

# Digitalization of Value Chains in Apparel Industry: Implications for SMEs and Startups

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**Digitalization of Value Chains in Apparel Industry:  
Implications for Small and Medium-Sized Enterprises  
and Startups**

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## **Abstract**

The paper examines how digitalization affects global value chain. By using empirical evidence at firm level, the paper elaborates the value chain digitalization process in the apparel industry. It is found that the digitalization of value chain usually originated in downstream stages where platforms emerge, disrupt, and replace traditional retailers; and traditional distributional channels, such as department stores and mass merchandise stores, are replaced by online marketplaces and e-commerce platforms. This type of value chain digitalization, or e-commerce, may be called a mode of (a partial) platform digitalization. In this mode, manufacturers still own, design, and make production decisions, whereas the apparel products are now digitally distributed through e-commerce platforms and thus traditional methods of distribution, such as department stores and mass merchandise store, are bypassed. In other words, the value chain is becoming flattened, and customers can now purchase apparel products at their homes within several clicks. This transformation of global value chain digitalization may have the opposite implications for the small and medium-sized enterprises and start-up manufacturers. On the positive side, the platforms' incorporation lowers customer acquisition cost and results in a higher level of labor productivity. On the negative side, firms have to pay a significant amount of money to platform owners through platform provider fee. Further, there could be asymmetric impacts on small and medium-sized enterprises and start-ups and old and incumbent firms, as the latter firms face trade-off between revenue (and customer) growth and profitability. Another, a full range mode of digitalization is also possible and observed, which involves the rise of platform owners as direct brand managers and designers. In this mode, platforms are trying to go beyond the primary role of a two-sided marketplace to penetrate deeper into higher value-added stages of designs and/or brands. These cases may lead to the emergence of new hybrid firms which have profound economic consequences.

## **JEL Codes**

F23, O33

## **Keywords**

digitalization, platform provider fee, value chain, upgrading, apparel

## I. INTRODUCTION

Global value chain (GVC) is a dominant feature of the global economy, and it is one of the topics that is widely discussed in the literature. Investigating GVCs unveils the picture of global production network as well as sheds light on the value creation process. As participation in GVC is proved to promote economic growth, support job creation, and enhance firms' performance (UNCTAD 2013; OECD 2013; WTO 2019), understanding dynamics in GVC and enhancing the readiness level to cope with changes in GVC, especially after the coronavirus disease (COVID-19) pandemic, are critical for any country and organization. This study aims to improve our understanding of the digitalization process in GVC, one of the four major trends which are reshaping the GVC (Brun et al. 2017).

Digitalization is a concept that is closely related to currently well-heard terms, such as digital economy or industry 4.0 or the fourth industrialization revolution (4IR). Different organizations and scholars have different definitions and understandings about the term. The notion "The 4th Industrial Revolution" was first used by Schwab at the 2016 World Economic Forum in Geneva. According to him, 4IR is powered by the newest technologies such as 3D-printing, Big data or artificial intelligence (AI). It differs from the first three industrial revolutions in which mechanization, electricity, and information and communication technology (ICT), in orderly, are the main drivers of industrial changes (Davis 2016; Schwab 2016). Rüßmann et al. (2015) identify nine key technologies that power the industry 4.0 including autonomous robot, simulation, horizontal and vertical system integration, the industrial Internet of Things (IoT), cybersecurity, the cloud, additive manufacturing, augmented reality, and big data and analytics.

UNCTAD (2017b), with a slight difference, defines industry 4.0 as a "platform-based ecosystem of ICT-based products and services". Platforms in UNCTAD's definition is further explored in Gawer and Cusumano (2014). In their paper, Gawer and Cusumano (2014) categorize platforms in two different kinds: internal platforms and external platforms. Internal platforms (company or product platforms) are defined as "a set of assets organized in a common structure from which a company can efficiently develop and produce a stream of derivative products" while external platforms (or industry platforms) are products, services, or technologies that provide the foundation as a business ecosystem for external innovators to develop their own products, services, or technologies. Examples of typical external platforms are Amazon, Apple App Store, Google Cloud, Uber, and WeWork.

In this paper, the concept GVC digitalization is understood first in terms of that in Mussomeli et al. (2016), which is "the use of advanced data analytical tools and physical technologies to improve the digital connectivity and technological capabilities of supply chains". Following the definition, there are three key characteristics that differentiate a digitalized GVC from the traditional one.

The first one is that parts of the value chain are digitally conducted. Examples include online shopping in downstream stages, e-auctions among suppliers in upstream stages, and the digital automation of plant operations in internal production stages (UNCTAD 2017b). The second

distinction of the digitalized GVC is the involvements of platforms in the value chain. Platforms like Apple Play Store, Amazon, and Alibaba, with superiority in technology capabilities, are penetrating into the value chain and disrupting traditional business models. It is not surprising that platforms are increasingly capturing more value from the GVC.

For instance, in the video game industry, despite the fact that gaming is not Apple and Google's core business, the two companies ranked fourth and sixth, respectively, in the top 25 largest public companies by game revenues in 2018 (Newzoo 2018b). In the apparel industry, being very similar, Morgan Stanley Research estimates that Amazon just became the number two apparel retailer and will soon become the number one in the United States market (CNBC 2018). Summarizing the power of platforms in the world economy, Kenney and Zysman (2016) simply stated that "we are in the midst of a reorganization of our economy in which the platform owners are seemingly developing power that may be even more formidable than was that of the factory owners in the early industrial revolution".

The final characteristic of a digitalized GVC is the data-driven value chain: Information from different sources and locations are incorporated to derive production decisions. A typical example of the data-driven value chain can be found in Indonesian aquaculture sector where eFishey, a successful start-up which was founded in 2013, develops sensors-based IoT applications that track fish behaviors data, which is utilized to analyze fish behaviors and improve feeding performance.<sup>1</sup> The booming of these similar IoT platforms and start-ups that focus on data collection is the key to the evolvments of the digitalized GVC (UNCTAD 2017b).

Currently, shifting to digitalization is observed globally in many countries, industries, and organizations. Taking the United State as an example, the Bureau of Economic Analysis estimates that the digital economy accounted for 6.9% (\$1,351.3 billion) of United State gross domestic product in 2017. Digital transformation also added billions of value to many United States industries in 2018. The industries that have the highest number of value-added by digitalization are (i) broadcasting and telecommunications (\$424.4 billion); (ii) computer systems design and related services (\$328.2 billion); (iii) data processing, internet publishing, and other information services (\$187.6 billion); (iv) publishing industries (\$179.5 billion); (v) computer and electronic products (\$149.7 billion); and (vi) retail trade (\$87.5 billion). As a result, the value chain is increasingly digitalized and this phenomenon raises a fundamental question of the worth of such transformation: Is the digitalization of GVC good or bad?

One of the first papers that looks at the impacts of GVC digitalization is the research of Mussomeli, Gish, and Laaper (2016). In their paper, they elaborate on how the usage of the latest technologies can transform the traditional linear GVCs to a more open and interconnected system. They also emphasize on the positive impact of a digitalized GVC because the collection of information from different sources and locations can be utilized to derive better production decisions. UNCTAD (2017a) also points out that digitalization can have massive and positive impacts on all stages of

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<sup>1</sup> From eFishery's website. <https://efishery.com/en/home/> (accessed 10 June 2019).

value chain, including upstream stages, internal production process, downstream stages, and end-to-end process.

Regarding the economic impact of e-commerce and online trading—a special form of value chain digitalization that is introduced in section II (platform digitalization)—there is some evidences that an engagement on online business can increase the amount of value-added to retail companies (Xia and Zhang 2010), enhance the efficiency of manufacturing firms (Quiros Romero and Rodriguez 2010), and boost firms' productivity in Taipei, China (Liu et al. 2013) and in Europe (UNCTAD 2015). While much of the literature has been focusing on the positive side of digitalization transformation, some scholars also have pointed out the negative aspect of a digitalized value chain. For instance, Kenney and Zysman (2016) raise several concerns about the dependence on platforms, the economics relation between platforms and their partners (gig employment), and the legal and institutional framework to regulate the “platform economy”. Foster and Graham (2015) also are concerned that small and medium-sized enterprises (SMEs) might find it difficult and challenging to adopt digitalization as many of them lack the sufficient capabilities to adopt sophisticated technologies and necessary requirements.

