

The Impact of E-commerce on Chinese Suppliers' Upgrading in Global Value Chains in a Digitalised Era

Abstract

This study investigates the challenges faced by Chinese manufacturing suppliers in Global Value Chains (GVCs) and how they respond to the challenges through GVC upgrading, facilitated by e-commerce. A multiple case study approach on nine case companies of three company size categories in the Chinese nonwoven fabric product industry was employed. The findings reveal four categories of internal challenges (i.e. *a product development challenge, a human resource challenge, a financial resource challenge and an intellectual resource challenge*) and two categories of external challenges (i.e. *a market challenge and a macroeconomic challenge*) faced by the Chinese suppliers in the e-commerce context. Furthermore, strategic responses undertaken by Chinese manufacturers are identified and are further related to various types of economic, environmental and social upgrading by applying the GVC framework. Unlike most extant research on the phenomenon of sourcing from China that approaches it from the viewpoint of global buyers, this study examines the phenomenon from the perspective of Chinese suppliers. Through the theoretical lens of GVC analysis and its core concept of upgrading, this study contributes to GVC research by shedding light on the impact of e-commerce on suppliers' GVC upgrading practices.

Keywords: global sourcing, challenges, Chinese suppliers, GVC upgrading, e-commerce

Introduction

Global value chains (GVCs) has drawn increasing attention of both researchers and practitioners over the last two decades (Gereffi *et al.*, 2005; Gereffi and Fernandez-Stark, 2011; Antràs and Chor, 2013; Hernández and Pedersen, 2017; McWilliam *et al.*, 2020). Studies on GVCs have examined various aspects such as governance types (e.g. Gereffi *et al.*, 2005), geographic scope (e.g. Antràs and Chor, 2013), disaggregation level (e.g. Beugelsdijk *et al.*, 2009) and upgrading practices (e.g. Humphrey and Schmitz, 2002). More recently, the rising phenomenon of digitalisation – including e-commerce – is noted to have considerable implications for GVCs (Laplume *et al.*, 2016; Choi, 2020; Kano *et al.*, 2020; Hu *et al.*, 2021).

However, the impact of e-commerce on GVCs is complex, especially for suppliers based in technologically advanced emerging economics such as China (Li *et al.*, 2019; Kano *et al.*, 2020). E-commerce reduces barriers to upgrading and facilitates access to end consumers for suppliers (Li *et al.*, 2019), meanwhile, further enhances standardisation of inputs, making suppliers more interchangeable and consequently vulnerable (Kano *et al.*, 2020). Extant studies have mainly approached this topic from the viewpoint of global buying firms (see, for example, Fang *et al.*, 2010; Ivarsson and Alvstam, 2010; Wang *et al.*, 2011; Laplume *et al.*, 2016). There have been few attempts to unravel the challenges or opportunities faced by Chinese suppliers, or how they are responding or how they could respond to these challenges enabled by e-commerce (Li *et al.*, 2019; Kano *et al.*, 2020). Understanding behaviour of suppliers is crucial to global buyers as it may influence their

GVC governance, network structure, geographic configuration and performance outcomes (Asmussen *et al.*, 2007; Yamin, 2011; Laplume *et al.*, 2016; Foster *et al.*, 2018; Islam and Polonsky, 2020). Therefore, to address this research gap, this study takes the perspective of Chinese suppliers.

The Chinese business environment is experiencing fundamental changes (Wang *et al.*, 2011; Huo *et al.*, 2018). First of all, due to the rise of overall costs of sourcing (Kumar, 2009), China is gradually losing its position as “the world factory” (Wang and Li, 2017). Questions about the relative advantages of Chinese suppliers have become a concern for global buyers. In particular, the present COVID-19 pandemic has triggered fears of economic dependence on China for strategic supplies, and firms have been re-configuring the location and governance of their global value chains (GVCs) (Gereffi, 2020; Ancarani *et al.*, 2021). But at the same time, the rapid scaling e-commerce has become a new engine for China’s economic development and industrial upgrading (State Council, 2015). In 2020, China’s total e-commerce transaction value reached USD 2.3 trillion, up from USD 1.8 trillion the previous year (Statista, 2021). This represents almost a third of total retail sales in China. Online connectivity through e-commerce is noted to have complex impacts on GVCs (UNCTAD, 2019), as the power relationship between GVC lead firms potentially changes in the e-commerce era (Li *et al.*, 2019).

Against this changing context, Chinese suppliers, therefore, need to maintain and improve their competitiveness within the GVC (Gereffi *et al.*, 2001). As aforementioned, understanding the latest challenges faced by Chinese suppliers and their corresponding

responses through GVC upgrading is also crucial to global buyers, especially those who do business with China. The goal of this research is to examine the changes taking place in these cross-cultural buyer-supplier relationships, as well as the factors affecting such changes, thus offering insights into how Chinese suppliers could maintain their competitiveness through the theoretical lens of GVC upgrading, given the deterioration of their cost advantages and the acceleration of the e-commerce development.

To achieve this goal, this research employs an exploratory case study method involving nine Chinese manufacturing suppliers and sets out to answer the following two research questions: First, *what are the challenges faced by Chinese manufacturing suppliers given the deteriorating cost advantages and the rising e-commerce development?* Second, *how are Chinese manufacturing suppliers responding to the challenges in this changing business environment by means of upgrading in GVCs?* The contribution of this study is two-folded. First, unlike most extant research on the phenomenon of sourcing from China that approaches it from the viewpoint of global buyers, this study examines the phenomenon from the perspective of Chinese suppliers. Second, through the theoretical lens of GVC analysis and its core concept of upgrading, this study contributes to GVC research by shedding light on the impact of e-commerce on suppliers' GVC upgrading practices.

This study is divided into six sections. The introductory section of this paper is followed by a review of the literature in order to broaden understanding of the topic at hand. The theoretical background and the premises of the topic then leads to the discussion of the

research methodology. The fourth section elaborates on and analyses the nine empirical cases involving Chinese suppliers in the nonwoven fabric industry. The fifth section discusses the results with a focus on the impact of e-commerce on Chinese suppliers' GVC upgrading practices. The final section concludes with theoretical contributions, practical implications, limitations and suggestions for future research.

Literature review

Given the focus of this research, two literature streams are reviewed: first, *Upgrading in GVCs*, which looks into the upgrading dimension of GVC analysis in terms of economic, environmental, and social upgrading; and second, *E-commerce and GVC upgrading in China*, which examines the development of e-commerce and its impact on Chinese firms' practices of GVC upgrading.

