An Integrated SWOT-AHP-Fuzzy TOPSIS Approach for Maturity Management Following the COVID-19 Outbreak: Lessons Learned from Fast Fashion

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Abstract

Purpose
Focusing on issues that have impacted textiles, clothing, and fast-fashion following the COVID-19 outbreak, this study aimed to identify agility factors pertinent to retail maturity management, mainly on resilience. These factors were then assessed based on priority.

Methodology
We conducted a strengths, weaknesses, opportunities, and threats (SWOT) analysis to identify the main factors. This analysis was integrated with analytic hierarchy process (AHP) to rank the internal and external factors. Then we employed Fuzzy TOPSIS (Technique for Order of Preference by Similarity to Ideal Solution) to evaluate the significant strategies from the SWOT analysis bases on adaptability and flexibility. Thus, we produced a prioritised list of relevant factors and guidelines useful in practical settings.

Findings
We identified and ranked 14 agility and resilience SWOT factors for maturity management and proposed and prioritised six relevant strategies. These highlight changes and adaptations must be undertaken by various actors, ranging from the supply/manufacturing side to global retail locations.

Research limitations

Our sampling study of experts is limited, and the application is focusing on one area. Future research might investigate other fields, for retail and industry.

Implications

The output of this study enables a better understanding of the internal and external factors of maturity management for fast fashion retailers. Hence will further help them going through resilience and agility challenges following the pandemic.

Originality

This study significantly contributes to the literature because the results can guide retailers in developing effective decision-making systems for mature business operations following the pandemic outbreak. Here, we incorporate internal, external, agility, and resilience aspects into one decision-making support system while enhancing existing knowledge on fuzzy multi-criteria decision-making applications. Further, this study discusses critical issues that have affected several aspects of the fashion and textile industry and will likely persist for some time.

Keywords: SWOT-AHP, Fuzzy-TOPSIS, maturity, agility factors, COVID-19, resilience management, fast fashion

1. Introduction

Originating in Wuhan, China, in December 2019, the COVID-19 pandemic has since spread worldwide (Goh *et al.*, 2020; Li *et al.*, 2021; Pan *et al.*, 2020; Rizou *et al.*, 2020). To date, several variants of the SARS-CoV-2 virus, which causes COVID-19, have emerged with higher transmission rates than the original (Van Oosterhout *et al.,* 2021; Abu-Raddad *et al.,* 2021; Chemaitelly *et al.,* 2021; Jalkanen *et al.,* 2021;Tregoning*et al.,* 2021). The death rates associated with the consequent respiratory issues have exponentially increased worldwide. Therefore, governments worldwide have implemented strict social distancing and lockdown policies (Galanakis *et al.,* 2021; Baba *et al.,* 2021) aimed at limiting the potential for viral transmission (Jordan *et al.,* 2020). Meanwhile, many businesses have confronted huge operational disruptions (Golan *et al.,* 2020; Paul *et al.,* 2021; Schmid *et al.,* 2021). These problems have been compounded by a lack of understanding about the full impacts of COVID-19, thereby resulting in untimely restoration plans and prolonged periods of deficit (Queiroz *et al.,* 2020).

One of the key pieces of empirical knowledge gained from COVID-19 is the need to ensure that supply chains (SCs) are more resilient to disruptions (Ivanov and Dolgui, 2020;Ali *et al.,* 2021;Burgos and Ivanov, 2021). Minimising the risks of outbreak-related delays has become critical to managing the pandemic supply chain (Grela and Hofman, 2021). The unprecedented circumstances of this period have provided a unique opportunity for practitioners and scholars to review this type of resilience (Ivanov and Dolgui, 2021; Viswanathan *et al.,* 2021). Several industrial SCs, including those used by clothing producers, have suspended production due to their reliance on raw materials from China (Sen *et al.,* 2020) and the fact that their suppliers' production factories are not operating at full capacity (Xu *et al.,* 2020). For example, brands such as Primark, H&M, American Eagle, and M&S have not received final products manufactured in Bangladesh, resulting in deferred payments (Sen *et al.,* 2020). Consumer purchase intention has also declined (Ali, 2020), with 23.26% preferring not to buy clothes during lockdowns (Pathak and Warpade, 2020). Despite this decline and the related market variations (Pantano *et al.,* 2020; Ambros *et al.,* 2020), there is evidence that retailers can use when attempting to ensure adequate resilience through customer demand management.

During the COVID-19 crises, mature and resilient management requires the ability to make rapid changes (Dawes, 2019; Barton *et al.,* 2020; Sobaih *et al.,* 2021) and maintain adaptability and flexibility (Putnik and Sluga, 2007; Worley and Lawler, 2010). A clear understanding of the flow patterns exhibited by partners (including customer demand) fosters SCs that are flexible, adaptable, and resilient (Centobelli *et al.,* 2019), thus helping practitioners set up proper recovery strategies in the context of the pandemic. Operations managers are therefore tasked with the challenge of building robust SCs that can avoid disruption.

Based on the above, this study investigated mature customer demand management in the retail setting based on resilience and agility. Our main objective was to identify relevant agility factors for mature resilience following the COVID-19 outbreak and then assess these factors based on priority. Fashion retailers need to address their operations with efforts to create value and minimize risks given the increased supply chain complexities (Hernandez and Haddud, 2018). We conducted a strengths, weaknesses, opportunities, and threats (SWOT) analysis to identify the main factors and then employed Fuzzy TOPSIS, a fuzzy multi criteria decision making approach designed to evaluate significant factors based on adaptability and flexibility. Our primary outcomes are as follows:

- Guiding retailers to develop effective decision-making systems for mature business operations following the pandemic outbreak; we incorporate internal, external, agility, and resilience aspects into one decision making support system.
- Enhancing existing knowledge on fuzzy multi-criteria decision-making applications.

The rest of this paper is organised as follows: Section 2 discusses our literature review on agility and resiliency aspects. Section 3 lists the Fuzzy TOPSIS methodology steps. Section 4 outlines the case description. Section 5 discusses the results and implications, and section 6 provides some concluding remarks and suggestions for future research.

2. Literature Review

Trade disruptions have been witnessed worldwide recently, prior to the COVID-19 pandemic. For example, Brexit and the US-China trade war have triggered and necessitated modifications in the supply chain strategies of global manufacturers (Johnson and Haug, 2021). While SCs have been interrupted owing to a variety of unprecedented crises, COVID-19 has been one of the most critical disruptors in recent history (Ivanov and Dolgui, 2020). Its global impacts on operations have triggered increased interest in SC resilience and agility practicability among practitioners and scholars (Belhadi *et al.,* 2021). Currently, disruptions to physical flows have resulted in closures across many factories and retailers, as the focus has been on reducing viral transmissions between workers (Sen *et al.,* 2020). This has highlighted the need for adequate managerial decision-making to ensure SC adaptability in the short- and long-term contexts (Ivanov and Dolgui, 2021). Indeed, research has shown that limited knowledge in this area can induce shortages and order delays (Queiroz *et al.,* 2020).

The mismatch between demand and supply following the pandemic has triggered the risk management issue in both academic and practitioners' communities. Precisely, the agile SC management has been widely considered. McMaster *et al*. (2020) discussed the risk mitigation methods in fast fashion supply chains. They outlined the criticality of suppliers' selection, and their geographical locations impacting the physical flows distribution, in case of disruption such as the COVID-19 lockdown. The authors highlighted the issue of products having a single-source. They suggested some alternatives for SC stakeholders, such as reallocating inventories among regions to reduce the dependency on a single location. Furthermore, they shed light on the importance of endorsing communication between suppliers and buyers to boost the information exchange.

Several aspects of SC have been studied to assess the impact of the COVID-19 outbreak on supply network performance. From sustainable partner selection (Badulescu *et al.,* 2021) to the financial performance of logistics firms (Atayah *et al.,* 2021) and sourcing risks (Sreenivasan and Suresh, 2021), the need to adapt the supply chain network to unexpected outbreaks is crucial. Hence, recent research has focused on resilience and agility, defined as the capability to monitor and collaborate while adjusting to and resisting shock, thus enabling proper recovery (Ali *et al.,* 2017; Gligor*et al.,* 2019). However, the literature highlights shortcomings in the theoretical background associated with agility and resilience-related concepts (Golgeci *et al.,* 2019; Ali and Gölgeci, 2019).Although it is crucial to establish both due to the current market circumstances, various constraints hamper their employment. After conducting a literature review, we selected 16 important enablers and barriers to adopt agility and resilience in SC management (Table I).

[insert Table I here]

Previous studies investigated the SC responsiveness, resilience, vulnerability, and agility in operations. Table II shows the results of a comparative analysis between recent agility and resilience papers and our work. We thus identified the following gaps:

- **Lack of qualitative methods:** Ivanov (2020) used structural control and dynamic systems to model SC viability. Considering the velocity of propagation, Ivanov and Das (2020) simulated the ripple effects of COVID-19 from the SC perspective. However, these studies failed to deeply understand customer attitudes and patterns, as they did not implement qualitative methods. Meanwhile, the literature shows that qualitative research enables a better description of the investigated phenomenon, with inductive research methods critical for theory generation (Sofaer, 1999; O'Donnell and Cummins, 1999).