By using empirical evidence at firm level, this paper takes SME manufacturers' point of view and discusses the issue to the benefits and costs of value chain digitalization in apparel industry. The main research question in the paper is: “Is the digitalization of GVC good or bad for manufacturers?”. Because of the broad range of impacts of digitalization on value chain, which is mentioned earlier in the research of UNCTAD (2017a), the paper focuses on the internal production and downstream stages, and it also discusses some variations.

In this paper, answering this question involves two dimensions. First, the paper elaborates the economic consequences of GVC digitalization. Being different from the literature that focuses on positive impacts of the GVC digitalization, the paper looks at both positive and negative sides. On the positive side, the paper measures how a partnership with platforms can enhance labor productivity by lowering customer acquisition costs. On the negative side, the paper quantifies the magnitude of the platform provider fee, a fee that manufacturers have to pay to platform providers to be included and to be able to appear in their platforms. Platform provider fee is a very new component in the digitalized GVC compared to a conventional one. To the best of our knowledge, this is the first paper that measures such fee in the apparel industry.

Second, by employing GVC perspective, the paper tries to see whether the digitalization of GVC has any implications to the two fundamental problems in any GVC research: governance issues and upgrading possibility (Gerrafi 2019). Regarding governance issues, the paper figures out the bargaining power between manufacturers and platform owners primarily through the ability to negotiate favorable partnership contracts and related terms, especially, about the platform provider fee. Regarding upgrading possibility, the critical question which is addressed in the paper is whether the digitalization becomes an additional barrier or will it serve as a window of opportunity for companies in the process of moving up the value chain.

The remaining parts of the paper are organized as follows: Section II provides three modes of GVC digitalization and their economic consequences. Section III discusses the process of GVC digitalization in the apparel industry, focusing on mode 1, platform digitalization. Section IV discusses the case of full-range digitalization where GVC digitalization may turn platforms into new competitors who directly compete with incumbent brands and manufacturers. Section V concludes and discusses some policy implications.

## **II. MODES OF GLOBAL VALUE CHAIN DIGITALIZATION AND THEIR ECONOMIC CONSEQUENCES**

UNCTAD (2017a) classified three kinds of digitalization in GVCs: thin integration, platform digitalization, and full digitalization. Although UNCTAD's classification is only applied to micro, small, and medium-sized enterprises (MSMEs), this classification can also be expanded to any firms, regardless of their sizes.

### **A. Mode 1: Thin Integration**

The first mode of GVC digitalization is “thin integration” or “thintegration”. This notion comes from the work of Murphy and Carmody (2015). It is the simplest level of value chain digitalization and mostly used by MSMEs. In this form, small firms start incorporating ICTs to their businesses. Using digital technologies helps to improve cooperation effectiveness in the chain. However, it does not affect the fundamental structure of the chain in a sense that there is no significant change in both aspects: the role of firms in the chain and the amount of value captured by these firms.

This level is prevalent in low-income and middle-income countries where the development of advanced ICTs is quite limited<sup>2</sup> and MSMEs are resource-constrained.<sup>3</sup> The ICTs used in this level are usually cheap and simple, such as the emails, smartphones, fax, postal box, intranet/extranet, and informational websites. McNamara (2008) finds evidence that some small apparel Chinese firms used emails to receive orders and communicate with their trading partners. By conducting a survey in Nigeria, Apulu et al. (2011) figure out that more than half of 66 SMEs considered in the research are using applications such as mobile phones and telephones, broadband, fax, intranet, and LAN for communication purposes. The usage of more sophisticated technologies such as commercial websites is also found in the paper, although it is only applicable to 2% of the total number of SMEs considered. These findings are also consistent with what in Esselaar et al. (2007)—a research that covers nearly 3,700 SMEs in 14 African countries. Esselaar et al. (2007) suggest that SMEs mainly use ICTs in six forms: mobile phones, telephones, fax machines, post boxes, computers, and internet connection.

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<sup>2</sup> Ihua (2009), Terero and von Braun (2005), and Weiner and Rumiany (2007).

<sup>3</sup> Computer is too expensive is the reason that 45% of SMEs state why they do not have a computer (Esselaar et al. 2007). Ashrafi and Murtaza (2008) found that more than 70% of 51 Oman SMEs considered in their research spend less than 10% of budget for ICTs.

Even in its simplest level, the GVC digitalization is proved to make contributions to the improvement of business performance of MSMEs. Ongori and Migiro (2010) summarize the five main benefits of the ICTs adoption on SME and MSMEs: (i) access to market and customers; (ii) access to robust information; (iii) knowledge management; (iv) efficient, admiration, control, and accountability; and (v) managing resources efficiently. The first advantage of value chain digitalization is exemplified in the work of Raymond et al. (2005) and the work of Esselaar et al. (2007) aforementioned because these papers find that the adoption of ICTs has a positive correlation to revenue generation. The second impact of “thin integration” is stressed by Irani (2002, p.12) as ICTs enable SMEs to gain access to robust information, which is a critical factor that improves the competitiveness of SMEs (Kohli and Devaraj 2004, p. 56). More or less, the remaining three are related to the positive effect of adopting ICTs on SMEs’ efficiency and business performance. Several papers already tackled this issue by pointing out that the usage of ICTs enhances efficiency, effectiveness, and competitiveness (Hamilton and Asundi 2008; Mahmood and Mann 2000); boosts labor productivity (Black and Lynch 2001; Esselaar et al. 2007); and improves the efficient administration of SMEs (Schware 2003; Mutula and Brakel 2006, p. 409).

Despite clear evidence of a positive correlation between the usage of ICTs and SMEs’ business performance, the digitalization process in MSMEs is held back by several factors. Mehrtens et al. (2001) are among the first papers that try to look at factors which have influences on the ICTs adoption. In their paper, corresponding factors are divided into three categories: perceived benefit of using ICTs, organizational and environmental readiness degree to apply ICTs, and external pressure. While the external pressure from trading partners or competitors usually pushes SMEs in favor of ICTs adoption, the perceived benefit of using ICTs and the readiness to implement ICTs can hinder the usage of ICTs.

As the benefit of digitalization is subjective, diverse views on the ICTs adoption persists. While many SMEs found the incorporation of ICTs into their business to be profitable, some simply do not. For instance, Esselaar et al. (2007) find that, among SMEs that do not have any computers, 45% of them said that it is because there is no need to buy one. In other words, these SMEs believe that the potential benefits of having a computer do not outweigh the cost of purchasing one. The readiness to implement ICTs is also an obstacle. It is obvious that environmental factors, such as the lack of supported facilities and services providers, can hinder the ICTs adoption process. This is the case of Nigerian SMEs where lack of electricity and lack of internet service providers were reported as major constraints in adopting ICTs (Apulu et al. 2011). In addition, many SMEs lack information technology experts and skilled employees who have sufficient knowledge to operate new technologies. Indeed, skills availability is reported as one of the main constraints in ICTs adoption in many countries. Examples include Brazilian and Indian SMEs (Basant et al. 2006); and American SMEs (Wielicki and Cavalcanti 2006).



## **B. Mode 2: Platform Digitalization**

The second mode in GVC digitalization is platform digitalization. It refers to the involvement and penetration of platforms into the value chain. The original concept of platforms was mainly used in the high-tech sector where information technology companies like Microsoft, IBM, Intel, and Cisco develop software and hardware that yield a foundation for a platform-based “ecosystem” with the participation of thousands of partners (Moore 1996; Iansiti and Levien 2004). The term platform later becomes ubiquitous and is widely used in several fields such as operation management (Meyer and Lehnerd 1997); industrial economics (Rochet and Tirole 2003; Evans 2003); and technology strategy (Gawer and Cusumano 2002; Eisenmann et al. 2006).

