Parameters for Sustainable Consumption Behavior towards Denim

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Abstract

Clothes give an identity to one`s personality; this is one reason that clothing has taken up so much space in our lives and wardrobes. But with the rise in consumption, there has also been an increase in concern over the sustainability of consumption patterns. Brands have been on their toes to keep up with this delicate balance between revenue and sustainable production. Many a time, brands try to catch up with the sustainability bandwagon by adopting greenwashing, which augments the brand image but rarely contributes to planetary benefits. Consumers are now more conscious and aware of the choices that they make. Therefore, understanding the factors that give rise to sustainable consumption behavior among consumers becomes crucial to serving them better and catering to their needs in a way that balances the environmental impact. With heightened awareness, consumers also want these sustainability claims to have concrete backing in traceability, more so for clothing items that are excessively consumed. A pair of denim jeans is one such item of clothing that is considered essential and takes up a place in almost every household. It is a garment that is often looked down upon when it comes to environmental impact due to its massive water consumption and unsustainable production process, and that is why denim as a fabric creates a colossal ecological footprint. This study explores parameters for sustainable consumption behavior towards denim from a consumer`s perspective, so that it becomes more apparent for brands to work on those key areas and understand pain points for consumers. Insight on consumption behaviour will create pathways to an enhanced understanding of sustainable consumer behavior.

The research entailed a consumer survey in the Delhi NCR region using a structured questionnaire that was based on three broad parameters and 14 individual items identified through the Delphi method. Factor analysis was performed to reduce the large number of variants to fewer factors. Four factors, namely, self-care, consciousness, traceability, and utility, were derived that contribute towards sustainable consumption. The study's results gave some crucial insights, highlighting major factors that give rise to sustainable consumption behavior towards denim.

Introduction

Over the years, consumption of clothing has increased significantly. Each stage of garment processing utilizes valuable natural resources and has an environmental bearing. With the surge in consumption, there has also been a rise in concern about environmental impact. Consumers have developed a heightened sense of consciousness, which has shaped their buying behavior and ultimately impacted their purchase decisions. Brands have taken up various sustainability initiatives to cater to consumers' needs and create a positive impact on the environment.

Some garments seem basic and harmless in terms of environmental impact, but when they are re-evaluated on the pedestal of environmental damage, the results paint an entirely different picture. Denim jeans are seemingly humble garments that have been made through different fashion seasons, easily adapting to changing cuts, patterns, and styles. Denim fabric is one of the most important and highly used textiles due to its exclusive features, including colour, versatile appearance, and high strength, that are widely used by people (Maryan and Montazer, 2013). A pair of denim jeans is a garment whose consumption is high; with its wide variety of cuts and durability, it is a favourite among every generation. Still, in terms of the environmental impact, it demands massive water consumption throughout its entire product life cycle, and each stage of garment processing has environmental consequences. Production of a single pair has an enormous environmental footprint using an average of 2,113 gallons of water, 48 kilowatts of energy (Levi Strauss, 2015), and 1.1 pounds of toxic and corrosive chemicals (Candiani Report, 2016). Therefore, sustainable consumption in terms of denim is explicitly a gap area in the existing literature. Hence, sustainability initiatives for this particular garment can leave a considerable imprint. It becomes crucial to understand the factors that give rise to sustainable consumption behaviour—the key factors that would entice a consumer towards buying sustainable denim.

In spite of environmental concerns, the trend indicates that the worldwide demand for denim products over the last few decades has increased tremendously. Considering that global jeans production in 2020 was estimated to be more than 3.5 billion units per year, the extent of environmental damage caused by this industry is quite evident. Hence, the question of sustainable production arises in the denim industry (Chatterjee, Sharma and Pal, 2020).

The majority of a product's environmental impact lies in the raw material and processing stages. Denim has seen green practices in the field of raw materials such as organic cotton or cotton certified by BCI, and manufacturing has seen innovations in terms of washing techniques. Research and development all over the world has undertaken many issues related to denim recycling, such as making the best use of used materials for new product development. Many retailers make immense efforts to show their involvement in the closed-loop recycling initiative by encouraging consumers to bring back old, used garments for new ones and recycling these garments for the manufacturing of raw materials or intermediate substances. With various initiatives, such as the use of organic cotton or recycled material, brands are working towards introducing sustainable initiatives.

Consumers today want to know about every aspect of the product, from packaging to shipping. Consumers who display sustainable consumption behavior also seek transparency amid rampant greenwashing and want to trace back the claims of brands in this direction, and sellers are confused regarding the selection of parameters that validate sustainability in their denim. While sustainability in garments in general is well understood, factors that give rise to sustainable consumption of denim from the consumer`s perspective lack research. Also, the consumer is not just satisfied with buying sustainable denim; they want to go a step further and validate those claims. Therefore, an understanding from the consumer`s perspective of the factors that give rise to sustainable consumption behavior will provide a clear direction to brands to further enhance the consumer experience and scope to establish a framework in terms of application in the future.