Upgrading in GVCs

A GVC is defined as “the full range of activities that firms and workers perform to bring a product from its conception to its end use and beyond, with the activities generally being carried out in inter-firm networks on a global scale” (Gereffi and Fernandez-Stark, 2016, p. 7). The past decade has seen the extensive use of GVC as a means of analysing how value has been created and captured within international expansions, and how supply chains have been geographically fragmented (Gereffi and Lee, 2012). A GVC could be either supplier driven or buyer driven (Zhang and Gregory, 2011). Furthermore, GVC analysis highlights how new patterns of international trade, production, and employment shape the prospects

for development and competitiveness, using core concepts such as “governance” and “upgrading” (Gereffi and Fernandez-Stark, 2016).

The concept of governance in GVC enables an understanding of how a chain is controlled and coordinated when certain actors in the chain have more power than others (Gereffi and Fernandez-Stark, 2016; You *et al.*, 2018). Upgrading, as a concept in GVC, is centred on the idea that firms acting at one stage in the value chain should innovate, not only to increase their share of value added in the value chain, but also to maintain their competitiveness (Gereffi and Fernandez-Stark, 2016). The upgrade of low-end firms in GVCs constitutes an important theoretical topic in terms of the world’s value chain (Chen *et al.*, 2016). When examining upgrading at the firm level, any innovation and the value it provides should be considered relative to the pace of innovation among competitors (Kaplinsky and Morris, 2001). Thus, for an innovation to be considered as upgrading, a firm must be able to innovate and increase its own yields relative to its peers (Kaplinsky and Readman, 2005). Literature suggests that there are three types of upgrading: economic, environmental and social.

Several types of economic upgrading that can be adopted at the firm level are recognised by the extant literature (Fernandez-Stark *et al.*, 2012, p. 6; Golini *et al.*, 2018). *Product upgrading*, namely the development and marketing of a product with improved performance characteristics, which can be defined in terms of increased unit values. It refers to the move toward more sophisticated products, entailing higher unit values. *Process upgrading*, which consists of the development and implementation of new or significantly

more efficient production processes or delivery methods by introducing superior technology. It refers to the achievement of efficiency improvements in the production process through the reorganisation of productive activities. *Functional upgrading*, which involves engaging in new and superior activities in the value chain, such as a firm moving from component manufacturing to product design. It consists of acquiring (or moving toward) new functions with higher skill content (usually marketing, R&D, branding, distribution). *End marketing upgrading*, which refers to diversifying to new buyers, new geographic market, and/or new product market. *Chain upgrading*, which describes entry into a new value chain by leveraging the knowledge and skills acquired in the current chain. It refers to moving toward new (often-related) industries.

Recent efforts have attempted to go beyond the discussion of economic upgrading, and include social and environmental upgrading as well (Barriento *et al.*, 2012; Gereffi and Lee, 2016; Poulsen *et al.*, 2018). Social upgrading is defined as “the process of improvement in the rights and entitlements of workers as social actors, which enhances the quality of their employment” (Barrientos *et al.*, 2012, p. 324). It can include access to better work, and enhancing working conditions, protection and rights (Barrientos *et al.*, 2012). Social upgrading is often assumed to be a result of economic upgrading in value chains, through better wages and working conditions (Knorringa and Pegler, 2006). However, it has also been argued that while social upgrading can be the outcome of economic upgrading in value chains, it may also be thwarted if the employment created is highly insecure and exploitative (Barrientos *et al.*, 2012). The links between economic and social upgrading can often be complex, with different workers experiencing different outcomes on the same

production site (Barrientos *et al.*, 2012).

Environmental upgrading is seen as “the process of improving the environmental impact of value chain operations – including production, processing, transport, consumption, and waste disposal or recycling” (Poulsen *et al.*, 2018, p. 84). Environmental upgrading can be carried out reactively – for instance, in response to regulatory or customer demands and/or proactively – for example, as part of greening strategies, optimisation of energy use, the development of new product/service portfolios, and brand repositioning (Poulsen *et al.*, 2018).

MacCarthy *et al.* (2016) suggest that insights from sociological research on GVCs could benefit the study of supply chain lifecycles and offer different perspectives, different units of analysis, and more longitudinal approaches. The GVC framework and its core concepts of governance and upgrading have often been used as a way to analyse contemporary supply chains and examine a wide range of global industries (Gereffi and Lee, 2012); global sourcing in particular (see, for example, Gereffi and Memedovic, 2003; Humphrey and Memedovic, 2003; Gereffi and Frederick, 2010). Both concepts tend to focus on the focal firm’s perspective, for example, how the focal company coordinates and orchestrates the GVC through different approaches of governance; or how focal firms facilitate the upgrading of their GVC suppliers (Humphrey and Schmitz, 2002; Fernandez-Stark *et al.*, 2011; Gereffi and Fernandez-Stark, 2016). The observations from the suppliers’ perspective, particularly on upgrading, are rare with only few exceptions (e.g. Anisul Huq *et al.*, 2014). In this particular study, the GVC framework – with a specific focus on the concept of

upgrading, including economic as well as social and environmental upgrading – is applied as a means of analysing the responses of Chinese manufacturing suppliers to the challenges they are facing in GVCs.

E-commerce and GVC upgrading in China

China is the largest e-commerce market in the world with over 50% of global e-commerce transactions coming from China (ITA, 2021). With the advancement of information technology, improved Internet infrastructure, and strong support of national policies, e-commerce has become a new driving force in China's economic development (Yue *et al.*, 2017). In particular, the emergence of top e-commerce firms from China, e.g. Alibaba Group and JD.com, has facilitated China's economic reform and industrial upgrading (Wang *et al.*, 2020). For example, it has reshaped consumption patterns (Luo *et al.*, 2019), and has potential for changing the power relationship between GVC firms (Li *et al.*, 2019). The focus of e-commerce and its impact on GVC upgrading in China is particularly meaningful as e-commerce in China is different than it is in Europe and America because of the difference in traditional business modes (Wong *et al.*, 2004).

The prosperity of e-commerce has enabled Chinese firms of all sizes to engage in various upgrading activities (Li *et al.*, 2019). For example, a recent investigation of the Chinese apparel industry shows that e-commerce facilitates functional upgrading and end-market upgrading of small and medium-sized enterprises (SMEs) apparel producers by moving up the value chain from low-value activities into service-related activities (Li *et al.*, 2019). For

large Chinese brands, e-commerce (including cross-border ecommerce) has enabled end market upgrading (e.g. end-market diversification) by providing easy access to a greater market reach (Bain & Company, 2015). The upgrading activities enabled by e-commerce reflect not only in the economic aspect but also in broader dimensions such as social and environmental aspects. This is because the adoption of e-commerce platform connects firms and consumers directly, which makes firms easily exposed to public pressure such as social audits and environmental requirements (PWC, 2017).

