International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 3 Volume No.7 May - June – 2023
DOI:10.46647/ijetms.2023.v07i04.023 ISSN: 2581-4621

An assessment of comfortable sports Shoe in terms of MD [material + design] factors

Ms. Priyanka Lamba[1] , Prof. (Dr). M.K.Nair[2]
[1]*Assistant Professor, Fashion & Design, SGT University, Gurugram, Delhi-NCR,India*
[2]*Professor& Dean, Fashion & Design, SGT University, Gurugram, Delhi-NCR,India*

Abstract: The objective of this study was to identify the comfortable sports shoes which are available with the participants and investigate the reasons for the comfortable sports shoes. Forty-five Delhi-national capital region Indian youth males participated in the study. A one-on-one discussion was conducted to fill the experience survey questionnaire. The questionnaire consists of two parts. First part consists of demographic details and second part includes the choice factors, but the comfortable factors [choice F1-F9] was mentioned by the participants and even scaled by them on the five point likert scale. Their sports shoe was found most comfortable and least comfortable mainly on the basis of utilitarian experience. The good comfortable shoes have the qualities like good material (M) and nicely designed (D).i.e. MD factors.
Keywords: Shoe, Sports, Comfort, Design. Material, Value.
Relevance to design practice: Participants encounter the sensation or character tics of comfort sports shoes. This comfort sports shoe reasons may help the sports shoe designers to designing in a better way.

Chapter – I : Introduction

Shoes refers to garments worn on the feet, which originally serves to purpose of protection against the environment, usually regarding ground textures and temperature etc.

Nearly more than 15,000 years ago the 'ice-man' wrapped animal skin and fur on his feet to protect from hard environment. Brian (2009) stated that style and material drive the shoe/footwear into higher level. The demands of the consumers increased day by day. Actually the sole height or heel height raised to keep the feet away from the dirty street in the earlier era, but slowly it was becoming modern or call it style.

The design of the older period styles coming back again like the toe area has the extra lengthy in shoes are called designer shoe. Shoes of different parts the basic style is similar and material, heel height, colour, making combination may vary. It may be due to the cultural influence and modern technology. In China, usually wear the small size of footwear/shoes and they believe in that small shoe makes the feet small and it denotes the person belongs to good family. If anybodies having big size of feet, their marriage getting delayed or not even getting marriage.

Charlotte (1997), coated that shoes are being used as a social status. According to the shoe the social status differs visibly. In Egypt shoes are used as ornaments and insignia of power. Secondary reason to use the shoe wearing is for feet protection.

Holbrook (2001) indicated that shoe are the symbol of status in Romans. The high class family wear the shoes and barefoot depicts as a symbol of poverty. Remaining the shoe before entry into the worship places and not used inside the home etc., are the traditional values maintained by them. This traditional values still followed by different regional communities.

Modern shoes are usually made up of leather, plastic, rubber etc. Shoes have the comfort ability while using and what makes comfort especially while using the shoes? Which shoes are more comfortable and why? Is the research question for this study and know further for the investigation or findings on the shoe consumers?

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 3 Volume No.7 May - June – 2023
DOI:10.46647/ijetms.2023.v07i04.023 ISSN: 2581-4621

Chapter – II: Literature Review

Elvin and Hekkert (2001) states that material is the base of the any product and its quality. The feel, softness or shape can be created on the basis of material. As the modern scenario, the consumers are quality conscious rather that cost conscious. The quality directly promotes the long lasting of the product. Certain kind of materials are specifically utilized for footwear because it keeps the feet dry and free from odor. Eg. Gore-tex. Endo & Kincade (2005) described that the manufacture must know and understand the costume approach and their actual needs. Once the manufacture understand the level of satisfaction is the great success of the product business. Maintaining good relationship with the customers also makes the business success. The manufactures should know how to reduce the cost and increase the quality of the footwear. Porter (1985) expressed that business on footwear required two factors. These factors are basic and advanced. Basic factors are raw materials, labor, resources, location, capital investment and availability. Advanced factors are modernized equipments, infrastructure and technically skilled persons. Yoshimura and Yonagi (2001) said that minimum level of design would be implemented on the product and try to bring the cost down always. Among the product feature factors style is very important for the product as it attract the customer more.

Schmitt and Simonson (1997) said that the overall outlook of the shoe makes the customer appeal towards the shoe. Hence branded companies maintain the products ranges in a particular and similar outlook. This uniformity forces the customer approach into all similar products. Eg. Form, color and style. Duff (1999) examined that the footwear purchasing customers have extra conscious on style, fit and feel of the product compare to other product purchases. It may be possible according to the demand requirements and circumstances of attires.

Chapter – III: Research Methodology

The reviews revealed on different findings but none of the study found yet on comfortable sports shoes on the basis of MD factors especially in Delhi capital region upon this research paper would fulfill the gap.

3.1. Objectives

- To identify the most comfortable sports shoe among the sports shoes which is available with the participants.
- To investigate the most important influencing factors for the comfort of the sports shoes.