Recent years have witnessed the proliferation of platforms. As pointed out by Eisenmann et al. (2011), platform markets “comprise a large and rapidly growing share of the global economy”. Examples of the largest platforms are Facebook and Twitter (social network), Alibaba and Amazon (e-commerce), Apple App Store and Google Play Store (app stores), Uber and Grab (ride-hailing), and Airbnb and Booking (hospitality). The success of these platforms in attracting users and building an ecosystem that is hard to compete with lies on one of the most intriguing characteristics of platform, the possibility to create network effect (Katz and Shapiro 1985; Gawer and Cusumano 2014). The value of platform adoption for any users is positively correlated with the number of interactions with other users they can make. Thus, the more users who affiliate to the platform, the more valuable platform becomes in users’ and firms’ eyes. In other words, the ecosystem created based on platform lures more firms and users to join the platform as more users, counterparts, and competitors do so.

Because of the concrete benefit of expanding customers base, many firms now come to platforms to do business. Meanwhile, customers also increasingly find that platforms are convenient places to satisfy their own desires, such as entertainments or purchase of products and services. In turn, the adoption of platform of both sides accelerates the penetration of platforms in the value chain. On the customer’s side, the dominance of several platforms is strengthening in a sense that more and more people are starting to adopt platforms.

For examples, the world largest social network, Facebook, has about 2.32 billion monthly users as of February 2019,<sup>4</sup> while Apple App Store, a leading ecosystem for app stores, received more than 500 million visitors per week as of June 2018.<sup>5</sup> Further, in the era of the platform digitalization, customers’ behaviors are also shifting in the favor of online shopping. UNCTAD (2015) shows that more than 50% of individuals in 10 countries purchased products online in 2013.<sup>6</sup> In the People’s Republic of China (PRC), purchasing products and services through online websites and

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<sup>4</sup> Facebook’s Chief Executive Officer Mark Zuckerberg announced at its 15th anniversary. <https://www.businessinsider.com/facebook-has-2-billion-plus-users-after-15-years-2019-2> (accessed 5 June 2019).

<sup>5</sup> Apple. 2018. <https://www.apple.com/newsroom/2018/07/app-store-turns-10/> (accessed 9 June 2019).

<sup>6</sup> The 10 countries are Australia, Denmark, Germany, Luxemburg, , the Netherlands, New Zealand, Norway, Sweden, the United Kingdom, and the United States.

e-commerce platforms such as Alibaba and JingDong accounted for 3.5% of total consumption in 2010 (CNNIC 2011).

On the firm's side, many MSMEs are starting to incorporate platforms in their businesses. Agriculture exporters in Ethiopia and Nairobi are using various exchanges based on platforms to trade commodities (EuropeAid 2012). Platforms are also integrated in South Africa's tourism industry to support online reservation and booking system (Murphy et al. 2014). Evidence of shifting in favor of platforms is also found in large enterprises and multinational corporations. For instance, in an unconventional move in 2017, the world-famous apparel brand Calvin Klein announced that their latest underwear collections for winter holidays were available exclusively in Amazon before being sold in traditional department stores.<sup>7</sup>

On the one hand, the adoption of platforms in the value chain benefits firms in many aspects. In agriculture, Goyal (2010) finds that the usages of platforms can result in a higher export price for commodity exporters. The involvement of platforms is also facilitating efficient trading as found by Waema and Katua (2014). Regarding the information storage and management—an essential task of many companies—the cloud computing adoption has been found to bring several advantages, such as cost reduction, flexibility, mobility, and shared resources (Erdogmus 2009; Gangwar and Ramaswamy 2015). Using platforms also helps facilitate upgrading as noted by Hinson (2010), Tihamiyu et al. (2012), and Li et al. (2019).

On the other hand, the involvement of platforms into the value chain also raises several concerns. As the power of platforms is increasing over time because of the network effect, the value is now condensed in the hand of several powerful platform providers. These platform owners protect their positions in the value chain by utilizing their tremendous power to muscle out competitors and reduce the competitions in the market, which result in monopoly or strong oligopoly position, and finally lead to potential antitrust violations (Kenney and Zysman 2016).

For instance, over the past 2 years, Google has been fined a total of €8.24 billion (\$9.3 billion) by the EU Commission for the antitrust violations related to its three dominant platforms: (i) search engine platform—Google search, mobile operating platform; (ii) Google Android; and (iii) online advertising platform—Google AdSense (EU Commission 2019). Also, as dependence in platforms increases over time, an unfavorable change in platform policies initiated by platform providers might have a negative spillover impact on the whole value chain. Therefore, despite the clear benefits of joining platforms, some companies are still reluctant to adopt platforms. For instance, while several apparel brands such as Adidas, Nike, and Calvin Klein are selling their products on Amazon page, Zara decided to expand online sales in 106 countries by its own effort without working with Amazon.<sup>8</sup>

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<sup>7</sup> Company's announcement. <https://www.wsj.com/articles/calvin-klein-to-begin-selling-new-underwear-only-through-amazon-1510792184> (accessed 9 June 2019).

<sup>8</sup> Company' announcement. <https://www.reuters.com/article/inditex-internet/corrected-zara-launches-online-sales-in-106-new-countries-idUSL8N1XI3YT> (accessed 9 June 2019).

### **C. Mode 3: Full Range Digitalization**

The third and highest form of GVC digitalization is full digitalization. UNCTAD (2017a) defines full digitalization as a “fully digitally integrated systems”, a term that is close to the notion used by Mussomeli, Gish, and Laaper (2016) as “digital supply network”. In this form, information and data through various levels, sources, and locations are integrated into a single system that is finally used in making production decisions (Sniderman et al. 2016). The role of information, especially information from the market and material suppliers, has been stressed as one of the most critical factors in determining the success of new products development and commercialization (Ottum and Moore 1997; Petersen et al. 2005). In the digital era where things are connected and the information flows are enriched, making use of information and turning them into valuable insights become a key element that determines company success.

In general, the full digitalization of value chain usually originates from data collection and utilization. Mobile apps, IoT applications, and sensors network are now adopted in various circumstances and industries to collect real-time and massive data.

Brugger (2011) points out the use of mobile applications to collect data in the agriculture field. It is also the case of the tea sector in Rwanda where Foster and Graham (2015) find the adoption of on-field data collection devices. Sniderman et al. (2016), based on projects with clients, figure out that a pharmaceutical company uses sensors in its inhaler products to collect real-time data. In manufacturing fields, for instance, in an attempt to improve the performance of coal-fired steam power plant, General Electric introduced a “Digital Power Plant” in which more than 10,000 sensors are incorporated into the system to monitor plant’s operation and get real-time performance (GE 2016).

The next step after data collection is data utilization, i.e., the creation of digital solutions based on data. Generally, the massive amount of data collected is used to improve business performance and customer satisfaction. On the firm’s side, data can be utilized to drive customer insights, project customer’s need, as well as develop algorithms for a real-time data-based pricing strategy (Sniderman et al. 2016). For example, Uber’s surging price policy in high demand hours is based on a complicated algorithm that tracks the real-time data of drivers and customers. This pricing model is found to be effective as it reduces the waiting time of a ride in the peak hours and enhances the efficiency of the whole system (Hall et al. 2015). Real-time data-based pricing is also the case of Deutsche Bahn AG, a cargo rail consortium, where the company uses the real-time data of available capacities and customers ordering information to customize pricing (OptaSense 2014). In the case of GE’s “Digital Power Plant”, as announced by the company, the system will analyze the data from a sensors network to model the real-time plant conditions so that administrators can adjust inputs and materials effectively. The system can also run simulations based on collected data to predict demands and supply in different weather conditions (GE 2016).

