

Drawing on extensive qualitative research in Kenya and Rwanda, including 264 interviews, we examine three sectors (tea, tourism, and business process outsourcing) exploring overarching, cross-cutting themes. The findings support more pessimistic expectations: small African producers are only thinly digitally integrated in GVCs. Moreover, shifting modes of value chain governance, supported by lead firms and facilitated by digital information platforms and data standards are leading to new challenges for firms looking to digitally integrate. Nevertheless, we also find examples in these sectors of opportunities where GVCs are not able to cater to emerging niche customers, and local or regional markets.

Overall, the study shows that improving connectivity does not inherently benefit African firms in GVCs without support for complementary capacity and competitive advantages.

Keywords: internet, global value chains, connectivity, East Africa, development

1. Introduction

The last decade has seen a significant growth in internet infrastructure in Africa. At the turn of the millennium, the continent was virtually disconnected from high-speed fiber optic networks, with firms having to use expensive and low-speed satellite links. Since then we have seen a concerted set of initiatives to provide fiber-optic infrastructure to the continent including the landing of eight new cables at an estimated cost of $3.9bn (Song 2014).

The anticipation, leading up to and following the construction of these cables has been palatable. International donor support was predicated on the belief that lack of ICT infrastructure was "a major bottleneck to growth and poverty alleviation in developing countries" (World Bank 2005). Given a perceived disconnect of East Africa from global economies, there has been a particular emphasis from donors, the media and politicians on how internet connectivity would overcome limitations of remoteness and distance (Graham 2015, Graham & Mann 2013). Donors and governments identified East-African based firms as important beneficiaries of changing connectivity, claiming that they would be able to overcome distance and better integrate with international markets and trade (Graham et al. 2015).

Global value chains (GVC) are a key medium through which export-orientated production is operationalized in a globalized world (Gereffi 2014), and GVC literature provides a base for critically exploring how East African producers and services providers integrate into global markets. Yet, there has been little systematic evidence of how internet connectivity in lower income countries impacts on GVCs (Foster & Graham 2016). This absence is particularly pronounced in relation to small and medium-sized firms, whose integration into global economies has been articulated as a key benefit of changing digital connectivity. Given the significant financial and political capital involved in supporting the expansion of connectivity

and building complementary policy, it is crucial to take stock and ensure that ongoing policy and practice lead to maximum impact. Thus, we look to answer the following questions: *How is changing internet connectivity in East Africa affecting the forms of GVC in the region? Does internet connectivity offer new opportunities or challenges for East African firms looking to link into GVCs?*

The paper is structured as follows. In section two, we explore literature on global value chains, outlining how the literature conceptualizes interaction of East African firms with export markets. Given the relative neglect of research exploring the impact of internet connectivity in low income countries, we also examine empirical literature dealing with the impacts of more established forms of connectivity, such as mobile phone use. This work outlines some key processes by which internet connectivity is likely to impact firms.

Our analysis of changing connectivity draws on cross-sectoral and cross-country research conducted in Kenya and Rwanda, outlined in section three. This extensive research draws on 264 qualitative interviews and 7 focus groups in three sectors: business process outsourcing, tourism and tea production. Section four outlines our key empirical findings.

Section five details a cross-sectoral analysis. Overall, our findings show that connectivity is driving a re-orientation of value chains towards standardized flexible networks in East Africa. Digitization, digital platforms and systems integration are creating new risks for export-orientated firms related to more dynamic and competitive networks. Further, the new demands around digital integration may serve to exclude smaller firms from participation in GVC. Improved internet connectivity has allowed smaller firms and entrepreneurs to become more networked and efficient, but has often enabled only limited "thin integration" with moderate improvements in some processes but without significantly upgrading their roles in value chains.

This work thus makes an important contribution to the economic geography literature. It documents well-established trends towards fragmentation of global value chains in the Global South and highlights the role of digital technology in facilitating these processes. The paper particularly highlights the growing centrality of information flows and data in new forms of standardized and monitored products and processes, and their emergence as a key source of value within flexible GVCs. However, digital components should not be seen as purely reflecting the will of large firms, for they offer the potential for more creative and innovative uses as well.

2. Global value chains and changing connectivity

2.1. The evolution of GVCs in East Africa

In order to answer the research questions, we first build a clear picture of the contemporary structures of globalized production, and the role that globally linked East African firms play in them. As Gereffi (2014 p.10) outlines, the global economy increasingly consists "of complex and dynamic economic networks made up of inter-firm and intra-firm relationships" making the global value chain (GVC) concept a particularly useful perspective to investigate our questions around globally linked firms. GVC perspectives explore the increasingly fragmented nature of production by focusing on linkages, processes, and the trajectories of individual enterprises and products in a globalized economy. It does so by focusing on two elements –value and governance. The notion of *value* refers to an economic-focused analysis exploring where benefits are captured in fragmented processes of production (Kaplinsky & Morris 2001). The ability to capture value is seen as relational and linked to the *governance* of value chains – the ways that production activity is guided by 'lead firm(s)', which influence production patterns even without directly managing all value chain elements (Gereffi et al. 2005, Gereffi 1994).

