Coping with the COVID-19 pandemic: evidence from the apparel industry in Bangladesh and China

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Made available courtesy of Emerald Insight:
http://dx.doi.org/10.1108/JFMM-08-2021-0213


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Abstract:

Purpose - The purpose of this study was to understand the impact of the coronavirus disease (COVID-19) pandemic on the global textile and apparel supply chain from the perspectives of industry professionals within the two leading production countries: Bangladesh and China.

Design/methodology/approach - Applying the theory of dynamic capabilities, a qualitative research design was employed using interviews with a total of 33 apparel industry practitioners, 15 in Bangladesh and 18 in China.

Findings - Findings indicate that four factors primarily impacted the extent to which COVID-19 disrupted a firm's supply chain: firm size, channel diversification, sourcing method and product type. Viewed through the lens of the theory of dynamic capabilities, findings point to the need for firms to address the challenges brought about by supply chain disruptions by creating opportunities.

Originality/value - It is important to understand the impact of COVID-19 in real time and within the two largest textile and apparel–producing countries globally, as they have borne much of the brunt of the supply chain disruptions brought on by COVID-19. This empirical study makes contributions to the apparel supply chain literature as it provides an in-depth investigation of what textile and apparel firms in China and Bangladesh have learned from the COVID-19 experience to better prepare for future unexpected global events.

Keywords: COVID-19 pandemic | Supply chain | Textile and apparel | Dynamic capabilities | China | Bangladesh

Article:

The textile and apparel (TA) industry, a classic representation of a global supply chain, relies heavily on worldwide supply networks, logistics and brick-and-mortar distribution
An uninterrupted supply chain network is critical to the success of firms. However, such networks can easily be disrupted due to unavoidable disasters, including the recent pandemic (Shahed et al., 2021). Beginning in early 2020, this extraordinary crisis caused a sudden halt in international business across many industries, alongside a shutdown of economic activities in most parts of the world. Since lockdowns and social distancing measures have been imposed in many countries, coronavirus disease (COVID-19) has had a particularly significant effect on the TA industry (Majumdar et al., 2020; Zhao and Kim, 2021). For example, trade data show that in 2020, the US imports of TA products (in US$) decreased by more than 19 per cent compared with 2019 (The International Trade Administration, 2021).

The purpose of this study was to understand the impact of the COVID-19 pandemic on the global TA supply chain from the perspectives of the two largest TA-producing countries globally: Bangladesh and China. China has been the world's largest TA exporter since 2000, and Bangladesh has ranked among the top five largest apparel exporting countries to the US market since 2013 (The International Trade Administration, 2021). In 2018, China contributed to more than half of the global textile and clothing production and more than 30 per cent of worldwide apparel exports (Statista, 2021). During the last five years, Bangladesh's apparel exports (in US$) accounted for over 80 per cent of Bangladesh's total exports (in US$) (Euromonitor International, 2021c). The TA industry is the backbone of manufacturing in Bangladesh, with roughly 2 million workers in the apparel industry and another 15 million depending indirectly on the industry (Euromonitor International, 2021b). In the five years prior to the pandemic, apparel exports from Bangladesh had more than doubled, from $14.6bn in 2011 to $33.1bn in 2019 – a compound annual growth rate of 7 per cent (Berg et al., 2021).

Due to the severe and urgent impact of the COVID-19 pandemic on the global TA industry, it is important to understand the impact of COVID-19 in real time and within the two largest TA-producing countries globally, as they have borne much of the brunt of the supply chain disruptions brought on by COVID-19. This research explores and highlights some of the unique consequences of the COVID-19 pandemic on the TA supply chain from the perspective of industry professionals in China and Bangladesh and while the pandemic was at its peak globally. A qualitative research approach was employed to dive deeply into the two interconnected research questions guiding the study:

**RQ1.** What are the most critical impacts of the COVID-19 pandemic on TA firms in China and Bangladesh?

**RQ2.** How has the current crisis helped these firms, and global sourcing and production in general, become more capable of withstanding other catastrophic events that may occur?

This study seeks to address the literature gaps and contribute to the TA supply chain literature in the following ways. First, it addresses the immediate and urgent need for empirical research on supply chain disruption and supply chain risk management in the COVID-19 context (Chowdhury et al., 2021; Flynn et al., 2021). Chowdhury et al. (2021) analyzed extant published research on the COVID-19 pandemic in the supply chain literature and argued that more research with firsthand, real-world data are required to understand the scope of the pandemic's effects across various industry contexts. Thus, the present study is an effort to address this gap through rigorous real-world and real-time empirical research. Second, this study provides in-depth investigation of what TA firms in China and Bangladesh have learned from the COVID-19 experience to better prepare for future unexpected global events. Prior literature on epidemic
outbreaks and supply chain disruptions revealed that impacts vary as a result of differences in network complexity (Bier et al., 2020; Chowdhury et al., 2021). To our knowledge, there is limited research that explores COVID-19 impacts from the TA industry perspective. Zhao and Kim (2021) developed a conceptual model illustrating the connections among various value chain segments in clothing and textile that have been affected due to the COVID-19 pandemic. The present study extends Zhao and Kim's (2021) study by providing an in-depth examination of how firms from the two major TA manufacturing countries have been coping with supply chain disruptions during the COVID-19 pandemic. The supply chain in the TA industry is unique among sectors and has gone through rapid reconfiguration in the last two decades; therefore, the findings of this study provide implications for future supply chain practices in the global TA industry. Third, the study employs the theory of dynamic capabilities to understand the impact of the COVID-19 pandemic on the global TA supply chain. Surprisingly, as Chowdhury et al. (2021) pointed out, thus far, that the majority of the published research on COVID-19 in the supply chain literature is not theory-based; therefore, they argued for studies on the topic that integrate management theories. By grounding this study in the theory of dynamic capabilities, findings offer new insight and contribute to a broader understanding of how a crisis like COVID-19 can be managed successfully.

