THE SOLUTIONS OF TEXTILE BRANDS TO THE INVENTORY PROBLEMS CAUSED BY THE COVID-19 PANDEMIC IN SWITZERLAND

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Abstract: This study focuses on the solutions of textile brands to the inventory problems caused by the Covid-19 pandemic in Switzerland. The aim of this research is to present a wide range of solutions to the inventory problems of the fashion industry and to analyse which solutions are most commonly used by apparel companies. An online survey is conducted for the research. 15.79% of the companies participating in the survey do not try any approach to reduce their inventory; however, all of these companies express that they do not even have inventory problems. On the other hand, 84.21% of the respondents select at least one approach from the list, which they use for inventory reduction. Companies find the approach to improve the service levels the most helpful. This approach is followed by improving forecast accuracy. Besides, the approaches: setting more focus on the quality, values, and sustainability and the three-season-strategy are popular among the companies.

Keywords: fashion industry, Covid-19, coronavirus, textile, supply chain, inventory.

1 INTRODUCTION

For a considerable time, textile industry has been criticized for its unsustainable and polluting nature. Although there have been attempts to put more focus on sustainability and to slow down fast fashion, most brands produce several collections per year. The products of fast fashion collections are often manufactured in low-wage countries, where employees work under desperately miserable conditions to keep the costs and prices low. As a result, the quality of the products is poor leading to an increase in the number of products purchased per year per customer.

The lockdowns lead to a severe increase in inventories as the goods cannot be sold. The crisis awakens the companies of the sector, and they try to focus on a radical reinvention. This research paper focuses on the solutions that textile brands developed to reduce their high stocks.

2 AIM, HYPOTHESES, AND RESEARCH QUESTIONS

Current paper possesses two aims. One of them is to present a wide range of solutions with detailed descriptions and examples for the inventory problems of the fashion industry thus supporting textile companies to overcome their stock problems. Secondary sources are collected and analyzed to provide a compiled list of actions that textile companies might take to solve their stock issues. The other goal is to examine which measurements have already been introduced or are planned to be taken in the future by fashion brands to overcome the crisis in Switzerland. The research focuses on the behavior of apparel companies as they try to optimize their stocks. The hypotheses and research questions are the followings:

H1: 75% of Swiss textile companies face increased inventories due to the Covid-19 pandemic.

Q1: What is the percentage of textile companies facing excess inventories?

H2: There is no difference between the bridge brands and all other brands in terms of their inventory situations.

Q2: Are there any significant differences between the bridge brands and all other brands in terms of their inventory situations?

H3: The average inventory level of Swiss textile companies does not increase due to the Covid-19 crisis and lockdowns.

Q3: Does the average inventory level of Swiss textile companies increase due to the Covid-19 crisis?

H4: Textile companies take several measures to reduce their inventories.

Q4: Which approaches do textile companies use to reduce their inventories?

3 LITEREATURE REVIEW

3.1 Related terms of warehouse management

There are several terms related to warehouse management. This part of the research paper sums the most crucial terms up to give an overall understanding of them.

Warehouse management is a field of activity efficiently operating the warehouse and distribution system [1]. The purpose of warehousing is to store goods, to preserve their condition, and to balance the material flows of the supply chain as needed. Warehouses preserve the quality and quantity of goods without loss, and through their material and goods handling system, they allow goods to be removed and stored as necessary. Warehouses are complex facilities that have their own specific network of relationships and internal processes. Successive phases in the logistics chain are connected through warehouses, which provide the material requirements for production or delivery. Warehouses and storage systems are primarily needed to compensate for the differences in the economic capacity of various work processes [2].

Warehouse management and inventory management have overlapping areas, but these terms are not synonyms. Inventory management is a *«system designed for the management of quantities and locations (storage locations) and especially their interrelations»* [1]. The inventory management focuses on those products and goods that are hold in the inventory as well as on the management of the quantities and storage locations [1]. Two strategies, namely constant inventory and variable inventory are available in case of the inventory management. On the one hand, the constant inventory strategy should be used when the demand is constant over time. On the other hand, the variable inventory strategy is more appropriate if the demand fluctuates, and there are very high peaks in the demand from time to time [3].

Warehouse management analyzes the warehouse and distribution system. It concentrates on the journey of goods within the warehouse between their arrival and dispatch [1].

Demand management matches the supply with the demand proactively to decrease the probability of disruptions [4].

The target of logistics is to have:
– the right goods
– at the right time
– in the right quantity
– in the right quality
– at the right location
– at the right costs. [1]

3.2 The Covid-19 pandemic and its impact on the fashion inventory management

The first infection with the virus of Covid-19 was registered on December 8, 2019 in China [5] and the infection series was classified as pandemic on March 12, 2020 [6].