As an integral element of the GVC framework, local institutional context, e.g. the prosperity of e-commerce in China, presents both opportunities and challenges for firms' upgrading trajectories (Frederick and Gereffi, 2011). In particular, the Chinese government has played a fundamental role in the country's e-commerce development (Li *et al.*, 2019). On the positive side, the Chinese government has attached great importance to the development of e-commerce, which it regards as an important instrument for economic transition and opening-up (Yue *et al.*, 2017). In 2007, the State Council issued the "E-commerce Development Five-Year plan", marking the beginning of national promotion of e-commerce. Since 2008, a number of key policies including the "E-commerce Law of the People's Republic of China" has been issued in order to harness online connectivity for economic growth. But at the same time, issues such as overall system complexity, inefficient customs clearance, and imperfect infrastructure have been considered as obstacles for impeding China's cross-border e-commerce development (Ministry of Commerce, 2018).

Although such institutional context is considered important, rare study has examined the GVC upgrading practices in China under it (Li *et al.*, 2019). Thus, in this study, we will explore that in the e-commerce context, the challenges faced by Chinese manufacturing suppliers' and the upgrading practices they undertake as responses.

Methodology

To answer the research questions, this study adopts an exploratory multiple case study approach involving nine Chinese manufacturing suppliers varying in size. The method is chosen for two reasons. First, given limited extant knowledge on Chinese suppliers' GVC upgrading practices in an e-commerce context, case study is deemed suitable as it emphasises depth and exploration (Eisenhardt, 1989). Second, multiple case study method allows answering the "how" types of questions and is particularly appropriate for cross-case comparisons on complex relationships among various constructs (Yin, 2013), which is the case in this study (i.e. the various challenges faced by Chinese suppliers and their corresponding responses through GVC upgrading).

Sample selection and data collection

As extant literature on GVC and upgrading have an industry-specific (Golini *et al.*, 2017), we also follow this to explore a specific industry. The textile and apparel industry in emerging economies has attracted great interest in previous GVC studies (e.g. Neidik and Gereffi, 2006; Evgeniev and Gereffi, 2008; Gibbon, 2008; Frederick and Gereffi, 2011), and recently more so from a Chinese perspective (e.g. Yue and Zhang, 2008; Lu and Zheng,

2010; Zhu and He, 2013; Wang and Guo, 2014). At the same time, as nonwovens are already playing a leading role in numerous market segments of textile production (Albrecht *et al.*, 2006), the decision of this study to base its investigation on the Chinese nonwoven fabric product industry is justified. Eisenhardt (1989) recommends that the sample selected for qualitative research should be purposeful and based on theoretical underpinnings. The data in this research were collected from Chinese nonwoven fabric product companies that differ from each other as widely as possible in terms of size (firm size is an important antecedent of particular forms of the internationalisation of Chinese firms (Cui and Jiang, 2009)), so as to fill in the theoretical niches (Stuart *et al.*, 2002) and maturity levels. We contacted as many Chinese suppliers as possible and finally selected nine companies in this research by their agreement to participate and, by applying a theoretical sampling approach (Miles *et al.*, 2014), the chosen case companies differ from each other in terms of their characteristics, challenges they are facing and their reactions on upgrading.

Face-to-face interviews were carried out to collect data from nine Chinese suppliers in the nonwoven fabric product industry. All of the nine case companies are based in the same town in Hubei Province, China, which is known as “the Famous Town of Nonwoven Fabrics in China” (CCPITTEX, 2012) and also a famous non-woven fabrics industry cluster. Most of the case companies export the majority (i.e. 80%-90%) of their products to global buyers in the United States (US) and Europe. As requested by the interviewees, all of the case companies are treated anonymously and only limited details about each case company are revealed, due to the competitive nature of the industry.

In total, 22 interviews were conducted over a period of three years. One informant was interviewed in each case company, and two rounds of interviews were conducted for data collection purposes. The first round includes 13 interviews, while the second round includes nine interviews. All the first-round interviews were conducted in China, when China's official factory PMI (Purchasing Managers' Index) was decreasing (National Bureau of Statistics of China, 2015) and foreign firms were withdrawing from China (Young, 2015). The second-round follow-up interviews with the same interviewees were also conducted in China, exactly two years after the first round of interviews, when the global economy was picking up (Prasad and Foda, 2017). The approach of interviewing the same informants again years later adds great value to the research, as it provides an opportunity to revisit suppliers to identify any changes (Harland *et al.*, 2007).

An interview protocol (can be obtained from the authors upon request) was developed prior to conducting the interviews, and a list of open-ended interview questions was formulated. The interviews were semi-structured, and qualitative in nature. Each of the interviews lasted from 45 minutes to one hour, and was recorded and later transcribed verbatim. The interview guide was prepared in both English and Chinese, and the face-to-face interviews were conducted in Chinese, and then translated into English by the lead author. Both the Chinese transcripts and the English translations were sent to the interviewees to be checked and confirmed.

Although Eisenhardt and Graebner (2007) suggest that numerous and highly knowledgeable informants should be interviewed to mitigate the challenge and bias of the

interview data, the researchers interviewed only one or two informants from each case company for this study. This was due to the nature of the companies themselves, as they only had one or two management-level employees (i.e. either the Founder/General Manager or the Founder and General Manager), while the remaining employees were outside the decision-making process. It is also important to note that all the case companies started as family-owned workshops, and consequently the only management-level employees in the case companies are either the fathers (as both Founders and General Managers) or the heirs (as General Managers who have taken on their fathers' positions). Table 1 provides the key features of the case companies and interviewees.

Insert Table 1 Here

Coding and analysis

Coding of the data was based on the transcripts, interviewer notes and secondary data. The categories in the coding were drawn from the reviewed literature which forms the basis for the different types of challenges as well as the responses. The data were manually processed based on these categories. Whenever there were inconsistencies between the data sources, the researcher followed up with the respondents. Furthermore, whenever there were questions arising from the interviewer notes, the researcher contacted the interviewees again through follow-up emails or phone calls. The data were analysed using both within-case descriptions and cross-case analyses in order to contrast findings with the extant literature and theory (Eisenhardt, 1989). Finally, yet importantly, each proposition of the findings is examined based on the data and relevant literature, in order to discover possible

explanations for the findings. Table 2 presents the validity and reliability of the research data.

Insert Table 2 Here

Results

This section starts with a within-case description, in which all of the cases are described and tabulated. Then the cross-case analysis is presented, where the similarities and differences between the cases are illustrated.

Within-case description

Table 3 summarises the major challenges and responses of each case company evinced by supporting quotations. The challenges include increasing labour costs, lack of labour force, product development, fierce competition for homogenous products, lack of financial and intellectual resources to establish physical stores, lack of financial and intellectual resources to perform exporting activities independently, lack of knowledge on end consumers' needs, appreciation of the currency, and fluctuations in international crude oil prices and foreign exchange rates. The responses include analysing consumer feed-back via e-commerce, engaging in cross-border e-commerce activities via the engagement of exporting intermediaries, investing in R&D, automating of production lines, and collaborating with other competing suppliers.