The Oxford Lexicon defines traceability as *"the quality of having an origin or course of development that may be found or followed"*. While sustainability has become a widely used term, traceability and validation of claims are still in the nascent stages. Many brands make their claims, and many certifications buttress those claims. There are still plenty of brands that make their claims but do not show any proof of authenticity. While the former is successful in proving their intent through certification, many questions remain lingering, such as the places the products have travelled in their production journey, the workers who have stitched the garment, etc. Many manufacturers and brands hesitate to go for third-party authentication.

Tracing the product right back to the farm from where raw fiber is procured is challenging. With multiple types of certifications, consumers and manufacturers are both confused

because aligning each process into a linear thread of traceability is not an easy feat. An important point in the world of clothing seasons and ever-changing styles is how the product is handled after its life. End-of-life traceability is still a new phenomenon in the fashion and retail industries. In the last decades, researchers have paid attention to extending the sustainability concept at the supply chain level, going beyond the typical boundaries of a company dedicated to the production of goods. Indeed, it is essential to consider not only the manufacturing processes needed to realize a product has to be traceable but also the entire network of stakeholders and suppliers involved in its production, from dealing with raw material procurement to others dedicated to the final product delivery and disposal. (Germani, et al., 2015).

Review of Literature

Sustainable consumption behavior

Promoting sustainable consumption behavior is high on the agenda for both policymakers and researchers. Robins and Roberts (1997) outline sustainable consumption as a level of consumption that balances time with costs in terms of money and simultaneously responds to present and future life needs. Appropriate methods of evaluating the sustainability of consumption behaviors are crucial to the success of economic and ecological functions. Fischer, Böhme and Geiger (2017) state that the development of such methods is hindered by two obstacles: (1) the lack of consensus on which consumption behaviors should be considered sustainable, and (2) the absence of a shared reference framework to integrate existing fragmented research on various consumption behaviors. A report by Ellen MacArthur Foundation (2017) underlines that sustainable consumption behavior is crucial in the fashion industry, as it is regarded as one of the most polluting industries. To make the textile industry sustainable, changing consumer behavior towards it is a prerequisite. To promote sustainable consumption patterns, it is necessary to comprehend consumption patterns throughout all consumption phases. However, only a few studies have examined the entire consumer purchase, use, and disposal cycle. Soyer and Dittrich (2021) have researched the three phases of consumption by confronting the question of how to convince consumers to purchase, use, and dispose of clothing in a more sustainable manner. Lehner, (2015) gives new insights into the "attitude-behavior gap" in sustainable consumption and how retailers can more effectively encourage sustainable consumption behavior in retail stores.

Quoquab, Mohammad and Sukari (2019), in their scale for sustainable consumption, include three parameters: quality of life, care of the environment, and care for future

generations. Park and Lee, (2020) have developed a scale for sustainable consumption. Their study conceptualizes, develops, and validates a scale to measure sustainable consumption of clothing products (SCCP) from the perspective of general clothing consumers.

Sustainable consumption research has grown rapidly as a scholarly field (Reisch et al., 2016). But when it comes to clothing and denim in particular, there is a gap in the area as factors that specifically give rise to sustainable consumption behavior towards denim are yet to be explored, as denim jeans are one of the most used garments and have a huge contribution towards the environmental impact of their production.

Parameters for sustainable denim

It takes 1,500 gallons of water to cultivate and process the 1.5 pounds of cotton required to make a pair of denim jeans, which poses a problem for the environment. Typically, denim is constructed with indigo-dyed yarn. Originally, indigo dye was derived from plants, but the trend transitioned to synthetic indigo dye over time. It is difficult to recycle denim due to the use of metal accessories such as buttons, zippers, rivets, and leather-look labels (Amutha, 2017). Due to such issues, the sustainability of denim is often questioned.

In the literature, many research papers elaborate on sustainability and describe the three dimensions as environmental, economic, and social well-being (Adams, 2006). Denim mills are spending large amounts of money on developing new concepts in denim, which in turn means that all jeans manufacturers will experiment with and achieve new levels of finishing (Roshan, Sandeep and Jegadeesh, 1996). Many experts believe that process forms a crucial parameter. For instance, in the wet processing of denim, different mechanical and chemical finishing operations can be replaced by enzyme treatments, as enzymes are eco-friendly, non-toxic, and fully biodegradable compounds (Mazumder, 2016). While many others argue that raw materials are equally vital, a prudent selection has to be made from the very beginning, like mechanically recycled cotton fiber instead of virgin cotton fiber, which is one of the most essential raw materials in textiles and grown using a high amount of water and pesticides. Conscious choices like a combined heat and power (CHP) plant instead of grid energy make a difference in terms of the environmental impacts, cost, and quality of denim fabric (Fidan, Aydoğan and Uzal, 2021).

The most common view is to look at the entire system as a complete and holistic mechanism where each part is inseparable from raw material to final product. While some consider the final product as the last leg, others want to go beyond denim and include its packaging in the product's afterlife.