- **Lack of fuzzy multi-criteria decision making (FMCDM):** Both Tarigan *et al.* (2021) and Siagian *et al.* (2021) investigated the integration of SC resilience and agility through other business performances. Hajli *et al.* (2020) explored the role of big data and customer agility in new product success, thus providing new insights into the quick responses and opportunities that companies experience after integrating customer agility. These studies suggest that stakeholders should make fast, profitable, and accurate decisions to ensure proper recovery in the wake of the economic crisis resulting from COVID-19. However, they failed to provide multi-criteria perspectives. FMCDM is used to address many attributes and objectives problems by considering the linguistic preferences preferred in practice to rank attributes that are important for decision-makers (Wang *et al.*, 2020). For example, although Chen and Lin (2020) did not work on resilience and agility aspects, they did use FMCDM to ensure long-term factory operations during COVID-19, thus providing a fuzzy assessment of smart and automated technology adoption in that setting.

- **Lack of analyses that jointly consider agility and resilience:** Wu *et al.* (2017) investigated SC agility in the electronic industry and provided an FMCDM structure via benchmarking from a case study. As for resilience management, He *et al.* (2020) considered customer requirements and risk factors when designing an SC resilience solution. Khemiri *et al.* (2017) provided a fuzzy evaluation of SC risk-oriented scenarios by integrating the procurement–production approach. Rajesh (2019) suggested a fuzzy index to assess resilience levels in firms and identified attributes that impacted resilience in SCs. Focusing on the agri-food sector, Kumar and Kumar Singh (2021) developed a strategic framework for SC resilience during COVID-19, with implications for retailers and farmers when attempting to maintain uninterrupted flows during breakdown periods. However, all these studies dealt with either agility or resilience individually rather than focusing on both. Meanwhile, some argued that agility and resilience share three common aspects; accelerating operations, anticipating the environment, and adjusting operations (Gligor *et al.,* 2019).

[insert Table II here]

Evaluations of the barriers and enablers of agility and resilience to COVID-19 provide a deeper understanding of the recovery drivers. Further, assessments of these factors establish a foundation for building short-, mid-, and long-term operations policies that are congruent with consumer demands. This can be tailored to the features of each industry and retail sector.

3. Methodology

This study used the SWOT-AHP, and Fuzzy TOPSIS approaches to identify and prioritise the factors of consumer demand, agility, and resilience following the COVID-19 outbreak (Figure 1).

[insert Figure 1 here]

3.1 Research design for formulating agility and resilience factors

We thoroughly reviewed the literature and conducted interviews with relevant experts to identify agility and resilience factors. The Fuzzy TOPSIS method was chosen for its wide usage as a qualitative methodology in ethnographic research (Qu and Dumay, 2011).

3.2 SWOT-AHP

We used the SWOT approach to analyse internal and external factors. It is a highly structured strategic analysis tool, enabling the investigation of internal and external criteria of the organisation (Elavarasan *et al.,* 2020). While this has been done in similar investigations, quantitative assessments are still limited (Solangi *et al.,* 2019). To address this gap, we combined SWOT with the analytic hierarchy process (AHP) method, to prioritise the factors of agility and resilience as identified via SWOT. AHP is a prevalent multi-criteria decision-making technique that can be applied across many subjects (Zahedi, 1986). It aids in the assessing strategic roadmaps (Belhadi *et al.,* 2019) and allows stakeholders to make decisions based on multiple criteria (Saaty, 1980).It is based on pair-wise comparisons associated with alternatives (Sequeira *et al.,* 2021). The weights were obtained from the average of the ranks provided by the interviewed experts mentioned above. The inconsistency of each evaluation matrix was thus provided. According tothe AHP, the consistency index (CI) was defined as follows:

$$CI = \frac{\lambda_{max} - n}{n - 1} \tag{1}$$

Here λ_{max} is the maximum value of the pair-wise matrix and *n* is the number of criteria. The consistency ratio (CR) was determined as follows:

$$CR = \frac{CI}{RI} \tag{2}$$

Where RI is the random index defined in Table III.

[insert Table III here]

3.3 Fuzzy TOPSIS

We used Fuzzy TOPSIS to prioritise the sub-factors of agility and resilience. We described its steps for *k* experts, *n* alternatives, and *m* criteria, as follows:

Step 1: Let $\tilde{w}_{ijk}= (w_{ijk1}, w_{ijk2}, w_{ijk3})$be the fuzzy weights, $\widetilde{W} = [\tilde{w}_1, \tilde{w}_2, ... \tilde{w}_n]$be the matrix of fuzzy weights, and$\tilde{x}_{ijk}= (a_{ijk}, b_{ijk}, c_{ijk})$be the triangular number representing the alternative i in the sub-alternative j.

$\tilde{x}_{ij}$ is the aggregate fuzzy weighting of each alternative, while$\tilde{w}_j$ is the aggregate fuzzy weighting of each criterion; then:

$$\tilde{x}_{ij} = (a_{ij}, b_{ij}, c_{ij})$$

$a_{ij} = \min_{k}\{a_{ijk}\}$

$b_{ij} = \frac{1}{K}\sum_{k=1}^{K} b_{ijk}$

$c_{ij}= \max_{k}\{c_{ijk}\}$

The fuzzy decision matrix was therefore defined as follows:

$$\widetilde{D} = \begin{bmatrix} \tilde{x}_{11} & \tilde{x}_{12} & \cdots & \tilde{x}_{1n} \\ \tilde{x}_{21} & \tilde{x}_{22} & \cdots & \tilde{x}_{2n} \\ \vdots & \vdots & \cdots & \vdots \\ \tilde{x}_{m1} & \tilde{x}_{m2} & \cdots & \tilde{x}_{mn} \end{bmatrix}$$

Step 2: Transform the decision matrix into a weighted normalised decision matrix$\tilde{V} = [\tilde{v}_{ij}]_{mxn}$, knowing that:

$\tilde{R} = [\tilde{r}_{ij}]_{mxn}$

$\tilde{r}_{ij} = (\frac{a_{ij}}{c_j{}^*}, \frac{b_{ij}}{c_j{}^*}, \frac{c_{ij}}{c_j{}^*})$

$\tilde{v}_{ij} = \tilde{r}_{ij}(.)\tilde{w}_j$

Step 3: Calculate the positive ideal solution A^* and negative ideal solution A^-:

$A^* = (\tilde{v}_1{}^*, \tilde{v}_2{}^*, ..., \tilde{v}_n{}^*)$, where $v_j{}^* = \max_i v_{ij3}$

$A^- = (\tilde{v}_1{}^-, \tilde{v}_2{}^-, ..., \tilde{v}_n{}^-)$, where $v_j{}^- = \min_i v_{ij1}$

Step 4: Calculate the distances from positive and negative ideal values:

$d_i{}^* = \sum_{j=1}^{n} d_v (\tilde{v}_{ij}, \tilde{v}_j{}^*)$

$d_i{}^- = \sum_{j=1}^{n} d_v (\tilde{v}_{ij}, \tilde{v}_j{}^-)$

Step 5:Calculate the similarity to the ideal option:

$CC_i = \dfrac{d_i{}^-}{d_i{}^* + d_i{}^-}$

The best alternative is the one with the highest value of closeness to the ideal solution.

4.Case Study and Data Collection

This study focused on the retail clothing and textile industry, an important economic manufacturing sector that has been challenged by several uncertainties due to the COVID-19 crisis. For example, vendors in Bangladesh, China, and India have had to cancel and postpone orders (Zhao and Kim, 2021). Further, pay cuts and layoffs have been implemented in several companies in India, where the textile industry is estimated to have comprised 10% of the compounded annual growth rate between 2016 and 2021(Kaur, 2021). Meanwhile, many brick-and-mortar fashion retail stores have closed in European countries and the United States (Chakraborty and Biswas, 2020). In turn, the stock prices of retailers such as Nike and Adidas decreased by as much as 25% from February to March 2020 (Youn *et al.,* 2021). In sum, we chose to investigate this industry due to the severe impacts incurred through the COVID-19 crisis.

As mentioned, we also solicited expert opinions through interviews of 13 participants from SCs and operations departments, including:

- Ten Store managers / Textile sales responsibles
- One Visual merchandiser
- One CEO of a denim brand producer
- One Supermarket director

Every individual had extensive professional experience in the textile industry and fast fashion retail, including a minimum of 10 and a maximum of 25 years, with an average of 16 years. For fashion experience in particular, experience ranged from five to 20 years, with an average of 12 years. The questions asked are outlined in Appendix A. The experts answered the questions via direct face-to-face interviews, distant call/Skype meetings, and filled surveys depending on their availability. The background of the study and the confidentiality of the interviews were shared and explained to each participant.