The rapid spread of the virus quickly led to various closures at different places all over the world.

Although the Covid-19 pandemic is a health crisis, it has a major impact on the economy and ultimately leads to an economic crisis. As the fight against the virus requires social distancing, lockdowns and postponements of events become necessary. Additionally, the spread of the virus generates the feeling of insecurity in citizens; thus, they reduce their consumptions to save financial resources up [7].

The Covid-19 pandemic has a negative effect on many sectors including the textile industry. Various players of this sector have already experienced the consequences of the pandemic. First of all, retailers struggle as they have to look for new distribution channels due to the lockdowns. Furthermore, customers stay away due to uncertainty of the future. Additionally, due to the production cancellations, sweatshop workers of the Far East lose their jobs leading them to deep poverty [8]. Moreover, lockdowns cause job losses, layoffs, supply problems, declining in sales and net profits across most fashion brands. Both small and large companies and companies of all price levels are affected by the decline in sales. Usually, customers adapt to crises by preferring products from the lower price range instead of the more expensive ones bought earlier. However, during this crisis, they behave differently and refrain from buying products [9].

Although the crisis brings many challenges, Buheji and Ahmed [10] emphasize that the situation creates many opportunities, which can have a positive effect, too. The crisis directs the attention to the areas not working currently. In these areas, the crisis leads to problems that need to be addressed thus triggering a positive outcome and a better solution for the future. One of the problems is the increase in the stock of the retailers and brands [11]. During the pandemic and lockdowns, brands and retailers cannot sell as many products as they used to before the crisis. This circumstance leads to the brands having higher stocks [12]. Additionally, huge amounts of their products follow short-term trends; therefore, these are more complicated to get sold later. These reasons lead to discounts after the lockdowns and to lower turnover.

The fashion industry works based on seasons; most of the brands have at least two seasons each year: spring/summer and autumn/winter. A lot of companies have additional capsule collections to follow the trends and constantly attract customers with new products [13]. Due to fast fashion, the number of micro seasons can reach up to 50-100 for a brand each year. Nowadays, customers are trend-focused, and due to the constantly changing trends, they buy 60% more clothing items than in 2000. At the same time, the time garments are kept in just half as long as before. As these examples highlight, the length of fashion cycles is steadily decreasing [14].

Calculating the demand for a collection is challenging as brands would like to benefit from the economies of scale and produce the highest possible quantity to satisfy the demand but at the same time, avoiding overproduction and sitting on the stocks for a longer time [15].

The problem of high inventories due to the Covid-19 pandemic was hinted at in February 2020. Back then, it was estimated that 10 to 15 million products were likely to be involved [16]. Currently, it is estimated that the industry groans under an overstock of around 40% [17]. As Freutel [18] wrote in January 2021, the inventory level of clothing retailers has never been as high as it is currently, even the value was lower in April 2020. Normally, 12% of the inventory remains unsold. Currently, it is more than the double of this industry's standard level [19]. Some companies stockpile products to protect themselves from sales through high discounts. However, the high stock levels mean space problems for the retailers [20].

3.3 Fashion supply chain model

The fashion supply chain is complex, and several stages of it are affected by inventory management. Thus, raw-material suppliers, textile producers, and garment manufacturers need all ingredients in their inventory to be able to start producing. Moreover, the distribution channels depend on the right inventory to fulfill the orders. On the other hand, if companies have overstock, they lock down capital and cash flow that makes them less adaptable to changes. Therefore, inventory management plays an important role in the success of companies operating in the textile industry.

There are several models available that visualize the supply chain process of the fashion industry. Based on the models of Shen and Mikschovsky [14], EURATEX [21], Martin [22], Gries et al. [23], Brito et al. [24], and the Swiss Federal Office for the Environment [25], a model is developed as part of current research. It models the actors and stages of the textile supply chain.