3.2. Participants

Forty-five Delhi-national capital region youth males with ages ranging from 15 to 25 years participated in the experience survey. Their weight ranged from 40.5 to 68.0 kg. Among these participants none of the participants had any foot or lower limb injury. The participants were required to bring their domestic branded sports shoes (at least four sets of sports shoes) for the experience survey study.

3.3. Experience Experiment Survey

A one-on-one interaction was conducted focusing on the participant's comfort sensation experience by laddering techniques/treadmill walk after wearing the sports shoes. The participants asked to wear each set of sports shoes one by one and walk on the treadmill for about 2 to 3 minutes at a 10 to 15 mints pace/gap. The participants should sit comfortably after finished the treadmill walk to fill up the experience survey questionnaire.

In the questionnaire part-I consists of demographic details and part-II consists of closed ended questionnaire on the basis of five point likert scale. The comfortable shoes rated by the participants. The experience of comfort factors mentioned by the participants and scale the rate accordingly for each pairs of shoes.

3.4. Data collection

The participant asked to fill the questionnaire after the treadmill walk experience. The participants must reside in National Capital Region of Delhi. And the collected data had used for further analysis to find out the objectives.

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 3 Volume No.7 May - June – 2023
DOI:10.46647/ijetms.2023.v07i04.023 ISSN: 2581-4621

Chapter – IV: Research Findings

In Delhi capital region the experience survey conducted on 45 men's participants and the findings are as follows. Graph Table-1

4.1. Mean

Mean is what most people commonly refer to as an average. The mean refers to the number you obtain when you sum up a given set of numbers and then divide this sum by the total number in the set. Mean is also referred to more correctly as arithmetic mean.

$$\text{mean} = \frac{\text{sum of elements in set}}{\text{number of elements in set}}$$

Given a set of **n** elements from a_1 to a_n

$$a_1, a_2, a_3, a_4, \ldots . a_n - 1, a_n$$

The mean is found by adding up all the **a**'s and then dividing by the total number, **n**

$$\text{mean} = \frac{a_1 + a_2 + a_3 + a_4 + \ldots . + a_n - 1 + a_n}{n}$$

This can be generalized by the formula below:

