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Equation Modelling of Automotive Textiles for Car Seat Covers in the Ghanaian Upholstery Industry

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Among the many materials utilized in the production of automotive components are textile materials. Long-term use of vehicle seats causes the textile material used to cover the seats to degrade. Because of this, drivers and vehicle owners critically inspect such deteriorated car seat covers before getting a new one. This study is aimed at identifying the various factors that influence drivers and vehicle owners' decisions about the choice of seat covers. In addition, to determine the factors that influence customers' perception of locally manufactured seat covers by upholstery artisans. Structured questionnaire and online google form were used to collect data from 1042 respondents across the 16 regions of Ghana. The five main factors that customers focused on were identified using Principal Component Analysis (PCA) with Varimax rotation. Structural Equation Modelling (SEM) was used to predict the perception factors of local upholstery artisans and customers using the Smart PLS software. Textile resistance and accessibility, durability, quality, perception and aesthetics were the selection factors. The findings showed that consumers of automotive textile materials take into account the aforementioned aspects before making purchases, therefore manufacturers should pay attention to these factors to increase efficiency. The study concludes that local upholstery artisans need to concentrate on these factors in their operations.

Keywords: Ghana, Automotive Textiles, Car Seat, Factor Analysis, PLS-SEM

I. INTRODUCTION

Textiles were first employed in the vehicle industry in the 19th century for automobile folding roofs [1]. Since then, there has been a noticeable increase in the use of textiles in vehicle building, with the size of the global market expected to reach 28.6 billion USD in 2021 [2]. It was estimated that the average amount of automotive textiles utilized in the production of car components is between 15 and 25 kilos [1, 3, 4]. The production of car components involves the use of a wide variety of textile products (i.e., fiber types and designs). The major uses of automobile textiles include seats, flooring, airbag materials, safety seat belts, interior lining, door lining, and interior lining. Vehicle carpets (including car mats) and upholstery fabrics account for 3.5 kg and 4.5 kg of the textiles used in automobiles, respectively [1].

The term "automotive textiles" refers to a class of specialist textile materials with a specific range of application and superior technical performance [5]. suggest that these materials primarily possess enhanced functional attributes, including superior insulation, increased tensile strength, and augmented heat resistance, rather than serving solely decorative or aesthetic functions. Various natural and synthetic fibers, including cotton, linen, ramie, nylon and polyester can be used to produce automotive textiles. (nomex, kevlar, spandex etc.). Textile materials, including fibers, filaments, yarns, and fabrics, which fall outside the category of apparel-grade textiles, are among the many varieties of automotive textiles that are frequently used for car components. Woven, nonwoven, coated, knitted, and composite textiles (the latter refers to blends of various fabrics or combinations of textiles with plastic elements) are just a few of the many different types of textiles that are typically utilized by vehicle manufacturers [6, 7].

Automotive textile materials are used in a variety of vehicle components for important reasons. These include automotive fabrics for seat comfort (car seat covers), passenger safety and concealed component safety (airbag fabrics, safety belts, air/fuel filters, and hoses). Other purposes include hygienic and security concerns, aesthetics of visible vehicle components (door panels, headrest lining, and carpets) and aesthetics in general [4, 5, 8, 25, 26].

The most essential feature of the interior that most car users notice when the door is opened is the car seat. This acts as the interaction between people (the passengers) on one hand and the car on the other hand. Among the crucial factors taken into account by both car buyers and passengers are the comfortability (i.e., physiological comfort) and aesthetics (i.e., appearance and beauty) of the car seat [1, 9].

Car seat coverings are made from both natural and

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artificial fibers, with the artificial fibers absorbing less moisture than the natural ones. Artificial seat cover fibers perform far worse in terms of thermal comfort than natural ones in the hotter tropical climates. Owing to extended durations in cars caused by traffic jams or long journeys, automobile passengers expect a certain standard from the textiles used in crafting seat covers. As a result, the auto industry is elevating the physiological comfort, technological, mechanical, and visual attributes of materials used for car seat covers [1].

The quality of the automobile textiles material used in the production of seat cover degrades (i.e., abrasion, colour fading, a loss in texture quality etc.) as the car continues to be used by passengers and car owners. Insufficient circulation and transfer of heat, air, and moisture between the human body and elements of the car seat, including the textile cover, lining, and foams, hasten their wear and tear. Subpar seat covers do not appeal to passengers, particularly in the case of commercial vehicles. Consequently, many car owners and drivers frequently swap out degraded textiles used in car seat cover production.