Insert Table 3 Here

Cross-case analysis

- *Challenges and responses*

The cross-case analysis starts with a table that categorises the challenge of the case companies by the characteristic of company size in Table 4. The challenges identified by the case companies are categorised into internal challenges (including product development challenges, human resource challenges, financial resource challenges, and intellectual resource challenges), and external challenges (including market challenges and macroeconomic challenges). Product development challenges were observed to affect the enterprises that were categorised as large enterprises, human resource challenges affected both large and medium-sized enterprises, financial and intellectual resource challenges affected only small enterprises. Market challenges and macroeconomic challenges were faced by medium-sized and small enterprises, with large enterprises only being affected by market challenges, not macroeconomic challenges.

Insert Table 4 Here

The categorisation of the challenges faced by enterprises in relation to the characteristic of company size in Table 4 reveals an important clue as to why certain enterprises might face certain types of challenge. Large and medium-sized enterprises face challenges that are more related to internal issues, perhaps due to their more solidly established presence within the industry as well as the long-term relationships they have established with their customers and more adequate funds. Relatively smaller medium-sized enterprises and small enterprises face challenges that relate to external issues, as their presence in the market might not be so well established; they may also have varying degrees of access to funds,

and their services can be more easily substituted. In particular, small enterprises face the difficulty in accessing international buyers, as they have limited financial resources and expertise to engage in exporting activities. Small enterprises also encounter with more barriers in establishing physical stores. The challenges are also affected by the maturity of the enterprises, as experience and knowledge are gained over time, and enterprises that are deficient in this respect tend to focus more on gaining the experience needed, while larger enterprises seem to focus on developing their acquired knowledge and products. Hence, the focus of the larger enterprises that have acquired the needed experience is no longer on lowering their prices and competing on homogenous products, but rather on supplying their customers with the best products and services possible. All case companies, despite various sizes, experience the challenge of insufficient knowledge of end users' needs due to limited interactions with the consumers. As most case companies are original equipment manufacturers (OEMs) for large international brands, their product design and manufacturing are largely dependent on the requirements of these global buyers, rather than the consumers.

In addition, small enterprises face tax and fee burdens that do not seem to affect large and medium-sized enterprises. This might be explained by the fact that large and medium-sized enterprises have more means to avoid/deal with taxes and fees and/or receive incentives from the government. Indeed, due to tax reduction and other incentives offered for foreign direct investment in China (Huang *et al.*, 2017), some of the large and medium-sized case companies in this research have clearly taken advantage of the law by forming joint ventures. Hence, they do not seem to suffer from tax and fee burdens as much as small

companies do. Table 1 also reflects on this character that joint ventures can be found in medium-sized and large firms, but not in the small ones.

- *Upgrading practices and types*

The upgrading practices undertaken by the case companies in response to the challenges they face are linked to the types of upgrading in GVCs, as presented in Table 5. The table shows that all of the case companies have engaged in all types of economic upgrading – namely *Product upgrading*, *Process upgrading*, *Functional upgrading*, *End market upgrading*, and *Chain upgrading*. Furthermore, all of the large companies (i.e. A, B and C), medium-sized companies (i.e. D, E, and F), and one small company (i.e. G) have engaged in *Environmental upgrading*. However, only the large companies (i.e. A, B and C) have engaging in *Social upgrading*.

Insert Table 5 Here

Although all of the case companies in this research face more or less the same types of challenges, depending on their relative company size and type of ownership, their responses to the challenges by means of upgrading are not exactly the same. Furthermore, all of the case companies, regardless of size, have already engaged in the economic upgrading in GVCs – namely *Product upgrading*, *Process upgrading*, *Functional upgrading*, *End market upgrading* and, *Chain upgrading*. This is not surprising, as all of the case companies have already been established for about two decades. Most of them have always existed to supply global buyers; they have also upgraded certain basic functions such as

moving from component manufacture to finished product manufacture, and engaging in new higher value end-market segments, such as the segment of medical protection products.

In particular, although all of the case companies have engaged in *Functional upgrading*, the upgrading practices adopted by the case companies are not exactly the same. All of the case companies have integrated manufacturing and exporting, while only the three large case companies have engaged in R&D activities. Furthermore, three case companies (i.e. A, D and H) have integrated consumers into their design and production process by analysing consumer feedback on their online stores. Here, the influence of e-commerce on companies' upgrading practices becomes apparent. Prior to the engagement of e-commerce, the case companies have limited interactions with the end consumers and thus have limited access to consumer preferences. By analysing consumers' comments and feedback via online stores, the case companies are able to adjust their design and production flexibly to maximise the consumer experience.

An interesting finding concerns the upgrading practice of establishing a sales office in customers' home countries, as only two large (i.e. B and C) and one medium-sized case company (i.e. E) have done so. These three companies have managers who have higher education and an international background, and this has contributed to the adoption of such an upgrading practice. As the results indicate, managers with higher education and an international background can play an important role for Chinese suppliers. It is important to note this factor, as the original company founders typically had less experience of global business and rarely spoke any language other than Chinese, while some of the new

generation managers (i.e. in five of the case companies) have enjoyed the opportunity to study abroad and have been exposed to a range of foreign languages and cultures. Thanks to this new generation of managers, Chinese suppliers now have more ways to find and be in direct contact with their customers, as a response to the challenges they face.

Moreover, all the case companies have engaged in *End market upgrading* by diversifying to new buyers via cross-border e-commerce. In other words, cross-border e-commerce was the upgrading driver for such end market diversification. Some differences exist in the upgrading practices depending on the company size. As small companies have limited financial and intellectual resources to engage in exporting and cross-border e-commerce independently, they turn to third party trading agents to handle the exporting process. Overall, cross-border e-commerce reduces the investment required for SMEs to become visible in the global market, and thus allows easier access to end market.

Finally, yet importantly, the findings reveal that most of the case companies have engaged in *Environmental upgrading* (i.e. A, B, C, D, E, F and G), while only large case companies (i.e. A, B and C) have engaged in *Social upgrading*. These upgrading practices are primarily driven by the increasingly demanding requirements in environmental and social issues of the customers from developed countries, as engaging in cross-border e-commerce provides suppliers with easy access to international customers, thereby increasing their (i.e. suppliers) exposure to such requirements.

Discussion

This exploratory study takes a deeper look into a situation in which China has lost its low-cost competitive advantage as the world's favoured manufacturing destination along with the rising e-commerce development in the country, and to understand the underlying issues. This is done by examining the challenges faced by nine Chinese manufacturing suppliers in the nonwoven fabric product industry, together with their upgrading practices in GVCs.