Similarly to Shen and Mikschovsky's [14] and Brito et al.'s [24] models, the developed model is based on a closed loop due to the fact that fashion industry pays more and more attention on sustainability and recycling. Even if today's recycling practices are not fully integrated in the supply chain of the textile industry, the possibility for this kind of action is marked with dashed lines.
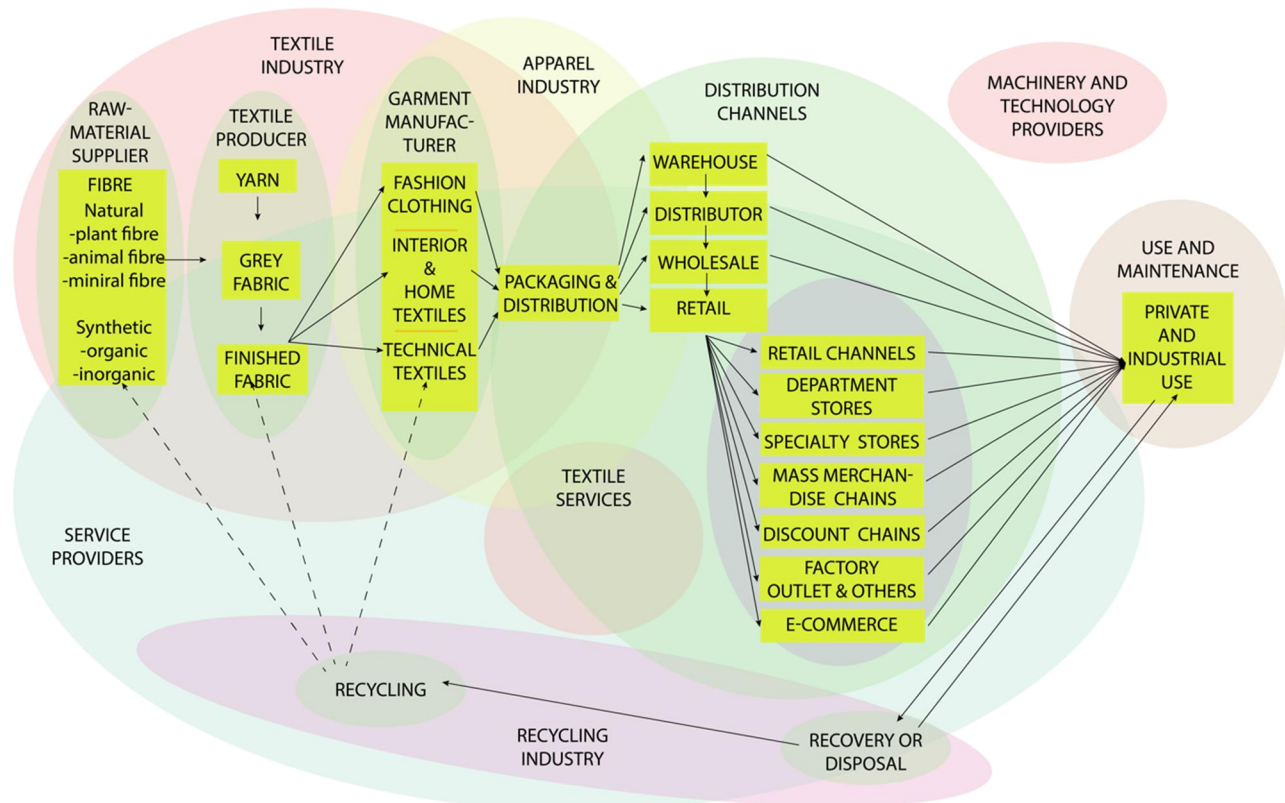

Figure 1 Fashion supply chain model

3.4 Approaches to solve the inventory problems in the fashion industry

The Fashion Inventory Management is especially important because it avoids stockouts, increases customer satisfaction, keeps carrying the costs low, helps in optimizing storage places, prevents tying up capital, and helps in maintaining the company's health [26].

As described above, nowadays, the fashion industry faces the problem of high inventory. There are approaches available to solve the problem [27]. Due to the Covid-19 crisis, several companies have already recognized that the reorientation of the fashion industry is necessary. Especially the concept of fast fashion and its environmental, social, and economic impact is questioned. According to designers and textile industry professionals, the adjustment of the seasonal cycles has been due for years; therefore, the return to the traditional two collections per year should take place. Additionally, the focus should go toward the direction of sustainable fibers and fabrics [13]. There are a lot of possibilities for the fashion industry to become more sustainable than it is currently; a high amount of their supply chain consumes natural resources [14]. According to Emig [28], the demand for high-quality products purchased for a lifetime is increasing likewise the aim of customers to support their local retailers. In order the fashion industry to be able to return to slow fashion, the customers need to make conscious apparel purchases [15].

Several brands have already committed to slow down, among others Giorgio Armani. He plans to reduce the number of their collections and to set more focus on the quality, values, and sustainability [29]. Besides Giorgio Armani, Gucci has committed to create non-seasonal collections and to reduce their shows, as well [30].

A different approach toward slower fashion has been taken by Ralph Lauren. The brand expands its on-demand manufacturing and personalized garment offerings. This approach not only allows the company to be more responsive to customer needs but to reduce inventory and waste as well as to focus more on the full-price business [31].