Car owners and drivers in Ghana engage the services of local artisan professionals in the field of automotive textile upholstery to repair or replace worn-out seat covers. To meet the thermo-physiological standard, it is necessary to choose premium automobile textiles with the necessary specifications. Additionally, to combine cut fabric sections without tearing the fabric or the thread, special sewing machines that are stronger and customizable for sewing multi-layered, thick materials are needed to make car seat coverings. The use of the proper seam, which must adhere to regulatory standards, is another crucial factor taken into account while sewing seat coverings [8, 10, 11].

Available literature revealed that some studies have looked into the physical characteristics of textiles used for vehicle upholstery. Additionally, investigations on the evaluation of the thermal-physiological characteristics and burning behaviors of automobile upholstery textiles woven with aramid and wool yarns as well as the comfort features of automotive upholstery textile were undertaken. Additionally, studies on the effects of the seam on the characteristics of technical and non-woven textiles used to make car seat covers have been conducted [1, 10, 12, 13].

All of the studies mentioned above involved experimental and property analyses and were carried out in industrialized nations. However, research on automotive textile has not been done in developing nations like Ghana. Therefore, there has not been any empirical research on the knowledge, perception, and consumption of automobile textiles with the necessary specifications for seat cover material. This study aims to close this gap by identifying the variables that affect car owners', drivers', and automotive upholstery professionals' selection of vehicle seat cover materials. Additionally, the study aims to ascertain the relationship between customers' perceptions of locally made car seat covers and the factors that affect their decision to purchase them.

II. METHODOLOGY

A. Sampling and Data Collection

Drivers and car owners in Ghana who had recently changed their seats' covers or undergone upholstery work participated in the study. Data were gathered by administering questionnaires to respondents using the convenience sample technique. Due to its speed, simplicity, ease of use, and ability to generate hypotheses, this sampling strategy was chosen [14]. Data was gathered from one-thousand and forty-two (1042) respondents, including drivers and car owners, who were selected across 16 regions of Ghana. The questionnaire that served as the data collection tool was adjusted to fit the needs of this investigation. For added validity and ambiguity detection, the instrument was piloted or pre-tested. Following the pre-testing, the data collection tool was improved, and the final questionnaire was converted to a google form. Two major forms were used to distribute the questionnaire to respondents: a face-to-face interview and an online google form (i.e., social media accounts like Facebook, WhatsApp, and email). While the online google form was given to a variety of respondents who had changed their car seat covers, face-to-face interviews with respondents were conducted at various lorry stations and upholstery shops. Five-hundred and six (506) respondents' answers to the online google forms and five-hundred and thirty-six (536) answers to the face-to face interview were obtained. Before distributing the questionnaires to the respondents, the purpose of the study was explained to them, and their permission was sought.

B. Measurement

There were two sections to the questionnaire. The first section concentrated on the respondents' demographic factors, including gender, the type of vehicle they owned or drove, their level of education, and their driving history. The second section had nine (9) constructs that were made up of factors that affected the choice of automobile textiles for seat covers. Participants were asked to express their degree of concurrence using a 5-point Likert scale for questions under each construct: "SD" representing strongly disagree, "D" for disagree, "N" indicating neutral, "A" signifying agree, and "SA" denoting strongly agree. The constructs examined encompassed facets such as appearance, material properties (be it fabric or leather), durability, aging, safety, susceptibility to stains, cost-effectiveness, environmental considerations, and perception.

C. Data Analysis

Version 22 of the Statistical Package for Social Sciences (SPSS) Software was used to modify, code, and enter the obtained data. In order to analyze the respondents' demographic features, frequency and percentages were calculated. Using Principal Component Analysis (PCA), the elements were divided into more manageable and significant components. Structural Equation Modelling (SEM), which was used to assess the study's hypothesis, utilized Smart PLS. Constructs were initially measured to make sure the model was appropriate for further research.

III. RESULTS AND DISCUSSION

A. Demographic Characteristics

Table I illustrates that, out of the 1,042 respondents in the study, a significant 85.8% were male, with the remaining 14.2% being female. This was expected because men were more engaged in matters relating to vehicle than women. Private-car drivers made up the majority of survey participants (95.5%). Both private and commercial car drivers came second with 3.5%, followed by Commercial car drivers who made up the minority with 1.1%. The majority of the participants in the study had tertiary education (98.3%). This is related to the majority of participants' capacity to buy private cars. Majority of participants (47.9%) had more than ten years of driving experience.