Background

COVID-19 and global TA supply chain disruption

Supply chain disruption refers to any unplanned or unanticipated event that disrupts the flow of goods or services in a supply chain (Ambulkar et al., 2015; Manhart et al., 2020). Although existing studies examined significant disruption risks caused by unanticipated or catastrophic events (Fan and Stevenson, 2018; Ho et al., 2015; Rao and Goldsby, 2009; Tang, 2006), the supply chain disruptions brought about by COVID-19 have been substantially multifaceted. Due to the international economic trends of the 21st century such as globalized supply networks, increasing product complexity, shorter lead times, expanding global customer bases and highly uncertain consumer demand, firms have faced rapidly escalating challenges caused by the COVID-19 pandemic. The COVID-19 pandemic put global TA manufacturing supply chains and retail operations under unprecedented pressure. During the pandemic, especially in 2020, a substantial number of TA manufacturing firms experienced unfilled orders, order cancellations, shipping delays and stalled production. In terms of social impact, thousands of TA workers faced the possibility of job loss or furloughs. Additionally, the global clothing consumption markets plunged. The worldwide lockdowns caused operational challenges and led to the closure of apparel retail stores. Stay-at-home orders and greater work-from-home practices caused an abrupt reduction in consumer demand for clothing. Social distancing and the practice of remote working have shifted consumers' preferences in clothing and will likely have long-term effects on the global TA industry (Amed et al., 2020).

The COVID-19 outbreak is considered a low-frequency, high-impact event, posing considerable risks to supply chains (Ivanov and Dolgui, 2021). TA firms had very little prior experience in disaster planning when faced with the global pandemic. Indeed, it has caused a ripple effect in the global TA supply chain. For example, the supply of fibers, fabrics and clothing trim products from China was first disrupted because of the lockdown in that country. Manufacturers in other countries tried to manage the situation using their excess inventories and sourcing from local suppliers. As the virus spread, a lockdown was implemented in Bangladesh in late March 2020, bringing the country's apparel industry to a complete standstill. As
lockdowns started throughout European countries and the USA, consumer demand for clothing declined sharply. Ultimately, unlike more regional or national crises, the COVID-19 crisis has exposed the vulnerabilities of the worldwide TA supply network (Majumdar et al., 2020).

As a result of the complexity and severity of the global pandemic crisis, there have been far-reaching and financially devastating effects on businesses and the economic stability of nations (Bier et al., 2020; Chowdhury et al., 2021; Craighead et al., 2007). The scope of the challenges faced by businesses in the TA industry has been widespread and substantial (McMaster et al., 2020; Zhao and Kim, 2021). Due to sheer volume, firms in China and Bangladesh experienced some of the largest supply chain disruptions of any countries involved in the TA supply network. The COVID-19 pandemic caused severe manufacturing slowdowns for both Chinese and Bangladeshi exporters (Euromonitor International, 2021a, c). As a result, compared with 2019, total US imports of textiles and clothing from China and Bangladesh in 2020 decreased by 31 and 11 per cent, respectively (The International Trade Administration, 2021).

Theory of dynamic capabilities
To address the call for research on the impacts of COVID-19 to be theory-based (Chowdhury et al., 2021), the theory of dynamic capabilities was employed in this study, as it is a theoretical approach that examines a firm's response to a turbulent business environment (Beske et al., 2014; Eisenhardt and Martin, 2000; Makkonen et al., 2014; Teece et al., 1997). As an extension of the resource-based view (Barney, 1991), the concept of dynamic capabilities comes from the area of strategic management and appeared for the first time in the seminal article, “Dynamic capabilities and strategic management” by Teece et al. (1997), published in the Strategic Management Journal. Teece et al. (1997) defined dynamic capabilities as “the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments” (p. 516). Barreto (2010) defined dynamic capability as “the firm's potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely and market-oriented decisions, and to change its resource base” (p. 271). The theory of dynamic capabilities emphasizes a firm's competitive survival in response to constantly changing business conditions.

A firm's dynamic capabilities include three components: its recognition and awareness of the pending disruption crisis, its ability to identify and capture new opportunities in the crisis and its capacity to integrate and reconfigure its internal and external resources to cope with the crisis (Barreto, 2010; Eisenhardt and Martin, 2000; Makkonen et al., 2014; Teece et al., 1997). These comprehensive capabilities enable the firm to make strategic responses and strive to turn threats into opportunities when coping with a crisis environment. Dynamic capabilities allow firms to realign their resources and processes to quickly adapt to changes resulting from threats caused by the disruption and build competitive advantage and are regarded as powerful tools for firms to create and sustain value in a changing environment (Teece, 2012). Dynamic capabilities thus reflect a firm's orientation to integrate, reconfigure, renew and recreate its resources and capabilities and, most importantly, upgrade and reconstruct its core capabilities in response to the dynamically changing environment to achieve and maintain competitiveness (Wang and Ahmed, 2007).

The theory of dynamic capabilities has been well received across the business literature, including management, entrepreneurship and international business strategy, as it helps explain the managerial and organizational behaviors needed for successful performance in an
increasingly dynamic business environment. Within the supply chain context, the theory of dynamic capabilities has drawn increasing attention from scholars and has been applied to investigate various issues related to supply chain management (Aslam et al., 2020; Chowdhury et al., 2019; Dubey et al., 2019; Gruchmann and Seuring, 2018; Yu et al., 2019). It provides a useful framework for explaining new value creation and continuation for firms in turbulent and dynamic environments. According to the dynamic capabilities view, a company seeking sustainable competitive advantage must develop new or reconfigure existing resources and capabilities to address emergent challenges or threats in the dynamic supply chain business environment and seize opportunities and advantages for sustained business growth. As firms in different industries manage supply chain disruptions and respond to crises and uncertainties in different ways, the specific processes of dynamic capability building in particular industries should be explored.