5. Results and Discussion

This section, outlines and discusses the qualitative and quantitative results by exploring the internal and external factors we thus identified and prioritised.

5.1 SWOT-AHP results and discussion

The SWOT analysis for agility and resilience following the COVID-19 outbreak revealed 14 factors relevant to fast fashion. Each factor was described, validated, and correlated with the agility and resilience enablers and barriers established through the literature review.Figure2 shows the rankings for these SWOT factors, the results of which indicate that opportunities policy had the lowest weight (0.143) compared to the other factors with strengths, weaknesses, and threats, equally ranked with 0.286 weights. Thus, these actions may help reduce the economic impacts experienced by fast-fashion retailers but are weak opportunities, as the period is full of uncertainties.

[insert Figure 2 here]

5.1.1 Strengths

Our analysis revealed the following five strengths factors:

S1: Enhanced anti-stress colours on the new products ranges. This is supported by the impact of clothing colours on an individual's mood. Research has shown that clothing features, such as colour, impact the wearer's mood (Hasan *et al.,* 2011). This is important, as many consumers are experiencing new stress owing to lockdown periods, the slow rate of vaccination progress, and social distancing requirements. Therefore, this factor is ranked as the third highest priority (Figure 3). It also supports the adaptability enabler (E9) aimed at meeting new customer demands, specifically by adapting the colours of product ranges to favour those that generate relaxation and improve mental health.

[insert Figure 3 here]

S2: Flexible logistics and sourcing processes to ensure quick responsiveness. COVID-19 has interrupted the availability of both finished goods and raw material flows. This is supported by the literature about firms' strategic reactions following the pandemic. Due to the global impacts of the pandemic on SCs, firms should embrace proactive strategies to achieve responsiveness and flexibility (Xu *et al.,* 2020). Therefore this factor is ranked as the second-highest priority (shared with S3, below). It also supports the flexible SC and manufacturing enabler (E2), which eases the transportation of products to consumers.

S3: Flexible human resource (HR) policies for staff management. This strength is crucial for fast-fashion retailers who manage the working hours of store employees to reflect business needs in times of increased and decreased sales. Research has shown that external labour markets are moving toward more flexibility to meet these fluctuations (Wallo and Kock, 2018).Since the experience of flexible working hours and working from home, policymakers can alter the future of working policies (Forbes *et al.,* 2020).They could have a significant impact on employees' satisfaction and the global employability rates for foreign workers. In this context, there have been sharp variations in the operational working hours of physical store locations, especially due to frequent closing mandates and subsequent consumer demands upon reopening. Therefore this factor is ranked as the second-highest priority (equal to S2). It also supports the real-time responsiveness capacity (E5), which is critical in physical store locations that must rapidly adjust working schedules for their staff.

S4: Diversified assortment, since consumers will prefer to shop less frequently but for larger quantities on each trip to minimise the potential for mass social gatherings. In this regard, footfalls counters have shown decreased numbers in shopping malls following lockdown periods. Research has outlined that this phenomenon has been explained as a new found consumer hesitancy to shop in these types of areas (Dinesh and Muni Raju, 2021). While consumers have shown impulse purchasing behaviours as a natural reaction to store closings and flow outbreaks, they are still minimising the number of visits they make to crowded public spaces. This factor is a top priority (shared with S5, below). It also supports the idea that firm stakeholders will adopt different operational strategies (E3) to capture market demand opportunities during these periods.

S5: Adapting the fast fashion brand image, as it is becoming less expensive in the market. Research has indicated that the pandemic has resulted in various negative economic impacts, thus generating significant decreases in consumer purchasing power and limiting spending potential (Ilmiah and Wonoseto, 2021). This factor is a top priority (equal to S4). It also supports customer management through pricing (E8), in which offerings are adapted to reflect consumer purchasing patterns.

5.1.2 Weaknesses

W1: Irrational staff reductions to reduce store expenses. This is considered a weakness due to its negative impacts on customer service. Research has shown that better sales staff availability enhances customer satisfaction and increases persuasion levels (Sharma and Stafford, 2000). This weakness is ranked as the second-highest priority (Figure 4). It also supports the resilience and agility barrier (B2). The inability to deliver flexible operational services during the current economic crisis has led to job cuts for several fast-fashion retailers.

[Insert Figure 4 here]

W2: Lack of situational leadership within operations and the inability of store managers to handle unexpected interruptions in the short and mid-term. Previous literature has revealed that stakeholders must consider whether organisational leadership practices can adequately deal with employees and customers issues in the context of organised retail operations (Sulaiman *et al.,* 2020). This weakness is ranked as the third-highest priority (shared with W4, below). It also supports the lack of managerial autonomy (B1) barrier. If store managers do not sufficiently empower staff through coaching and communicating, they will not be encouraged to apply the autonomy needed to take quick actions.

W3: Lack of adaptable store processes when customers must be served quickly, as store lead times are unprecedently shorter to minimise social gatherings. Literature has outlined that self-efficacy has a direct negative impact on risk levels (Chang, 2021).Many retailers now require social distancing in their physical shopping locations as there is a higher risk of COVID-19 transmission in low-cost crowded stores (Shumsky *et al.,*2021). This weakness is the top priority. Fast fashion stores must manage the return to normal conditions (B3), especially since the negative perception of crowded stores affects shopping intentions.

W4: Lack of management adaptation to handle decreased staff motivation due to the risk of reductions and current employment uncertainties. Literature has outlined that following the COVID-19 outbreak, serious social and societal issues such as depression and anxiety have increased due to job insecurity, economic uncertainty, and unemployment (Godinic *et al.,* 2020). This weakness is ranked as the third-highest priority (equal to W2). It also pertains to the barrier in which employees tend to work on their self-interests (B4). Many employees are experiencing anxiety over their future professional careers and opportunities due to current job insecurities.

5.1.3 Opportunities

O1: Adapt processes to reflect the accelerated purchasing trends that have arisen amid interruptions. More specifically, impulsive purchasing behaviours have emerged during the COVID-19 pandemic. This supports the case study findings performed in Indonesia, for example, where it has been found that fast fashion items were the most frequently purchased products in thee-commerce setting during the pandemic (Iriani *et al.,*2021). This opportunity is the top priority (Figure 5). It also supports e-business and communication technologies(E1) and customer relationship management (E4).In this regard, managers must meet the demand for impulse purchasing while addressing consumer expectations for strong online channels and better remote service.

[insert Figure 5 here]

O2: Adapting the assortment to include more fitness and sports apparel products, as health awareness has increased due to COVID-19. Research has shown that the lockdowns have increased populational interests in physical activity and exercise (Ding *et al.,*2020 ; Robertson *et al.,* 2021). This opportunity is ranked as the third-highest priority and reflects the commitment to agile practices (E6) and

customer relationship management (E4). The agile management of customer demand patterns enables pulled product designs.

O3: Adapting new product ranges to include more pyjama styles, as consumers are staying home at much higher rates. This is supported by the literature stating that due to concerns over the pandemic, consumers are now avoiding publicly consumed products (Mason *et al.*, 2020). Another study revealed that 80% of the surveyed working women stated that the pandemic impacted their clothing choices. Most of them prefer more cotton clothing products and less formal ones (Gogoi *et al.,* 2021).This opportunity is top-ranked (equal to O1). It also supports the fast introduction of new products (E7), in which all SCs function to supply the new product range, from sourcing to distribution.

5.1.4 Threats

T1: Many consumers have begun to shop for clothes in hypermarkets during lockdowns, threatening fast-fashion retailers who provide similar products and prices. This is supported by the literature revealing the impact of product unavailability on consumer purchasing behaviour. Consumers typically prefer to divide their shopping between several stores, even if they can find suitable apparel items in larger markets. However, the ability to find the same products in several stores may decrease consumer loyalty to specific stores (Majercakova *et al.*, 2021). This threat is top-ranked (Figure 6) and reflects the inability to provide outputs with minimum resources (B6). Fast-fashion brands usually do not distribute their products to large textile markets, which typically offer products of lesser quality and feature manufacturers who do not operate proper stores. However, lockdowns have forced malls and stores to close, influencing consumers to shop at larger markets. To retain customers, these markets have responded by offering better items.

[insert Figure 6 here]

T2: Increased online purchasing habits during lockdowns may reduce sales among fast-fashion brands that only allow physical store purchases. Most consumers are predicted to continue shopping online to build resilient shopping satisfaction (Kursan Milaković, 2021). This threat is the second-highest priority and supports the inability to change modes of delivery and output rapidly (B5). The online delivery of fast-fashion products to customers is a threat for brands that have not adopted this practice.