Table-I: Profile of Respondents Demographics

Variables	Category	Frequency	Percentage
Gender	Male	894	85.8
	Female	148	14.2
Type of vehicle	Private	995	95.5
	Commercial	11	1.1
	Both	36	3.5
Education level	Primary	9	0.9
	Secondary	9	0.9
	Tertiary	1024	98.3
Driving experience	1-5 years	222	21.3
	6-10 years	321	30.8
	Above 10 years	499	47.9
VehicleSeat Cover change frequency	Monthly	80	7.7
	2-6 months	78	7.5
	Yearly	233	22.4
	More than 1 year	651	48.09

B. Reliability Test Analysis

The internal consistency of the questions on the questionnaire were examined using the reliability analyses. These analyses assess how consistent the various measures are to make sure that the measurements' results are not overly variable. Since each item on the scale measures the same construct and is highly correlated, this is the guiding principle when doing an internal consistency test [15]. In order to assess the reliability of the items falling within the constructs, the Cronbach alpha test was used in this study. Cronbach's alpha values for the constructions ranged from 0.553 to 0.822, according to the data shown in Table II. For every construct, the Cronbach alpha values exceeded 0.5.

C. Factor Analysis

In this research, the underlying dimensions and perception of automotive seat cover items were ascertained using Principal Component Analysis (PCA) with Varimax rotation. Some correlations among a number of items are above 0.30 according to the initial correlation matrix analysis result that was inspected. The Kaiser-Meyer-Olkin (KMO) index and anti-image correlation were used to estimate the Measures of Sampling Adequacy (MSA). These were done to see if the scaled items' covariance was high enough to ensure the implementation of factor analysis. .For further factor analysis, the KMO calculated for the data set was 0.700, which is acceptable. Additionally, the majority of the MSAs diagonals for the Anti-image Correlation were above 0.5, indicating that the dataset met the requirements for factor analysis. The Bartlett Test of Sphericity was calculated to see if the correlation matrix was an identity matrix and hence appropriate for factor analysis. The results of the Bartlett's test indicated that the data set was factorable ($p < 0.000$). In this work, components were extracted using a screen plot and Varimax rotation with Kaiser Normalization analysis using Kaiser's criterion for eigenvalues. The 44 items on the Likert scale were reduced to 14 significant factors using factor analysis. In the initial PCA, certain variables were limited. The screen plot and the 14 factors that were recovered with eigenvalues greater than 1.0 are shown in Figure 1 and Table III, respectively. Rotation apart, the initial factor accounted for 21.059% of the variance. The 14-factor accounted for 74.495% of the whole cumulative variance.

The items and their factor loadings for the rotated components are displayed in Table IV. For better clarity, loadings less than 0.25 were left out. However, items having factor loadings below the recommended minimum of 0.40 for factor analysis [16] were removed in order to control the size of the rotating 14-factors. Additionally, [17] proposed that when a scale has fewer than 10 items, mean inter-item correlations can be used to gauge internal consistency. Additionally, according to [18] and [17][27], items with mean inter-item correlations between 0.2 and 0.4 are considered appropriate. Inter-item correlations for factors in the rotated matrix above 0.4 and more than four items for a factor were considered in this investigation as a standard for creating the factor structure matrix as shown in Table V.

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Table- II: Evaluation of Questionnaire Item Internal Consistency

Construct	Code	Items	CITC	Cronbach alpha
Aesthetics	AES1	Design of textile	0.328	0.553
	AES2	Colour of textile	0.390	
	AES3	Texture of textile	0.429	
	AES4	Conspicuous stitches presence	0.117	
	AES5	Inconspicuous stitches presence	0.247	
	AES6	Seat cover design	0.463	
Material	MAT1	Air flow of textile	0.412	0.612
	MAT2	Air retentive textile	0.386	
	MAT3	Water repellent textile	0.341	
	MAT4	Heat repellent textile	0.458	
	MAT5	Comfortability of textile	0.235	
Durability	DUR1	Preference of textile to leather	0.097	0.782
	DUR2	Preference of leather to textile	0.146	
	DUR3	Textile more durable than leather	0.335	
	DUR4	Leather more durable than textile	0.175	
	DUR5	Heat from textile than leather	0.416	
	DUR6	Heat from Leather than textile	0.281	
	DUR7	Textile deteriorates than leather	0.474	
	DUR8	Leather deteriorates than textile	0.262	
	DUR9	Fraying of thread in textile vehicle seat cover	0.606	
	DUR10	Fraying of thread in leather vehicle seat cover	0.513	
	DUR11	Folding of leather vehicle seat cover	0.481	
	DUR12	Folding of fabric vehicle seat cover	0.464	
	DUR13	Peeling of textile vehicle seat cover	0.563	
	DUR14	Peeling of leather of vehicle seat cover	0.338	
	DUR15	Textile fading of vehicle seat cover	0.481	
	DUR16	Colour fading of leather vehicle seat cover	0.421	
Ageing	AGE1	Textile heat resistant of vehicle seat cover	0.503	0.669
	AGE2	Textile colour fading resistance	0.503	
Safety	SAF1	Textile flame resistance	0.701	0.822
	SAF2	Textile resistance to acid and solvent	0.701	
Maintenance	MAI1	Vehicle seat cover textile resistance to dirt	0.735	0.822
	MAI2	Vehicle seat cover textile resistance to Oil	0.619	
	MAI3	Vehicle seat cover textile easy to launder	0.683	
Economy	ECO1	Vehicle seat cover textile availability	0.574	0.607
	ECO2	Vehicle seat cover textile cost	0.547	
	ECO3	Preference of simple design to complex design	0.209	
	ECO4	Preference of complex design to simple designs	0.293	
Ecology	ECL1	Recycling of vehicle seat cover	0.520	0.684
	ECL2	Pollution threat of vehicle seat cover	0.520	
Perception	PER1	Local seat covers more comfortable	0.447	0.715
	PER2	Local seat covers easily usable	0.793	
	PER3	Local seat covers more beautiful	0.792	
	PER4	Local seat covers stronger and robust	0.663	