At each step, there is certification to authenticate the sustainability claims, like GOTS (Global Organic Textile Standard), BCI (Better Cotton Initiative), to procure raw cotton, and OekoTex Standard 100 for bamboo procurement. For packaging, there are FSC (Forest Stewardship Council) parameters for sustainable denim. Though they vary across manufacturers, brands, rating and certification agencies, etc. The reasons can vary from differences in the target consumer group to different demographies. The constant part is understanding changing environmental needs and being aware of consumer preferences.

Traceability in denim

Supply chain traceability requires recording various types of information at different stages of the product transformation, from raw material production to reverse logistics. Traceability can be adopted to control counterfeiting, to document the origin of a product, to leverage cultural assets (such as "made in" or fair trade products), to promote corporate social responsibility (CSR), and to increase the transparency and perceived quality of marketed products. For example, who, where, when, and how a product was manufactured (Pigni and Crave, 2007). Although connected through a complex network, supply chain partners find it difficult to identify and access information related to the suppliers involved (Grimm, Hofstetter and Sarkis, 2016). Different traceability factors that are essential are depicted in Figure 1. For instance, traceability implementation has long been reported to restore consumer confidence in product quality and safety by providing more information related to product origin, composition, quality, etc. (Cheng and Simmons, 1994).

Consumers' perceptions of the concepts of denim quality and safety are associated with the improvement of denim supply chain traceability, and consumers will base their purchasing intentions on these beliefs (Van Rijswijk et al., 2008). Traceability systems are becoming important for tracking, monitoring, and managing product flows through supply chains, as well as certifying production, processing, and packaging. Environmentally sustainable production is a credible attribute that is gaining importance in the eyes of consumers (Myae and Goddard, 2012).
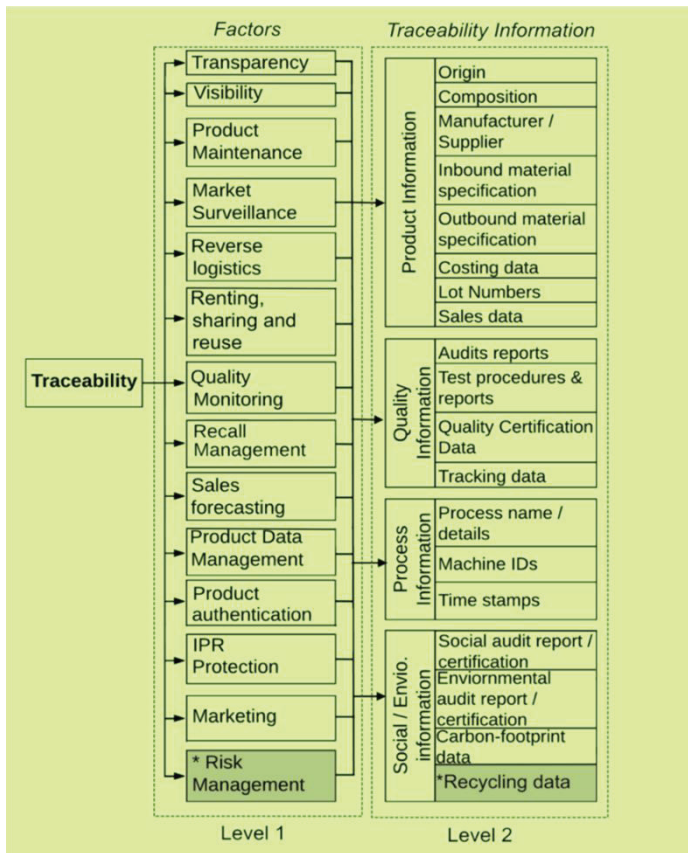
Figure 1: Traceability Factors *(Agrawal and Pal 2019)*

Research Problem

The existing literature gives insights about sustainable consumption behavior towards clothing in general, but there is a lack of study on sustainable consumption behavior towards denim. Since denim has significant consumption in terms of volume and a significant environmental footprint, it becomes crucial to explore this aspect of sustainable consumption behavior even further. Traceability is an important aspect of sustainability. While traceability has been studied in depth for the clothing and apparel industry, a study that focuses explicitly on denim is missing. Different papers discuss various factors of traceability, but none cover it from the consumer`s perspective. Getting into the mind of the consumer will enhance the existing understanding of consumer behavior, and therefore, it presents itself as an interesting area of research. This study explores the factors that give rise to sustainable consumption behavior in denim and traces the parameters that impact traceability.

Research Methodology

This study was divided into two phases.