With respect to firms involved in value chains in East Africa, the GVC literature has documented the changing nature of governance in GVCs and highlights evolving challenges. Important challenges particularly emerge from new modes of governance which simultaneously facilitate more geographically dispersed value chains, and more granular coordination and control of GVC by lead firms (Gereffi 2014).

Granular coordination and control throughout the chain is becoming increasingly embedded within requirements on products and processes, guided by lead firms in the value chain. In many GVCs, requirements come in the form of specification of standardized components (Sturgeon 2002). In addition, in sectors such as agriculture, quality and standards imply not only tight control of *products* but also of *processes* (Ouma 2010, Ponte & Gibbon 2005). Product and process requirements are often exclusionary as they can be complex and difficult for smaller firms to meet, limiting their GVC participation (Dolan 2010).

Lead firms have also expanded flexibility of GVCs through the move toward more agile and shifting networks. The terminology of "turn-key" networks was first used in the electronics sector to describe new divisions of labor in GVCs - between retail-orientated firms who innovate and interact with customers; firms whose job it is to assemble products according to strict specifications; and the range of smaller firms producing standardized components (Sturgeon 2002). Similar flexible networks have been observed in a wider set of sectors, and indicate trends in GVCs towards customer-facing actors disengaging from the complexities of value chains, and rapidly changing networks of producers driven by standardized outputs or services (Fold 2001, Lee et al. 2012, Neilson & Pritchard 2011). For smaller producers of standardized products, which are likely to be firms in lower income countries, these shifting relationships present new risks. Inconsistent demand linked to just-in-time production and the ability for lead firms to rapidly reconfigure networks when conditions become unfavorable threaten to destabilize smaller firms (ibid.).

While customers and markets can be distant to producers in East Africa, GVC governance and subsequent patterns of value capture are still impacted by changing consumer preferences and orientations. Innovation and demand at the retail end of value chains may entail new standards or induce new conditionalities on production. For example, new value added products such as food products that require cold chain storage and goods with ethical marks have led to integrated strategies and new processes within GVCs (Fold & Gough 2008, Ponte 2002). Lead firms with financial and organizational power tend to take the lead in coordinating such changes, often working with a limited set of well-connected firms in the GVC. Thus, as well as standards and quality, new customer requirements can introduce new constraints and require new investments, thereby marginalizing smaller firms that cannot comply (Fold & Gough 2008).

In sum, the literature on GVC articulates new opportunities and challenges for firms in East Africa. Dispersed global value chains appear to offer opportunities for East African firms to participate in value chains, but trends in standards and specification, flexible GVC and shifting customer demands all pose risks and high demands for firms that are part of them.

2.2. Digital connectivity and firms

Where the internet has been brought into models of globalized production within economic geography or development studies, it is often discussed in a very general sense, describing how ICTs and connectivity are important factors in supporting the fragmentation of production, but without much detail (Castells 2000, Dicken 2011, Henderson et al. 2002, Malecki & Moriset 2007). Where internet connectivity has been discussed more explicitly, it has generally been analyzed for its impacts closer to the consumer. For example, Gereffi(2001) in his exploration of the internet on GVCs tracks the rise of retail-facing intermediaries and services, and their potential to become influential lead firms in orientating value chains. He also outlines how customer facing firms drive customization of good and

services through online platforms, and thus demonstrates how changing customer demands imply shifts in value chain governance.

However, with respect to actors in low income countries, economic geographers have not systematically explored the role that internet connectivity has played in production. This lack of attention is not surprising given that internet access has up until recently been quite costly and only accessible to a few, meaning that extensive use of connectivity has tended to occur only in parts of the value chain closer to the customer (Humphrey et al. 2003, Moodley 2003). Given the relatively recent expansion of internet connectivity into East Africa, literature is limited and thus we draw on studies examining other forms of digital connectivity (particularly mobile phone connectivity) to supplement our review. This older literature helps to identify a number of potential benefits and challenges of connectivity and to consider the possible role that the internet may play in value chains.

Firm benefits of digital connectivity

In low income countries, economists and geographers have observed that small and micro-firms tend to have low levels of productivity (Liedholm & Mead 1999). However, existing research has documented how ICTs can play an important role in improving their efficiency (Aker &Mbiti, 2010). At its simplest, efficiency gains arise due to the reduced need for physical journeys to clients or customers. ICT-enabled information flows also allow firms the ability to better monitor and manage key assets and workers (Donner 2004, Esselaar et al. 2007).

Beyond such internal efficiency improvements, improved access to knowledge resources and information can be significant. Examples include improved awareness of government support, or access to new types of information, tools and customer knowledge to support market activity in specific sectors (Eggleston et al. 2002). Smaller firms may struggle to find

relevant online knowledge or struggle to interpret it correctly. Thus knowledge and information are often transmitted through direct communications such as through private mobile and email messages, which complement and strengthen existing face-to-face interactions (Donner & Escobari 2010). As these information flows become richer and as firms build stronger networks amongst themselves, ICTs can enable new creative and innovative activities amongst clusters of firms (Foster & Heeks 2013).