Note: (1) The CITC is corrected item-total correlation for measuring internal consistency of the items on the questionnaire. If the determined CITC of any scaling item is greater than 0.3, the item should be maintained in the questionnaire; otherwise, the item should be deleted. (2) The Cronbach α test shows the internal consistency reliability of the constructs. If α is greater than 0.7, it shows that the internal reliability is strong

Table-III: Total Variance Explained by Extracted 14 Factors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	9.266	21.059	21.059	9.266	21.059	21.059	5.526	12.558	12.558
2	3.342	7.596	28.656	3.342	7.596	28.656	3.411	7.751	20.310
3	2.825	6.420	35.075	2.825	6.420	35.075	3.382	7.687	27.997
4	2.722	6.187	41.263	2.722	6.187	41.263	3.076	6.992	34.988
5	2.291	5.208	46.470	2.291	5.208	46.470	2.650	6.023	41.011
6	1.746	3.967	50.438	1.746	3.967	50.438	2.147	4.881	45.892
7	1.696	3.854	54.291	1.696	3.854	54.291	1.941	4.412	50.304
8	1.557	3.539	57.830	1.557	3.539	57.830	1.641	3.729	54.033
9	1.431	3.251	61.082	1.431	3.251	61.082	1.631	3.706	57.739
10	1.411	3.207	64.288	1.411	3.207	64.288	1.630	3.705	61.444
11	1.241	2.820	67.109	1.241	2.820	67.109	1.512	3.436	64.880
12	1.156	2.627	69.736	1.156	2.627	69.736	1.464	3.328	68.208
13	1.056	2.400	72.137	1.056	2.400	72.137	1.464	3.327	71.535
14	1.038	2.358	74.495	1.038	2.358	74.495	1.302	2.960	74.495

15	.874	1.987	76.482
16	.778	1.767	78.249
17	.772	1.756	80.004
18	.724	1.646	81.650
19	.674	1.531	83.181
20	.628	1.428	84.609
21	.606	1.377	85.986
22	.526	1.195	87.182
23	.500	1.136	88.318
24	.461	1.048	89.365
25	.454	1.033	90.398
26	.445	1.012	91.410
27	.386	.878	92.288
28	.371	.844	93.132
29	.360	.819	93.951
30	.354	.805	94.755
31	.300	.681	95.437
32	.286	.651	96.088
33	.254	.576	96.664
34	.224	.508	97.172
35	.203	.461	97.633
36	.181	.411	98.044
37	.167	.380	98.425
38	.157	.358	98.783
39	.113	.257	99.040
40	.104	.237	99.277
41	.091	.208	99.485
42	.086	.167	99.681
43	.073	.197	99.848
44	.67	.152	100.000

Method of Extraction: Principal Component Analysis/Assessment Loadings < 0.25 are omitted