### **III. DIGITALIZATION OF VALUE CHAIN IN APPAREL INDUSTRY**

#### **A. Data and Methodology**

The paper uses empirical evidence at firm level to explore the impacts of the last two modes in GVC digitalization. A group of companies and leading platforms are selected. Next, data of these firms and platforms are collected mainly from companies' official annual and quarterly reports, filings, statements, and websites.

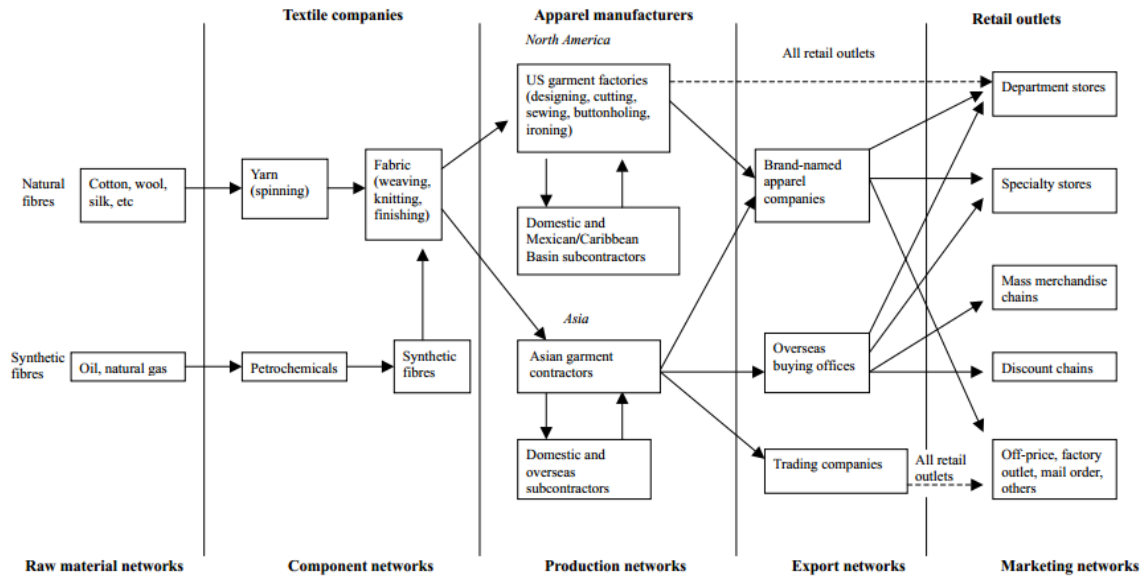
In the apparel industry, among three main kinds of e-commerce platforms namely B2B (business to business), B2C (business to customer), and C2C (customer to customer), the paper mainly focuses on B2B and B2C platforms while it ignores platforms that merely do C2C business because the primary objective of the paper is to examine the economic impacts of GVC digitalization on apparel brands and manufacturers. UNCTAD (2015) reveals a list of the top 10 countries by B2C revenue in 2012–2013 and the paper uses this list to identify leading B2C and B2B e-commerce platforms in each of these 10 countries. Some regional leading platforms are also put into consideration. Several indicators are used to determine leading platforms, including customer base size, gross merchandise volume, and the number of monthly visitors. In the end, the e-commerce platforms which are considered in this paper include Amazon (United States, United Kingdom, France); eBay (United States, United Kingdom); Asos (United Kingdom); Cdiscount (France); Rakuten (Japan, United States); Otto (Germany); Gmarket, Coupang (Republic of Korea); Tmall, Tmall Global, JingDong Marketplace, JingDong Global, and Yanxuan (PRC); MercadoLibre (Brazil, Argentina, Mexico); B2W Marketplace (Brazil/Latin America); and Lazada and Shopee (Southeast Asia).

Apparel brands and manufacturers which are included in the paper are mostly SMEs. They consist of four Korean companies (Good People, Chuu, 8seconds, and Realcoco); one company from each of four countries: Singapore (Mary Craft), PRC (Yanxuan), Australia (Cahill+), and the United States (Taylor Swift Fashion). Overall, in the apparel industry, the paper considers 8 manufacturers/brands and 23 platforms in 12 countries/regions.

#### **B. Mode 2-Type Digitalization: Platform Digitalization**

The traditional apparel value chain involves many players and primarily consists of five stages including raw material network, component network, production network, export network, and marketing network (Figure 1). In the traditional apparel value chain, retailers such as department stores and mass merchandise stores play an important role in the success of apparel brands as it is the only way that enables apparel products to be reached by customers. The traditional apparel value chain is also characterized as a buyer-driven value chain in which a small number of global lead firms control production and distribution network (Gereffi 1999). These global lead firms decide where to buy materials and designate manufacturers to produce products. Taking the advantages of information collection and interpretation, these companies have been maintaining a strong bargaining power and dominant positions that make it difficult for latecomers to compete with (Gereffi 1997; Coe et al. 2004).

**Figure 1: The Traditional Apparel Value Chain**



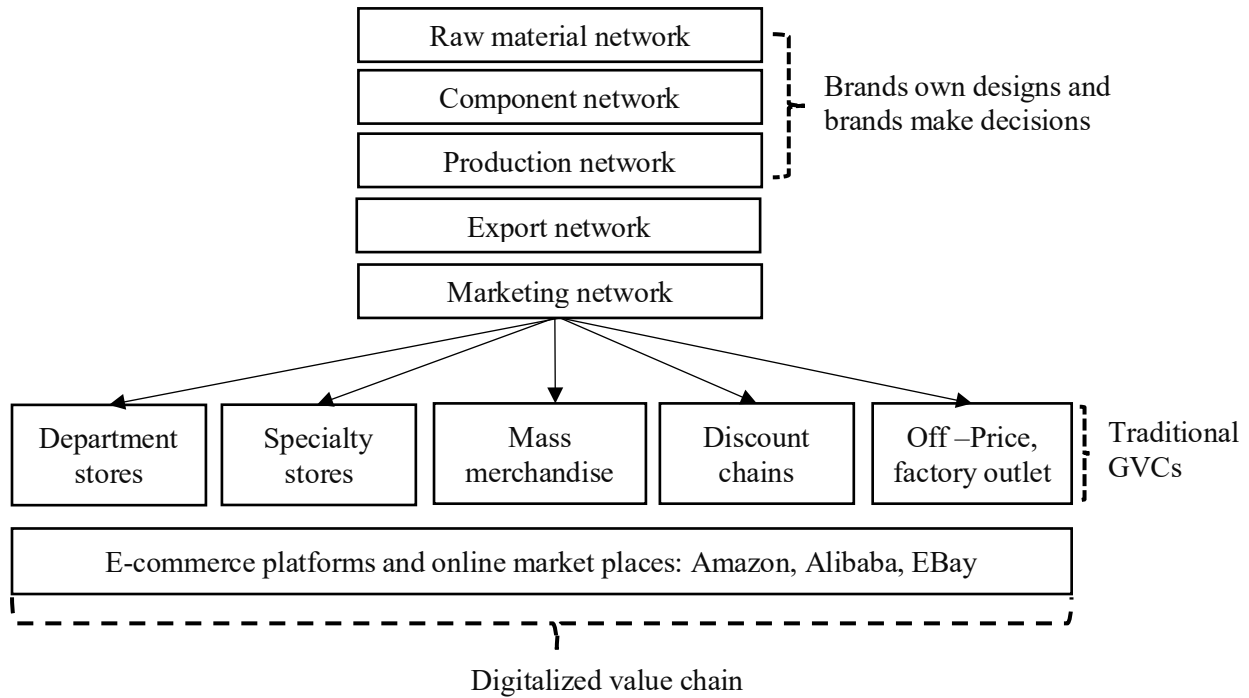
US = United States.

Source: Appelbaum and Gereffi (1994), p. 46.

However, the relationship and bargaining power between players in the apparel value chain have been shifting in the digitalization era where digital platforms are penetrating into the value chain. Generally speaking, the digitalization of apparel value chain originated in the downstream stages where traditional distribution channels, such as department stores and mass merchandise stores, are being replaced by online marketplaces and e-commerce platforms (Figure 2). This level of value chain digitalization, or e-commerce, corresponds to the mode 2 or platform digitalization mode which is introduced in section II.