Moreover, sales are supported by comprehensive data analyses and tools. Dynamic pricing can be used to sell surplus stock faster and with higher margins [19].

The blending of retail and online warehouses can be helpful, as well. Retailers can use their numerous shops as warehouses for the delivery of online purchases. This method can shorten delivery times and reduce inventory and delivery costs [31].

Furthermore, some brands postpone the launch of part of their collections [32]. Callersten et al. [11] recommend a three-season strategy for fashion brands. This solution could increase both stock monetization and profitability over at least three selling seasons. In the long term, this method could replace the short-term solution of discounting. Besides reorientation, fashion brands have several possibilities to improve their inventories. Blanchard [33] defines 12 ways to reduce inventory:

– reduce demand variability
– improve forecast accuracy
– re-examine the service levels
– address capacity issues
– reduce order sizes
– reduce manufacturing lot sizes
– reduce supplier lead times
– reduce manufacturing lead times
– improve supply reliability
– reconfigure the supply chain
– reduce the number of items
– eliminate the questionable practices.

4 METHODOLOGY

In the first part of the paper, the theoretical foundations are uncovered with secondary sources. The related terms of warehouse management, the impact of the Covid-19 pandemic on the fashion inventory management, the approaches to solve the inventory issues in the fashion industry, and the fashion supply chain model are explained.

The next section, the primary research of the study, focuses on the practical behavior and handling of textile companies. The aim of this research is to collect and analyze the data provided by textile companies to identify their behavior. For this, a quantitative research is conducted. The answers of companies are measured with a Likert Scale. The respondents are able to agree or disagree with the statements on a predetermined multi-level answer scale. Additionally, yes-or-no questions are asked.

The quantitative survey is sent to 216 Swiss textile companies that are members of the "Swiss Textiles", the association uniting the actors of the Swiss textile industry [34].

Of the emails sent, 17 are not delivered; thus, 199 email requests are successfully received. The survey in the form of another email is sent again as a reminder after 10 days. Due to the anonymity of the survey, it is not possible to contact exclusively those companies that do not fill out the survey. That is why multiple reminders are not sent. During the two-week period when respondents could complete the survey, the survey is completed 19 times. This results in a response rate of 9.55%.

$$Response\ rate = \frac{19}{199} = 0.09547739 = 9.55\%$$

5   FINDINGS

The findings of the quantitative study are summarized in this section. For a better understanding of the situation of the companies, their demographical characteristics including their field, location, and positioning are examined. Of all companies, their headquarters are located in Switzerland. 21.05% of them have offices in other countries as well but 78.95% are based exclusively in Switzerland.

When comparing the companies' sizes, it can be seen (Figure 2) that most respondents to the survey are small and medium-sized companies and large corporations do not participate in the survey to a great extent. This factor is a limitation of the study and leads to the fact that the findings apply to the small and medium-sized companies and not to the large corporations.

Furthermore, the survey records the market levels where the companies operate. Companies could choose from:

- Haute Couture - meets the four main requirements of the French Ministry of Industry, offering made to measure products
- Luxury Fashion - high quality designer brands
- Bridge Brands - great quality clothing at a more adequate price point
- Diffusion Lines - created by luxury labels as more budget friendly, secondary lines
- High Street Fashion - accessible, quality fashion with a longer life span than economy items at affordable prices
- Fast Fashion - well-known, affordable brands, extremely quick turnover in fashion and trends
- Economy Fashion - mass production, low prices, low quality, and short lifespans of products

52.63% of the brands operates just at one market level and 47.37% operate at two market levels.