**COVID-19 crisis and the global TA supply chain: a dynamic capabilities perspective**

Scholars have urged researchers to conduct studies underpinned by management theories to give rise to strategies for overcoming the challenges caused by various disasters and risks (Fan and Stevenson, 2018). The dynamic capabilities perspective is highly relevant to supply chain risk management research (Ambulkar et al., 2015; Chowdhury and Quaddus, 2017; Chowdhury et al., 2021; El Baz and Ruel, 2021; Manhart et al., 2020). Supply chain environments generate various causes of uncertainties and vulnerabilities for firms. Firms respond to supply chain risks by their dynamic adaptation to disruptive situations. The capability of a firm to manage its internal and external resources and reconfigure them through strategic initiatives according to the environmental setting is critical for the firm to be resilient to supply chain disruptions. Ambulkar et al. (2015) defined a firm's resilience to supply chain disruptions as “the capability of the firm to be alert to, adapt to, and quickly respond to changes brought by a supply chain disruption” (p. 112). Previous research considers resilience to be a dynamic capability (Chowdhury and Quaddus, 2017; El Baz and Ruel, 2021; Martinelli et al., 2018; Yu et al., 2019). Furthermore, Manhart et al. (2020) argue that supply chain resilience is a dynamic capability that is developed in the face of supply chain disruptions and is a key supply chain risk management construct. Firms facing disruption risks need to acquire, shed and reorganize their existing resource base to develop capabilities that allow them to adapt to the changing environment (Ambulkar et al., 2015; Manhart et al., 2020). A firm may sense new threats or opportunities and may need to renew, reconfigure or realign its risk management infrastructure to mitigate disruption threats and exploit opportunities (Ambulkar et al., 2015; Manhart et al., 2020).

In their survey of 470 French firms across various industries, El Baz and Ruel (2021) used dynamic capabilities theory as a theoretical foundation to investigate how firms deploy supply chain risk management practices to deal with COVID-19's disruption. As the COVID-19 outbreak has been both unexpected and unpredictable, firms must possess dynamic capabilities to cope with it in a non-procedural, innovative and dynamic manner. The turbulent nature of the business environment became even more prominent during the COVID-19 pandemic. On the one hand, the pandemic presents unprecedented challenges to firms; on the other hand, the pandemic represents a real opportunity for firms to unleash the full potential of their dynamic capabilities.

In the context of the COVID-19 outbreak, TA firms' survival and growth have become a pressing issue for both scholars and practitioners. Yet, in the field of TA, research has yet to employ dynamic capabilities as a theoretical foundation compared to other fields, despite the relevance, importance and applicability of the theory in the global TA industry. The development
of dynamic capabilities in the unique context of the global TA industry, especially from the perspective of TA firms in Bangladesh and China, deserves special attention. Addressing this theoretical void will make contributions to the TA literature. A review of recent literature on COVID-19's impact on supply chain risk management suggests that a dynamic capabilities perspective may be very useful in understanding how TA firms cope with the pandemic and strive to turn supply chain disruption threats into opportunities. This is particularly the case in light of the strategic changes in TA firms globally, including product lines, market width, business operations infrastructure and external relations triggered by the crisis.

Research design
Data collection
Applying the dynamic capabilities framework, a qualitative research design was employed in this study with interviews as the method used to collect primary data. All four of the researchers worked together to design the study and to identify the sample frame. After receiving institutional review board's (IRB) approval, two members of the research team, one with experience in the Chinese industry and the other in the Bangladeshi industry, recruited interview participants using a combination of purposive sampling and snowball sampling through their existing network connections with apparel industry practitioners in the two countries. In total, three contacts were conducted with each interviewee: (1) recruitment; (2) introducing the project, reviewing the consent form and conducting the interview; and (3) requesting a review of the interview transcript and summary of initial findings. The interviews occurred from June to September 2020 and were conducted by phone or through internet chat/meeting tools (WeChat, Zoom, etc.). The interviews lasted from 70 to 120 min and were recorded with participants' consent.

Interviews began with the participant's description of the firm's business and background, followed by their individual responsibilities. This was followed by questions focused on their views on the impact of COVID-19 and what the crisis means going forward. Examples of the questions included, “What are the impacts of the COVID-19 crisis on your firm's business?” and “Can the crisis be used to strengthen your supply chain networks, and if so, how?” Interviews with Bangladeshi participants were conducted in English and interviews with Chinese participants were conducted in Chinese. Interviews were continued until data saturation was reached (Hodges, 2011). As per IRB requirements, personal and identifying information was removed from the data, pseudonyms were assigned and all data were stored in the university's cloud drive with access restricted to the researchers.

Description of participants
A total of 33 participants were interviewed, 15 in Bangladesh and 18 in China. Participants held positions ranging from junior to senior operational and managerial roles in TA firms, with job titles ranging from merchandiser to chief executive officer (CEO)/owner. Participants all had extensive knowledge of the TA industry, with years of experience in their current firms ranging from 2 to 30 years (mean = 11.5 years; see Table 1). All have firsthand experience with managing the impact of the COVID-19 pandemic.