Table IV: Rotated Factor Loadings Matrix

Construct	Code	Items	CITC	Cronbach alpha
Aesthetics	AES1	Design of textile	0.328	0.553
	AES2	Colour of textile	0.390	
	AES3	Texture of textile	0.429	
	AES4	Conspicuous stitches presence	0.117	
	AES5	Inconspicuous stitches presence	0.247	
	AES6	Seat cover design	0.463	
Material	MAT1	Air flow of textile	0.412	0.612
	MAT2	Air retentive textile	0.386	
	MAT3	Water repellent textile	0.341	
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	MAT5	Comfortability of textile	0.235	
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	DUR2	Preference of leather to textile	0.146	
	DUR3	Textile more durable than leather	0.335	
	DUR4	Leather more durable than textile	0.175	
	DUR5	Heat from textile than leather	0.416	
	DUR6	Heat from Leather than textile	0.281	
	DUR7	Textile deteriorates than leather	0.474	
	DUR8	Leather deteriorates than textile	0.262	
	DUR9	Fraying of thread in textile vehicle seat cover	0.606	
	DUR10	Fraying of thread in leather vehicle seat cover	0.513	
	DUR11	Folding of leather vehicle seat cover	0.481	
	DUR12	Folding of fabric vehicle seat cover	0.464	
	DUR13	Peeling of textile vehicle seat cover	0.563	
	DUR14	Peeling of leather of vehicle seat cover	0.338	
	DUR15	Textile fading of vehicle seat cover	0.481	
	DUR16	Colour fading of leather vehicle seat cover	0.421	
Ageing	AGE1	Textile heat resistant of vehicle seat cover	0.503	0.669
	AGE2	Textile colour fading resistance	0.503	
Safety	SAF1	Textile flame resistance	0.701	0.822
	SAF2	Textile resistance to acid and solvent	0.701	
Maintenance	MAI1	Vehicle seat cover textile resistance to dirt	0.735	0.822
	MAI2	Vehicle seat cover textile resistance to Oil	0.619	
	MAI3	Vehicle seat cover textile easy to launder	0.683	
	ECO1	Vehicle seat cover textile availability	0.574	

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Economy	ECO2	Vehicle seat cover textile cost	0.547	0.607
	ECO3	Preference of simple design to complex design	0.209	
	ECO4	Preference of complex design to simple designs	0.293	
Ecology	ECL1	Recycling of vehicle seat cover	0.520	0.684
	ECL2	Pollution threat of vehicle seat cover	0.520	
Perception	PER1	Local seat covers more comfortable	0.447	0.715
	PER2	Local seat covers easily usable	0.793	
	PER3	Local seat covers more beautiful	0.792	
	PER4	Local seat covers stronger and robust	0.663	

Table- V: Factor Structure Matrix

Code	Item	Component 1	2	3	4	5
RES1	Textile fading of vehicle seat cover	.428				
RES2	Textile heat resistant of vehicle seat cover	.660				
RES3	Textile colour fading resistance	.706				
RES4	Textile flame resistance	.763				
RES5	Textile resistance to acid and solvent	.808				
RES6	Vehicle seat cover textile resistance to dirt	.722				
RES7	Vehicle seat cover textile resistance to Oil	.750				
RES8	Vehicle seat cover textile easy to launder	.708				
RES9	Vehicle seat cover textile availability	.606				
RES10	Vehicle seat cover textile cost	.456				
DUR1	Peeling of leather of vehicle seat cover		.804			
DUR2	Textile more durable than leather		.540			
DUR3	Leather deteriorates than textile		.775			
DUR4	Fraying of thread in leather vehicle seat cover		.656			
DUR5	Folding of leather vehicle seat cover		.705			
DUR6	Colour fading of leather vehicle seat cover		.482			
QUA1	Textile deteriorates than leather			.735		
QUA2	Heat from textile than leather			.535		
QUA3	Fraying of thread in textile vehicle seat cover			.688		
QUA4	Peeling of textile vehicle seat cover			.815		
QUA5	Peeling of leather of vehicle seat cover			.712		
PER1	Local seat covers more comfortable				.514	
PER2	Local seat covers easily usable				.916	
PER3	Local seat covers more beautiful				.906	
PER4	Local seat covers stronger and robust				.809	
AES1	Design of textile					.787
AES2	Colour of textile					.592
AES3	Texture of textile					.633
AES4	Heat repellent textile					.582
AES5	Comfortability of textile					.675