In this form, manufacturers still own, design, and derive production decisions. However, the apparel products are now digitally distributed through e-commerce platforms while traditional methods of distribution, such as department stores and mass merchandise store, are bypassed. The value chain is becoming flattened and customers can now purchase apparel products at their homes within several clicks. This characteristic is very similar to what happens in video game industries as the emergence of app store platforms displaces the traditional distribution methods.

**Figure 2: Platform Digitalization in the Apparel Value Chain (E-Commerce)**



GVC = global value chain.

Source: Author.

In what follows, both positive impact (large numbers of customer reach) and negative impact (paying platform provider fee) of platform digitalization in the apparel industry are explored. The possibility of industrial upgrading, thanks to the facilitation of e-commerce platforms, is also examined.

### C. Benefits: Wider Customers Reach

The emergence of e-commerce platforms offers a great opportunity for apparel manufacturers and brands to reach an enormous number of customers. Although several concerns, such as fake products, security, and privacy issues persist, it is indisputable that e-commerce brings an array of benefits to modern life. One of the biggest advantages of purchasing products through e-commerce platforms is its convenience. With an internet connection, anyone can instantly access e-commerce website and order apparel products within minutes. In addition, the listed price on e-commerce websites is very competitive in the sense that it is usually lower than the price which is listed elsewhere. Customers buying online also have much more information on the products as they can read others' reviews and comprehensively compare with other available products.

Thus, it is not surprising that e-commerce platforms increasingly attract more and more customers. As more buyers come to e-commerce platforms to purchase products, more and more sellers are shifting to e-commerce platforms to get new orders and push sales. The involvement of more

supply, in turn, enrich the product diversity and availability in the platforms. It makes e-commerce platforms a more attractive place in customers' eyes to purchase apparel products. This network effect became stronger over time and it resulted in an enormous number of annual active customers in leading e-commerce platforms (Table 1). All nine e-commerce platforms in Table 1 are operating in populous countries/regions (United States, Japan, the PRC, Germany, France, the United Kingdom, and Latin America) and had more than 100 million customers base in 2018.

**Table 1: Selected E-Commerce Platforms' Customers, 2018**

<b>E-Commerce Platforms</b>	<b>No. of Memberships/ Customers (million)</b>	<b>Note</b>
Amazon	Over 100	Paid prime members, globally
eBay	179	Annual active customers, globally. StubHub customers included
Rakuten	100.2	Only in the Japanese market
JingDong	305.3	Annual active customers
Tmall	636	
MercadoLibre	267.4	Confirmed registered users, Latin America region
	37.4	Annual active customers, Latin America region
Asos	18.4	Active customers globally
Cdiscount	9	Active customers in France
Otto	6.6	Active customers, 2017 data

Source: Author from companies' websites and reports.

#### **D. The Cost Side: Platform Fee in the Apparel Industry**

To be included into platforms, apparel sellers have to pay a fee to e-commerce provider. In general, a platform provider fee in the apparel industry usually consists of three components: listing fee, commission fee, and additional fee:

$$\text{Platform provider fee} = \text{listing fee} + \text{commission fee} + \text{additional fee}$$

Listing fee (sometimes subscription fee, platform service fee, insertion fee, or usage fee) refers to the fee that apparel sellers have to pay to e-commerce platform providers to be included and to be able to appear in providers' platforms. The listing fee usually comprises a registration fee plus a monthly (yearly) expense ranging from as low as \$24 in case of Asos Marketplace to as high as \$946 in case of Rakuten Japan. Rakuten Japan is also the only platform listed in Table 2 that charges sellers a one-time registration fee of \$568. It is worth noting that some platforms allow sellers to join for free. It is the case of Mercado Libre, the leading e-commerce platform in Latin America and Shopee and Lazada, two leading e-commerce sites in Southeast Asia. To encourage sellers to enhance their products' quality, some e-commerce's platforms even conditionally return

listing fee to sellers if some requirements are met. For instance, Tmall refunds annual service fee to sellers with a strong record of sales performance and a good rate of customers' reviews.

Commission fee (sometimes referral fee or real-time transaction fee) indicates a fee that e-commerce platforms collect on a sale (or an item) basis. There are two popular methods of calculating commission fee: relative measure and absolute measure. The relative value is usually calculated as percentages of the final transaction value. Most of the e-commerce platforms considered in the paper follow this kind of calculation. For instance, the commission fees of apparel products are 13% (Gmarket), 5% (Tmall), and 5% (Lazada). Mercado Libre uses both measures as its commission fee consists of both relative term and absolute term. Some platforms, with a quite different pricing strategy, even set the minimum value (Amazon) and maximum value (eBay United States) for the commission fee. It is worth noting that the lowest commission fees are the cases of Rakuten Japan, Shoppe, and Lazada. While Rakuten Japan only collects a small commission fee because it already charges a lot for the registration fee and monthly listing fee, Shoppe and Lazada mainly maintain a low-level fee to attract more sellers as the e-commerce activities in Southeast Asia are not yet developed compared to other regions and countries (Table 2).

Additional fees are the other fees which are subjective to each e-commerce platform. Some e-commerce platforms require sellers to pay a small fee to enhance system, e.g., 0.1% (Rakuten) or contribute to promotional programs, e.g., 0.5% for the Tmall customer loyalty program. In addition, sellers have to pay a payment processing fee, which usually ranges from 1% to 4%. However, this fee is not mentioned in Table 2 because it is not the core capabilities of e-commerce platforms.<sup>9</sup>

One of the most prominent characteristics of a platform provider fee in the apparel industry is its diversity and complexity (Table 2). This comes from the fact that the e-commerce platforms market is very fragmented. While in the video game industry, the app store platforms market is highly concentrated with the duopoly dominant positions of Apple App Store and Google Play Store, there is no global dominant e-commerce platform and, in most of the cases, regional or local e-commerce platforms dominate the regional or local market. For instance, Amazon, one of the world largest e-commerce platforms, is popular in the United States, Canada, and some Europe countries such as the United Kingdom and Germany. Rakuten is the most popular e-commerce platform in Japan, while Alibaba (Tmall) and JingDong Marketplace dominate the Chinese market. Each of these e-commerce providers develops a unique pricing model to compete with other e-commerce platforms in the market.

Beside complex fee structure, group pricing is also a popular characteristic of platform provider fee in the apparel industry. Based on the size of sellers (in term of potential sales and number of merchants), e-commerce platforms offer different fee rate and other additional benefits. Rates are usually lower for big sellers as they bring greater benefit to platform providers. Big sellers group

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<sup>9</sup> Tmall Global charges 1% for Alipay fee while Rakuten Japan charges United States entity 4% for card payment fee. Lazada generally collects 2% payment fee.



also enjoys additional benefit such as unlimited listing and more image capacity (Rakuten) or unique flagship pages and the possibility to sell products on foreign countries (Amazon). Some e-commerce platforms also differentiate sellers by their origins. Local sellers usually enjoy a lower rate compared to foreign sellers (Lazada, Rakuten, JingDong Marketplace). For instance, United States sellers on Rakuten Japan have to pay a larger amount of service usages fee compared to domestic sellers.

Further, the fee rates and fee structure in the apparel sector are somewhat different from other sectors, or mobile game sector in particular. First of all, while mobile game developers have almost no choice but to distribute their mobile games through third-party platforms, apparel manufacturers and brand owners have various options to distribute apparel products. On the one hand, the traditional distribution methods are still the optimal choice in many countries, which have been a long tradition and use well-established network. Especially in developing countries where online payment has not developed yet and other facilitating facilities are not well-established, traditional distribution channels are still prevailing over digital distribution methods. On the other hand, selling products on third-party e-commerce platforms and online market place is not the only available way to digitally distribute apparel products. Indeed, apparel manufacturers and brand owners can develop their own e-commerce platforms to sell their products directly to customers without referring to any third parties. As such, compared to video game sector, platform providers in the apparel industry are less powerful and have substantial lower bargaining power. Therefore, it is not surprising that the provider fee in apparel industry is generally much lower than that in video game industry (Table 2). Indeed, platform provider fee in apparel industry ranges from as low as 2% (Shopee in the Philipines) to as high as more than 27% (MercadoLibre in Argentina).