Data analysis
All interviews were transcribed and then translated utilizing a collaborative and iterative translation process (Douglas and Craig, 2007), if needed. Transcripts were analyzed collectively,
and an iterative, hermeneutic approach to the interpretation of the data set was employed to identify common themes within the data (Braun and Clarke, 2006). The analysis of the data was based on a combination of inductive and theoretical thematic analysis. Guided by the theory of dynamic capabilities, emergent themes related to TA firms’ capabilities of sensing and understanding the crisis and identifying and capturing new opportunities were identified. Specific attention was paid to the challenges and opportunities prompted by the COVID-19 pandemic. All four authors read through the interview transcriptions and engaged in the thematic analysis procedure following Braun and Clarke (2006), including generating initial codes, searching for themes, reviewing themes, defining and naming themes and producing the report. Any overlap or discrepancies between coding results were discussed and resolved among all four members of the research team. To establish the credibility and trustworthiness of the interpretation, Creswell and Miller's (2000) procedures were followed. This process included triangulation through corroborating the interview data collected from multiple participants holding different operational and managerial positions in TA firms, with the analysis of various industry documents on the topic of the pandemic (e.g. trade publications, industry news and websites of industry organizations) (Patton, 1999). Member checking was also employed via transcript review by each participant to ensure accuracy, as well as participant review of the initial findings.

**Findings and discussion**
The global TA business environment has become even more turbulent as a result of the COVID-19 pandemic. The theory of dynamic capabilities, therefore, constitutes a relevant framework to understand how TA firms in Bangladesh and China coordinated their resources and capabilities in response to the crisis. While the crisis has caused substantial disruption risks, at the same time, it represents a real and immediate opportunity for firms to realize the full potential of their dynamic capabilities (El Baz and Ruel, 2021; Guo et al., 2020).

Figure 1 illustrates the themes that emerged across the interviews with industry professionals in the two countries. Regarding RQ1 (critical impacts of the pandemic), four themes were identified as primary factors that determined the extent to which COVID-19 disrupted a firm's supply chain, and four themes were identified as challenges to firms presented by these factors. Regarding RQ2, per the theory of dynamic capabilities, the challenges that were identified are framed as opportunities across the interview data. In the following sections, emergent themes are presented, followed by the study's findings as interpreted through the lens of dynamic capabilities.
<table>
<thead>
<tr>
<th>Coded name</th>
<th>Gender</th>
<th>Functional role</th>
<th>Experience in their firm (years)</th>
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<tr>
<td>BD02</td>
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Notes: BD, Bangladesh; CN, China
Factors impacting the effects of COVID-19 on TA supply chain disruption

Firm size. Participants in larger firms in both countries reported major order cancellations, but most had the ability to manage them. In contrast, those with smaller firms faced greater difficulties. Flynn et al. (2021) posited that “small businesses and entrepreneurial activities have perhaps disproportionately suffered from the COVID-19 crisis due to their lower capitalization and limited geographical reach” (p. 5), and the participant responses confirmed this idea. Large firms have enough capital and technological infrastructure necessary to survive. For example, one participant (BD12) who is a manager of a leading Bangladeshi woven manufacturing company indicated that they had been less impacted by the COVID situation. In contrast, due to a lack of demand, participants with small firms talked about difficulties with continuing production lines and operating only a fraction of their full production capacity due to slowed demand and order cancellations. As one participant, who is a senior purchasing manager at a Chinese firm, explained,

Production has been running at only about 50–60 per cent of full capacity due to the sluggish demand from the rest of the world while they are fighting the COVID-19 pandemic. We are also facing a lot of order cancellations. (CN03)

Channel diversification. Alongside firm size, channel diversification was found to play a critical role in terms of impact. According to the participants, online business channels demonstrated substantial advantages for both TA firms in China and Bangladesh and their overseas apparel retailers/buyers during the pandemic. If overseas clothing buyers/retailers only have brick-and-mortar shops, their suppliers in both China and Bangladesh have faced greater negative impacts. As apparel retail stores in many developed countries were closed for a time...
during the lockdowns and consumers did not shop in brick-and-mortar stores during most of 2020, those retailers with only physical stores often either reduced or canceled orders, which, in turn, negatively affected their Chinese and Bangladeshi suppliers. In contrast, retailers with both online and brick-and-mortar shops or only online shops were less impacted and even experienced major sales growth; thus, their Chinese and Bangladeshi suppliers were less affected. As one participant from Bangladesh, who is a managing director of a knit apparel factory, explained,

> Some customers are one hundred per cent online retailers, so their business has really, really been going strong. We have got some online retailers, their order quantities just doubled or quadrupled because their online selling has really gone up in this pandemic situation. [...] So all together, we are extremely lucky that this pandemic situation has not given us a very hard time, to be honest. (BD09)

Channel types played an even more important role for manufacturing companies if they have online channels for their e-commerce business operations. That is, some firms were doing much better than in pre-pandemic times because online purchases have increased dramatically. As the owner of an apparel firm in China stated, “Maybe because people stay at home a lot now, our online sales channel increased in volume when the quarantine started” (CN05).

**Sourcing method.** The impact of the sourcing method on supply chain disruption was repeatedly mentioned by participants. Some of the Chinese participants explained that as China is the world's largest hub in the global TA supply chain, any unexpected events in that country will create a cascade effect for the entire supply chain. China provides value-added textile materials such as synthetic fibers/fabrics, apparel trims and accessories, nonwoven textiles and textile chemicals and dyes to Bangladesh and other countries. Indeed, participants from Bangladesh indicated that they had never imagined how devastating a disruption in supply, operation and transportation could be, and yet they had to witness such disruptions happening simultaneously worldwide due to COVID-19. As B06 explained,

> Because China was closed [...] we faced the impact. When the first hit of COVID was active, we were very helpless in terms of raw materials. There were [orders of] recycled polyester from China and we couldn't receive those on time. So, we had to use traditional polyester just to run our productions. So that we could have our shelves full. (B06)

Based on the responses of participants, it appears that the firms which relied on both local and foreign suppliers of raw materials and thereby maintained a strategic mix of suppliers were better able to manage the crisis. In addition, some sought to outsource noncore activities from multiple supply chain partners so that the impact of the disruption could be more evenly spread out across different network entities.