Earlier research has suggested that the factors of low cost of manpower, the quality and quantity of products, the availability of major logistic platforms, and the possibility of justifying a commercial presence in the Chinese market (Nassimbeni and Sartor, 2007) are the major motivations for global buyers to source from China. Meanwhile, the rising cost of labour, shortages of skilled labour and changing legislation (Kumar, 2009) are considered to be the main challenges in sourcing from China. The findings of this study on the challenges faced by Chinese suppliers are well in line with the challenges in sourcing from China identified by previous studies. Despite the fact that a decade has passed, the findings of this study on Chinese suppliers' competitive advantages, such as the quality and quantity of products, are still in harmony with the motivational factors for global buyers to source from China, as identified by previous studies.

However, the findings further reveal that in the e-commerce context, Chinese suppliers face other challenges and hold other competitive advantages that are less prominent in previous studies. Prior to the prosperity of e-commerce in China, global buyers mainly source from large Chinese suppliers who have financial and intellectual recourse for exporting and the capability to accessing international customers. This provides global buyers a limited

supply base and therefore, less bargain power when sourcing from China due to the small number of available suppliers (Gereffi, 2014). But thanks to the growth of e-commerce in China, small and medium-sized Chinese suppliers now are able to engage in exporting activities with the assistance of intermediaries and present in the international market. This provides global buyers a larger supply base with more available Chinese suppliers and in particular, possibly cheaper suppliers as small and medium-sized suppliers may have lower cost than large suppliers in order to attract more customers (Tanskanen and Aminoff, 2015).

In line with previous research (e.g. Li *et al.*, 2019), findings from this study also confirm the significant impact of e-commerce on Chinese suppliers' GVC upgrading practices. Specifically, in response to the challenges and opportunities that came along with e-commerce development, Chinese suppliers have engaged in *Functional upgrading* and *End market upgrading* entail practices such as integrating consumers into design and production process via online feedback, and diversifying to new buyers via cross border e-commerce. These upgrading practices enabled by e-commerce not only help Chinese suppliers overcome the challenges caused by limited financial and intellectual resource through, for example, opening online stores instead of physical stores, engaging in cross-border e-commerce with the assistance of exporting intermediaries; but also provide them knowledge of end consumers through analysing consumers' feedback via e-commerce. The latter generates additional competitive advantages for Chinese suppliers as producing more consumer-tailored products can make them more favourable suppliers (Yi *et al.*, 2015).

In terms of *Environmental upgrading* and *Social upgrading*, the research findings suggest that e-commerce further highlights the increasingly demanding requirements of customers in developed countries with regard to environmental and social issues. Chinese suppliers that have engaged in cross-border e-commerce have not only gained greater market reach, but also encountered with increased level of competition and reduced information asymmetries between Chinese suppliers and global buyers. Therefore, initiatives involving *Environmental upgrading* and *Social upgrading* practices could potentially increase Chinese suppliers' competitiveness as a differentiating factor. Our results, though, demonstrate that Chinese suppliers' upgrading activities in this respect are still in its infancy. Particularly, more attention is given to environmental issues than to social matters, as products must fulfil particular environmental requirements to be even allowed into a particular region. Despite the demands from governmental organisations and customers, not all of the social requirements could even be met. It could be also noted that suppliers are far more interested in answering their customers' needs, and that customers may or may not necessarily be genuinely interested in the social welfare of the suppliers' employees. The differences are also rooted by the size of customers; the big firms serve relatively larger customers which have higher corporate social responsibility standards than the medium-sized and small customers have.

Conclusions

China has been at the forefront of academic interest in global sourcing, due in particular to its recent turbulent and changing business environment (Fang *et al.*, 2008; Ma *et al.*, 2009;

Li *et al.*, 2019). However, as most research regarding China in the field of purchasing and supply management has been conducted from the perspective of global buying firms, this exploratory study investigates the lesser-known viewpoint of Chinese suppliers, in order to identify the challenges they face and the steps they are taking to upgrade in GVCs, given the deterioration of their cost advantages and the growth of e-commerce in China. This research was able to identify and categorise the challenges faced by Chinese suppliers, and their upgrading practices in relation to the types of economic, environmental, and social upgrading in GVCs in the e-commerce context (Humphrey and Schmitz, 2002; Fernandez-Stark *et al.*, 2011; Barrientos *et al.*, 2012; Gereffi and Lee, 2016; Poulsen *et al.*, 2018). The challenges varied from internal issues to external issues, ranging from product development challenges, human resource challenges, financial resource challenges, intellectual resource challenges to market challenges and macroeconomic challenges, while the responses of Chinese suppliers to these challenges largely relate to the characteristic of company size and GVC upgrading types.

From a theoretical perspective, this research makes a valuable contribution by categorising the challenges that, regardless of the industry, suppliers in developing economies might encounter when supplying to global buying firms. More importantly, this study contributes to theoretical development of GVC analysis and upgrading by identifying different types of upgrading practices, and taking into account not only the economic upgrading, but also the environmental and social upgrading in the e-commerce context. E-commerce is a powerful new force in the global economy and can enable various GVC upgrading for suppliers. This finding responds to the call of whether and how e-commerce transforms the governance of

GVCs, especially from the supplier side (Foster *et al.*, 2018; Li *et al.*, 2019; Kano *et al.*, 2020). In addition, while categorising the challenges and identifying upgrading trajectories, the study was also able to generate new insights into how the characteristic of company size affects the challenges that companies face and how these challenges are responded to by engaging in different types of upgrading at the firm level. Even though definitions of company size differ in Western and Chinese views, the relative perception remains the same – i.e. larger firms typically undertake more mature upgrading practices.

On more practical and managerial levels, companies from developing economies that are already involved in GVCs could benefit from this study by examining the challenges and responses identified in the case examples of the Chinese suppliers, and by deducing what they themselves might encounter and what they could do in similar circumstances. More importantly, this study helps firms from developing countries by providing guidance that could be utilised as a basis for long-term planning and managing their upgrading in GVCs. In particular, e-commerce offers new opportunities for small and medium-sized producers based in developing economies, which account for a large number of suppliers in GVCs (Parker and Van Alstyne, 2018). For small and medium-sized companies, proactive engagement in e-commerce is encouraged, as it not only allows easier access to and thus knowledge acquisition of the end market, but also helps them become more visible to global buyers through cross-border e-commerce.

This study also has several limitations. While the research was able to identify the challenges for Chinese suppliers, it nevertheless investigated only one industry, within one

location and industrial cluster. Thus, the applicability of the findings to other industries still needs to be tested. Furthermore, as we only interviewed the suppliers, a supply chain perspective with multiple chain players could potentially provide more insights.