First phase

In the first phase, a Delphi method was adopted to arrive at the initial parameters related to sustainable consumption behavior (Figure 2).
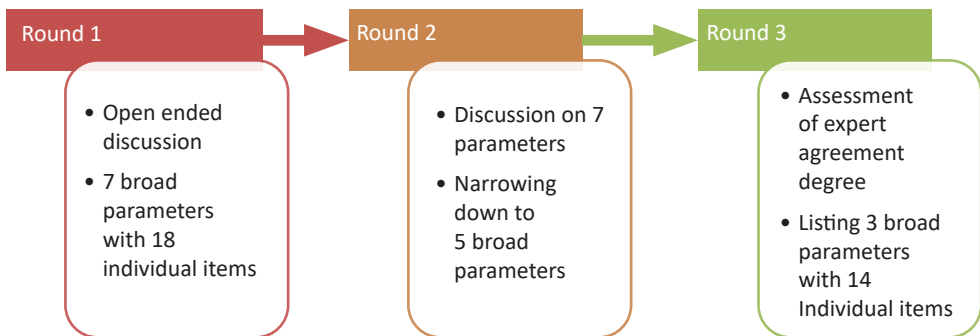

Round 1
- Open ended discussion
- 7 broad parameters with 18 individual items

Round 2
- Discussion on 7 parameters
- Narrowing down to 5 broad parameters

Round 3
- Assessment of expert agreement degree
- Listing 3 broad parameters with 14 Individual items

Figure 2: Process of Delphi method

Ten experts with 10–15 years of experience in denim production participated in this study. Two of these experts had over 15 years of experience as category managers for denim brands. Two others had 10 years of experience as sourcing managers. Another two experts were employed in the industry, handling sales positions for a denim brand. Three experts had experience as buyers in a buying house handling denim brands. Lastly, one of the experts was a brand director. A semi-structured questionnaire was prepared based on the information derived, and after the experts answered, another round of discussion was conducted to arrive at a consensus among experts. On the basis of responses, crucial areas of sustainable consumption behavior in denim were shortlisted.

The three broad parameters that were identified are stated below:

- Existing awareness about sustainability in denim includes socio-economic as well as ecological dimensions. It included items such as:
    - Material composition
    - Fair trade practices
    - Overall environmental impact

- Concern for the future generation

- Impact of chemicals on health

- Consumption phases, which included stages of product acquisition, usage, and disposal. It included the following items:

    - Comfort derived from the product

    - Utility of the product

    - Price of the product

    - In sync with the trend

    - Mindful product usage

    - Responsible buying behavior

- Areas of traceability in denim It included the following items:

    - Accountability in stages of the supply chain

    - Ensuring an environmentally conscious production process

    - Validation of responsible disposal of products

Second phase

The items shortlisted in the first phase were used as a base for constructing a structured questionnaire in the second phase. The questionnaire consisted of objective, close-ended questions, and a few questions were based on the Likert scale.

This study is exploratory in nature, where exploratory factor analysis has been used to map the factors for sustainable consumption behavior.

The sample frame consisted of denim consumers who were using branded denim, both male and female, in the age group of 18–31 years and who were residents of Delhi-NCR. The non-probability judgmental sampling technique was used with a sample size of 170, of which 164 responses were complete in all aspects and formed the basis for this study. SPSS was used to carry out factor analysis to arrive at the factors needed to explore sustainable consumption behavior.

Result Interpretation

The socio-demographic profile of the respondents is indicated in Table 1. A total of 170 responses were received, out of which 164 were complete in all aspects. Out of the total respondents, 65.9 percent were females and 34.1 percent were males. 14.7

percent of the respondents were in the age group of 17–20 years, 58.8 percent of the respondents were in the age group of 21–24 years, 11.8 percent of the respondents were in the age group of 25–28 years, and 14.7 percent belonged to the 28–31 year age group.

Table 1: Socio-demographic profile of respondents

Indicators	Number	Percentage (%)
Gender		
Male	58	34.1
Female	112	65.9
Age Distribution		
17-20	25	14.7
21-24	100	58.8
25-28	20	11.8
28-31	25	14.7
Education		
Secondary/Higher Education	32	18.8
Graduate	70	41.2
Post Graduate	66	38.8
Ph.D.	2	1.2
Occupation		
Government Service	10	5.9
Private Service	98	57.6
Business	37	21.8
Unemployed	25	14.7
Monthly Household Income		
Less than Rs.40000	32	18.8
Rs.40001 to 60000	20	11.8
Rs.60001 to 80000	36	21.2
Rs.80000 to 100000	42	24.7
More than Rs.100000	40	23.5
Number of Family Members		
Upto 3	67	39.4
4-6	89	52.4
6-8	10	5.9
9 and above	4	2.4

The correlation matrix was chosen over the covariance matrix as all the variables were not measured on the same scale. The coefficient of correlation for most observed variables was between .317 and .746 in absolute terms, which was in the desired range of 0.30 to 0.80.

All the coefficients of correlation were checked at a 0.05 level of significance, and the p-value of most coefficients was below 0.05, indicating that they were significant. Some of the coefficients of correlation were not in the desired range; therefore, the data was checked for multicollinearity. The determinant value for the matrix was 3.51, which was greater than 0.00001; therefore, no multicollinearity was found in the data set.