**Types of products produced.** The impact of the pandemic appeared to be different depending on the types of products made by participants' firms. For example, those that produce formal and work/business types of clothing experienced dramatic order declines or cancellations from buyers, which, in turn, posed a direct threat to their survival. But due to the increased demand for casual wear, pajamas and lounge apparel, firms producing these types of clothing received an increasing number of purchase orders from buyers. One participant (BD01), who is with a brand's sourcing office in Bangladesh, indicated that the firm's ability to produce
activewear helped it to survive. As he explained, “In the activewear department, previously we were making only 350,000 garments, but this year, it's about 700,000. So, it's almost doubled the quantity.”

A sales director for a Chinese knitwear factory which specializes in small-batch lounge apparel said that although their production was disrupted in the early months of the COVID-19 pandemic due to panic and order cancellations from buyers, the business came back even stronger after the summer. As he explained,

In the beginning, we had many order cancellations, but we are dealing with a large number of buyers. Soon after the situation became clearer, they actually came back and placed those orders again. So overall, year on year, we actually have a slight increase in sales. So COVID-19 has not really impacted us negatively. (CN07)

Other kinds of disruptions mentioned by participants included those within related industries which created difficulties in receiving trim goods, such as metal buttons or nylon coil zippers. Given the inability to produce their typical products, during 2020, some of the participants' firms were able to pivot to producing personal protective equipment (PPE) to respond to the rising needs. As one Chinese participant (CN15) noted, “The PPE business cannot make decent profits, but it gives a production opportunity to keep the maximum number of workers.”

Challenges

Need to establish/maintain safety measures. In both countries, production floors are often overcrowded, with many workers focused on the different operations to produce a single garment. Participants talked about the challenge of maintaining physical and social distancing and the required degree of production efficiency at the same time. Ensuring that masks are available for the workers in a factory and disinfecting the work spaces became new challenges for the participants' firms. For example, factories were faced with the need to ensure adequate ventilation with fresh air and to provide more handwashing facilities. Most participants do not see this as changing anytime soon. As one business owner (CN17) noted, “I think the protective measures like masks and disinfectants will continue to be normal in the future.”

According to participants, the COVID-19 pandemic has altered the reality of workplace safety and health issues in general. That is, their firms have realized the importance of implementing safety policies as their duty to the workers, as some did not take worker health and safety very seriously before the pandemic. However, the extent to which firms are able to provide this clearly differed between the two countries. A participant (BD04) from Bangladesh admitted that “Personal safety or social distancing, whatever you say, you can't maintain those properly in countries like Bangladesh.” In contrast, a participant (CN14) from China said, “To fight the virus, we are ensuring that all official health guidelines are followed in the factory, like social distancing, masks and superintense cleaning of working spaces.”

Need to upgrade technology/invest in technology. Alongside social distancing in the manufacturing workspace, office employees of the participants’ firms started working from home. For this to function properly, however, firms had to invest in faster communication technologies such as computers, high-speed internet connections and various software applications. Firms that were not equipped with substantial digital technologies before COVID-19 found themselves constrained in their ability to respond to the evolving workplace
requirements. As one participant (BD06) said, “People were hesitating to use new technologies, but this COVID-19 has actually forced everyone to get on board with these new technologies.”

Supply firms experienced greater pressure from buyers to adopt advanced communication technology amidst the pandemic. For example, some buyers who had already incorporated three-dimensional (3D) modeling software and videoconferencing software applications asked their participants' firms to adopt them. Sending physical samples to overseas buyers has been and is still being hampered due to the limited operations of airlines and shipping companies. One participant (BD01) with an apparel brand's sourcing office said, “Before COVID-19, we were approving printing and fitting in a physical norm, and now we've moved our physical day-to-day activities into online-based. We are heading towards the 3D technology, and we'll continue.” Likewise, a Chinese participant (CN04) pointed to the need to invest in technology, “The robotic technology is growing fast, and it is perfect for this COVID situation, so we are starting to install robotic sewing machines to do certain sewing processes.” While not all firms were ready or able to invest in new technologies, for the sake of the continuation of their firms and recovering the losses they have experienced during the pandemic, many talked about the need to do so quickly.

Disruptions caused by international freight transportation. Participants with firms where production is primarily based on imported materials from other countries have faced the greatest challenges. Due to the limited operations of transport facilities and the varying impact of COVID in different parts of the world, a major challenge has been getting the required raw materials delivered on time. Due to travel bans and port closures, suppliers of raw materials and intermediate goods could not ship the materials to garment producers. As a result, producers experienced high levels of uncertainty about their ability to ship existing orders. In contrast, the firms using locally sourced raw materials did not experience that severe of an impact, as did those who focused on the local market. As one participant (CN11) noted, “As we are making products for our own brand, we did not have the problems of order cancellations like our counterparts who were mainly doing orders from overseas buyers.”

To overcome the difficulties involved in transport, many factories tried to source raw materials from local suppliers. However, a major concern is that such suppliers may compromise compliance-related factors and the sustainability-related goals of both the buyers and the participants' firms. One participant from Bangladesh, who is a merchandiser, explained that

We import ecologically sustainable goods from China. However, I could not get them from China due to the lockdown. I had to purchase them from local factories which are not ecologically sustainable at this moment. That has been one of the key areas of the failure […] [maintaining] sustainability. (BD08)

Extra costs in production, distribution and management. New and different costs emerged during the pandemic, including extra costs in production, distribution and management. While keeping production lines running was the main priority, in order to survive, many of the participants' firms had to redesign the setup of these lines to maintain the new safety requirements brought on by the virus. These new protocols carried substantial extra costs. One Chinese participant explained,

We used to have sewing machines placed side by side. Now because we want the workers to have a safer distance from each other in the workshops, we rearranged
the sewing machines making sure the distance between them to be at least 1.5 m apart. These new changes involved a lot of money and took much more space than before. (CN03)

Participants in both countries talked about how their firms provided pick-up and drop-off transportation for their employees. As a result of the pandemic, in order to maintain the required social distance inside the vehicles, the companies needed a greater number of vehicles for the same number of employees. One participant (BD08) explained, “For employee transport now we need to use three vehicles. While the three vehicles are on the road, they need more drivers, fuel costs and vehicle operating costs. Previously we used two before COVID.”