**Table 2: Leading E-Commerce Providers' Fee for Apparel Products**

Platforms	Country/ Region	Listing Fee	Commission Fee	Additional Fee	Note
Amazon	United States	\$39.99	17% min: \$0.3 on per item basis		Professional plan
eBay		\$299.95 (yearly renewal)	10% (max: \$250 per sales)	5% if the performance level is below standard	Anchor eBay store subscription
Rakuten		\$39	15% per sale + 99 cents per item sold		
Amazon	United Kingdom	\$30 (£25)	15% min: £0.25, per item basis		Professional plan
eBay		\$480 (£399)	10%	4% if the performance level is below standard	Anchor eBay shop subscription
Asos Marketplace		\$24 (£20)	20%		
Amazon	France	\$44 (€39)	15% min: €0.3 on per item basis		Professional plan
Cdiscount		\$45 (€39.99)	Used product: 17% New product: 15%		
Amazon	Japan	\$46 (¥4,900)	15%		Professional plan
Rakuten		\$946 (¥100,000) plus a one-time registration fee of \$568 (¥60,000)	For purchase made via PC: 2%–4% Mobile: 2.5%–4.5%	0.1%–1% and 8% more for sales through affiliates	Mega Shop Plan, Japanese entity
			PC: 3.5%–5.0% Mobile: 4.0%–5.5%		Mega Shop Plan, United States entity
Gmarket	Korea,	-	13%		
Coupang	Republic of	-	10%		
Tmall	China, People’s Republic of	\$4,500–\$9,000 annually (CNY30,000–CNY60,000)	5%	Deposit of \$425–\$21,250 (CNY30,000–CNY150,000)	Chinese sellers
JingDong Marketplace		\$142 (CNY1,000)	8%		
Tmall Global		\$5,000–\$10,000 annually	5%	0.5% + deposit of \$21,250 (CNY150,000)	Foreign sellers
JingDong HK		\$3,000 annually	6%	Deposit of \$15,000	
Mercado Libre	Brazil	-	16%+ \$1.27 per unit (for sales below \$44.2 only)		Premium plan

	Mexico		17.5%		
	Argentina		27% + \$0.22 per unit (for sales below \$30.5 only)		
B2W Marketplace	Brazil/ Latin America	-	16%		
Lazada	Southeast	-	5%		LazMall sellers
Shopee	Asia	-	2%–5%		Shopee Mall sellers

Notes: A listing fee is on a monthly basis unless stated otherwise. The exchange rate is from XE.com (accessed 2 August 2019).

Source: Author from e-commerce providers' websites, data as of 12 August 2019.

### E. Possibility of Upgrading via Platform Participation

So far, two opposite effects of e-commerce platforms adoption in the apparel industry have been analyzed. We now explore the economic consequences of platform adoption in small and medium-sized apparel manufacturers with a focus on the possibility of industrial upgrading, one of the key dimensions in GVC research (Gereffi and Fernandez-Stark 2016).

End-market upgrading refers to the diversification of products to new buyers or new geographic (Frederick and Gereffi 2011, p.73). Traditionally, when apparel companies want to do business abroad, they usually have to set up their own store chains. That is how the foreign big brands like Uniqlo (2002), Zara (2006), H&M (2007) have entered the Chinese apparel market. However, this method is usually costly, risky, inflexible, and time-consuming. It not only takes a lot of time to obtain the necessary documents, make contracts with domestic partners, and find optimal locations, but also require a large amount of money for the initial investment. As such, it is out of reach for lots of companies, especially small and medium-sized ones with constrained financial resources and low implementation capabilities. However, thanks to the platform digitalization, apparel companies can now start selling abroad without establishing physical stores. Li et al. (2019) already pointed out successful end-market upgrading cases of small Chinese SMEs to sell apparel products directly to United States customers. In this paper, two different cases are drawn.

The first case is foreign apparel brands to sell in the Chinese market. Many foreign apparel brands decided to enter the Chinese market for the first time through partnerships with leading e-commerce platforms. Small Korean apparel brands such as Chuu, Good People, 8seconds, and RealCoCo entered the Chinese apparel market for the first time in 2016 by listing their products on e-commerce platforms (Fung Business Intelligence 2019). While Chuu, Good People, and 8seconds formed partnerships with Tmall, RealCoCo decided to go with Mengdian. In 2016, the Australian apparel brand Cahill+ also worked with Tmall to enter the Chinese apparel market. One year earlier, JingDong announced the opening of the first official online store of Taylor Swift Fashion, a United States famous fashion brand.<sup>10</sup>

<sup>10</sup> Company's announcement. <https://ir.jd.com/news-releases/news-release-details/jdcom-announces-first-and-only-official-taylor-swift-online> (accessed 27 June 2019).

The second case is a Singapore-based apparel brand to sell in the United States market. Mary Craft is a small woman apparel company with the number of headcounts from 80 to 100 people. This company was found in 2013 with headquarters in Singapore and production plant in Viet Nam. Mary Craft is one of the typical successful cases of selling on Amazon which is officially introduced in Amazon websites. Since the company started selling products on Amazon in 2015, the company's sales have increased by 150%. Using the Fulfillment by Amazon services, the company can deliver its products to United States customers within 1 day or 2 days compared to a length of 10 days when using traditional distribution method. At present, the company is also considering expanding its market outside the United States by starting selling on Amazon United Kingdom and Amazon Canada.

#### **IV. EMERGENCE OF ANOTHER MODE: FULL RANGE DIGITALIZATION OF VALUE CHAIN**

##### **A. More Involvement of Platforms into Value Chains**

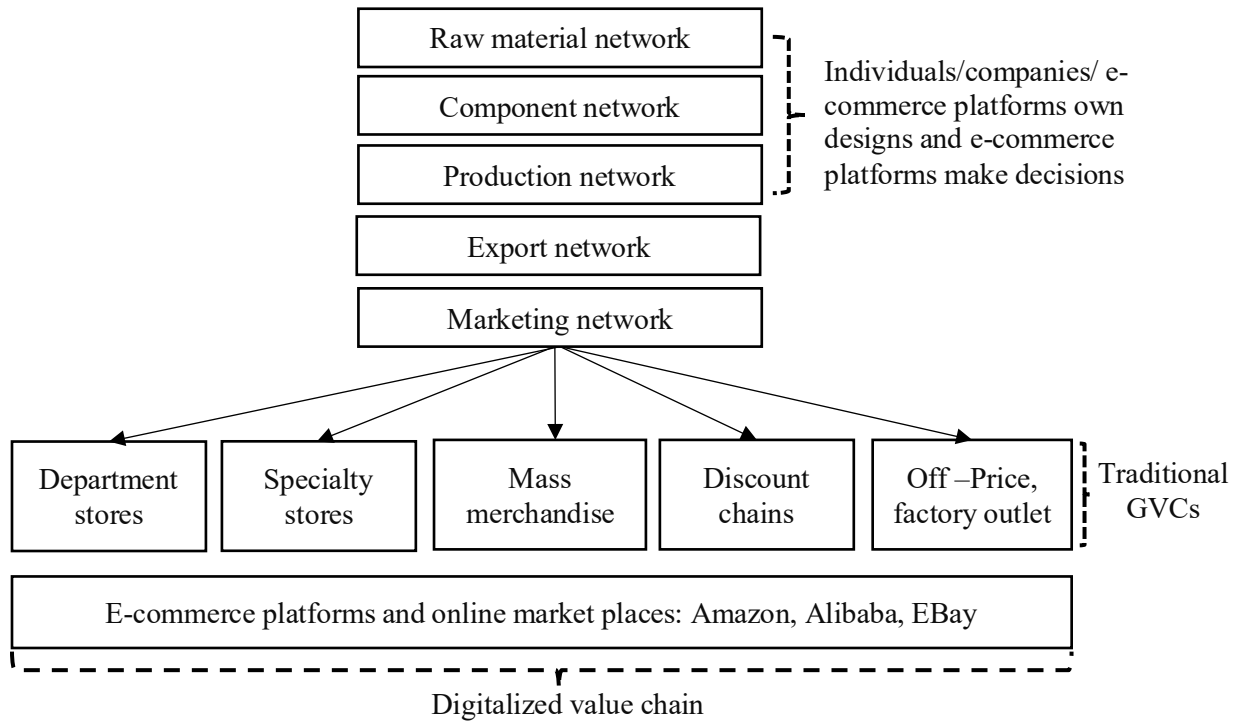
A higher and sophisticated level of digitalization in the apparel value chain is also identified. Going beyond a two-sided market place that merely connects sellers and buyers and collects a small part of transaction value, the e-commerce platforms are trying to penetrate deeper into higher value-added stages in the value chain. By exploiting the large loyal customer bases and utilizing the massive amount of data collection, e-commerce platforms are reshaping business models in apparel industry in which e-commerce provider is not only product distributors but also product designers and brand owners (Figure 3).