Kaiser meyer olkin and bartlett`s test

The Kaiser-Meyer-Olkin (KMO) Test measures the suitability of the data for factor analysis. The value for the KMO test statistic for the given data set was 0.672, which makes it suitable for running factor analysis. The calculated value, or Bartlett's test of sphericity, for this data set was 895.354, which was greater than the tabulated value. A significant result was that the observed variables are related and suited for structure detection.

The initial eigenvalue of all the variables are given in Table 2. In the analysis, all the extracted values are high. This means that the obtained factors can explain the most variation in the observed variables.

Following analysis, only the first four factors were retained, whose eigenvalue was greater than 1. Since factor analysis was conducted on the correlation matrix, the variables were standardized, which means that each observed variable had a variance of 1, and the total variance was equal to the number of variables used in the analysis, in this case, 15. Varimax rotation tries to maximize the variance of each of the factors, so the total amount of variance accounted for is redistributed over the three extracted factors.

The scree plot graphs the eigenvalue against the factor number (Figure 3). The values for the same are given in Table 2 in the first two columns. From the fifth factor, it can be observed that the line is almost flat, meaning each successive factor accounts for smaller and smaller amounts of the total variance. This point is called the inflection point from which the graph becomes flat, and in this analysis, it is obtained on the fifth factor, as per the scree plot.

As per the eigenvalue criteria, the eigenvalue of the fifth factor is 0.743, which is lower than one, and it can only explain 4.953 percent of variation, which is quite low. Therefore, we go with the eigenvalue criteria and choose four factors.

Table 2: Total variance explained

Factor	Total	Percentage of variance	Cumulative Percentage	Total	Percentage of variance	Cumulative percentage	Total	Percentage of variance	Cumulative percentage
	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation sums of Squared loadings		
1	6.266	41.771	41.771	6.091	40.608	40.608	5.356	35.706	35.706
2	3.594	23.963	65.733	3.342	22.281	62.889	2.629	17.528	53.234
3	1.608	10.719	76.452	1.302	8.682	71.572	1.848	12.317	65.551
4	1.010	6.731	83.183	.791	5.271	76.843	1.694	11.291	76.843
5	.743	4.953	88.136						
6	.414	2.758	90.894						
7	.333	2.222	93.116						
8	.290	1.930	95.046						
9	.216	1.438	96.484						
10	.157	1.049	97.533						
11	.119	.793	98.327						
12	.111	.738	99.065						
13	.068	.455	99.520						
14	.051	.342	99.862						
15	.021	.138	100.000						

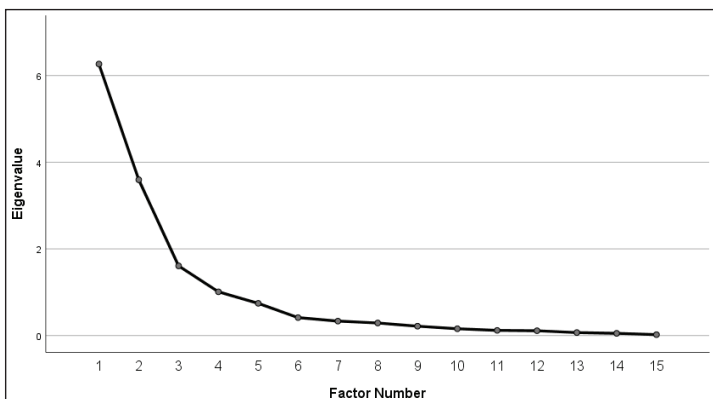*Extraction Method: Principal Axis Factoring*

Figure 3: Scree Plot

Table 2 contains the unrotated factor loadings, which are the correlations between the observed variables (15 in this study) and the factor. Four factors were extracted by the principal axis factoring method, and 16 iterations were required. Factor rotation was conducted by observing the correlation matrix. It was concluded that the observed variables were correlated, and therefore a Varimax rotation was conducted, which was also an orthogonal rotation and was meant for correlated observed variables.

Table 3 contains the rotated factor loadings, which represent both how the variables are weighted for each factor and also the correlation between the variables and the factor.

Table 3: Factor matrix

S.No	Factor	1	2	3	4
1.	Fair trade practices and ethical work	.915			
2.	Responsible disposal of product	.913			
3.	Environmentally conscious production process	.905			
4.	Future generations	.841			
5.	Traceability of sustainable supply chain	.819			
6.	Raw material composition	.805			
7.	Health	.724	.571		
8.	Environment Impact	.681			
9.	Responsible buying		.812		
10.	Trend		.718		
11.	Comfort		.682	.517	
12.	Sustainability	.541	.562		
13.	Utility		.552	.660	
14.	Price			.531	
15.	Concern for future generations		.516		.547

Extraction Method: Principal Axis Factoring

For orthogonal rotations, such as Varimax, the factor pattern and factor structure matrices are the same. Four factors were extracted by Varimax rotation with Kaiser normalization. It was convergent in five iterations (Table 4).