To ensure maximum safety in the workplace, cleaning and disinfecting workspaces daily and buying masks, wipes, handwash and disinfectants for employees have become mandatory for factories both in China and Bangladesh. These measures lead to increased overhead costs, as one Chinese participant (CN18) said, “I think the masks and cleaning measures will be for the long term now. And we kind of need to accommodate these in our overhead [costs].”

**Opportunities**

As in any industry, with challenge comes opportunity. Figure 1 illustrates how the challenges to the TA supply chain stemming from the pandemic were reframed by participants as opportunities for their firms. All of the participants in this study talked about how supply chain disruptions brought about the possibility of increasing the overall competitiveness of their firms and even furthering the sustainable development of the global TA industry.

**Strengthening employee programs and social responsibility initiatives.** According to the participants, one of the key positives that emerged during the pandemic was realizing a connection between business sustainability and maintaining a focus on workers' safety and welfare. Many talked about taking these issues seriously simply for the sake of their firms' survival. The pandemic increased the pressure on both buyers and suppliers to assess and revamp their compliance measures, and for many, the need for worker protection has actually resulted in stronger employee programs and corporate social responsibility initiatives. For example, several of the participants' firms started to proactively provide training for workers to increase health and safety awareness, providing protective equipment and educating their employees about how to protect themselves from the virus. In some cases, even those buyers who were not that serious about the level of social responsibility engaged in by their suppliers began instituting compliance policies. One Bangladeshi participant, who is with a sourcing office for a major retailer, said,

Yeah, it (COVID-19) has had many negative impacts, but we as a firm have shifted those negative points towards positive points. So, previously, I must say we took less care of the workers in our suppliers' factories as we are not working [directly] with them. Now our company's compliance team is taking care of the workers on a weekly basis and making sure that they have their all compliance and safety needs. (BD01)

For participants, the social responsibility measures, and especially worker benefits, have been a major investment for the short term, but several talked about how the return will be worth it, particularly in terms of a higher retention rate of skilled workers. As one senior purchasing manager (CN03) said,
All employees over one year of working with the company get a full package of social security benefits: retirement contribution, housing funds, medical insurance contributions. And two of our factory's locations now provide day care facilities.

As Flynn et al. (2021) pointed out, the COVID-19 pandemic has highlighted the issues of unsafe working conditions in suppliers that are in lower-tier subcontract positions and unknown or invisible to the focal firm. As one participant (BD07) noted, “This crisis, or this pandemic, is giving us a lesson to be more careful about the workers.”

**Technology innovation.** The pandemic has also enforced the importance of digital technology and innovation. According to participants, COVID has been a wake-up call for many firms, not just in China and Bangladesh, about the critical role of technology as key to the pandemic response. For example, for one participant (BD06), adopting 3D modeling technology significantly reduced lead times for sample approval, while it increased the firm's efficiencies,

So, we are working digitally to approve our samples and working with technologies like 3D fitting. We have installed this new equipment in our office. Now we are getting things done that we previously couldn't have […] we have cut down lead time. So, the overall efficiency of the business is increased […]. And this is due to the COVID-19 pandemic.

As the cost of manufacturing labor has been rising rapidly in China for the past decade, the adoption of automation has increased to keep pace. Due to uncertainty around consumer demand, the advantage of automation has become much clearer. As one participant (CN07) explained, “We have re-setup our production and invested in automation and e-commerce platforms that enable us to produce small batch orders more efficiently now.”

Firms with advanced technologies found themselves better positioned to respond to the crisis. For example, those equipped with advanced technologies were able to run multiple scenarios during the pandemic so they could keep up with the sudden spike in demand of some product categories and prepare for continued unexpected situations as the pandemic evolved. CN11, a production manager, explained,

> We are now testing our 3D body measuring system from our IT supplier. This will increase our cutting and measurement accuracy in developing our products. This way, we can have products fit consumers better so less returns will occur, this is also another way to save on transportation of the product, ultimately less carbon footprint will result.

**Vertical integration and localization.** The limited operation of transport facilities worldwide created difficulties in getting raw materials from overseas suppliers and in selling finished products to overseas customers. Yet for many of the participants, this challenge was viewed as an opportunity, as some firms shifted to local sourcing for necessary materials or sought local end markets for their products amid the pandemic. As CN08 explained, “We used to focus on export, but the COVID situation overseas is still far from over. Therefore, we have increased our domestic channels drastically since the pandemic.” Expanding the business downward or upward along the supply chain, participants' firms sought to reconfigure resources
and build new capabilities to respond to the uncertain business environment. Another type of response was to emphasize vertical integration. As one participant (BD04), who is a merchandiser, pointed out, “I think my company [hasn't experienced] the same as what others are experiencing. Because we are a vertically integrated organization. So, our sourcing is in-house.”

*Improving efficiency and agility.* During the early days of the pandemic, most of the TA supply chain activities stopped completely. Some firms used this time as an opportunity to restructure their production operations to improve efficiency and agility. For example, new procedures were developed to manage various processes and activities. Several participants who are managers recognized that working from home could also bring efficiency to administration and service departments.