5.2 Fuzzy-TOPSIS results and discussion

The SWOT analysis led to a cross investigation of strategies, namely, weakness-strength (WT), weakness-opportunity (WO), strength-opportunity (SO), and strength-threat (ST). This analysis allowed us to explore how strengths could maximise opportunities while avoiding potential weaknesses and threats. We offer the following six strategies about customer demand resilience and agility in fast-fashion:

- ST1: Enhancing e-commerce business. This strategy is ranked as the third-highest priority (Table IV). Fast-fashion retailers should accelerate digital transformations by implementing mobile-friendly online sales and applications that foster resilient e-purchasing. This includes updated data on product ranges. Augmented reality technologies are also recommended to facilitate consumer choices and make the virtual shopping experience closer to the physical counterpart. This supports the results of McMaster *et al*. (2020) where the authors found that online sales enabled sustain sales for fast fashion brands. As well, the authors proposed augmented reality applications for creating digital fitting rooms, as part of outbreak risk management.

[insert Table IV here]

- ST2: Reshaping product pricing policies. This strategy is ranked as the second-highest priority. Generally, fast fashion brands provide items ranging from the lowest cost to mid-cost. In this period, they should focus on product ranges with the lowest prices (i.e., basic items, which increase agility during the economic crisis). They should also optimise SC costs for global fast-fashion retailers; for example, by offshoring, the production of clothing items for local manufacturers, where the brand operates point-of-sale locations and worker wages are not very high. This will reduce costs and enable a resilient supply if international physical flow disturbance soccur.

- WT1: Enhancing the omnichannel customer experience. This strategy is ranked as a top priority. It will enable an agile shopping experience and better consumer convenience. Strategies such as Experience-in-Store-and-Buy-Online (ESBO) and Buy-Online-and-Return-in-Store (BORS) (Huang and Jin, 2020; Artusi*et al.,* 2021; Liu *et al.*, 2021; Mandal *et al.,* 2021) are good alternatives for fast-fashion brands to ease both the return process and online purchase intention.

- WT2: Emphasising situational leadership. This strategy is ranked as the fourth-highest priority. It includes enhancing the level of empowerment for store staff who must make physical contact in the customer service setting. This includes the alteration of operation hours, curfews, and eventual stock-outs due to interrupted distribution. This strategy also includes enhancing remote work mindsets for merchandisers, planners, and customer representatives who previously investigated customer demands by arranging frequent face-to-face meetings and making store visits.

- SO: Maximising practical clothing offerings. This strategy is ranked as the fifth-highest priority. Lockdown periods have influenced consumers to purchase more comfortable products while staying at home. This supports previous research (Choi and Lee, 2020) showing that the demand for home-based clothing has increased during the COVID-19 pandemic. Fast-fashion retailers should review their product ranges accordingly.

- WO: Endorsing fitness product ranges. This strategy is ranked as the fifth-highest priority. It reflects the increasing demand for home workouts and indoor exercise. It is now acknowledged that COVID-19 has changed several lifestyle and social behaviours (Jia *et al.,* 2021). Diet patterns and a healthy lifestyle are among the areas that have had more interest. For example, online exercise classes have become popular in Germany during lockdown periods (Füzéki *et al.,* 2021), especially as the immune system can be strengthened against COVID-19 via exercise (Nieman, 2021). As such, fast-fashion retailers should endorse fitness products congruent with the 'new normal' customer demand.

5.3 Sensitivity analysis

We conducted a sensitivity analysis to assess the robustness of the developed decision-making system. We varied the input weights of the SWOT criteria, evaluated eventual changes in the agility and resilience strategies, and investigated five cases (Table V). The results of this analysis are outlined in Table VI. As shown, the(SO) and (WO) strategies varied from 5 to 6 ranks because they initially shared the same rank; thus, any variation in weights created a difference in their priority. ST1 and WT2 also changed, with one rank level in case 5; the strategy rankings remained the same in all other cases. This validated the results of the decision-making system.

[insert Table V here]

[insert Table VI here]

6. Conclusion

Analysing and assessing the factors impacting retail maturity following the pandemic is a sophisticated process involving internal and external factors. This study created a decision-making system to address customer demand maturity based on agility and resilience management following the COVID-19 outbreak. We employed an integrated methodology comprised of the SWOT-AHP and Fuzzy-TOPSIS approaches. This specifically guides the fast-fashion industry. This study provides 14 SWOT factors for agility and resilience management. It has been found that the economic crisis and the psychological effects of the pandemic have influenced fast-fashion purchasing patterns and employees' motivation. With the adaptation to the new normal, the transition to situational leadership with the retailers' employees and the endorsement of e-commerce platforms have become crucial.

The importance of SWOT for resilience and agility analysis post-COVID-19 is the endorsing of strengths while working on weaknesses and utilising opportunities while minimising threats. This internal and external investigation enables fast-fashion retailers to address the factors associated with employees and customers to lead the customer demand management during this crisis. Taking decisions on agility and resilience recovery plan should be in line with the importance of each factor and strategy as the SWOT qualitative study was complemented with quantitative analysis, that is, multi-criteria methods for creating a prioritisation order. The fuzzified decision-making system helps tackle issues of vagueness and ambiguity with the rates provided by the experts.

6.1 Implications for theory

The theoretical implications concerned integrating SWOT, AHP, and Fuzzy-TOPSIS and their associated application on multi-criteria decision-making and adaptations to post-COVID operational needs. It is pertinent to outline that this methodology has helped guide resilience and agility management strategies while considering internal and external analysis. The adaptability and effectiveness of the decision-making system with SWOT can also present other implications. Other aspects of post-pandemic impact are investigated by combining strategic analysis tools with fuzzy multi-criteria decision systems methods such as PEST (political, economic, social, and technological factors). Since other MCDM approaches were out of this paper's scope, experts in decision making systems might be interested in investigating the results of other methodologies' integrations for the post pandemic maturity management and compare the results with ours.

Furthermore, researchers working in the area of fast fashion retail, precisely about operations topics, can utilize the proposed factors and implement them in their studies. The suggested methodology may be used as well in other retail fields for academics. Hence this paper addresses and helps in reducing the gap between the literature and the fast fashion industry for maturity management. Researchers working on topics associated with the textile industry supply chain, from customer demand management to design and production, may use this paper's results to forecast how to be agile in new collections productions for resilient sales.

6.2 Implications for practice

The practical implication of this paper is twofold. First, it helped in obtaining information that will help fast fashion retailers manage this period in line with consumer expectations. The patterns of consumer purchase that have been changed following the pandemic, in terms of styles preferences and prices affordability should be addressed. Hence we provide fast fashion retailers with practical factors, to

be used in enhancing the managerial decisions for the post pandemic maturity management. The SWOT factors will help fast fashion retailers to develop an integrated action plan, toward internal organizational constraints, such as pandemic impact on staff, and external customer behavior features.

Second, the integrated FMCD method can enable fast fashion retailers to prioritize their efforts in post pandemic maturity action plan. Fuzzy TOPSIS results show that the omnichannel strategy is top prioritized, followed by pricing policies. Being flexible to the purchasing power of consumers and adapting the communications and physical flows channels to ensure operations continuity at the customer's convenience is a vital success factor for resilient and agile management. The key to success here is to understand the changes to consumer patterns and adapt the processes accordingly. The dominant element is the economic factor. Fast-fashion retailers should put more effort into designing long-lasting products, providing payment facilities, and focusing on the basic, most affordable products instead of the trendy ones during this period. These implications enable fast-fashion retailers to lead the economic side of the recovery plan.

6.3 Limitations and directions for future scope

This study also had some limitations, including a limited number of surveyed fast-fashion experts. Future research can enlarge the sample of experts surveyed to get more factors or emphasise the stated findings. A follow-up research may focus on other areas of the textile industry like luxury fashion or others (food, automotive, and aeronautic industries) significantly impacted by the COVID-19 outbreak. Researchers can work on benchmarking between different retail and industrial sectors, and future outcomes could be about resilience and agility lessons learned per business area. Additionally, other methodologies for fuzzy multi-criteria decision-making can be investigated while comparing the ranking of strategies resulting from them, such as fuzzy VIKOR, DEMATEL, and ANP.

References
Abu-Raddad, L. J., Chemaitelly, H., and Butt, A. A. (2021), "Effectiveness of the BNT162b2 Covid-19 Vaccine against the B. 1.1. 7 and B. 1.351 Variants", *New England Journal of Medicine*, https://doi.org/10.1056/NEJMc2104974

Al Humdan, E., Shi, Y., and Behnia, M. (2020), "Supply chain agility: a systematic review of definitions, enablers and performance implications", *International Journal of Physical Distribution & Logistics Management*, Vol. 50, No. 2, pp.287-312, https://doi.org/10.1108/IJPDLM-06-2019-0192

Ali, B. (2020), "Impact of COVID-19 on consumer buying behaviour toward online shopping in Iraq", *Economic Studies Journal*, Vol. 18, No. 42, pp.267-280.