Another important strand of literature relates to how digital connectivity alters the interaction of small firms with markets, potentially improving access, efficiency and coordination. For instance, mobile phone use has enabled small firms greater access to markets and market information, enhancing their ability to select new markets, find customers online and integrate their businesses onto online platforms (Dangi & Singh 2010, Sarkar et al. 1995). Thus, digital platforms and marketplaces might potentially disintermediate previous market gatekeepers, and enable new types of business model and innovation at scale online (World Bank 2016a).

Whilst such research provides insight, its weakness lies in the fact that it is often focused on decontextualized firm-to-firm or firm-to-customer interactions and typically uses transaction cost models. This approach can neglect the overall structure of the value chain and particularly the role that power relations play in governance, and therefore paint an incomplete picture of the impact of connectivity.

Exclusionary aspects of digital connectivity

Due to improving connectivity and lowering costs, small firms are willing to invest in ICTs and internet access (Esselaar et al. 2007). However, as highlighted in the digital divide literature, marginal individuals and firms may still use the internet only in quite limited ways (James 2013). Limitations emerge from a range of factors including lack of human or

financial resources poor digital skills and costs to full online engagement (Jung et al. 2001); social inequalities that amplify online inequality (Warschauer 2003); and the fact that applications and platforms do not fit the needs of marginal groups (Van Dijk 2005). In recent studies on smaller firms in lower income countries, these additional aspects of the digital divide that move beyond access have been seen as crucial (Graham 2014, Kumar 2014).

Implicit in a number of these more critical studies on the digital divide is the idea that the impact of digital connectivity may not benefit all, but rather ICTs can become a source of power and control between different types of firms. More powerful firms may restrict digital access to smaller firms, or digital systems may be created in a way that they are only useful for certain actors or processes (Carmody 2012, Murphy & Carmody 2015). Whilst connectivity enables links between firms, weaker firms can also be pulled into subservient relationships within such networks and be subject to economic downgrading and de-skilling rather than to digital empowerment (Molla & Heeks 2007, Murphy et al. 2014, Murphy & Carmody, 2015: 20).

In sum, critical literature on digital connectivity in lower income countries suggests that connectivity does not necessarily solve digital exclusions. Moreover, more connectivity might empower stronger firms in relation to weaker ones, and might therefore be exclusionary (Foster & Graham 2016).

2.3. Summary

The literature review has highlighted that lead firms within GVCs are moving towards stricter requirements and flexible networks. Thus, a key focus will be to explore the role that digital information flows play in these processes. We have identified trends that are potentially leading to more exclusionary conditions for small producers in lower income countries. Improved internet connectivity might potentially accelerate, or provide workarounds to

exclusions. The goal is to make a cross-sectoral analysis of internet connectivity that will move beyond previous sporadic studies of internet impact within firms to provide more generalized insights for practice and policy.

3. Approach

As outlined in the literature review, impacts of connectivity are likely to be shaped by the characteristics of the specific sectoral value chain within which firms participate. We thus take the global value chain as the scope of the study, comparing and contrasting across different sectors. However, critiques suggest GVC studies often underplay the richness that backwards linkages, policy and local conditions play in value chain activity (Coe et al. 2008). Intuitively, such considerations are likely to be especially important with regards to small enterprises and producers, where the intersection of firm activity, internet connectivity and value chain participation is more complex (Fold 2014). Thus, this paper particularly emphasizes the local institutional and policy contexts and their alignment with GVCs. This approach complements others that draw on notions such as *regional coupling*, *embeddedness*, *disarticulations* and *social upgrading*, which have been used to more richly explore the activities of marginal actors and firms in studies of global value chains (Bair & Werner 2011, Barrientos et al. 2011, Fold 2014, Murphy & Carmody 2015).

We draw on extensive research undertaken in East Africa over the period 2010-2014 in two countries, Kenya and Rwanda. The duration of the research coincided with the period following the landing of the first three submarine fiber-optic cables in the region, and consequently there was a significant change in the availability, cost and quality of digital connectivity (Sprague et al. 2014). In Kenya, internet access[1] rose from 10% in 2009 to

[1] Access data includes those who have access to internet directly and indirectly (i.e. through family members and cybercafés), based on national household surveys (World Bank 2016b).

220 43.4% in 2014 (World Bank 2016b). In Rwanda, official figures of growth have been more modest moving from 7.7% in 2009 to 10.6% in 2014 (ibid.), but access may be significantly higher in reality[2]. In addition to their similar experiences with changed connectivity, Kenya and Rwanda are both countries where internet connectivity was explicitly part of core government economic transformation strategies (c.f. GoK 2007, GoR 2009).

225 Within these countries, we selected three economic sectors to explore. We focused on export-orientated sectors that make (or are predicted to make) significant contributions to national economies to ensure that we were researching sectors relevant to the country's economies. Sector selection additionally aimed to explore sectors with contrasting value chains in order to support more generalized conclusions.

230 We chose to include two established sectors: tea production, the biggest commodity source of export income in both countries with a well-established GVC; and tourism, a service sector which is a significant source of jobs and income, and seen as a growth area for the future. As can be seen in Table 1, both sectors make a large contribution to exports in East Africa and are thus considered key sectors in the two countries. Moreover, given the comparative low

235 global share in these sectors, small changes in global share could have significant impacts. In addition to tea and tourism, we also chose to examine a new sector: the business process outsourcing and IT-enabled services sector (BPO/ITES), a sector that has been actively promoted by both governments related to the expansion of regional connectivity.