In general, participants talked about how the pandemic pushed them to think strategically about new initiatives, such as diversifying customer bases and moving to more diversified and complex products and value-added services. A production manager of a Chinese apparel factory said,

> I think we have to be change-oriented to stay in the competition. Many people know that the labor cost in China is no longer cheap compared to other developing countries. As a frontline manager myself, I face increasing difficulty to recruit new workers each year, so I think we need to improve a lot on supply chain efficiency and maybe automation, to maintain our industry's competitive advantage. (CN13)

This view toward transformation was held by several participants. As one participant from Bangladesh explained, the negative of the pandemic has prompted his firm to see the positive that can come from the transformation of the country's ready-made garment sector.

> I would say the golden era is waiting for us. This COVID has given us an eye-opening moment so that we can think where we are going […] [for example] my department [activewear] […] it's almost doubled the [production] quantity. So, yeah, we have taken the chance. We have turned the negative into positive. We also hope that in the long run, we will be competitive and in a more win–win situation. (BD01)

*Applying the theory of dynamic capabilities*

Two interconnected research questions were addressed through the interview data and through the lens of the theory of dynamic capabilities. To address RQ1 (What are the most critical impacts of the COVID-19 pandemic on TA firms in China and Bangladesh?), based on the data, it is clear that firms faced pressing challenges amidst the pandemic crisis, including the urgent need to establish/maintain safety measures, upgrade technology and increase technology investment, manage delays caused by international freight transportation and account for the extra costs in production, distribution and management. Most of the challenges happened simultaneously and caused a cascade effect across the entire TA supply chain. As seen in the interview data, larger firms, firms that operate at least in part within the online channel, firms with balanced sourcing operations and firms producing certain types of products (e.g. casual clothing, lounge apparel, face masks, etc.) were in a better position to evaluate and respond to the situation successfully and therefore faced fewer negative consequences. According to the theory
of dynamic capabilities, firms with dynamic capabilities have the potential to sense and assess a crisis in a timely manner (Ballesteros et al., 2017). The theory also posits that a firm's ability to sense the crisis and face the challenges varies, as the firm possesses heterogeneous resources and capabilities. Assessing how a firm's various business operations would be impacted by a crisis (i.e. the challenges faced and the extent of the effects caused by the crisis) can help the firm develop dynamic capabilities to mitigate its vulnerabilities in an uncertain environment and, at the same time, design effective strategies required to combat the challenges arising from the uncertain environment.

To address RQ2 (How has the current crisis helped these firms, and global sourcing and production in general, become more capable of withstanding other catastrophic events that may occur?), given the responses of participants, it appears that at least some TA firms in both China and Bangladesh have sought to proactively drive initiatives aimed at turning the crisis into an opportunity to reconfigure firm competencies (Teece et al., 1997). The data revealed four major opportunities perceived by TA firms in Bangladesh and China: strengthening employee programs and social responsibility initiatives, technology innovation, vertical integration and localization and improving efficiency and agility. Findings indicate that the COVID-19 pandemic disrupted social and business patterns and gave rise to business opportunities for firms to implement new initiatives, build new or enhance existing capabilities and ultimately achieve supply chain resilience. In line with the dynamic capabilities view, firms can use crisis disruptions as opportunities to learn and grow, which can trigger organizational resilience and viability (Ivanov and Dolgui, 2021; Martinelli et al., 2018; Yu et al., 2019).

TA firms equipped with dynamic capabilities can better capture opportunities, are more likely to absorb and create new knowledge from the external environment and even perhaps move to a different innovative state (Ballesteros et al., 2017; Chowdhury and Quaddus, 2017; Yu et al., 2019). As seen in the interviews conducted for this study, the lock downs and the disruptions in transportation due to COVID-19 generated a dramatic increase in online business. E-commerce became a key focus, as the majority of participants' firms in China and Bangladesh have expanded and increased their online presence to connect with customers and drive sales. Moreover, some of the participants talked about how their firms pivoted to produce face masks and personal protective clothing, which not only provided them with a source of revenue but also helped in meeting the dramatic growth in consumer demand for these goods.

Alongside the challenges, findings illustrate how the COVID-19 pandemic crisis has better positioned global TA sourcing and production to become more capable of withstanding future supply chain catastrophic events and ultimately be more sustainable for the long term. For example, the COVID-19 pandemic actually accelerated some Chinese TA firms' plans to implement new innovations into their business operations, such as a direct-to-consumer business model or increased automation. Likewise, Bangladeshi firms adopted technologies for communicating sample information and launching online platforms for communication and e-commerce. Moreover, in the case of both countries, participants described how attention to employees' health and safety has increased (Mollenkopf et al., 2020). Valuable opportunities to strengthen employee programs and social responsibility initiatives were cited by the participants. Although there is still a long way to go before all TA firms in the two countries are socially responsible and focused on worker safety, several participants mentioned how their firms sought to mitigate some of the negative impacts of the crisis by creating programs to address employee health and well-being.
As a final point of discussion regarding the theory of dynamic capabilities, and particularly RQ2, based on the data, it appears that COVID-19 has accelerated two critical trends prompting industry transformation in a time of change: (1) the increased need for developing local networks and strengthening vertical integration and (2) answering the call for digital technology adoption and/or upgrades. As seen in the data, digital technology has played a vital role in resolving some of the TA supply chain disruptions by reshaping business products, processes and services, as well as buyer–supplier relationships, by increasing firm flexibility and efficiency to minimize adverse impacts. Majumdar et al. (2020) argued that firms should blend “Localization” with “Globalization” to form the new “Glocalization” approach as an innovative sourcing strategy that can ensure efficiency and agility and mitigate disruption risks (Majumdar et al., 2020). As seen in participants' responses, TA firms in China and Bangladesh reconfigured their internal and external resources to further develop their dynamic capabilities through sourcing networks and digital technologies. Such actions enhance their supply chain resilience, helping them to recover from this crisis while becoming better prepared to survive the next (Mollenkopf et al., 2020).