While this research has opened a new pathway for understanding the challenges that enterprises face by looking not only at the types of challenges but also at the characteristic of company size, further research could investigate how different contingencies might affect suppliers and buyer-supplier relationships, and particularly how the role of company size might vary in different contexts. Additionally, as Chinese “guanxi” (Yang, 1994) could constitute a source of sustained competitive advantage for doing business in China (Tsang, 1998), it would be interesting for future research to examine the role of Chinese “guanxi” in order to understand how Chinese suppliers interact with their Western buyers socially to improve their productivity and efficiency for sustained competitive advantage.

Nonetheless, this exploratory research provides a starting point for promoting understanding of the challenges faced by Chinese suppliers by, for example, investigating other industries at different and varying locations. Another possible stem of research, based on this exploratory study, would be to compare the performance of companies residing in an industrial cluster with the performance of those that are not located in or near an industrial cluster. Furthermore, as the business environment is constantly experiencing change, one of the most interesting aspects is how companies respond to these changes, particularly considering companies that have managers with higher education and an international background and those that have not. Thus, more research into the effects of

the role of managers' educational and international background is to be encouraged. One thing is clear, however. Chinese suppliers do have the keys to success in their hands, as long as they choose to utilise them wisely.

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Table 1. Key features of the case companies and the interviewees

Case	Company Type	Year of establishment	Main product categories	Company size by Chinese standards ¹	Number of employees	Annual sales (million USD)	Percentage exported	Location of major foreign buyers	Position of interviewee/s at case company
A	Private	1992	Industrial protection, Medical protection	Large	3250	100	100%	Europe and US	Founder/ General Manager
B	Private; Joint venture	1996	Medical protection	Large	1500	58	99%	Europe and US	General Manager
C	Private; Joint venture	1993	Medical protection, Safety protection	Large	1800	17	100%	US	Founder/ General Manager
D	Private	1997	Medical protection; Safety protection	Medium	700	12	100%	US, Europe and Middle East	General Manager
E	Private; Joint	2001	Medical protection,	Medium	600	8	99%	US, Europe	General Manager

¹ The sizes of enterprises in different industries in China have well-defined standards, and they differ greatly from the US/European definitions. For the manufacturing industry in China, the sizes of enterprises are categorised as follows: large enterprises have above 1000 employees or annual revenue of above 40 million CNY (i.e. the official currency of the People's Republic of China). Medium-sized enterprises have from 300 to 1000 employees or annual revenue that falls between 20 and 40 million CNY. Small enterprises have from 20 to 300 employees or annual revenue between 3 and 20 million CNY. Micro-enterprises have fewer than 20 employees or annual revenue below 3 million CNY (Ministry of Industry and Information Technology of the People's Republic of China, 2011).

	venture		Laboratory protection					and Malaysia	
F	Private; joint venture	1993	Medical protection; Labour protection; Plastic products; Paper products	Medium	460	6.9	100%	US and Europe	General Manager
G	Private	1999	Medical protection; Plastic products	Small	200	3.5	90%	US	General Manager
H	Private	1996	Medical protection	Small	200	3	95%	North America and Middle East	General Manager
I	Private	2009	Medical protection	Small	100	1.3	80%	Europe, US, Chile and Mexico	Founder/General Manager

Table 2. Validity and reliability of the research data

Validity and reliability	Practices
Mitigate biases	Use of interview, archival and observational evidence
Control for the biases of any one individual researcher	Use of multiple researchers
Mitigate the biases of a single respondent	Multiple types of data, including primary data sources such as interviews and observations, and secondary data sources such as annual reports of the case companies etc.
Match rhetoric with reality and spur further questioning	Plant tours of the case companies

Table 3. Challenges and responses of Chinese manufacturing suppliers in GVCs

Case	Challenges	Supporting quotations	Responses	Supporting quotations
A	<p>Increasing labour costs</p> <p>Lack of knowledge on end consumers' needs</p>	<p><i>"The other challenge is that, when we started in the industry some 20 years ago, the monthly wage of an employee was only around CNY (Chinese currency) 200-300. But now it is CNY 2500-3000, and even this amount barely makes the employees satisfied."</i> (Founder/General Manager)</p> <p><i>"Our products are constantly changing, and our products and manufacturing processes are constantly being upgraded due to the fact that our customers are constantly tightening their requirements. It is difficult to follow and predict the customers' needs and to know what do the consumers want."</i> (Founder/General Manager)</p>	<p>Invest in R&D, collaborate with textile universities</p> <p>Increase the wages of employees</p> <p>Analyse consumer feed-back via e-commerce</p>	<p><i>"You have to upgrade your products from the lower-end to the higher-end...If you don't upgrade your products to a higher-class, if you still make low-class products, you will lose money, and you will eventually go bankrupt. We invest more than CNY 20 million annually in R&D relating to new products and technological innovations, and we have collaborated with a major Textile University. With the assistance of the textile university, we have also established a nonwoven fabric product R&D Centre. In this year alone, we have received 11 patents. Our company's Nonwoven Fabric Productivity Promotion Centre has been recognised by the Ministry of Science and Technology of the People's Republic of China as a "National-level Demonstrational Productivity Promotion Centre"...When you invest money in manufacturing higher-class products, you will also make more profit, and when you make more profit, you can increase the wages of your employees. When you increase the wages of your employees, it will then be easier for you to attract more workers. Now it is very difficult for the whole nation [to hire workers], and it is not easy for us to attract and maintain a workforce of 3000-4000 employees. If we do not offer them better pay, they may not come here to work for us."</i> (Founder/General Manager)</p> <p><i>"Via our online store, we are now able to know the consumers' needs, and based on their feedback, we are able to respond and adjust our production quickly."</i> (Founder/General Manager)</p>
B	Product	<i>"Our biggest challenge now is to</i>	Invest in	<i>"How have we responded to this challenge? Well, what</i>