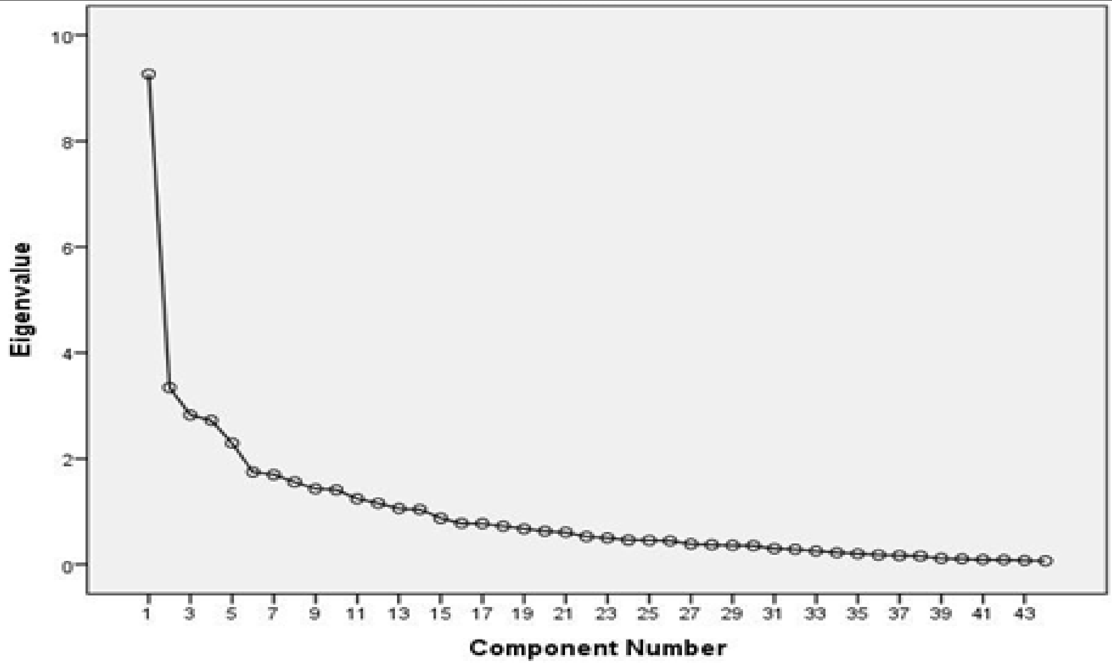

Figure 1: Explanation of Variance Using a Scree Plot

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D. Final PCA

A final PCA was performed for the remaining 30 items in the 5-factor solution using the obtained components from Table 4. The resulting PCA had a KMO of 0.78, indicating a sufficient sample size, and was significant ($p<0.000$) for the Bartlett's test of sphericity. It explained a total variance of 66.224%. This demonstrates that the correlation matrix was an identity matrix, and that factor analysis was thus acceptable for it. The calculated Cronbach alpha value was 0.86. The researchers debated and improved the final labels (i.e., construct names) for the final PCA based on the item groups and literature comparisons.

Factor one: Resistance and Accessibility of Textile Materials Used in Vehicle Seat Covers: The initial factor addressed the durability of seat cover materials in response to environmental challenges. This factor encompasses ten items, predominantly centered on resistance-associated concerns. This first factor explained 25.819% of the overall variance with an eigenvalue of 7.74. With a Cronbach alpha of 0.89, it is evident that a significant determinant influencing the choices of automotive textile by vehicle owners and operators for car seat covers is the material's resilience, particularly against acidic substances and other solvents. According to a study, synthetic leather (PVC) and woven materials used in vehicle textiles did not exhibit any surface alterations during an abrasion resistance test. Because of their composition and finishing techniques, this suggests that these textiles have good resistance [19][28][29]. According to a different study, the abrasion resistance of the upholstery fabric for car seats is a crucial factor in determining its suitability [9].

Factor two: Seat Cover Textile Durability: The second factor comprised six items detailing the automotive textile's capacity to withstand wear and tear, pressure, and damage over an extended period. This factor had an eigenvalue of 2.91 which explained 9.694% of the overall variance. The Cronbach's alpha was calculated to be 0.82. The result showed that durability of the textile, particularly peeling and folding-off for leather materials, was the second factor buyers took into account when choosing automotive textile car seat coverings. Durability is influenced by various aspects, including whether the vehicle is utilized for private or commercial functions. As per earlier research, knitted fabric emerges as the most resilient automotive textile. This fabric, characterized by a consistent weave where both the weft and warp consist of identical threads, minimizes the impact on seam degradation during cut-off due to its orientation [20].

Factor three: Quality of Textile Materials for Vehicle Seat Covers: This factor, which described the quality of the automobile textile, was composed of five items. The factor had an eigenvalue of 2.79 and accounted for 9.131% of the overall variance. Cronbach's alpha was calculated to be 0.78. The third factor suggests that consumers prioritize quality, considering aspects such as resistance to tearing, heat retention, and issues like thread loss or fraying. Furthermore, this factor encompasses the deterioration and bending out of shape of the automotive textile. Drawing from the extant literature, [21] defines quality in the apparel industry as a product free from issues such as staining faults, sewing anomalies, fabric defects, discrepancies in size measurements, mismatches in colour or stripe patterns, and cutting errors. This finding underscores that quality stands as a pivotal consideration in the selection of automotive textiles for vehicle seat covers. Specifically, phenomena like peeling or fraying serve as crucial quality benchmarks for consumers when choosing these materials.