Ali, A., Mahfouz, A.and Arisha, A. (2017), "Analysing supply chain resilience: integrating the constructs in a concept mapping framework via a systematic literature review", *Supply Chain Management*,Vol. 22, No. 1, pp.16-39.

Ali, I.andGölgeci, I. (2019), "Where is supply chain resilience research heading? A systematic and co-occurrence analysis", *International Journal of Physical Distribution & Logistics Management*, https://doi.org/10.1108/IJPDLM-02-2019-0038

Ali, I., Nagalingam, S., and Gurd, B. (2017), "Building resilience in SMEs of perishable product supply chains: enablers, barriers and risks", *Production Planning & Control*, Vol. 28, No. 15,pp.1236-1250.

Ali, M. H., Suleiman, N., Khalid, N., Tan, K. H., Tseng, M. L., and Kumar, M. (2021), "Supply chain resilience reactive strategies for food SMEs in coping to COVID-19 crisis", *Trends in Food Science & Technology,* Vol. 109, pp.94-102,https://doi.org/10.1016/j.tifs.2021.01.021

Ambros, M., Frenkel, M., Huynh, T. L. D., and Kilinc, M. (2020), "COVID-19 pandemic news and stock market reaction during the onset of the crisis: evidence from high-frequency data", *Applied Economics Letters*, pp.1-4.

Artusi, E.and Luminoso, M. (2021), "Promoting frontend and backend collaboration in the omnichannel era: an optimisation model and its application to an apparel retailing case", available at

http://hdl.handle.net/10589/175663 (accessed 9 September, 2021)

Atayah, O. F., Dhiaf, M. M., Najaf, K., and Frederico, G. F. (2021), "Impact of COVID-19 on financial performance of logistics firms: evidence from G-20 countries", *Journal of Global Operations and Strategic Sourcing*, http://dx.doi.org/10.1108/JGOSS-03-2021-0028

Baba, I. A., Yusuf, A., Nisar, K. S., Abdel-Aty, A. H., and Nofal, T. A. (2021), "Mathematical model to assess the imposition of lockdown during COVID-19 pandemic", *Results in Physics*, Vol. 20, No. 103716, https://doi.org/10.1016/j.rinp.2020.103716

Badulescu, Y., Hameri, A. P., and Cheikhrouhou, N. (2021), "Sustainable partner selection for collaborative networked organisations with risk consideration in the context of COVID-19", *Journal of global operations and strategic sourcing*, https://doi.org/10.1108/JGOSS-11-2020-0069

Barton, M. A., Christianson, M., Myers, C. G., and Sutcliffe, K. (2020), "Resilience in action: leading for resilience in response to COVID-19", *BMJ Leader*, Vol. 4, No. 3, http://dx.doi.org/10.1136/leader-2020-000260

Belhadi, A., Kamble, S., Jabbour, C. J. C., Gunasekaran, A., Ndubisi, N. O., and Venkatesh, M. (2021), "Manufacturing and service supply chain resilience to the COVID-19 outbreak: Lessons learned from the automobile and airline industries", *Technological Forecasting and Social Change*, Vol. 163, No. 120447,https://doi.org/10.1016/j.techfore.2020.120447

Belhadi, A., Touriki, F. E., and Elfezazi, S.(2019). "Evaluation of critical success factors (CSFs) to lean implementation in SMEs using AHP", *International Journal of Lean Six Sigma*.

Blome, C., Schoenherr, T., and Rexhausen, D. (2013), "Antecedents and enablers of supply chain agility and its effect on performance: a dynamic capabilities perspective", *International Journal of Production Research*, Vol. 51, No.4, pp.1295-1318.

Burgos, D.and Ivanov, D. (2021), "Food retail supply chain resilience and the COVID-19 pandemic: a digital twin-based impact analysis and improvement directions", *Transportation Research Part E: Logistics and Transportation Review*, 152, 102412.

Centobelli, P. Cerchione, R., and Ertz, M. (2020), "Managing supply chain resilience to pursue business and environmental strategies", *Business Strategy and the Environment*, Vol. 29, No. 3, pp.1215-1246.

Chakraborty, S.and Biswas, M. C. (2020), "Impact of COVID-19 on the textile, apparel and fashion manufacturing industry supply chain: case study on a ready-made garment manufacturing industry", *Journal of Supply Chain Management, Logistics and Procurement*, Vol. 3, No. 2, pp.181-199.

Chang, T. S. (2021), "Social distancing in retail: influence of perceived retail crowding and self-efficacy on employees' perceived risks", *Journal of Retailing and Consumer Services*, Vol. 62, 102613,https://doi.org/10.1016/j.jretconser.2021.102613

Chemaitelly, H., Yassine, H. M., Benslimane, F. M., Al Khatib, H. A., Tang, P., Hasan, M. R., and Abu-Raddad, L. J. (2021), "mRNA-1273 COVID-19 vaccine effectiveness against the B. 1.1. 7 and B. 1.351 variants and severe COVID-19 disease in Qatar", *Nature Medicine*, pp.1-8,https://doi.org/10.1038/s41591-021-01446-y

Chen, T.and Lin, C. W. (2020), "Smart and automation technologies for ensuring the long-term operation of a factory amid the COVID-19 pandemic: an evolving fuzzy assessment approach", *The International Journal of Advanced Manufacturing Technology*, Vol. 111, No. 11, pp.3545-3558.

Choi, Y. H.and Lee, K. H. (2020), "Changes in consumer perception of fashion products in a pandemic-Effects of COVID-19 spread", *The Research Journal of the Costume Culture*, Vol. 28, No. 3, pp.285-298.

Christopher, M. (2000), "The agile supply chain: competing in volatile markets", *Industrial marketing management*, Vol. 29, No. 1, pp.37-44.

Christopher, M.and Towill, D. R. (2000), "Supply chain migration from lean and functional to agile and customised", *Supply Chain Management*, Vol. 5, No. 4, pp.206-213.

Dawes, J. (Ed.), (2019), *Developing agility and quickness*, Human Kinetics Publishers, Champaign, IL.

Dinesh, S.andMuni Raju, Y. (2021),"Scalability of e-commerce in the COVID-19 era", *International Journal of Research-GRANTHAALAYAH*, Vol. 9, No.1,pp.123-128,

https://doi.org/10.29121/granthaalayah.v9.i1.2021.3032

Ding, D., del Pozo Cruz, B., Green, M. A., and Bauman, A. E. (2020),"Is the COVID-19 lockdown nudging people to be more active: a big data analysis", *British Journal of Sports Medicine*, Vol. 54, No. 20, pp.1183-1184, https://doi.org/10.1136/bjsports-2020-102575

Elavarasan, R. M., Afridhis, S., Vijayaraghavan, R. R., Subramaniam, U., and Nurunnabi, M. (2020),"SWOT analysis: A framework for comprehensive evaluation of drivers and barriers for renewable energy development in significant countries", *Energy Reports*, Vol. 6, pp.1838-1864, https://doi.org/10.1016/j.egyr.2020.07.007

Faisal, M. N., Banwet, D. K., and Shankar, R. (2007), "Supply chain agility: analysing the enablers", *International Journal of Agile Systems and Management*, Vol. 2, No. 1, pp.76-91.

Forbes, S., Birkett, H., Evans, L., Chung, H., and Whiteman, J. (2020), "Managing employees during the COVID-19 pandemic: flexible working and the future of work", available at https://www.birmingham.ac.uk/Documents/college-social-sciences/business/research/responsible-business/managerial-experiences-during-covid19-2020-accessible.pdf (Accessed 9 September, 2021)

Füzéki, E., Schröder, J., Groneberg, D. A., and Banzer, W. (2021), "Online Exercise Classes during the COVID-19 Related Lockdown in Germany: Use and Attitudes", *Sustainability*, Vol. 13, No. 14, p.7677.

Galanakis, C. M., Rizou, M., Aldawoud, T. M., Ucak, I., and Rowan, N. J. (2021), "Innovations and technology disruptions in the food sector within the COVID-19 pandemic and post-lockdown era", *Trends in Food Science & Technology*, Vol. 110, pp.193-200, https://doi.org/10.1016/j.tifs.2021.02.002

Gligor, D., Gligor, N., Holcomb, M., and Bozkurt, S. (2019), "Distinguishing between the concepts of supply chain agility and resilience: a multidisciplinary literature review", *The International Journal of Logistics Management*, Vol. 30, No. 2, pp.467-487, https://doi.org/10.1108/IJLM-10-2017-0259

Godinic, D., Obrenovic, B., and Khudaykulov, A. (2020), "Effects of economic uncertainty on mental health in the COVID-19 pandemic context: social identity disturbance, job uncertainty and psychological well-being model", *International Journal of Innovation and Economic Development*, Vol. 6, No. 1,pp.61-74.