The luxury fashion and bridge brands market levels are the most common with 25%-25% of the respondents operating in both segments. It is followed by haute couture. High street fashion is indicated by 14.29% of the surveyed companies. 10.71% of the textile companies sell diffusion lines. Fast and economy fashion are very rarely marked by the respondents.
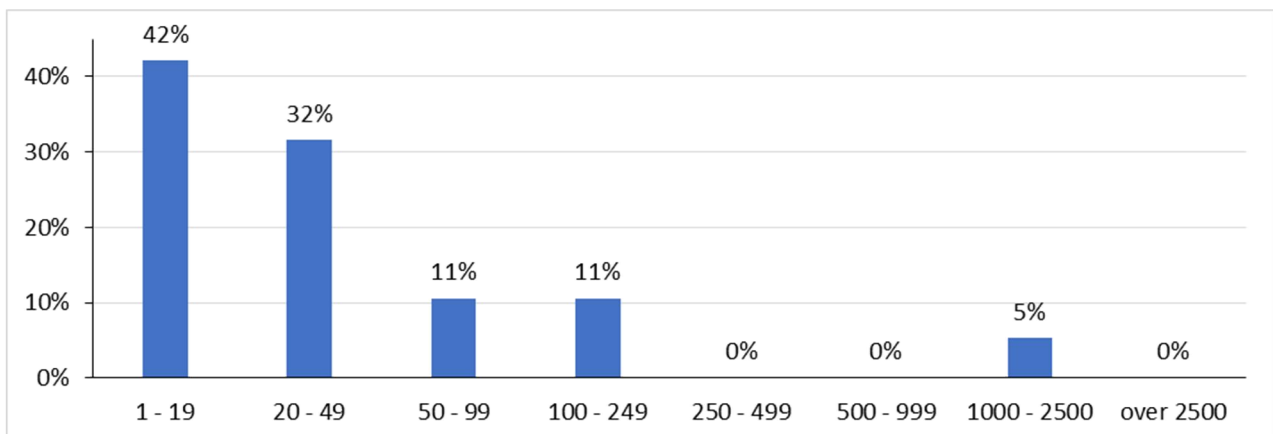

Figure 2 The total number of employees at all locations of the company
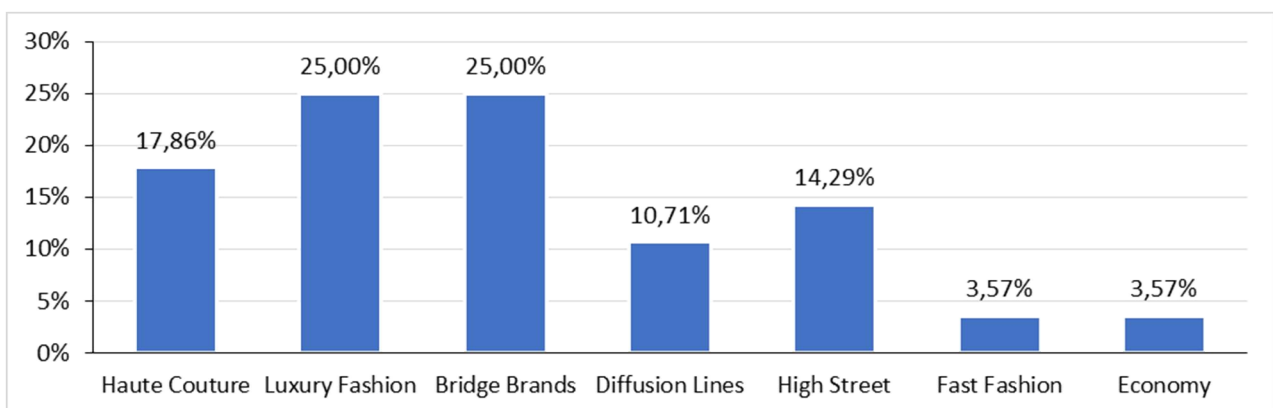

Figure 3 The breakdown of the companies' presences at different market levels

5.1 The investigation of the first hypothesis

The first examined hypothesis and research question are the following:

H1: 75% of Swiss textile companies face increased inventories due to the Covid-19 pandemic.

Q1: What is the percentage of textile companies facing excess inventories?

H_0: x=75%
H_a: x≠75%

To answer the research question, it has to be analyzed how many companies have to deal with increased inventories. Overall, 47.37% of the respondents face higher stock levels due to the Covid-19 pandemic. 52.63% of the companies do not feel any negative impact on their stock levels due to the virus and lockdowns.
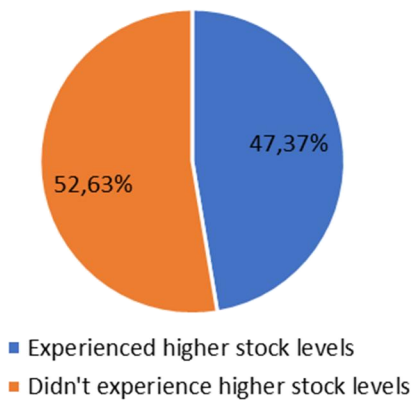

Figure 4 Experiencing higher stock levels

As 47.37% experience higher stock levels, p=0.4737. P_0 is 0.75 as it is attempted to find out whether it is 75%.

$$z = \frac{p - P0}{\sqrt{(\frac{P0(1-P0)}{n})}} \sim N(0,1) = \frac{0.4737 - 0.75}{\sqrt{(\frac{0.75(1-0.75)}{19})}} \sim N(0,1) =$$

$$= \frac{-0.2763}{0.0993} \sim N(0,1) = -2.7825$$

As this is a double-sided test, the absolute value of -2.7825 is used for further calculations, which is 2.7825.

z_{calc}=2.7825

The level of significance is 95%, which means α=0.05. However, as the test is double-sided, for the calculation $\alpha/2$ has to be used, which is 0.025. The critical value is 1.96.

z_{crit}=1.96

If z_{calc} > z_{crit}, then H_0 can be rejected. In this case, the requirement is fulfilled; therefore, the hypothesis has to be rejected; there is a significant difference. Not 75% of Swiss textile companies face increased inventories due to the Covid-19 pandemic.