	Kenya		**Rwanda**	
	Sectoral share of national exports (%)	**Sectoral share of global market (%)**	**Sectoral share of national exports (%)**	**Sectoral share of global market (%)**
Tea sector (by $	23	16.1	17	0.8

[2] Discussions with Rwandan policy makers reveals that access data has not been officially collected since 2010, and thus new growth has not been factored in, as highlighted by a recent estimate of internet users by one Rwanda mobile operators at 19% (NISR 2014)

sales)				
Tourism sector (by receipts)	19	2.4	28	0.8
BPO/ITES sector	Not collected	<0.1%	Not collected	<0.1%

Table 1: Share of national and global exports.
Source: Based on (FAO 2013, UN-COMTRADE 2017, WTTC 2013)[3]

In each sector, we mapped actors within each network and selected a sample of interviewees that would allow us to understand the perspective of different actors within each value chain and thus help us to build a substantive picture of activities and inter-connectedness (see Figure 1- Figure 3 in our analysis). As outlined above, we weighted our interview samples towards SMEs and entrepreneurs in Kenya and Rwanda (such as tea farming groups and 'factories', local tour operators and local BPO firms) in order to more clearly understand those smaller and emerging indigenous firms. We also included local sectoral support, policy makers and key institutions within our sample. This sample was supported with an analysis of the intermediaries, buyers or retailers in consuming countries in GVC that could be traced back to East Africa.

The research was based on 264 qualitative semi-structured interviews. Interviews were in-depth and looked to qualitatively understand the sometimes subtle nature of power and control in GVC. Interviews focused on core themes[4] but were open-ended to allow flexibility. We also undertook 11 focus groups at two stages (mid-project and end of the project) to verify our findings with interviewees and sectoral experts. Consequently, through intensive, cross-sectoral research, our research provides a substantive qualitative description of the changes in each sector, where the selection and sampling approach supports generalizability.

[3] Figures based upon 2013 reporting. Tourism exports denote tourism receipts which are classed as an export in world trade statistics. BPO/ITES data is not collected as yet in these countries, but as an emerging industry is likely to be a small contribution at present.

[4] In line with the research questions, our themes looked to explore how digital connectivity had changed firms, if improved connectivity had changed how firms engaged in production internationally and how firms interacted with other firms.

Sector	Kenya	Rwanda	Total	Breakdown *(see sectoral GVC diagrams for details[5])*
Tea	38 (2)	37 (2)	75	Coops (17), Processors(25), Private Factory Owners (4), Brokers(5), Warehouses (5), Buyers(6), Sectoral actors (13)
Tourism	38 (2)	49 (2)	87	Sights & attractions (7), Local services (8), Hotels (11), Tour operator (inbound) (27), Travel agent (14), Tour operator (outbound) (12), Sectoral actors (8)
BPO/ITES[6]	49 (2)	53 (1)	102	Policy (7), Local firms (61), Firm Outsourcers (9), Consultants (6), Sectoral support & infrastructure (19)
Total	125	139	264	

Table 2: Interviews (and focus groups in brackets), broken down by sector, country and role in value chain

The empirical material was analyzed using Nvivo 9 qualitative software for code-based searching and reporting (Gahan & Hannibal 1998, Van Hoven & Poelman 2003). A pre-defined set of themes was coded to explicitly explore some of the issues discussed in the literature review. Additionally, new themes also emerged during the coding process, which allowed more grounded influence of empirical research on findings. Emerging themes were subsequently examined in more detail, with some integrated into the core analysis, and others deemed outside the core scope of research[7]. Coding thus followed well-established techniques of content analysis, which allow interpretations of relations between categories and emergent themes (Krippendorff 2012, Lutz & Collins 1993, Slater 1998).

Elsewhere we have gone into richer detail around the specific outcomes in the three sectors, and their sectoral policy implications (Foster & Graham 2015a, Foster & Graham 2015b, Graham & Mann 2013, Mann et al. 2015, Mann & Graham 2016, Waema & Katua 2014). Here we present summaries of these sectors in order to answer our broader research question about the cross-sectoral impacts of connectivity on GVCs. In section four, we outline key

[5] Some actors can play multiple roles in the value chain. Here we classify them by their principal role

[6] As will be outlined in more detail in section 4, we found the BPO sectors to be small, particularly in Rwanda where only a few firms existed. We thus also interviewed those providing IT-enabled services in the countries (such as local bill payment and application providers). Many of these firms had previously been involved (or have seriously considering entering) into the BPO space and thus this additional data provided insights into the failures of the sector to have significant impact.

[7] For instance, emergent coding of discussions around firms in the tea sector highlighted 'data access' as a crucial elements of inclusion and exclusion that are discussed in more detail in the next section.

findings in each sector, with section five subsequently highlighting cross-cutting findings that link back to the literature.