Table 4: Rotated factor matrix[a]

S.No	Factor	1	2	3	4
1.	Environmentally conscious production process	.957			
2.	Responsible disposal of the product	.928			
3.	Raw material composition	.907			
4.	Traceability of sustainable supply chain	.880			
5.	Fair trade practices and ethical work	.874			
6.	Future generations	.731			
7.	Environment Impact	.579			
8.	Comfort		.821		
9.	Health		.791		
10.	Trend		.650		
11.	Price			.853	
12.	Utility			.677	
13.	Mindful product usage				.817
14.	Responsible buying				.657
15.	Concern for future generation				.566

Extraction Method: Principal Axis Factoring

Rotation Method: Varimax with Kaiser Normalization

a. *Rotation converged in 5 iterations*

Using the rotated factor loadings, the items that constitute each factor were obtained, which are as follows:

Factor 1 is explained by the following items: comfort, health, and trend.

Factor 2 consists of the following items: responsible buying, concern for the future, and mindful product usage.

Factor 3 is characterized by these items: environmentally conscious production process, raw materials, supply chain, fair trade practices, and responsible disposal.

Factor 4 is influenced by material composition and price.

Labelling of factors

Factor One (Self-Care): Three items, namely comfort (0.821), health (0.791), and trend (0.566), have large positive loadings on this factor (Figure 4). When the respondents were asked to rate the importance of factors when purchasing sustainable denim,

55 percent of respondents gave comfort the highest ranking, and 25 percent of respondents gave health the second highest rating. The impact of synthetic dyes on human skin and the overall impact of deleterious pesticides used for cotton cultivation were causes of concern for the health of consumers. Lastly, trend was an important factor, as respondents wanted sustainable denim jeans to be in sync with the ongoing trend. Vingilyte and Khadroo (2022) state that personal clothing style is predicated on self-knowledge, consistency, and an enduring sense of comfort. In this study, self-care was used to holistically cover items such as comfort derived from sustainable denim, the health impacts of sustainable denim versus regular denim for consumers, and resilience in adopting trends for sustainable denim.
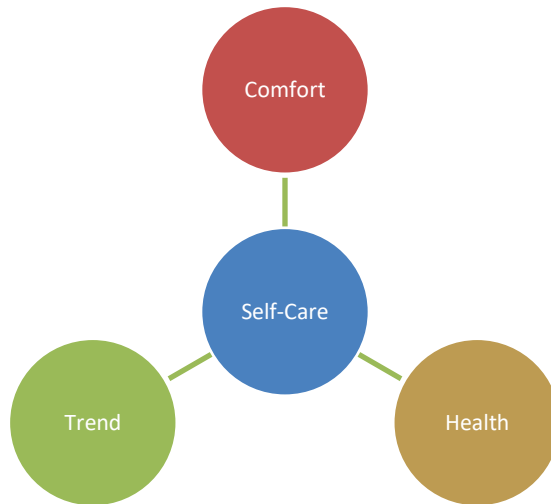
Figure 4: Factor One (Self-Care)
Source: Primary data

Factor Two (Consciousness): The importance of mindful product usage (0.817), responsible buying (0.657), and concern for future generations (0.731) have large positive loadings on this factor that has been labeled as Consciousness (Figure 5). Quoquab, Mohammad and Sukari (2019), in their scale for sustainable consumption, included three parameters: quality of life, care of the environment, and care for future generations. Soyer and Dittrich, (2021) classified sustainable consumption behavior using three consumption phases, i.e., purchasing, using, and disposing of clothes. When it comes to sustainability, only a product made from sustainable production methods is not enough; how the product is used during its life is equally important. 82 percent of respondents felt that mindful product usage was a crucial factor that impacted

sustainability. Following care instructions augments the product's life and contributes to sustainable consumer behavior. Responsible buying was important, as respondents felt this would lead to greener consumer practices. Concern for future generations was a factor that resulted in sustainable consumer behavior. It is a well-established fact that the world has finite resources, and with its huge consumption, the world is heading towards a resource crunch and a future of instability. It was refreshing to note that consumers now worry about future generations and consider that when making a purchase decision.
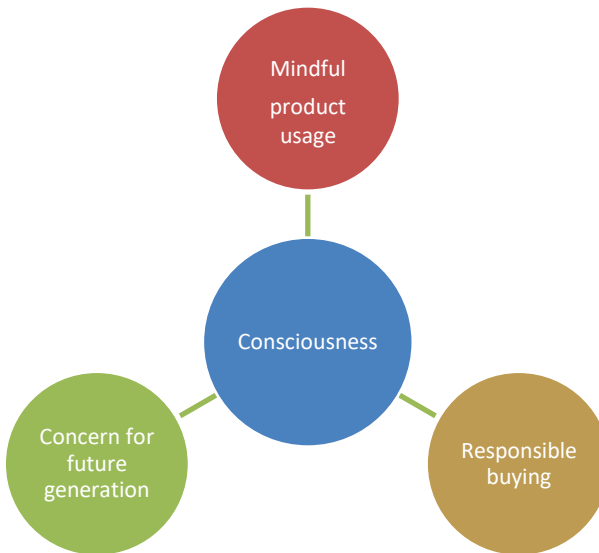
Figure 5: Factor Two (Consciousness)
Source: Primary Data