Gogoi, N., Saikia, D., andNeog, P. (2021), "Influence of Covid-19 Pandemic on Clothing Interests of Working Women", available at http://krishi.icar.gov.in/jspui/handle/123456789/49248 (Accessed 9 September, 2021

Goh, Y., Chua, W., Lee, J. K., Ang, B. W. L., Liang, C. R., Tan, C. A., ... and Quek, S. T. (2020),"Operational strategies to prevent coronavirus disease 2019 (COVID-19) spread in radiology: experience from a Singapore radiology department after severe acute respiratory syndrome", *Journal of the American College of Radiology*, Vol. 17, No. 6, pp.717-723.

Golan, M. S., Jernegan, L. H., and Linkov, I. (2020), "Trends and applications of resilience analytics in supply chain modelling: systematic literature review in the context of the COVID-19 pandemic", *Environment Systems &Decisions*, Vol. 40, pp.222-243, https://doi.org/10.1007/s10669-020-09777-w

Golgeci, I., Bouguerra, A., and Rofcanin, Y. (2019), "The human impact on the emergence of firm supply chain agility: a multilevel framework", *Personnel Review*, Vol. 49, No. 3, pp.733-754, https://doi.org/10.1108/PR-12-2018-0507

Grela, G.and Hofman, M. (2021), "Does insourcing of processes pay off?", *Journal of Global Operations and Strategic Sourcing*, Vol. 14, No. 3, pp.477-501, https://doi.org/10.1108/JGOSS-06-2020-0029

Hasan, S. A., Subhani, M. I., and Osman, M. (2011), "New Article of Clothing translates the Mood of an Individual", available at https://mpra.ub.uni-muenchen.de/34761/1/MPRA_paper_34761.pdf (Accessed 9 September, 2021)

Hajli, N., Tajvidi, M., Gbadamosi, A., and Nadeem, W. (2020), "Understanding market agility for new product success with big data analytics", *Industrial Marketing Management*, Vol. 86, pp.135-143.

He, L., Wu, Z., Xiang, W., Goh, M., Xu, Z., Song, W., ... and Wu, X. (2020),"A novel Kano-QFD-

DEMATEL approach to optimise the risk resilience solution for sustainable supply chain", *International Journal of Production Research*, Vol. 59, No. 6, pp.1-22.

Hernandez, D. F.and Haddud, A. (2018), "Value creation via supply chain risk management in global fashion organizations outsourcing production to China", *Journal of Global Operations and Strategic Sourcing*, Vol. 11, No. 2, pp.250-272.

Huang, M.and Jin, D. (2020),"Impact of buy-online-and-return-in-store service on omnichannel retailing: A supply chain competitive perspective", *Electronic Commerce Research and Applications*, Vol. 41, p.100977.

Ilmiah, D.and Wonoseto, M. G. (2021), "Consumer Confidence Index in Coronavirus Disease (Covid-19) Era", *EkBis: JurnalEkonomi dan Bisnis*, Vol. 5, No. 1, pp.515-525.

Iriani, S. S., Nuswantara, D. A., Kartika, A. D., and Purwohandoko, P. (2021),"The impact of government regulations on consumers behaviour during the COVID-19 pandemic: a Case Study in Indonesia". *The Journal of Asian Finance, Economics and Business*, Vol. 8, No.4, pp.939-948.

Ivanov, D. (2020),"Viable supply chain model: integrating agility, resilience and sustainability perspectives—lessons from and thinking beyond the COVID-19 pandemic". *Annals of Operations Research*, https://doi.org/10.1007/s10479-020-03640-6.

Ivanov, D.and Das, A. (2020), "Coronavirus (COVID-19/SARS-CoV-2) and supply chain resilience: a research note", *International Journal of Integrated Supply Management*, Vol. 13, No. 1, pp.90-102.

Ivanov, D.and Dolgui, A. (2021),"OR-methods for coping with the ripple effect in supply chains during COVID-19 pandemic: managerial insights and research implications", *International Journal of Production Economics*, Vol. 232, p.107921, https://doi.org/10.1016/j.ijpe.2020.107921

Ivanov, D.and Dolgui, A. (2020), "Viability of intertwined supply networks: extending the supply chain resilience angles towards survivability. A position paper motivated by COVID-19 outbreak", *International Journal of Production Research*, Vol. 58, No. 10, pp.2904-2915.

Jalkanen, P., Kolehmainen, P., Häkkinen, H. K., Huttunen, M., Tähtinen, P. A., Lundberg, R., ... and Julkunen, I. (2021),"COVID-19 mRNA vaccine induced antibody responses against three SARS-CoV-2 variants", *Nature Communications*, Vol. 12, No. 1, https://doi.org/10.1038/s41467-021-24285-4

Jia, P., Liu, L., Xie, X., Yuan, C., Chen, H., Guo, B., ... and Yang, S. (2021),"Changes in dietary patterns among youths in China during COVID-19 epidemic: the COVID-19 impact on lifestyle change survey (COINLICS)", *Appetite*, Vol. 158, 105015, https://doi.org/10.1016/j.appet.2020.105015

Johnson, J. E.and Haug, P. (2021), "Modifications to global supply chain management strategies resulting from recent trade disruptions: an exploratory study", *Journal of Global Operations and Strategic Sourcing*, https://dx.doi.org/10.1108/jgoss-12-2020-0074

Jordan, R. E., Adab, P., and Cheng, K. (2020), "Covid-19: risk factors for severe disease and death", *BMJ*, https://doi.org/10.1136/bmj.m1198

Kamalahmadi, M.and Parast, M. M. (2016), "A review of the literature on the principles of enterprise and supply chain resilience: Major findings and directions for future research", *International Journal of Production Economics*, Vol. 171, pp.116-133.

Kaur, K. (2021),"The Early Impact of COVID-19 on Textile Industry: An Empirical Analysis",*Management and Labour Studies*, https://doi.org/10.1177%2F0258042X21991018.

Khemiri, R., Elbedoui-Maktouf, K., Grabot, B., and Zouari, B. (2017),"A fuzzy multi-criteria decision-making approach for managing performance and risk in integrated procurement–production planning", *International Journal of Production Research*, Vol. 55, No. 18, pp.5305-5329.

Kumar, P.and Kumar Singh, R. (2021), "Strategic framework for developing resilience in Agri-Food Supply Chains during COVID 19 pandemic", *International Journal of Logistics Research and Applications*, 1-24, https://doi.org/10.1080/13675567.2021.1908524

KursanMilaković, I. (2021), "Purchase experience during the COVID-19 pandemic and social cognitive theory: the relevance of consumer vulnerability, resilience, and adaptablity for purchase satisfaction and repurchase", *International Journal of Consumer Studies*, https://doi.org/10.1111/ijcs.12672

Li, T., Rong, L.and Zhang, A. (2021), "Assessing regional risk of COVID-19 infection from Wuhan via high-speed rail", *Transport policy*, Vol. 106, pp.226-238, https://dx.doi.org/10.1016%2Fj.tranpol.2021.04.009

Lin, C. T., Chiu, H., and Chu, P. Y. (2006), "Agility index in the supply chain", *International Journal of production economics*, Vol. 100, No. 2, pp.285-299.

Liu, J., Xu, Q., and Zhang, G. (2021), "Omni-channel strategy for an online retailer: considering experience service and shopping costs", *INFOR: Information Systems and Operational Research*, Vol. 59, No.2, pp.232-256.

Majercakova, M.and Rostasova, M. (2021), "Customer Behaviour and Sentiment Due to the COVID-19 Global Pandemic", InKliestikT. (Ed.)*SHS Web of Conferences (Vol. 92)*,EDP Sciences, https://doi.org/10.1051/shsconf/20219201029

Mason, A., Narcum, J., and Mason, K. (2020), "Changes in consumer decision-making resulting from the COVID-19 pandemic", *Journal of Customer Behaviour*, Vol. 19, No. 4, pp.299-321.

Mandal, P., Basu, P., and Saha, K. (2021), "Forays into omnichannel: An online retailer's strategies for managing product returns", *European Journal of Operational Research*, Vol. 292, No. 2, pp.633-651.

McMaster, M., Nettleton, C., Tom, C., Xu, B., Cao, C., & Qiao, P. (2020), "Risk management: Rethinking fashion supply chain management for multinational corporations in light of the COVID-19 outbreak" *Journal of Risk and Financial Management*, Vol. 13, No 8, pp. 173.

Meredith, S.and Francis, D. (2000), "Journey towards agility: the agile wheel explored", The TQM Magazine, Vol. 12, No. 2, pp.137-143, http://dx.doi.org/10.1108/09544780010318398

Nieman, D. C. (2021), "Exercise is medicine for immune function: implication for COVID-19",*Current Sports Medicine Reports*, Vol. 20, No. 8, pp.395-401.