	<p>development</p> <p>Buyers' demands and raised expectations in environmental and social issues</p>	<p><i>develop new products to meet our customers' requirements. Other than that, we do not really have any other challenges.</i>" (General Manager)</p> <p><i>"The downside of engaging in cross-border e-commerce is that we face more competition now. Especially our Western customers have high requirement regarding environmental and social issues."</i> (General Manager)</p>	<p>R&D</p> <p>Invest in environmentally sound product and process and relevant certification</p>	<p><i>can you do in this situation? You just have to put more money and resources into developing new products based on the customers' expectations. And this is what we have been constantly doing.</i>" (General Manager)</p> <p><i>"We have been trying hard to meet the [social] requirements of the Labour Law, for example, regarding the working hours, the Fire Department and our foreign customers. But you know the actual situation in China, it is not always easy or even possible to do so. If you cannot meet the [social] requirements, you have to prove that you have tried to improve the situation. However, regarding our products, we will have to meet the requirements of our foreign customers in terms of environmental certifications and so on; otherwise, our foreign customers will not do business with us anymore. Many smaller companies could not meet such requirements; they just had to give up the business."</i> (General Manager)</p>
C	<p>Increasing labour costs</p> <p>Lack of labour force</p> <p>Buyers' demands and raised expectations in environmental and social issues</p>	<p><i>"The competition is rather fierce, especially in terms of labour costs ...Countries such as Vietnam and India, which used to be poor countries, are now developing. They have cheaper labour. We had cheap labour in 1993, but now their labour is much cheaper than ours."</i> (Founder/General Manager)</p> <p><i>"Because working with nonwoven fabric products is not very high tech, and also because the</i></p>	<p>Automate production lines</p> <p>Invest in environmentally sound product and process and relevant certification</p> <p>Provide employees</p>	<p><i>"The only thing we can do now is to use machines to replace manual work. If we take the production of nonwoven fabric products as an example, we have automated the production of many products. For instance, we used to have more than 100 people making masks, but we do not need them now. Now the masks are manufactured by machines, and the production output stays the same."</i> (Founder/General Manager)</p> <p><i>"...In recent years, my son has represented our company in various international industrial exhibitions – for example, in Germany and in the US. [Because of this]he has gained very many good contacts abroad, and now we plan to send him to Australia this year to start a sales</i></p>

		<p><i>working age population is getting smaller and smaller, young people can choose and are not willing to become blue-collar workers. Nowadays, normal families usually have only one or two children – at most two children – and, after their graduation, the children all want to become white-collar workers. They all want to work in offices. Who would want to work as a blue-collar worker in a factory anymore?”</i> (Founder/General Manager)</p> <p><i>“With e-commerce, things have become more transparent. Because now we have direct interactions with our consumers, we want to build our company brand and present them a positive image that we are an environmentally friendly and socially responsible company.”</i> (Founder/General Manager)</p>	<p>with insurance, funds or partake in charity donations</p>	<p><i>representative office there for us. In addition, I have a niece who is now studying abroad in the US, and she has also started a sales representative office for us there. I believe that, by setting up these offices abroad, it will be much easier for us to find more end-user customers.”</i> (Founder/General Manager)</p> <p><i>“When we first started our business, our foreign customers and local government both urged us to adopt corporate social responsibility. But we had always bargained with them, in the hope that we could pay as little as possible for this “corporate social responsibility”. Later on, as our company grew bigger and bigger, I gradually changed my mind. We have changed from being forced to adopt social responsibility to voluntarily adopting it, and now we even take the initiative in developing social responsibility. For instance, on the environmental side, our products have been certified with ISO 14001 and MDA. On the social side, all of our employees now have five insurances and one fund [i.e. endowment insurance, medical insurance, unemployment insurance, work-related injury insurance, childbirth insurance and housing accumulation funds]. I can give you one more example; just recently, we took the initiative and voluntarily donated to the Poverty Alleviation Fund and the Learning from Lei Feng Foundation. I think large enterprises must take the initiative for corporate social responsibility. If we, as successful entrepreneurs, do not take this responsibility, who else has the will and the ability to act responsibly for our society?”</i> (Founder/General Manager)</p>
D	Fierce competition	<p><i>“Now our customers have very many expectations of our</i></p>	<p>Locating in an industrial</p>	<p><i>“It is more convenient for our customers to source from here, even when the labour costs are rising. This is</i></p>

	<p>for homogenous products</p> <p>Lack of knowledge on end consumers' needs</p>	<p><i>products. If we focus on just one aspect, we often cannot meet all of their requirements. Then they are more willing to do business with an import-export trading firm or a middleman that can configure all of their orders, and [let the middleman] find the factories to do it.” (General Manager)</i></p> <p><i>“It would be really helpful if we could know what do the consumers want, so that we could adjust our supply chain in advance.” (General Manager)</i></p>	<p>cluster</p> <p>Analyse consumer feed-back via e-commerce</p>	<p><i>because we have a comprehensive industrial chain; we have hundreds of companies in the same town working in this [nonwoven fabric product] industry and other relevant industries, ranging from the production of nonwoven fabric, to string, to buttons, to every component needed for a finished product. Simply by going around in our town, you can source every necessary part. It will cost them much more in terms of logistics, coordination and time if they source from somewhere else than here. This is also why we predict that this [nonwoven fabric product manufacturing] will still stay in China for a few more decades, until other countries catch up and build comprehensive industrial chains that are similar to what we have here now.” (General Manager)</i></p> <p><i>“In a way, our online shops are our eyes and ears to tell all the smallest requirements and feedback from the end users. We feel more confident now in our production, as we are able to anticipate the changes in consumers' requirements in advance.” (General Manager)</i></p>
E	<p>Appreciation of the currency</p> <p>Lack of labour force</p> <p>Fierce competition for homogenous products</p>	<p><i>“The biggest challenges we are now facing are the appreciation of the CNY, the lack of labour, increasing labour costs and the tough competition for homogenous products in the industry.” (General Manager)</i></p>	<p>Simplify the organisation, redesign the production process to lower production costs</p> <p>Attract labour force</p>	<p><i>“We have responded to the challenge caused by the appreciation of the CNY by simplifying our organization and redesigning our production process to lower costs. We have responded to the lack of labour by hiring employees from remote and poorer areas. And we have met the fierce competition for homogenous products in the industry by constantly upgrading our products.” (General Manager)</i></p> <p><i>“We have also invested in environmental certifications such as ISO 14001 to become more competitive.” (General Manager)</i></p>

			<p>from remote and poorer areas</p> <p>Upgrade the products</p> <p>Invest in environmentally sound product and process and relevant certification</p>	
F	<p>Fluctuations in international crude oil prices and foreign exchange rates</p>	<p><i>“We face different difficulties in supplying to our foreign customers. For example, fluctuations in international crude oil prices can lead to drastic changes in the prices of raw materials in China. Likewise, fluctuations in foreign exchange rates can directly influence our prices and profits.”</i> (General Manager)</p>	<p>Communicate with customers</p>	<p><i>“As the quotations we make for our customers are sometimes for the whole year, or even longer, we have to communicate with them in good time, renegotiate and adjust the prices, or bear the loss of profits on our own or together with our foreign customers.”</i> (General Manager)</p>
G	<p>Acquiring international customers</p> <p>Tax and fee burden</p>	<p><i>“Regarding challenges and difficulties, our biggest challenge now is how to get more foreign customers, which I think is common to all companies in this business. On the other hand, the taxes and fees that our company has to pay are also somewhat of a</i></p>	<p>Invest in advertising</p> <p>Engage in cross-border e-commerce activities via the</p>	<p><i>“As our biggest challenge has been to get more foreign customers, we invested a lot more in advertising, you know, on the Internet, in search engine optimisation. So when foreign buyers search for nonwoven fabric products on the Internet, they will find our company. With respect to the tax and fee burden, we have no choice but to pay. As local entrepreneurs, we have orders from the local government that we need to follow. Isn't it</i></p>