Factor Three (Traceability): Six items, such as the environmentally conscious production process (0.928), responsible product disposal (0.957), raw material composition (0.907), traceability of the supply chain (0.880), fair trade practices and ethical work (0.874), and environmental impact (0.539), have significant positive loadings on this factor (Figure 6). Agrawal and Pal (2019) identified factors such as product information, quality information, process information, and social and environmental information as crucial to traceability. Since the six items constitute traceability, this factor has been labeled as traceability. In the current study, traceability was a crucial factor for sustainable consumption behavior, which included items such as transparency in the supply chain, responsible disposal after the production process, traceability of raw material suppliers, and adoption of fair trade practices.
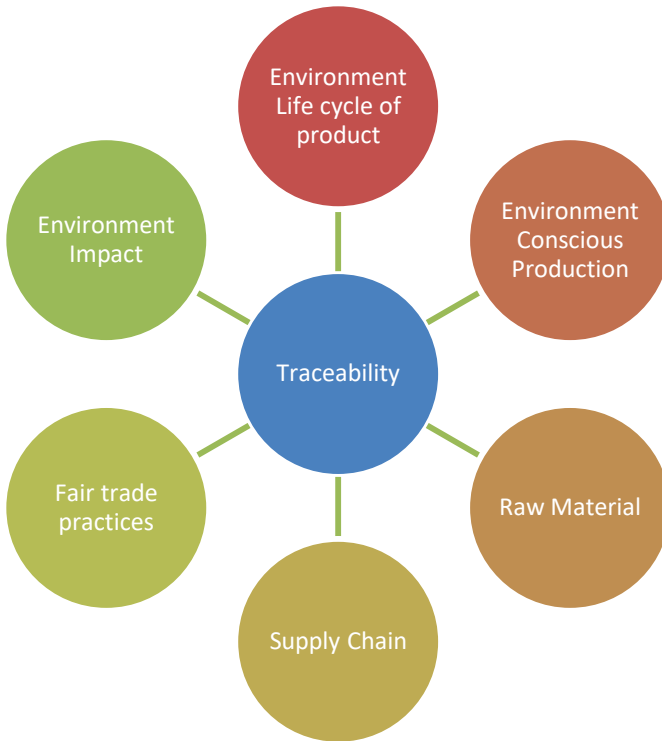
Figure 6: Factor Three (Traceability)
Source: Primary Data

Factor Four (Utility): Price (0.677) and material composition of the denim (0.822) have large positive loadings on this factor that has been labeled as utility (Figure 7). Respondents were keen on verifying the material composition of the denim jeans they were purchasing, and that is why, when it comes to sustainable denim, they make an effort to check the material composition labels. Price is an important aspect of any product purchase, and denim jeans are no different. Before making a purchase, consumers felt that price was an important factor that they considered, and 92 percent were willing to pay an increased price to buy a sustainable pair of denim jeans. This is coherent with what Robinson, (2012) points out: "customers are not consuming products, but value", which shows that consumers are evaluating their choices before making a purchase, and sustainability in denim is an added value for them.

Together, all four factors, namely, self-care, consciousness, traceability, and utility, explain 0.76843, or 76.843 percent, of the variation in the data.
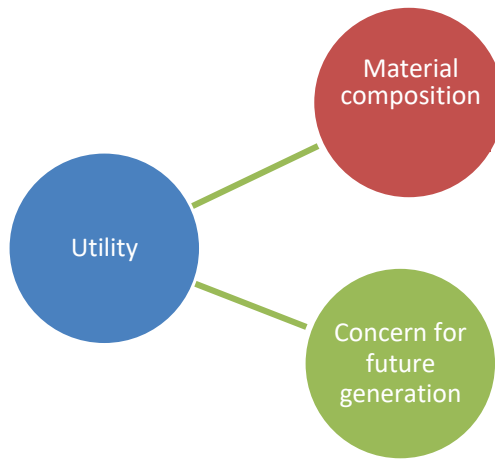
Figure 7: Utility
Source: Primary data

Discussion and Conclusion

In this study, four major factors that indicated sustainable consumption behavior towards denim specifically were established. With these four factors, a model for sustainable consumption behavior towards denim was developed (Figure 8), and factors such as self-care and utility were seen in the context of sustainable denim, which were not explored previously.

According to Rijswijk et al., (2008), traceability's significance to customers lies in the benefits related to aspects they consider important when it comes to denim. In this study, traceability factors can serve as proxies. For instance, quality can be inferred from the raw materials, and safety can be assessed by understanding the production process and its environmental impact.

Rijswijk et al. (2008) also discovered that consumers' perceptions of denim quality and safety are linked to the improvement of denim supply chain traceability. These beliefs influence consumers' purchasing intentions, a finding that aligns with the results of this study.