At this level, the involvement of e-commerce platforms into value chain ranges from downstream stages to the production network. In this full digitalization mode, the e-commerce providers can capture more value on the chain as they gain value at both downstream stages at the distributors and at the production stages as design owners and product manufacturers. In addition, an expansion beyond its core business of a marketplace can benefit e-commerce providers by enhancing efficiency, which is generated through the economies of scope derived from the better utilization of intangible or tangible assets (Panzar and Willig 1981).

In the case of e-commerce providers, the intangible assets are invaluable connections with a large number of customers in the ecosystem that is created by their platforms. These intangible assets are then translated to the massive amount of information collected from million but not billion transactions per day that can be analyzed to figure out trends in customer's behaviors. In general, this level involves a very high level of technologies. Big data are usually used to derive customers' insights, which are useful in production decision making. Other advanced technologies, such as 3D printing, can be also applied to the production process.

In the following, two typical cases are drawn to examine in detail the full digitalization in the apparel value chain.

**Figure 3: Full Digitalization in the Apparel Value Chain**



GVC = global value chain.

Source: Authors.

## B. The Case of Merch by Amazon

Merch by Amazon is a program that was launched in 2015 by Amazon. It focuses on a print-on-demand business model with T-shirt production only (until early 2019). The idea behind Merch by Amazon is very similar to that of the ridesharing company Uber or the co-working place We Work, that is making money by utilizing the decentralized underutilized assets. In the case of Uber, it is the better utilization of personal vehicles. In the case of Merch by Amazon, it is the utilization of individual talent in T-shirt designs. Thousand but not millions of individuals have creative abilities to make beautiful and funny designs, but most of them have few chances to commercialize their artwork because of the limited funding and the difficulty in acquiring customers and handling productions.

With Merch by Amazon program, all the content creators have to do is upload their artwork to Amazon, choose appropriate product type and color, add a product description, and set the price. Then, Amazon will handle all of the remaining tasks with no upfront costs incurred to individuals. Indeed, Amazon will create a product page on Amazon.com and, when customers buy products, Amazon will handle production, fulfillment, distribution, and customer service. Using a print-on-demand business model, individuals do not have to worry about inventory risk as products are only printed after customers made orders.

To handle production, Amazon signs contracts with two United States manufacturers: Port and Company and Bella + Canvas to produce the T-shirt. For every T-shirt sold, the individual will receive a royalty ranging from 13% to 40% of the product price. Generally, the higher the price of the product is, the larger the amount of royalty the individual receives. For examples, if a standard T-shirt price \$25.99 is sold to customers in the United States market, the individual who owns the design will receive a royalty of \$9.77 (37.6%), while for a \$15.99 T-shirt, the royalty is only \$2.21 (13.8%). Enjoying royalty without being worried about any risks, thousands of individuals can become "Individual Original Design Manufacturer" in the apparel industry.

Not only being applied to individuals, Merch by Amazon program is also expanding to attract designs from entertainment brands, social influencers, musicians, and singers. Some of the famous names that have partnerships with Merch by Amazon are Disney, Marvel, CN cartoon network, and Dr. Seuss. All these companies have reported an increase in sales and growth in profitability. Among these, Dr. Seuss is a highly successful case as the company sales through Merch by Amazon had increased by 40% since its partnership with Amazon in late 2017 (Reuter 2019).

Merch by Amazon model works as Amazon takes advantage of two things: The first is a large number of loyal customers who purchase on Amazon very frequently. The second is the world-class printing technology which allows that the production can be completed within couples of days. Regarding this aspect, Amazon is investing lots of money in developing printing technology that can further reduce cost and improve product quality. In fact, Amazon has been granted several United States patents related to on-demand printing technologies which use lasers and robotic system for cutting fabric.

### **C. The Case of NetEase's Yanxuan in the People's Republic of China**

In the Merch by Amazon mode, e-commerce platforms only take part in the production process while product designs are not their intellectual assets. There are some cases where e-commerce platforms are going deeper in production network by participating in product designs and even brands. This business model is exemplified in the case of NetEase Yanxuan.

Yanxuan is an e-commerce platform owned by Chinese internet giant NetEase. It was launched in April 2016 in the PRC. While the products sold on the majority of e-commerce platforms are under third-party sellers' name, all products sold in Yanxuan are under the company-owned brand (private label products). Thus, being very different from B2C and C2C models which are prevailing in Chinese e-commerce market, Yanxuan' business is called as "a self-run e-commerce platform rather than a mere two-sided platform for commodities, manufacturers, and brands to base on".

Yanxuan' slogan is "a better life doesn't have to be costly". It competes in the e-commerce market by proving "consistent high-quality products at competitive price".<sup>11</sup> The company claims that it sells products with quality as high as that in global leading brands, but at a very substantial lower price. The starting point in Yanxuan' model is data collection and interpretation. By analyzing the massive amount of data and information generated through daily customers' transactions, Yanxuan derives valuable insights about customers' behaviors. The most relevant and powerful insights on popular patterns, prevailing colors, and favorable fabrics are gathered to create product designs.

At the next point, Yanxuan works with big Chinese apparel manufacturers to improve products' designs and handle mass production. The company chooses manufacturers on based on merit: the selected producers should have a good ranking in the industry with sufficient production capacity and, especially, the experience in working with global brands. In many cases, the chosen producers are also the original design manufacturers (ODMs) for global famous apparel brands. The partnership is welcomed as it benefits both sides. On Yanxuan's side, as production know-how is not the core capabilities of the company, working with experienced ODMs is the best way to ensure product quality and other production-related aspects such as on-time delivery. On ODMs side, as many global apparel brands are cutting orders and leaving the PRC to countries with much lower cost such as Bangladesh, India, and Viet Nam, many Chinese ODMs are experiencing a difficult time in doing business. In this context, working with Yanxuan offers another channel to generate sales and overcome difficulties in the market. In fact, it is reported that Yanxuan has more than 3,000 manufacturers, among which about 100 are overseas suppliers (Fung Business Intelligence 2019).

In the final stage, apparel products which are produced by ODMs will be eventually sold directly to customers through the Yanxuan's e-commerce platform. By doing that way, the company can provide good quality products offered by big brands, but at a much lower price because of the elimination of brand premium and cutting the cost of layers of distributors and retailers. For instance, as of August 2018, a UGG ankle boots had \$200 price on both the two Chinese authorized sellers—JD.com and Tmall—but the very similar product made by "a manufacturer of UGG" was sold at just \$45 in Yanxuan (*Forbes* 2018).