4. Analyzing changing connectivity

4.1. Tea sector

Whilst the adoption of the internet was rare amongst marginal actors in the East African tea sector (with, for example, very low internet use among tea growers), we found that key local firms involved in processing and trade were adopting higher speed internet connections and were consequently adding to flows of digital data in the value chain. New flows included data around tea processing (sharing tea quality, weights, batches), tea trading (sharing auction lots, prices, market information) and tea logistics (sharing location data). However, whilst ICTs were increasingly recording and transmitting tea production activities, the benefits tended to accrue to the larger tea firms that coordinate the value chain.

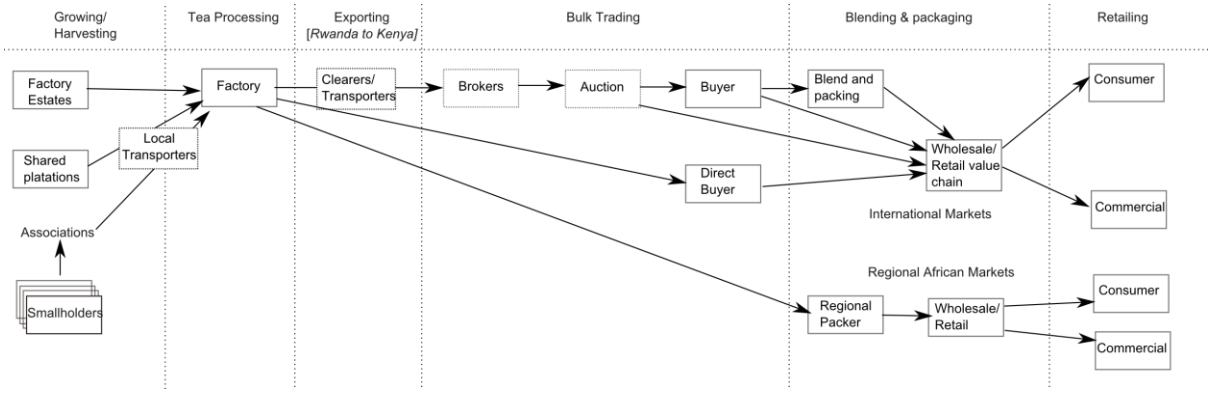

Figure 1: Processes and actors in the value chain for tea[8]

Tea value chain are rapidly evolving in the region, and control over digital data is increasingly crucial to these changes. Firstly, the tea sector has recently been privatized in Kenya and Rwanda, where private firms are often owned by subsidiaries of multinational tea

[8] Note that there are some differences between the Kenyan and Rwandan cases, particularly around relationships between growing/harvesting and tea processing actors. This diagram integrates some typical scenarios.

firms. With the private sector focus, there is demand for data for improved planning and management. Internet connectivity thus enables tea firms to more efficiently organize logistics and share data about the availability of processed tea to buyers at the retail end of the value chain (as shown on the right in Figure 1).

Secondly, there is growing demand in the tea retail market for differentiated products - environmental, fair trade or quality teas (Ponte 2002). Crucial to the value-add of these products is the 'traceability' of tea, the ability to guarantee that tea batches have satisfied conditions around location, food safety, chemical use, fair labor, etc. Data is thus in demand because it is integral to these value-added products.

Therefore, digital data flows have been particularly harnessed by multinationals to allow integrated analysis of tea production across multiple locations, by digitizing tea data from smaller and local tea processing sites to the internet (on the left of Figure 1) and integrating factory data with auction, shipping and logistics data through firm information systems (the intermediary firms in Figure 1). For instance, the manager of a firm in Kigali, Rwanda whose firm owned four tea factories, highlighted how reliable internet has facilitated new data flows and improved monitoring of tea.

> *"[W]e have been able to achieve a lot of efficiencies, like we have integrated our ERP [Enterprise Resource Planning System[9]] ... so once the factory dispatches ... they are able to see it when it reaches Mombasa [port] ... I think that kind of integration has brought efficiencies."*

Such digital integration has supported the trend of improved control of value chain by lead firms. Digital flows are also support the movement of innovation away from the fields and processing facilities in rural Rwanda and Kenya towards head offices in Mombasa, India and the US. For example, value-added teas while embedded in the processes and data produced in East Africa, come into being during the blending process. It is here that standardized

[9] ERP is a type of IT system that allows operational management and planning based upon production data.

components are combined and configured by retail firms, supported by full chain traceability data.

Smallholder farmers and their associations[10] were demanding more data in the tea sector. Tea privatization policies and a move to market orientation were leading to demand for information such as tea auction prices and tea growing knowledge. This information could allow them to increase prices and yields. Smallholder associations now have mobile internet access, and thus they might serve as a conduit for information for farmers. However, many still struggled to access data: some complained that they did not know where to look (but were aware that useful information was available online), others complained that other value chain actors upchain were not sharing access to key information systems with them, and some found it difficult to search for information in English.

In sum, more reliable and cheaper internet access has facilitated increased flows of digital data. But new digitalization is typically allowing GVCs to be more flexible, and strengthening the management of the value chains. Where data flows integrate smaller firms in the region, without wider attempts investments in upgrading (such as improved cooperatives and control of processing) gains from digital integration are captured elsewhere.