Factor four: Public Perception of Domestically Produced Vehicle Seat Cover Materials: This particular factor consists of four items detailing customer perceptions regarding automotive textiles used for seat covers. It registered an eigenvalue of 2.38, representing 7.946% of the total variance, with a Cronbach alpha coefficient of 0.80. This dimension captures the diverse viewpoints customers hold concerning seat covers crafted from local automotive materials. Based on the findings, there's a prevailing sentiment among customers that locally-produced seat covers are both more user-friendly and aesthetically pleasing. This preference may stem from the flexibility of locally-made covers to be readily customized to cater to individual customer requirements.

Factor five: Aesthetics of Vehicle Seat Cover Textiles: This dimension encompasses five elements associated with the visual appeal of car fabrics. It represents 5.728% of the overall variance and has an eigenvalue of 1.72. The determined reliability coefficient, Cronbach's alpha, for this dimension is 0.81. The results show that customers ranked aesthetics as the 5th factor when selecting automotive textiles for vehicle seat cover. Hari (2020) posits that aesthetics comprises features including designs, forms, texture, denier (the fibre's thickness), luster (the fibre's shine), and colour (its dyeing capacity). Concurrently, [22] expand this understanding of automobile textile aesthetics to encompass fragrance, a factor they found to significantly impact market demand and competitiveness. Consequently, this element also plays a pivotal role in determining the choice of textiles for automotive seat covers.

E. Perception of Locally Fabricated Car Seat Covers and Customer's Influencing Factors Measurement Model

Reliability and Validity Analysis

The reliability of the constructs was measured using the Cronbach's Alpha and Composite Reliability (CR) which were ≥ 0.70; suggesting a strong internal reliability and thus satisfactory and reliable constructs (Table VI). Construct validity was carried out to assess whether the scales measured the concept intended to measure in the study. The Average Variance Extracted (AVE) was > 0.50; an indication of an acceptable criterion and thus fulfilling convergent validities.

Table VI: Reliability Assessment of Constructs

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Aesthetics (A)	0.725	0.835	0.631
Durability (D)	0.772	0.825	0.573
Economy (E)	0.73	0.881	0.788
Material (MT)	0.824	0.895	0.74
Perception (PC)	0.84	0.895	0.682
Safety (S)	0.824	0.918	0.848

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To determine the distinctiveness of the constructs, a discriminate validity was carried out using the [23] Criterion (Table VII). It was observed that square root of the AVE values for the constructs were greater than the correlation with all other constructs.

Table VII: Discriminant Validity by Fornell and Laker Criterion

Constructs	Aesthetics	Durability	Economy	Material	Perception	Safety
Aesthetics	**0.794**					
Durability	0.216	**0.61**				
Economy	0.315	0.516	**0.888**			
Material	0.43	0.416	0.536	**0.86**		
Perception	0.173	0.322	0.414	0.21	**0.826**	
Safety	0.334	0.363	0.555	0.662	0.19	**0.921**

Figures bolded on the diagonal show the square root of the AVEs; figures below the diagonal are the construct correlations *Structural Equation Modelling (SEM)*

The SEM was done to determine the relationship between the perception variables and influencing factors. The Variance Inflation Factor (VIF) analysis indicates that the model did not have any co-linearity since all the VIF values were below 4 (Table VIII). Table VIII and Figure 2 show the path coefficients (i.e., standardized beta (ß)) and path diagram to examine the hypothesis of vehicle seat cover customers perception of locally fabricated seat cover. The computed values were between -1 and +1, where a higher absolute value indicates a stronger predictive relationship between the constructs. It was observed that three constructs (i.e., Aesthetics, Durability and Economy) has positive signs showing a positive influence on the perception construct (For instance, if Aesthetics increased and perception also increased). These influencing factors were statistically significant. This implies that vehicle seat cover customers consider economy, aesthetics, and durability as first, second and third factors respectively which influence their perception of a locally fabricated vehicle seat covers.

Two of the construct's paths (i.e., Material=>Perception and Safety=>Perception) had negative standardized beta values with Material => Perception not statistically significant. This implies that the type of materials being used for fabrication of vehicle seat covers do not have any influence on how seat cover customers perceived local upholstery artisans. The path diagram generated based on 10,000 bootstrapping samples is illustrated in Figure 2. The adjusted $R^2 = 0.4338$ value was obtained in the study, an indication of moderate predictive power. Computed adjusted $R^2 \approx 0.25$, $R^2 \approx 0.50$ and $R^2 \approx 0.75$ are considered to have weak, moderate and substantial predictive powers, respectively [24]. The Q^2 value shows the PLS predictive relevance where if the computed Q^2 value is greater than zero (> 0) indicate a meaningful prediction. The Q^2 computed in this study was 0.878 indicating that the PLS model was relevant in predicting some relationships between the exogenous and endogenous constructs.