O'Donnell, A.and Cummins, D. (1999), "The use of qualitative methods to research networking in SMEs", *Qualitative Market Research,* Vol. 2, No. 2, pp.82-91, https://doi.org/10.1108/13522759910269991

Pan, A., Liu, L., Wang, C., Guo, H., Hao, X., Wang, Q., ... and Wu, T. (2020),"Association of public health interventions with the epidemiology of the COVID-19 outbreak in Wuhan, China", *Jama*, Vol. 323, No. 19, pp.1915-1923.

Pandey, V. C.and Garg, S. (2009), "Analysis of interaction among the enablers of agility in supply chain", *Journal of Advances in Management Research*, Vol. 6, No. 1, pp.99-114

Pantano, E., Pizzi, G., Scarpi, D., and Dennis, C. (2020),"Competing during a pandemic? Retailers' ups and downs during the COVID-19 outbreak", *Journal of Business Research*, Vol. 116, pp.209-213, https://doi.org/10.1016/j.jbusres.2020.05.036

Pathak, G.andWarpade, S. (2020), "Impact of Lockdown Due to COVID-19 on Consumer Behaviour While Selecting Retailer for Essential Goods", *Zeichen,* Vol. 6, No. 7, pp.282-289.

Paul, S. K., Chowdhury, P., Moktadir, M. A., and Lau, K. H. (2021),"Supply Chain Recovery Challenges in the Wake of COVID-19 Pandemic", *Journal of Business Research*, Vol. 136, pp.316-329, https://doi.org/10.1016/j.jbusres.2021.07.056

Ponomarov, S. Y.and Holcomb, M. C. (2009), "Understanding the concept of supply chain resilience", *The International Journal of Logistics Management*, Vol. 20, No. 1, pp.124-143, https://doi.org/10.1108/09574090910954873

Power, D.J., Sohal, A.S. and Rahman, S-U. (2001), "Critical success factors in agile supply chain management – an empirical study", *International Journal Physical Distribution & Logistics Management*, Vol. 31, pp.247–265.

Putnik, G. D.and Sluga, A. (2007), "Reconfigurability of manufacturing systems for agility implementation",*Digital Enterprise Technology*,Springer, Boston, MA, pp.91-98.

Qu, S. Q.and Dumay, J. (2011), "The qualitative research interview", *Qualitative Research in Accounting & Management*, Vol. 8, No. 3, pp.238-264

Queiroz, M. M., Ivanov, D., Dolgui, A., and Wamba, S. F. (2020),"Impacts of epidemic outbreaks on supply chains: mapping a research agenda amid the COVID-19 pandemic through a structured

literature review", *Annals of Operations Research*, pp.1-38, https://doi.org/10.1007/s10479-020-03685-7

Rajesh, R. (2018),"Measuring the barriers to resilience in manufacturing supply chains using Grey Clustering and VIKOR approaches", *Measurement*, Vol. 126, pp.259-273.

Rajesh, R. (2019),"A fuzzy approach to analysing the level of resilience in manufacturing supply chains", *Sustainable Production and Consumption*, Vol. 18, pp.224-236.

Rizou, M., Galanakis, I. M., Aldawoud, T. M., and Galanakis, C. M. (2020),"Safety of foods, food supply chain and environment within the COVID-19 pandemic", *Trends in Food Science & Technology*, Vol. 102, pp.293-299.

Robertson, M., Duffy, F., Newman, E., Bravo, C. P., Ates, H. H., and Sharpe, H. (2021),"Exploring changes in body image, eating and exercise during the COVID-19 lockdown: a UK survey", *Appetite*, Vol. 159, 105062.https://doi.org/10.1016/j.appet.2020.105062

Saaty, T.L.(1980), *The Analytic Hierarchy Process: Planning, Priority Setting, Resource Allocation*, McGraw-Hill, New York, NY

Samvedi, A., Jain, V., and Chan, F. T. (2013), "Quantifying risks in a supply chain through integration of fuzzy AHP and fuzzy TOPSIS", *International Journal of Production Research*, Vol. 51, No. 8, pp.2433-2442.

Sangari, M. S.and Dashtpeyma, M. (2019), "An integrated framework of supply chain resilience enablers: a hybrid ISM-FANP approach", *International Journal of Business Excellence*, Vol. 18, No. 2, pp.242-268.

Schmid, B., Raju, E., and Jensen, P. K. M. (2021), "COVID-19 and business continuity-learning from the private sector and humanitarian actors in Kenya", *Progress in Disaster Science*, Vol. 11, 100181,https://doi.org/10.1016/j.pdisas.2021.100181

Sequeira, M., Hilletofth, P., and Adlemo, A. (2021),"AHP-based support tools for initial screening of manufacturing reshoring decisions", *Journal of Global Operations and Strategic Sourcing*, Vol. 14, No. 3, pp.502-527, https://doi.org/10.1108/JGOSS-07-2020-0037

Sen, S., Antara, N., Sen, S., and Chowdhury, S. (2020),"The Unprecedented Pandemic'COVID-19'Effect on the Bangladesh Apparel Workers by Shivering the Apparel Supply Chain", *Supply Chain Management eJournal,* https://doi.org/10.2139/ssrn.3598542,Available atSSRN 3598542.

Sharma, A.and Stafford, T. F. (2000), "The effect of retail atmospherics on customers' perceptions of salespeople and customer persuasion: An empirical investigation", *Journal of Business Research*, Vol. 49, No. 2, pp.183-191.

Shumsky, R. A., Debo, L., Lebeaux, R. M., Nguyen, Q. P., and Hoen, A. G. (2021),"Retail store customer flow and COVID-19 transmission", *Proceedings of the National Academy of Sciences*, Vol. 118, No. 11, https://doi.org/10.1073/pnas.2019225118

Siagian, H., Tarigan, Z. J. H., and Jie, F. (2021), "Supply chain integration enables resilience, flexibility, and innovation to improve business performance in COVID-19 era", *Sustainability*, Vol. 13, No. 9, 4669.

Sobaih, A. E. E., Elshaer, I., Hasanein, A. M., and Abdelaziz, A. S. (2021),"Responses to COVID-19: The role of performance in the relationship between small hospitality enterprises' resilience and sustainable tourism development", *International Journal of Hospitality Management*, Vol. 94, 102824,https://doi.org/10.1016/j.ijhm.2020.102824

Sofaer, S. (1999),"Qualitative methods: what are they and why use them?",*Health services research*, Vol. 34, No. 5 Pt 2, pp.1101-1118.

Solangi, Y. A., Tan, Q., Mirjat, N. H., and Ali, S. (2019), "Evaluating the strategies for sustainable energy planning in Pakistan: An integrated SWOT-AHP and Fuzzy-TOPSIS approach", *Journal of Cleaner Production*, Vol. 236, No. 2, 117655.

Sreenivasan, A.and Suresh, M. (2021), "Modelling the enablers of sourcing risks faced by start-ups in COVID-19 era", *Journal of Global Operations and Strategic Sourcing,*https://doi.org/10.1108/JGOSS-12-2020-0070

Sulaiman, M. A. B. A., Ahmed, M. N., and Shabbir, M. S. (2020),"Covid-19 challenges and human

resource management in organized retail operations", *Utopia y Praxis Latinoamericana*, Vol. 25, No. 12,pp.81-92.

Tarigan, Z. J. H., Siagian, H., and Jie, F. (2021),"Impact of Internal Integration, Supply Chain Partnership, Supply Chain Agility, and Supply Chain Resilience on Sustainable Advantage", *Sustainability*, Vol. 13, No. 10, pp.5460.

Tregoning, J. S., Flight, K. E., Higham, S. L., Wang, Z., and Pierce, B. F. (2021),"Progress of the COVID-19 vaccine effort: viruses, vaccines and variants versus efficacy, effectiveness and escape", *Nature Reviews Immunology*, pp.1-11,https://doi.org/10.1038/s41577-021-00592-1

Van Oosterhout, C., Hall, N., Ly, H., and Tyler, K. M. (2021),"COVID-19 evolution during the pandemic–Implications of new SARS-CoV-2 variants on disease control and public health policies",*Virulence*, Vol. 12, No. 1, pp.507-508, https://doi.org/10.1080/21505594.2021.1877066

Viswanathan, M., Faruque Aly, H., Duncan, R., and Mandhan, N. (2021), "Unequal but essential: How subsistence consumer–entrepreneurs negotiate unprecedented shock with extraordinary resilience during COVID-19", *Journal of Consumer Affairs*, Vol. 55, No.1, pp.151-178.

Wallo, A.and Kock, H. (2018),"HR outsourcing in small and medium-sized enterprises", *Personnel Review*, Vol. 47, No. 5, pp.1003-1018, https://doi.org/10.1108/PR-03-2017-0066

Wang, T. Y., Shaw, C. F., and Chen, Y. L. (2000), "Machine selection in flexible manufacturing cell: a fuzzy multiple attribute decision-making approach", *International Journal of Production Research*, Vol. 38, No. 9, pp.2079-2097.