		<p><i>burden. For instance, as summer approaches, we as a company will have to pay a flood prevention fee to the local government, and there are other fees like this, such as the environmental sanitation fee, which are unavoidable.” (General Manager)</i></p>	<p>engagement of exporting intermediaries</p> <p>Arrange forward exchange rates with banks</p>	<p>so?” (General Manager)</p> <p><i>“To gain more foreign customers, we also started doing cross-border e-commerce with the help of an agent, which specialises in cross-border e-commerce. Because we are a small company, we don’t have such knowledge. It’s better to let someone with the expertise handle it.” (General Manager)</i></p>
H	<p>Customers demand lower prices</p> <p>Lack of knowledge on end consumers’ needs</p>	<p><i>“One challenge is that, after customers start to do business with you, and when you later ask them to place more orders, they will intentionally demand lower prices and will tell you about the prices of other suppliers, so that you will have to lower your prices. Some customers will bluff and tell you a “fake” price, while others might tell you a real price. And it is often hard to know whether the price is real or not. However, if a “fake” price given by a customer is acceptable but lower than expected– then it is totally up to you to negotiate and see how things go.” (General Manager)</i></p> <p><i>“Because there are many layers of distributors, we don’t know the actual needs of the consumers. In</i></p>	<p>Negotiate and provide better quality and service</p> <p>Collaborate with other competing suppliers</p> <p>Analyse consumer feed-back via e-commerce</p>	<p><i>“The main thing is to negotiate with our customers. We have cooperated for so many years, and based on their [good] impression of us, they can decide by themselves [if they want to negotiate with us or not]. Of course, we will also adjust our prices, if we see fit. Another thing is to arrange a forward exchange rate with the banks, so as to mitigate the exchange rate risk.” (General Manager)</i></p> <p><i>“Sometimes when we don’t have enough capacity to deliver the products to our customers on time, we will give some of our orders to other factories [companies] that have free capacity, for them to work on, so that we can meet the demands of our customers on time. If some other factories face the same problem of limited production capacity, while we happen to have extra capacity, they will then give us the portion of the order for which they do not have the capacity, so that they can meet the demands of their customers on time. It is a win-win situation for all of us.” (Founder/General Manager).</i></p> <p><i>“The consumers are much closer now with the online store, because we can communicate with them directly and ask what they want and how should we improve.</i></p>

		<i>this sense, we are much dependent on our customers. We manufacture what they tell us to.” (General Manager)</i>		<i>Also because of that, our customers have less bargaining power over us now.” (General Manager)</i>
I	Customers ask for credit Lack of financial resources to establish physical store	<i>“Of course we have challenges. For example, when you do business with a customer; the more orders you receive from him, the more likely it is that he will ask you for credit. When we started and first began to receive orders, the customers would always give us the money up front. But gradually we are getting more orders. The customers want to develop, and we also want to develop. If we don’t give the customers credit, their capital chain may rupture, and we don’t want that to happen. So we will look at the situation and give credit. Our payment terms are currently two months.” (Founder/General Manager)</i> <i>“Of course, we want to have more stores, but our financial situation would not allow it” (Founder/General Manager)</i>	Negotiate on payment terms Establish online stores	<i>“I can give you an example, so that you can see how the exchange rate has affected our business. When I started this business, the exchange rate (between the USD and the CNY) was 6.0, and now it is 6.2. If we compare them – for example if you do 4-5 containers per month – then the difference will be CNY 15,000, so that the influence of the exchange rate is huge. CNY 15,000 is enough to cover the wages of a few employees. Therefore the exchange rate is crucial and has a significant impact on our business.” (Founder/General Manager)</i> <i>“It’s much cheaper to open an online shop than a physical one, and we are very happy about it. E-commerce has indeed helped small companies like us a lot.” (Founder/General Manager)</i>

Table 4. A categorisation of challenges for Chinese suppliers in supplying to global buyers

Company size		Large enterprises (A, B, C)	Medium-sized enterprises (D, E, F)	Small enterprises (G, H, I)
Category of challenge				
Internal	<i>Product development challenge</i>	Product and process R&D	/	/
	<i>Human resource challenge</i>	Lack of labour force Increasing labour costs	Lack of labour force Increasing labour costs	/
	<i>Financial resource challenge</i>	/	/	Lack of financial resource to establish physical stores Lack of financial resource to perform exporting activities independently
	<i>Intellectual resource challenge</i>	/	/	Lack of expertise in exporting
External	<i>Market challenge</i>	Buyers' demands and raised expectations in environmental and social issues Lack of knowledge on end consumers' needs	Buyers' demands and raised expectations in environmental and social issues Buyers' willingness to change to import-export trading firms or middlemen Fierce competition for homogenous products Lack of knowledge on end consumers' needs	Buyers' demand for lower costs and/or credit Risk of buyers switching suppliers Difficulties in acquiring international customers Lack of knowledge on end consumers' needs
	<i>Macroeconomic challenge</i>	/	Fluctuation of crude oil prices and foreign exchange rates Appreciation of CNY (Chinese yuan)	Fluctuations in exchange rates Tax and fee burdens

Table 5. A summary of Chinese suppliers' upgrading practices in relation to the types of GVC upgrading

Upgrading types and practices	Types of upgrading										
	Economic upgrading									Environment al upgrading	Social upgrading
	Product upgrading	Process Upgrading		Functional Upgrading				End market upgrading	Chain upgrading		
	Shifting production from lower value products to higher value products	Improve productivity through investment in machineries	Redesign the production process (e.g., to save costs)	Integrate manufacturing and trading/exporting	Integrate consumers into design and production process via online feedback	Establish sales office in customers' home countries	Engage in R&D	Diversifying to new buyers via cross-border e-commerce	Expand into higher end market segments (e.g., medical industry)	Invest in environmentally sound product and process and relevant certification	Provide employees with insurance, funds or partake in charity donations
A	✓	✓		✓	✓		✓	✓	✓	✓	✓
B	✓	✓		✓		✓	✓	✓	✓	✓	✓
C	✓	✓		✓		✓	✓	✓	✓	✓	✓
D	✓	✓		✓	✓			✓	✓	✓	
E	✓	✓	✓	✓		✓		✓	✓	✓	
F	✓	✓		✓				✓	✓	✓	
G	✓	✓		✓				✓	✓	✓	
H	✓	✓		✓	✓			✓	✓		
I	✓	✓		✓				✓	✓		