The Standardized Root Mean Squared Residual (SRMR) value was used to measure the model fitness. The SRMR value obtained (SRMR = 0.072) was higher than the acceptable value for a good fit model of less than 0.08. This suggests that the PLS model has a weak fitness.

Table VIII: Structural Model Results

Path	β	t-values*	p-values*	VIF
Aesthetics=>Perception	0.059	2.38	0.017	1.48
Durability => Perception	0.157	5.72	0.000	1.66
Economy => Perception	0.372	10.238	0.000	1.75
Material => Perception	-0.032	0.842	0.400	1.96
Safety => Perception	-0.072	2.038	0.042	1.96

*Note: SRMR = 0.072; Q^2 = 0.878; Adjusted R^2 = 0.4338 *Based on 10,000 bootstrapping samples*

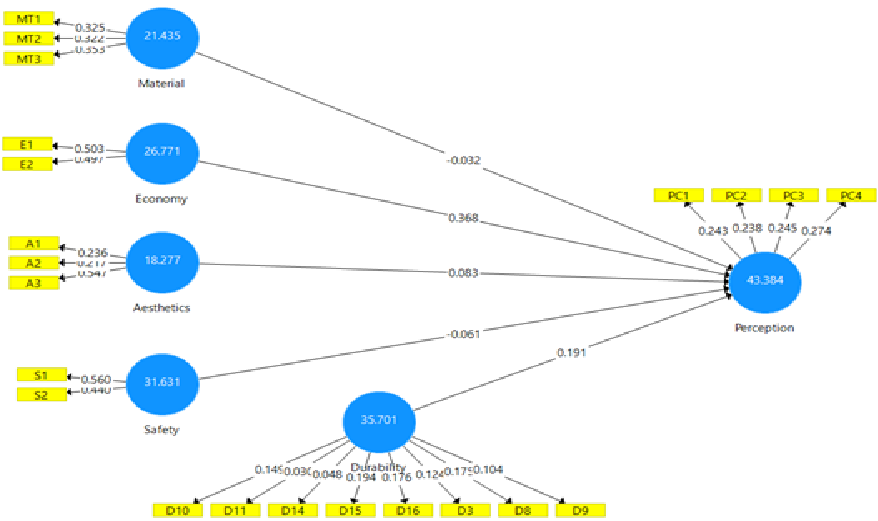

Figure 2: Structural Model Results Based on 10,000 Bootstrapping Samples

IV. CONCLUSION

Car seats are a crucial component of a car's interior since they serve as the main point of interaction between a human (the driver) and a machine. The seats are commonly covered and safeguarded using automotive materials like textiles or leather. Nevertheless, customers (i.e., drivers) who commonly request automotive textile materials consider a number of variables before making their decision. This paper discusses the variables that influence the selection of a textile for car seat coverings. Five primary dimensions were discerned through factor analysis, namely: textile resistance and accessibility, durability, quality, perception, and aesthetics. These dimensions crucially affect the selection criteria for automotive seat cover textiles. Indicators of the items' internal cohesion (with a Cronbach alpha value at 0.87), adequacy of the sample size (KMO standing at 0.78), and the significance of Bartlett's test of sphericity ($p<0.000$) all exhibit commendable results. In general, a total variance of 66.224% was explained by the final PCA. The factor analysis suggests that before making a purchase, consumers of car seat vehicle textiles prioritize textile resistance to environmental factors. According to this implication, customers would then evaluate whether the automotive textiles will be resistant to abrasion, acids, and other solvents that are expected to come into contact with the textile. The durability of the automotive textile in terms of usage comes next. This demonstrates the durability of the automotive textile. Quality, perception, and aesthetics were ranked third, fourth, and fifth on the customers' priority list, respectively. This study demonstrates that consumers of automotive textiles will undoubtedly consider a few important factors before making a purchase. The study unequivocally demonstrates that in order to increase productivity, automotive textile producers should concentrate on the aforementioned aspects while manufacturing automotive textiles. Additionally, the SmartPLS has a fair amount of prediction power for models with inadequate model fits, identifying affordability, attractiveness, and durability as the first, second, and third characteristics, respectively, that affect how customers perceive locally made seat covers. This suggests that purchasers for car seats believed that when local upholstery artisans produced car seat coverings, customers took into account the cost (economy), the aesthetics of the end product, and the longevity of the seat cover.

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