Worley, C. G.and Lawler, E. E. (2010), "Agility and organization design: a diagnostic framework", *Organizational Dynamics*, Vol. 39, No. 2, pp.194-204.

Wu, K. J., Tseng, M. L., Chiu, A. S., and Lim, M. K. (2017), "Achieving competitive advantage through supply chain agility under uncertainty: a novel multi-criteria decision-making structure", *International Journal of Production Economics*, Vol. 190(C), pp.96-107.

Xu, Z., Elomri, A., Kerbache, L., and El Omri, A. (2020), "Impacts of COVID-19 on global supply chains: facts and perspectives", *IEEE Engineering Management Review*, Vol. 48, No. 3, pp.153-166.

Youn, S. Y., Lee, J. E., and Ha-Brookshire, J. (2021), "Fashion Consumers' Channel Switching Behaviour During the COVID-19: Protection Motivation Theory in the Extended Planned BehaviourFramework", *Clothing and Textiles Research Journal*, Vol. 39, No. 2,pp.139-156, https://doi.org/10.1177%2F0887302X20986521

Yusuf, Y. Y., Gunasekaran, A., Adeleye, E. O., and Sivayoganathan, K. (2004),"Agile supply chain capabilities: determinants of competitive objectives", *European journal of operational research*, Vol. 159, No. 2, pp.379-392, https://doi.org/10.1016/j.ejor.2003.08.022

Zahedi, F. (1986), "The analytic hierarchy process—a survey of the method and its applications", *Interfaces*, Vol. 16 No. 4, pp.96-108.

Zhao, L.and Kim, K. (2021), "Responding to the COVID-19 Pandemic: practices and strategies of the global clothing and Textile value chain", *Clothing and Textiles Research Journal*, Vol. 39, No. 2, pp.157-172.

Appendix A

Part 1: Interview background information

1. Academic research presentation

2. Background of the interview's topic

3. Confidentiality agreement (only the interviewees number of years of experience, along with department/position will be published. The interviewee and company names are anonymous)

Part 2: Questions

Question 1:

What are in your opinion the internal strengths (related to the fast-fashion brand) impacting the flexible management of retail store operations after COVID in terms of rapidly going back to normal state?

Question 2:

What are in your opinion the internal weaknesses (related to the fast-fashion brand) impacting the flexible management of retail store operations after COVID in terms of the customer service?

Question 3:

What are in your opinion the external opportunities (related to the customer) impacting the adaptability of retail store operations after COVID in terms of customer fashion preferences?

Question 4:

What are in your opinion the external opportunities (related to the customer) impacting the adaptability of retail store operations after COVID in terms of purchase quantities of customers?

Question 5:

What are in your opinion the external threats (related to the customer) impacting the adaptability of retail store operations after COVID in terms of customer new purchase behaviours?

Question 6:

How do you rate the importance and impact of each of the stated elements compared to the other internal and external factors?

- Very weak
- Weak
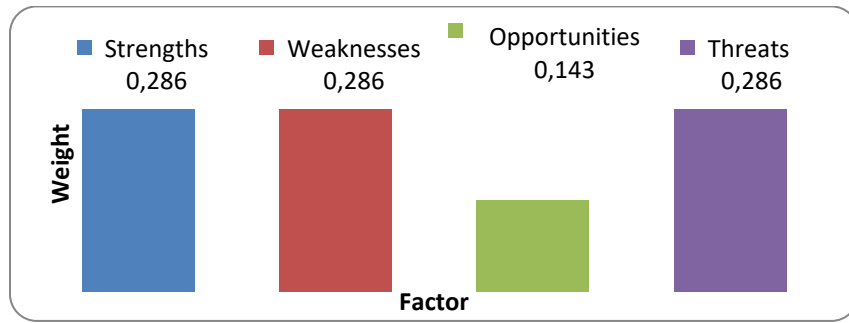- Moderate
- Strong
- Very strong
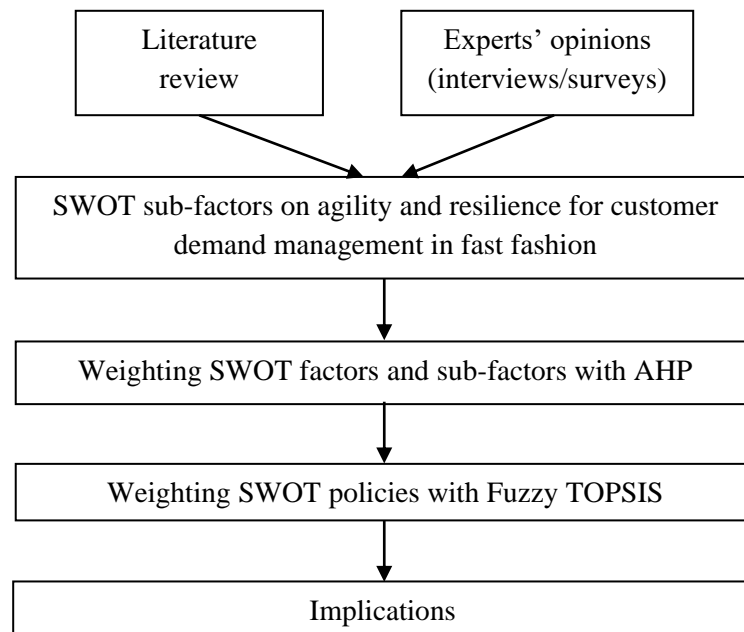
Figure 1.Study methodology
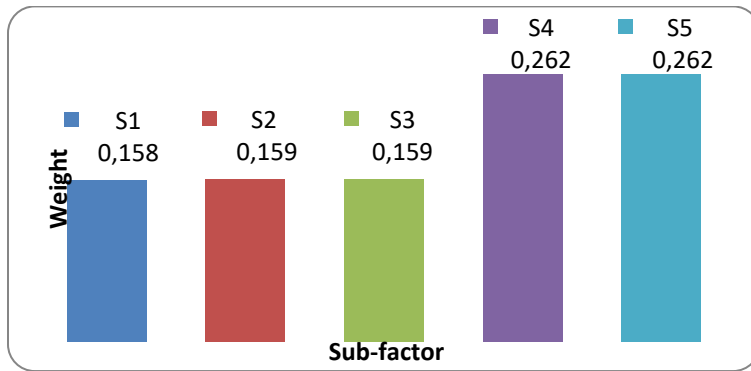
Figure 2.Weights and rankings of the SWOT factors

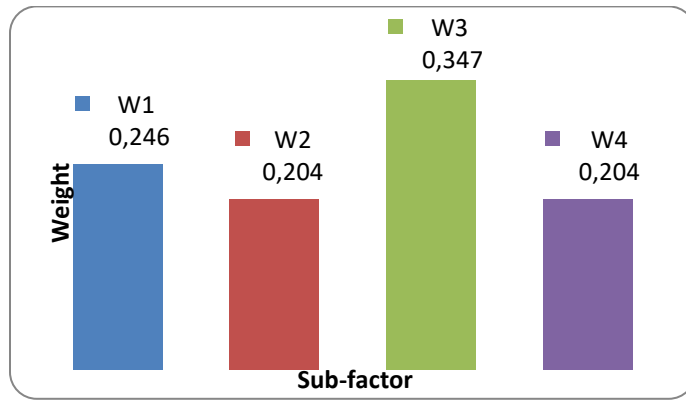Figure3.Weights and rankings of the strengths sub-factors
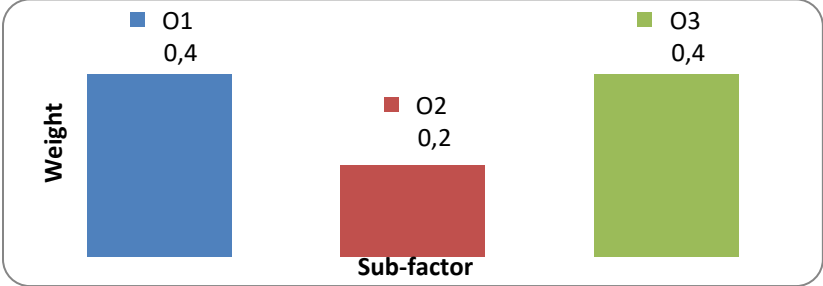
Figure4.Weights and ranking of the weaknesses sub-factors

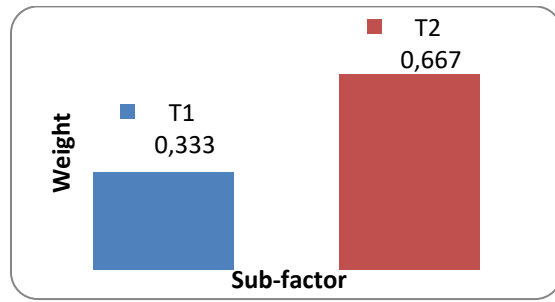Figure 5. Weights and rankings of the opportunities sub-factors

Figure 6.Weights and ranking of the threats sub-factors