5.2 The investigation of the second hypothesis

The second examined hypothesis and research question are the following:

H2: There is no difference between the bridge brands and all other brands in terms of their inventory situations.

Q2: Are there any significant differences between the bridge brands and all other brands in terms of their inventory situations?

In order to detect the factors that lead to differences between the companies and have an impact on the inventory levels, deeper analyses have to be carried out. Thus, it is investigated whether the activity of the different market levels has an impact on the increased inventory. It is studied at which market level operating companies have the most problems. Based on Figure 5, it is apparent that most of the distributors of bridge brands have higher stock levels due to the Covid-19 crisis. 54.55% of the companies that distribute these fashion lines have inventory problems. The chart shows the distribution of stock problems at all the market levels.
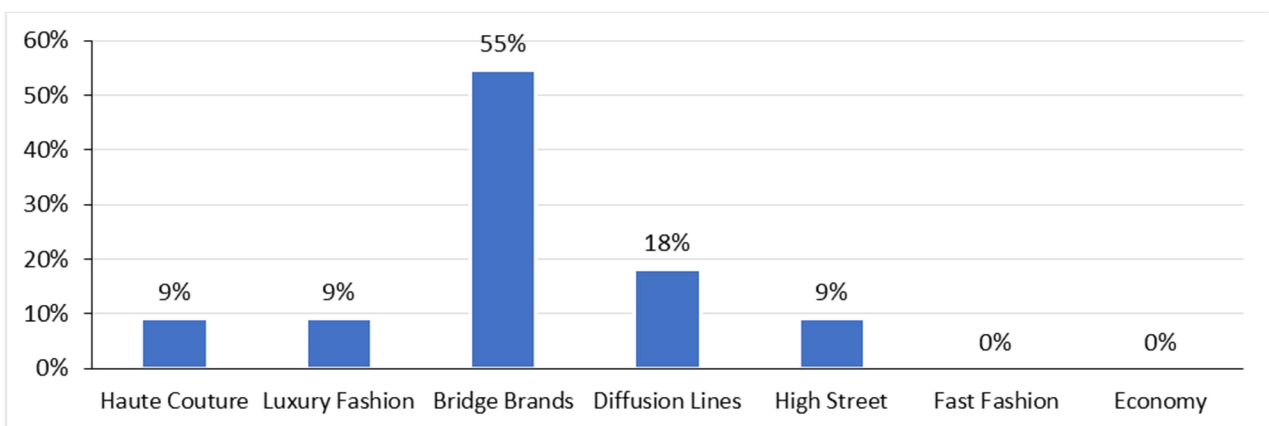

Figure 5 The breakdown of stock problems by market levels

To examine the problem further, a two-sample t test, which is based on the relation of all survey attendees and those that experienced stock problems, is conducted.

H_0: P1-P2=0
H_1: P1-P2≠0

$$z = \frac{p1 - p2}{\sqrt{\bar{p}\bar{q}(\frac{1}{n1} + \frac{1}{n2})}} = \frac{0.8571 - 0.2632}{\sqrt{0.41 * 0.59(\frac{1}{7} + \frac{1}{21})}} =$$

$$= \frac{0.8571 - 0.2632}{\sqrt{0.2419(\frac{4}{21})}} = \frac{0.5939}{\sqrt{0.04608}} = \frac{0.5939}{0.2147} = 2.7661$$

Where:

- *p1*=0.8571, which represents the percentage of those bridge brands that suffered by the Covid-19 pandemic caused inventory problems
- *n1*=7
- *p2*=0.2632, which represents the weighted average of all other price level brands that suffer by the Covid-19 crisis caused inventory problems
- *n2*=21
- As there are companies that sell goods in more than one category, the companies are examined as subsidiaries, raising the total number of items to 28.

$$\bar{p} = \frac{n1p1 + n2p2}{n1 + n2} = \frac{7 * 0.8571 + 21 * 0.2632}{7 + 21} =$$

$$= \frac{5.9997 + 5.5272}{7 + 21} = \frac{11.5269}{28} = 0.411675 \approx 0.41$$

$$\bar{q} = 1 - \bar{p} = 1 - 0.41 = 0.59$$

The level of significance is 95%, which means α=0.05. However, as it is a double-sided test, for the calculation $\alpha/2$ has to be applied, which is 0.025. The critical value is 1.96.