Offering good quality products at a very reasonable and affordable price, it is not surprising that Yanxuan has achieved big success until now. Starting from home textile and home product sellers, as of December 2018, Yanxuan expanded its business to 10 categories with more than 20,000 stock-keeping units (Fung Business Intelligence 2019). According to the NetEase annual reports, net revenues from the e-commerce segment (mainly from Yanxuan) increased by 287% to \$661.0 million in 2016 from \$170.8 million in 2015. The figure continued increasing to \$1,698.8 million in 2017 after reaching a new record of \$2,797.7 million in 2018. (Fung Business Intelligence 2019).

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<sup>11</sup> Company' press release. 2018. [http://media.corporate-ir.net/media\\_files/IROL/12/122303/2019/NetEase%20Explores%20An%20Innovative%20Model%20For%20China.pdf](http://media.corporate-ir.net/media_files/IROL/12/122303/2019/NetEase%20Explores%20An%20Innovative%20Model%20For%20China.pdf) (accessed 20 June 2018).

Intriguingly, Yanxuan is also acting like a “true brand owner” as, besides its own e-commerce platform, the company also opened online flagship stores on other e-commerce platforms to sell its own brand products. Indeed, Yanxuan has online stores in other e-commerce platforms in the PRC (JingDong and Sunning) and in foreign countries (Shopee Singapore and Shopee Malaysia). The store of Yanxuan in JingDong attracted more than 2 million customers as of September 2018 (Fung Business Intelligence 2019).

It is worth noting that Yanxuan's ODM model is increasingly becoming popular. The other two e-commerce giants in the Chinese market, Alibaba and JD, are also resembling Yanxuan's model by launching their own programs (Alibaba in 2017 with Taobao Xinxuan and JD in August 2018 with Jingzao). Platforms in other markets, for instance Coupang in the Republic of Korea, also have their own products. In fact, Yanxuan's model of shifting from a marketplace to a “brand owner” is not new in the apparel industry. It is Amazon that first launched this business model by introducing its private-label AmazonBasic in 2009. As of January 2019, Amazon had a total of 109 labels under apparel category (TJI Research 2019).

## **V. SUMMARY AND CONCLUDING REMARKS**

Digitalization is the major trend that is sharply reshaping the global economy. By using empirical evidence at firm level, the paper elaborates the value chain digitalization process in the apparel industry. The paper finds that the digitalization of value chain usually originated in the downstream stages where platforms emerge, disrupt the conventional linear value chain, and displace traditional distribution methods. At this level of value chain digitalization, the chain becomes dis-intermediated and flattened with the involvement of fewer players. The platforms penetration also helps connect the decentralized buyers and sellers, make the transaction faster and easier, and facilitate the entry of SMEs.

A higher level of value chain digitalization is also found in the apparel industry where platforms owners, after certain success in downstream stages, are trying to penetrate deeper into the production network. By exploiting the technical superiority and massive data collection, these platforms are going beyond the primary role of a marketplace that connects both sides to take production-related tasks. Some serve as the principal agents in the production network (Amazon with Merch by Amazon) while others directly join product design stage and become “brand owner” (Yanxuan). At this level, platform owners can capture more value on the chain as they get value at both downstream stages as distribution partners and at production stages as production agents.

From the point of view of SME manufacturers, such digitalization of value chain may lead to opposite effects. On the positive side, partnership with platforms provides a great opportunity to expand the customer base and push sales which eventually lead to the enhancement of labor productivity. Both prospective domestic and global customers can be reached through a large number of loyal users attracted by leading platforms. This is especially valuable for SMEs and



start-ups as they usually find it difficult to get customers and orders because of limited resources and capabilities. For large companies, working with platforms is also an effective way to lower customer acquisition cost and attain a higher level of labor productivity, which is measured as efficiency in revenue generation. As time passes, the dominant positions of leading platforms can be maintained and strengthened as a result of the network effect.

On the negative side, as “there is no such thing as a free lunch” to be included into platforms, entering companies have to pay some amount of money to platform providers. Platform provider fee is the very new component of the digitalized value chain. It is found that, in the apparel industry, the fee is in the range of 2%–27%.<sup>12</sup> In addition, this fee is fixed and not negotiable in the video game industry, while in apparel industry it has a complex structure with various pricing models. The differences reflect the divergence in the bargaining power of platform owners in two industries. In the video game sector, mobile game publishers have almost no alternative choice but to publish mobile games into global dominant app store platforms. Thus, platform providers in the video game industry have strong bargaining power, which leads to a very high fee rate. Being very different, in apparel industry, as there are no global dominant e-commerce platforms and the traditional distribution methods are still prevailing in many countries, leading e-commerce platforms are less powerful and cannot charge a high fee.

The interaction between the negative impact and positive impact of value chain digitalization derives its ultimate economic consequences. Regarding the SMEs and start-ups, it is more likely that the benefits may dominate the costs, so that digitalization adoption is generally beneficial. The reason comes from the fact that the value chain digitalization lowers the entry barriers and facilitates upgrading. This implies that the value chain digitalization can serve as a window of opportunity, but not additional barriers for SMEs in the process of moving up the value chain. Indeed, this argument is exemplified in several companies, which successfully made an upgrading in the end market.

The precise costs and benefits of value chain digitalization may vary, depending on the digitalization degree and digitalization modes. A full platform digitalization is rewarded as it amplifies the positive effect of value chain digitization by creating a strong network effect that can be self-sustaining over a long period of time. Meanwhile, this kind of network effect is not present in a partly platform digitalization.

Overall, the contributions of the paper are as follows. First, by discussing the nature and role of the platform provider fees as a new component in the digitalized GVC, the paper shows the asymmetric impacts of value chain digitalization on SMEs and incumbent firms. The GVC digitalization is generally beneficial for SMEs and start-up as it lowers entry barriers and facilitates upgrading. Meanwhile, the value chain digitalization may hurt some of the incumbent firms

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<sup>12</sup> In video game industry it ranges from 15% to 30%, somewhat higher than in apparel industry.

because, in the apparel industry, the digitalization of value chain may lead to the case where platform owners may rise as a new strong and direct competitor.

The paper also has several implications for business practice and policymakers. The first implication is about platforms and value chain digitalization governance. Because of the network effect, the positions of leading platforms in the value chain are reinforced over time. In the near future, it might be the case that a very small number of platforms will have substantial power in the world's flow of goods and services. Given that involvements of platforms into the value chain bring both negative and positive economic consequences, the question should not be how to resist against them and protect traditional players, but how to harness the positive impact of value chain digitalization while mitigating the negative one. In this sense, the regulatory sandbox approach should be employed which enables experimentation of new technologies and business models (UNSGSA 2018).

The second implication is about the digital transformation of SMEs. As digitalization can serve as a window of opportunity for SMEs to enter into the value chain and support growth, government agencies should prioritize policies that facilitate the digitalization adoption of SMEs. With limited resources and low technological capabilities, it is quite difficult and challenging for SMEs to attempt transformation to digitalization. Thus, assistance and support should be provided. The policy packages should include financial and technical assistance and the training of good practices in digitalization adoption (OECD 2019).

The third implication is about “naïve” digitalization and strategic digitalization of large organizations. While digitalization is becoming a global phenomenon and many incumbent firms are setting out plans to an “as fast as possible” digital transformation, taking the advantage of value chain digitalization is not an easy task and a simple digital transformation might not work. Besides the direct negative economic consequence of having to pay a large amount to platform providers, incumbent firms should also be aware of other potential risks. The fact that digitalization facilitates entry into the value chain implies that heading to digitalization is doing business in a very competitive market with low entry barriers. This means that firms' competitors are not only the other companies currently in the market but also the potential ones who come from nowhere. Also, a shift to digitalization by working with platforms can potentially create direct competitors in the future. Thus, a realistic and holistic view of cost and benefit of digitalization should be taken into consideration before any decisions are made.

There may be some potential limitations in the paper. First, analyses in the paper tend to be based on the data collected from some number of selected group of companies and platforms. Second, by narrowing the paper's focus on the internal production process and downstream stages, the paper might overlook the impacts of GVC digitalization at upstream stages.

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