4.2. Tourism sector

In tourism, improved internet connectivity makes it possible for East African firms to better integrate with international tourism sites and services. We found that connectivity was enabling a number of firms to integrate with online services (e.g. online travel booking, online payments), to transmit tourism management data (e.g. booking availability, service information) and to use online resources to improve their visibility to customers (e.g. social media, websites). Through such resources, East African firms' could better reach

[10] Typically co-operatives that serve to facilitate and support smallholder activities

international customers and build stronger links up the value chain to international tour operators. However, there were technical barriers particularly for small firms in the region. Many local firms had some form of internet connection, but improvements were mainly restricted to small-scale efficiency gains in everyday communication (e.g. email communication, sending of photos) and gathering information online (e.g. flights, hotel costs).

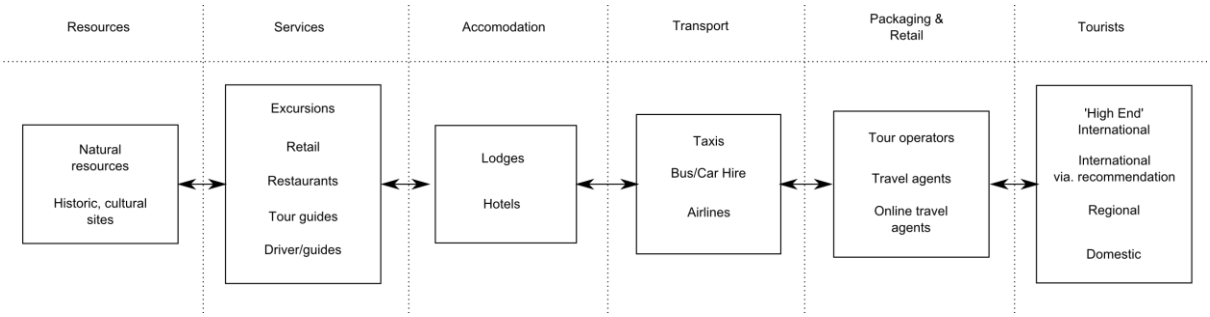

Figure 2: Processes and actors in the value chain for tourism.

In tourism in the region, the service value chain is composed of multiple local tourism services and sights that are packaged together, often by international tour operators. As shown in Figure 2, actors on the right such as international tour operators, domestic tour operators and travel agents do the work of 'packaging' a bundle of services together such as hotels, transport and tours (Christian 2012, Doerry 2008). In recent years, value chains are changing in that customers, or international tour operators are increasingly seeking to more dynamically package tour packages according to needs of specific customers.

A key driver of this more dynamic packaging is online data flows, which allows customers or upchain firms to quickly view availability, prices, and facilities and make bookings and payments for a range of sights, services and accommodation. There has been growing discussion around how smaller service providers and firms might be integrated into tourism value chains to support stronger development impacts(Mitchell 2012). One potential way of supporting this is through integration of East African firms into online tourist websites and

services, which might allow more local service providers (often small firms) the ability to better attract international customers. Yet, such integration was found mainly in more established firms, and mainly in Kenya.

For domestic firms previously heavily involved in local tourism logistics, the presence of online integration was pushing them out of GVCs rather than integrating them. With digitization, international firms can now organize, schedule or book online from afar, as described by one UK based tour operator.

> *"... [previously to organise a tour] for each one of the places, then someone gets on the phone and books those places. Now obviously with technology that's changing a bit. Sometimes where there is a lot of fiddly stuff for us, a ground handler and DMC [domestic tour firms] works ... but that's relatively unusual for us".*

For smaller service providers in the tourism sector digital integration was limited by the technical skills and managerial requirements of system integration. While online travel agents (OTA) (i.e. online booking such as Expedia, Kiyak, Hotels.com) are growing in popularity in the region, they require firms to adopt internal booking systems and coherent booking management. Even medium-sized hotels with higher speed internet might not have appropriate systems in place to integrate (for example, booking in such hotels may still be based on a paper diary or custom excel spreadsheets). Even in cases when small hotels are able to link with OTAs, they struggle with inconsistent bookings and the demands of being part of the OTA.

More optimistic findings emerged from cases where local firms focused on niche markets or embraced new markets of tourism (e.g. regional tourism, emerging market tourists). For niche firms, even building basic online resources could provide an important avenue for discovery by customers when their strategies were novel. For instance, we found small but successful tour operators offering sports, community tourism, niche wildlife and eco-tourism that were reporting significant proportions of new customers and contacts through their online

presence. Typically customers would gather information about niche activities from web searches and social media recommendations. Information gathering could result in email or telephone conversations, which in turn could lead to customers making further arrangements, reservations and/or payments for activities.

In sum, all firms felt that internet connectivity had provided efficiency gains and access to more information. However, the expected integration into online platforms was beyond the ability of many firms. Unlike the tea sector, barriers to entry and upgrading are lower in tourism, and there is room for innovative tourism entrepreneurs to use online resources to reach international customers, albeit at a relatively modest scale.

4.3. BPO/ITES sector

BPO/ITES has been identified as a potential growth area for the region. In both countries, ITES firms had good internet connectivity, particularly when located in urban zones with dedicated fiber links designed to support the communication needs of BPO and IT firms.