Conclusions and implications
This study explored the impact of a major supply chain disruption – COVID-19 – while it was happening and from the perspective of TA manufacturing industry professionals within the two largest TA-producing countries globally: China and Bangladesh. Findings illustrate the pivotal role played by a firm's unique dynamic capabilities, including sensing and assessing the COVID crisis for supply chain challenges, identifying and embracing new opportunities brought on by the crisis (Ballesteros et al., 2017) and integrating and reconfiguring internal and external resources to build competitive advantages (Teece et al., 1997). The interpretation of the data highlighted the most critical impacts of the pandemic on TA firms in China and Bangladesh, while considering the ways that these firms sought to withstand such impacts. Key findings point to the need for firms to address challenges brought about by supply chain disruption by creating opportunities and therefore extend the findings of prior studies employing the theory of dynamic capabilities (Ballesteros et al., 2017; El Baz and Ruel, 2021; Guo et al., 2020).

Theoretical implications
Findings of this study contribute to the TA management literature by shedding light on the response of an important global supply chain, the TA supply chain, to the COVID-19 pandemic. Characterized as having a buyer-driven, outsourcing dominant and geographically complex supply chain (Su, 2013), the TA industry was particularly vulnerable to the adverse economic ramifications of the COVID-19 outbreak. Moreover, all components of the global TA industry, including manufacturing, logistics and markets, have been impacted, whether sequentially or concurrently, and within overlapping time windows. Importantly, the findings of this study offer an in-depth and systemic examination of firms' response to COVID-19 supply chain impacts in real time, as opposed to isolated practices or processes and in hindsight.

This study addressed the need for further research into building dynamic capabilities for managing supply chain disruptions (Ambulkar et al., 2015; Chowdhury et al., 2021; El Baz and Ruel, 2021; Manhart et al., 2020; Remko, 2020). Recently, there have been several calls for more theory-based empirical research to understand how various industries are responding to the COVID-19 crisis, including the TA industry (Zhao and Kim, 2021), and how businesses facing COVID-19 disruptions might develop strategies to mitigate risks going forward (Chowdhury et
This study addresses both needs, as it is among the first to empirically explore the consequences of COVID-19 for the global TA supply chain from the practitioner perspective and by applying the theory of dynamic capabilities in explaining TA firms' behaviors during the pandemic crisis.

Findings of this study contribute to TA research by highlighting the applicability of the dynamic capabilities views to TA supply chain risk management. Although the focus of this study is the TA supply chain, the findings can contribute to supply chain risk management and resilience research in other industries that depend on worldwide supply networks. Therefore, this study extends the extant literature on supply chain risk management. Furthermore, this study assists with efforts to close the gap between supply chain resilience research and industry practice.

**Implications for practice**

The study provides unique practical implications for the global TA industry. Specifically, the findings of this study shed light on the extent to which the COVID-19 crisis impacted the global TA supply chain, as well as how China and Bangladesh's TA manufacturers have coped with the crisis. Participant responses offer valuable lessons in how to quickly reshape the business to meet emergent needs. Their firms' ability to adapt to a turbulent global economic environment demonstrates the importance of agility and resilience within the global TA supply chain. Indeed, the capacity to converge technological, social and economic recovery planning to strategically mitigate disruption will enable supply chains to quickly return to normal in response to the next crisis, whatever that may be (Ivanov, 2021). It is noteworthy that many of the TA firms in this study took a positive view regarding the challenges posed by the extraordinary and unprecedented situation. As a result, many strove to turn the uncertain TA supply chain environment into an opportunity to develop growth initiatives and enhance their capabilities to improve resilience and viability.

Findings indicate that it is necessary that TA firms spend time scanning and learning from the environment to quickly respond to changes and to take robust initiatives to deal with risks in order to prompt faster recovery. Moreover, it is important that TA firms deploy strategic initiatives and develop new or reconfigure existing capabilities and resources to address emergent opportunities. Resilience, as a dynamic capability, enables TA firms to absorb the disruption effects, respond to unexpected changes and capitalize through strategic initiatives. Findings therefore offer practical lessons on how to resolve future supply chain risk challenges when the next crisis comes around.

The data collected for this study indicate that firms in the global TA industry need to utilize a broader systemic and strategic perspective incorporating the benefits of global reach and local responsiveness. It is important for TA firms to diversify their TA supply chains in multiple ways. For example, boosting domestic production capacity to help reduce reliance on imported materials and products deemed essential for clothing manufacturing. As a mitigation strategy, TA firms in both countries could expand the number of international material suppliers and customers and pursue diverse consumer markets to avoid overreliance or dependence on a few limited locations. Moreover, a key strategy found in this study was to offer diversified and value-added products and services and broaden the customer portfolio. For example, some of the participants' firms saw opportunities as the demand for PPE skyrocketed and quickly pivoted to manufacturing fashion face masks, medical face masks, gloves and gowns. Last, the supply chain
disruptions caused by COVID-19 highlight the need for network collaboration and inter-organizational sharing of resources and capabilities.

As with all research, the limitations of this study offer opportunities for further research. First, the context of the study is the TA industry, and the interviews were from the perspectives of practitioners in China and Bangladesh. Future studies in other countries or in other industry contexts would expand the generalizability of the findings and provide additional insights. Second, data collection occurred during the summer of 2020; thus, the information provided in this study is a snapshot of the impacts of COVID-19 at one point in time. As the pandemic continues to evolve, further investigation is needed to examine the more long-term effects. Finally, studies that employ a cross-sectional design could examine relationships between supply chain risk management and firm performance.

References


Acknowledgements
This study was funded by a grant from the *Virtual Collaboratory for Sustainable Business Practices* supported by the VF Corporation Foundation, Bryan School of Business and Economics, The University of North Carolina at Greensboro (UNCG).

*Declaration of Conflicting Interests*: The authors declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

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