The four parameters identified for sustainable consumption in denim, namely, self-care, consciousness, traceability, and utility, had a bearing on individual items. Self-care had further loadings in the form of items such as comfort, health, and trend. Comfort signifies consumers who wish to purchase sustainable denim jeans without sacrificing
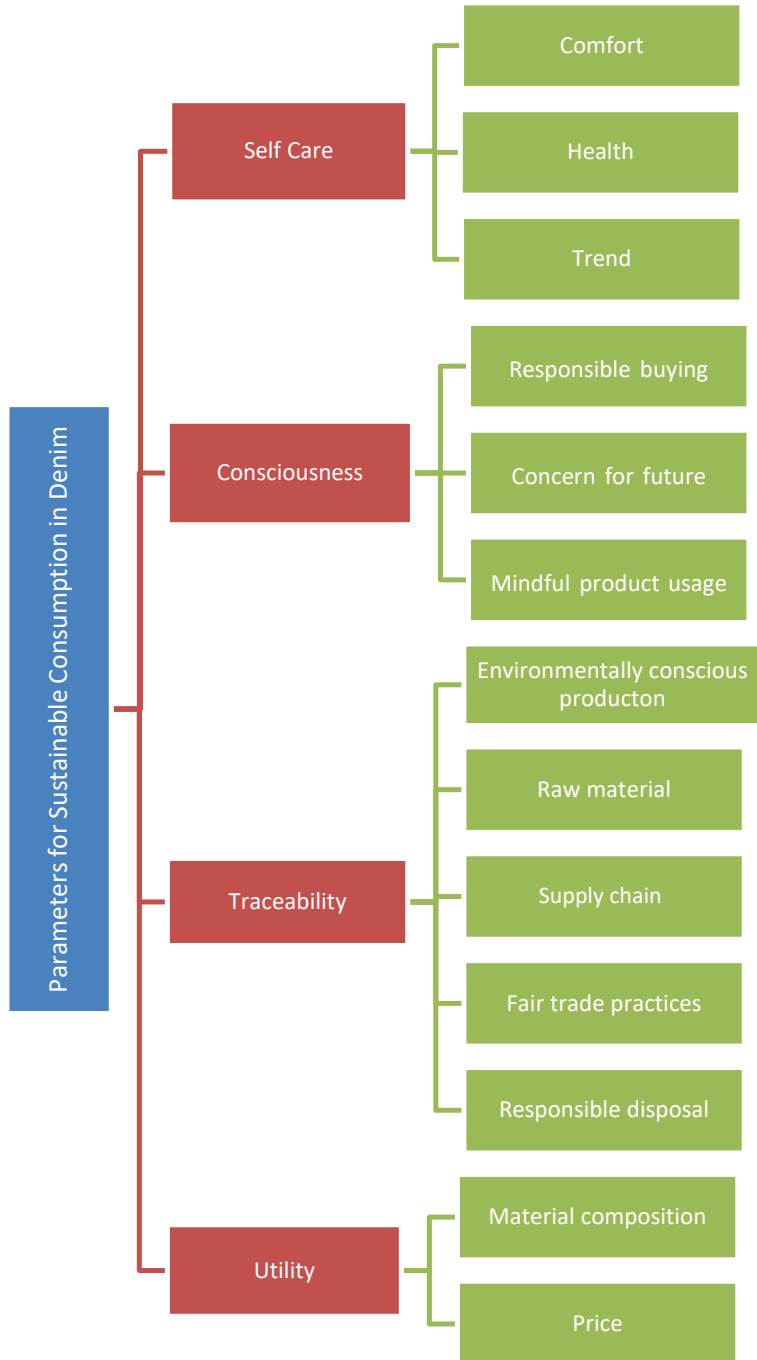
Figure 8: Model indicating parameters for sustainable consumption behavior in denim.
Source: Primary data

the comfort associated with regular jeans. Health was also an important aspect that was considered when purchasing sustainable denim, as chemical dyes were seen as a threat to health for consumers. Consciousness came from items such as concern for the future generation, responsible buying, and mindful product usage. This indicates that consumers are very cognizant of their buying behavior. They were aware of the need for the current generation to use its limited resources wisely without compromising the needs of future generations. Mindful product usage was crucial in extending the life of the product, which shows a positive trend in consumers towards the longevity of the product, a step away from fast fashion.

Traceability as validation of sustainability claims enhances consumer trust and thereby adds value. Traceability in sustainable denim adds to the product benefit, which in turn facilitates purchase intention. The consumers wanted to be aware of the material used in production, the production process employed, the supply chain information, and its impact on the environment. The traceability factors identified enhance the consumer's understanding of this aspect and can aid in implementing essential changes in denim jeans production. Further studies can include the impact of the application of traceability in the denim industry and the tools through which this can be explored, such as block chain technology. Information such as material composition and price become important aspects of the factor of utility. Consumers expressed their willingness to pay a premium for a sustainable pair of denim jeans.

This study lays the groundwork for further studies in terms of sustainability in denim. Confirmatory factor analysis can be performed to verify the factor structure of the observed variables.

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