However, despite substantial national investment, strong government support and reams of positive media publicity, we found a small and shrinking number of locally owned, export-oriented firms in Kenya and virtually no dedicated BPO firms in Rwanda. At present, many Kenyan firms were engaged in low-value work and some were struggling for financial survival. In Rwanda, only a handful of firms were carrying out export-oriented service provision but in very niche sectors like computer-aided design engineering or accountancy. Where firms have survived, they have struggled to build direct relationships with international clients and have instead relied upon a wide range of different intermediaries to access clients as highlighted in the emerging value chain in Figure 3.

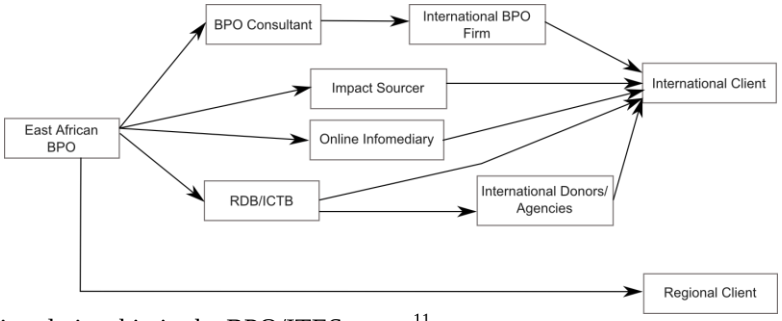

Figure 3: Value chain relationship in the BPO/ITES sector[11]

Historically, BPO work has been facilitated through direct relationships between an international client and outsourcing firm. This relationship is, however, evolving as large BPO firms, consultants and online platforms facilitate further outsourcing work to smaller suppliers. Some Kenyan firms have been a recipient of such outsourcing, particularly in the case of online platforms, used by small firms to access digital work - such as guru.com, eLance and oDesk. Although firms could gain access to direct inflows of international work from such platforms, the nature of work was short term and low value.

Higher value contracts requiring more interaction with clients tended to occur through direct relationships. In Kenya, the main limitation was a lack of management capacity to undertake high-quality outsourcing work particularly in terms of quality control and sufficient scaling. For example, an interviewee from Kenya who was considering bankruptcy described his problem in achieving scale

> *"[W]e approached a few people from [established BPO firms] and they told us that [they] have 100 people at daytime and 100 people at night. Here we are trying eight people in daytime and four at night…We don't have the scale…"*

In light of the difficulties of accessing high value, international work, some BPO firms have looked towards the local market. In Kenya, most of the interviewed firms were now mainly dependent on domestic clients. Local work opportunities are particularly attractive because Kenyan firms can have direct interaction with clients and are thus less dependent on

[11] RDB is the Rwandan Development Board and ICTB is the Kenyan ICT Board. Both have attracted international clients for BPO firms.

intermediaries. Local relationships with Kenyan firms also made domestic BPO firms more competitive in relation to foreign incumbents (Mann & Graham 2016).

In sum, on the surface BPO seemed to offer prospects for East African firms. The digital nature of work and lower labor costs of the region offer the possibility that with fibre connectivity the East African BPO sector would rapidly emerge, and engage in international BPO activities. However, in practice, policymakers and firms were struggling to build a strong position for themselves in GVCs, particularly in Rwanda. Kenya was somewhat successfully integrating into emerging value chains by sourcing low-value work from platforms and intermediaries. Yet in the sporadic cases where BPO sector firms have been able to be more successful, opportunity has come through developing a niche focus such as local markets and/or software.

5. The Uneven Impact of changing connectivity

5.1. Connectivity and changing value chains

Changing connectivity has led to three key trends in value chains. Firstly, digital data is becoming a crucial aspect in facilitating more discrete, standardized value chains in East Africa. Secondly, more dynamic GVC are particularly supported by online systems and platforms. Thirdly, customer needs and orientations have had an impact on how value chains products and processes are constituted, and these are often data led. We outline these trends in detail below.

Where East Africa firms are part of value chains, GVC are marked by a move towards discrete production into standardized ‘chunks’. Digitization of value chains strengthens these trends as legible data allows improved management and monitoring of GVC (i.e. tea batches and standards, discrete outsourcing tasks). In East Africa, tighter specification of goods and processes has occurred alongside shifts from previous intensive regional coordination (i.e. tea

boards in tea or inbound tourism firms) to standardized components or goods. Digital platforms and information systems were enabling more arm's length interaction in value chains, reducing the need for regional coordination.

In hand with digitization, the growing digital information flows have affected the nature of value chain governance. In all three sectors, digital integration through online platforms and information systems is contributing to greater flexibility for lead firms in the suppliers of goods and services. In more advanced examples, such as online BPO platforms and online tourism, this supports lead firms and clients in the ability to rapidly switch across equivalent goods or services in different locations aided by digital systems.

New consumer innovations in these sectors such as customized tourism or ethical teas have had impacts on GVCs in East Africa. These innovations often depend on digital data flows. However, innovation and subsequent value capture tend to accrue to lead firms who were able to use digital data to support them in building and market products, far away from the producers.