z_{crit}=1.96
z_{calc}=2.7661

If $z_{calc} > z_{crit}$, then H_0 can be rejected. In this case, this requirement is fulfilled; therefore, the hypothesis has to be rejected because there is a significant difference. In terms of their inventory situations, there is a difference between the bridge brands and all other brands. One particularly interesting finding is that companies struggling with higher inventory levels are those operating in only one market segment. Over three quarters of the companies having stock problems serve exclusively one market segment with their products. Of all the companies that are active in several market segments solely 22.22% have stock problems.

This result may indicate that companies representing multiple market segments are able to act more agilely and to find solutions quickly to align their actions with the needs of the market.
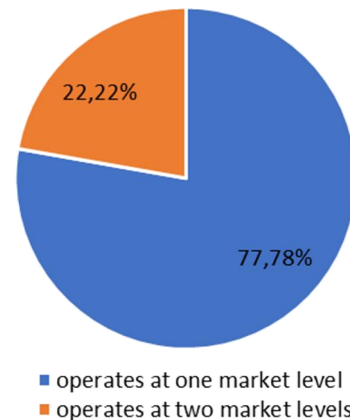

Figure 6 The breakdown of stock problems based on the operation at different market levels

5.3 The investigation of the third hypothesis

The third hypothesis and research question state:

H3: The average inventory level of Swiss textile companies does not increase due to the Covid-19 crisis and lockdowns.
Q3: Does the average inventory level of Swiss textile companies increase due to the Covid-19 crisis?

H_0: *μ1 = μ2 = μ3*
H_a: Not all population means are equal

47.37% of the companies do not have available information regarding their stock levels. These companies are excluded from the research on the development of the stock levels over the last seasons. To analyze the means of the groups, the statistics analysis of Anova is conducted. The level of significance is 95%, which means α=0.05.

Table 1 The Anova Table

SUMMARY						
Groups	**Count**	**Sum**	**Average**	**Variance**		
Before the Covid-19 crisis	10	1.13	0.113	0.00713444		
End of the SS20	10	1.5	0.15	0.00944444		
End of the FW20/21	10	1.37	0.137	0.00880111		
ANOVA						
Source of Variation	**SS**	**df**	**MS**	**F**	**P-value**	**F crit**
Between Groups	0.0070467	2	0.0035233	0.41646966	0.66353423	3.354130829
Within Groups	0.22842	27	0.00846			
Total	0.2354667	29				

Because the p-value is not $<=\alpha$, the H_0 cannot be rejected. Thus, it is indicated that there is not enough significant difference between the changes in the stock levels during the examined seasons. As it is visible in the Table 1, the average percentage of the remaining stocks at the end of the seasons before the Covid-19 crisis is 11.3%. The average stocks of the textile companies have increased to 15% by the end of the season spring/summer 2020. After this peak, the average started to decrease again, and it is solely 13.7% at the end of the season fall/winter 2020/2021.

5.4 The investigation of the fourth hypothesis

The fourth hypothesis and research question examine the several approaches taken by the companies to reduce their inventories.

H4: Textile companies take several measures to reduce their inventories.

Q4: Which approaches do textile companies use to reduce their inventories?

Solely 15.79% of the companies participating in the survey have not tried any approaches to reduce their inventories, and all of these companies indicate that they do not have inventory problems at all. On the other hand, 84.21% of the respondents have selected at least one approach from the list, which they have already used for inventory reduction.