In sum, changing internet connectivity has played an important role in changing the nature of GVCs in East Africa, moving towards flexible networks. Indeed, our evidence suggests that while ideas of flexible or "turn-key" networks have been discussed in the literature, these are only emerging in East Africa as a consequence of connectivity in the region. As flexible networks become more established, digitally integration will no longer be optional, and will rather become a core aspect of value chain integration.

5.2. Challenges for smaller firms in East Africa

East African firms seeking out international markets and trade have turned to the internet to aid them. Our research found that connectivity has supported efficiency gains and enhanced communication in and amongst firms. Previously marginal firms have begun to use simple

tools such as email and excel spreadsheets and in all sectors, firms were increasingly using web searching for information to build knowledge and facilitate online support among employees. Such activities highlight a rich set of often creative activities that allow these firms to better integrate into networks of knowledge and improve their practices over time (Grant 2015). However, in general though we argue that findings align with the concept of 'thin integration' discussed in Murphy & Carmody's (2015) key work on ICTs in Africa. Firms in the region do integrate, and make some small gains in terms of improved communication and productivity, but overall these forms of integration do not significantly challenge the status quo nor allow for substantive economic transformation. Digital integration is likely to only be beneficial to firms where it compliments broader investments and upgrading initiatives.

Indeed, trends towards more standardization products and flexible GVC were often exclusionary for small firms. For instance, not all tea producers or BPO producers are able to meet export standards and requirements and hence participation in GVC may not be possible for them. Our work provides additional insights that digital integration can become an additional exclusionary barrier to GVC entry. Exclusionary digital barriers were akin to those from the digital divide literature. Internet access is now viable for small firms, but a wider set of capacities (i.e. skills, finance, systems) digitally excludes them from playing a more substantial role in GVC (Van Dijk 2005, Warschauer 2003).

Even when firms were able to digitally integrate, more flexible GVC, driven in part by the emergence of platforms and information systems entailed reduced profits amongst by East African actors as their goods and services are more easily replaced. In more flexible GVC lead firms might move to alternative suppliers when unfavorable conditions emerged.

As outlined previously, in flexible GVCs, innovation often results from the ways in which lead firms combine goods or services. In some cases such as the tourism sector, lead firms

cannot cater for all types of customers and customer needs. Here there was an opportunity for smaller firms. In niche areas (such as niche tourism or local BPO work) domestic firms could innovate in products and create new informal linkages built on digital resources. Such innovative activity could allow smaller firms to establish themselves with relatively novel products or new consumers, where competitive pressures from conventional GVCs were weaker.

6. Conclusion

This paper has set out to explore the role that changing internet connectivity has had on GVCs in East Africa, drawing on work in three sectors of production. Digitalization, online information systems and/or platform integration are key drivers of standardized goods and services, and can enhance the ability for lead firm(s) to implement more flexible 'turn-key' GVCs involving actors in lower income countries, with management and control from afar.

For East African firms, standardized and flexible GVC leads to potentially increasing marginalization, and new risks. For those able to connect, online intermediaries - systems integration and online platforms - are accelerating the granular management and dynamic switching of value chains. In sectors like tourism this changing form of value chain governance has led to significant risks for firms in terms of less stable business and higher competition in broader markets. For smaller firms, barriers to GVC participation outlined in the literature such as standards and product quality are heightened by digital integration requirements, beyond the skills and capabilities of such firms.

Thus, the expected core benefits of internet connectivity - global access to markets and knowledge - have not greatly benefitted firms in East Africa. Improving connectivity has generally resulted in 'thin integration', through which small firms tend to make small communication and productivity improvements without more substantial upgrading.

Exceptions to this pattern are firms who have been able to develop niches and build novel markets that conventional GVC struggle to serve. Such a finding suggests that improved connectivity works as a complement to creativity and local knowledge (Adelman 1984).

These findings have implications for how the regions' policy makers consider opportunities for firms. The impact of connectivity will not come from solely 'plugging' the region into better connectivity. Connectivity is only one step in achieving economic benefits. The focus must shift away from seeing connectivity as an end in itself and move towards to a better understanding about the role that new digital resources plays in re-orientating the value chains that are central to export-orientated activities in East Africa. Barriers for East African firms, come not only in the lack of digital access but also in the digital skills and resources they have. Moreover, value capture and governance are increasingly entwined with the digital. It is, therefore, important to also explore who exerts control over the digital and how governance might change. Thus, researchers must endeavor to play closer consideration to prevalent forms of codification, digitization and access to digital resources, in order to better understand the limitations of digital integration and how firms operating on the margins of the global economy might use digital technologies to capture more value.

Examples of more favorable conditions have also emerged in instances where firms have been able to access and use the internet for establishing new competitive advantages and niches. Thus, rather than looking at digital connectivity as the means to compete within already established GVC, East African firms may want to identify their competitive advantages, and concequently re-think how connectivity might enhance these advantages.

For economic geography, this work poses a challenge to better explore changing relations of economic production in low income countries. Our work attempts to concentrate scholarly attention over who exerts control over the digital within core economic geography debates around governance, upgrading and value in GVC analysis. As ever more people and firms

connect to the internet, these questions will become more and more important in the years to come.

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