Figure 7 presents according to the companies, which approaches have contributed the most to them for the reduction of their inventories. It can be seen that the most helpful is "improving service levels". This approach is followed by "improving forecast accuracy". Besides, the approaches "setting more focus on the quality, values, and sustainability" and "three-season-strategy" are popular among the companies, as well.
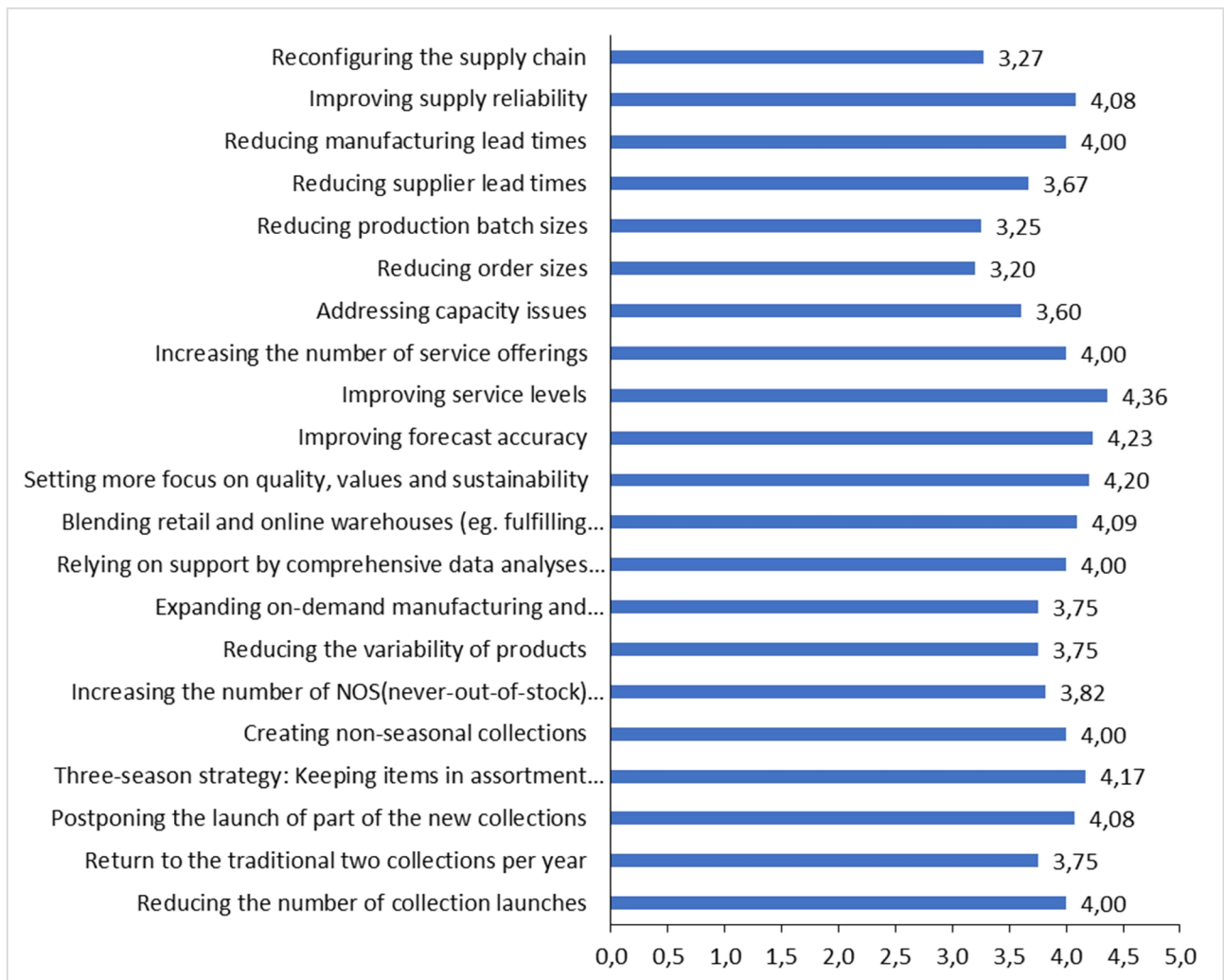

Figure 7 The contribution of various approaches to the reduction of stock level

6 CONCLUSION

This research addresses the inventory problems of apparel companies. Four hypotheses are formulated, which are investigated with the help of research questions.

The research provides the following evidence: overall, 47.37% of the respondents face higher stock levels due to the Covid-19 pandemic. 52.63% of the companies do not feel any negative impacts on their stock levels due to the Covid-19 crisis and lockdowns.

One particularly interesting finding is that companies struggling with higher inventory levels are those operating in only one market segment. Over three quarters of the companies that have stock problems serve exclusively one market segment with their products. Of all the companies that are active in several market segments, solely 22.22% have stock problems.

15.79% of the companies participating in the survey have not tried any approaches to reduce their inventories, and all of these companies indicate during the survey that they do not have inventory problems at all. On the other hand, 84.21% of the respondents select at least one approach from the list, which they have already used for inventory reduction. Companies find the most helpful to "improve service levels". This approach is followed by "improving forecast accuracy". Besides, the approaches "setting more focus on the quality, values, and sustainability" and the "three-season-strategy" are very popular among the companies, too.

A limitation of the study is the low number of participants in the survey. Only 19 companies participate in the questionnaire. In addition, most of the participating companies are small and medium-sized enterprises. Therefore, the results might rather apply to the small and medium-sized companies alone and not to the large corporations.

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