$$\text{mean} = \frac{1}{n} \sum_{i=0}^{n} a_i$$

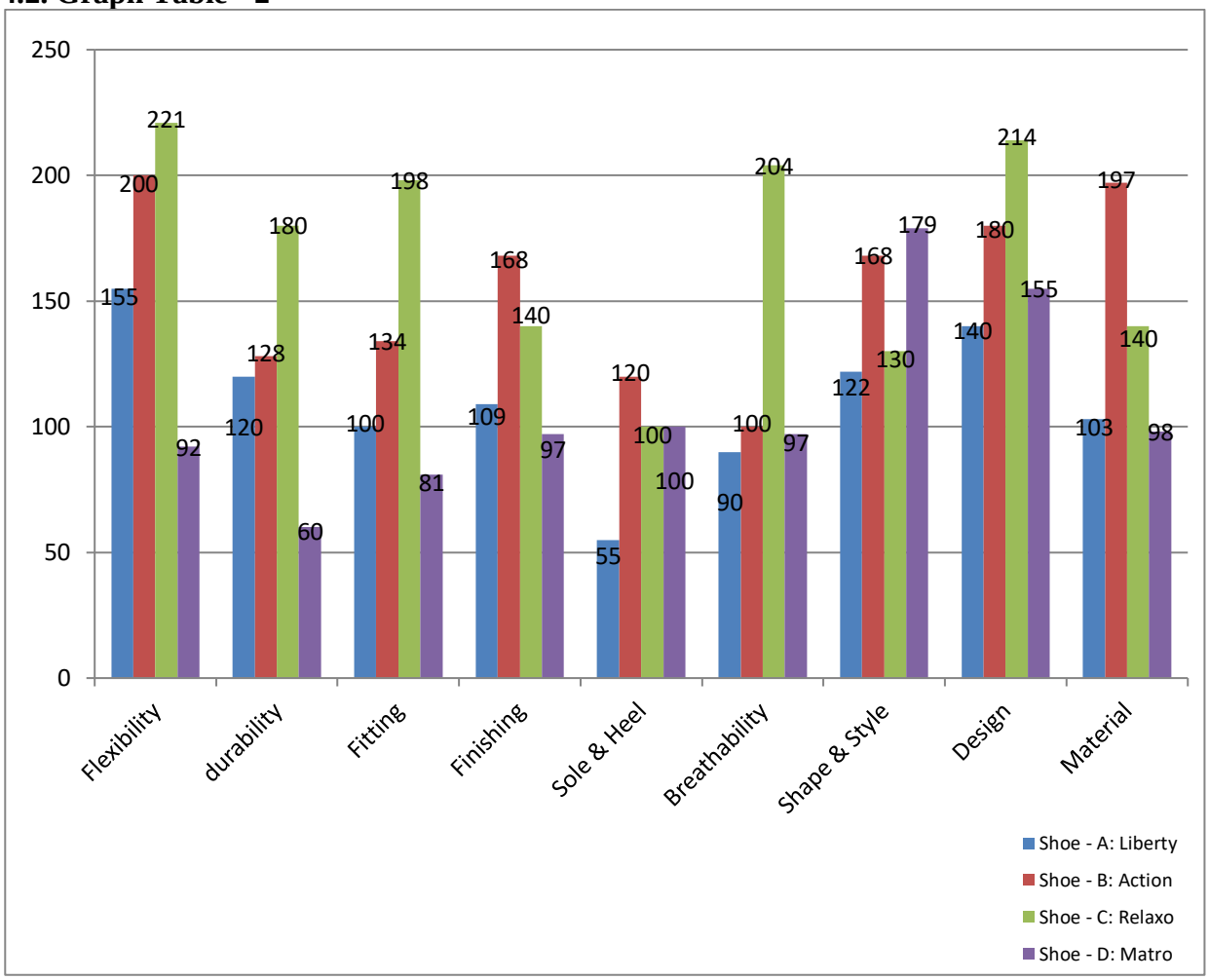
4.1 Table 1

Factors	**Brands**	**Mean**
Flexibility	A- Liberty B- Action C- Relaxo D- Matro	155 200 221 92
Durability	A- Liberty B- Action C- Relaxo D- Matro	120 128 180 60
Fitting	A- Liberty B- Action C- Relaxo D- Matro	100 134 198 81
Finishing	A- Liberty B- Action C- Relaxo D- Matro	109 168 140 97
Sole & Heel	A- Liberty B- Action C- Relaxo D- Matro	55 120 100 100
Breathability	A- Liberty B- Action C- Relaxo D- Matro	90 100 204 97
Shape & Style	A- Liberty	122

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 3 Volume No.7 May - June – 2023
DOI:10.46647/ijetms.2023.v07i04.023 ISSN: 2581-4621

	B- Action C- Relaxo D- Matro	168 130 179
Design	A- Liberty B- Action C- Relaxo D- Matro	140 180 214 155
Material	A- Liberty B- Action C- Relaxo D- Matro	103 197 140 98

4.2. Graph Table - 2



4.3. Objective -1 Comfortable Shoe

Shoe –C: Relaxo is the most comfortable shoe among the domestic branded sports shoes. Its flexibility, durability, breathability and design components rates are higher than other sports shoes. Material and sole & heel wise Relaxo placed in second position compare with Action shoe. Graph Table-1.

Shoe -B: Action is the second most comfortable shoe among the domestic branded sports shoes because its score is higher than the Liberty and Matro shoes. Action shoes material is better, good flexibility material utilized and finishing is far better than all other shoes.

Shoe –A: Liberty placed in third position comparatively. It is overall better than Matro shoe and next to Action shoes. Its flexibility is good so the durability also leads to better. Design wise not bad.

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 3 Volume No.7 May - June – 2023
DOI:10.46647/ijetms.2023.v07i04.023 ISSN: 2581-4621

Shoe –D: Matro shoes shape and style is better than all other shoes but flexibility, durability and fitting is not so better than other brands. Finishing and material is not so good and not very bad in condition. Hence it is placed at the bottom in the comfortable shoes hierarchy

4.4. Objective – 2: Most important Comfort factors

The results of this study shows that material and design plays an important role for comfortable sports shoes, i.e. flexibility, durability, fit, sole & heel are directly related to material. The comfortable shoes include fits well, made of soft material, suitable heel height, flexible while walking, absorb the jerk of body weight and treadmill impacts, good breathability. It is being viewed the comfort and non-comfort sensations through treadmill walking. In the other side shape, style, finishing and fit are directly linked with design. Hence

The material (M) and design (D) is the main factors to make a sports shoe much more comfortable. The way of molding or giving shape or designing might have the threshold of the comfort ability. Even the brands and its value differ according to the material and design. (MD factors). Without material, design cannot have the value and vice versa i.e. without design the material don't have the value in terms of brand. Table -2 shows the details.

If, Say
M-Material
D-Design
Then M+D = C
Means, Material + Design = Comfort
Material – Design = Discomfort/less comfort
Design – Material = Discomfort/less comfort

4.5. Table - 3

Material centric	Fit	Material with properly designed. This comes in both M&D factors.
	Soft material	Soft and cushion materials will absorb the jerk. Material should soft enough and design for comfort
	Sole & Heel height	Material is the base to increase or reduce and biomechanical angle.
	Flexible material	Flexible material provide more durable and comfort
	Breathability	Mesh or leather kind material providing breathability.
	Durable quality	Good stuff for durability.
Design centric	Shape & Style	Proper molding leads to good shape. The different design is uniqueness called style.
	Finishing	Giving good shape, style and over all look along with proper finishing leads to value addition of the product.

4.6. Conclusion

In the investigation of reason behind the comfortable sports shoes, almost all of the respondents indicated about the comfortable reasons but major reason is material and design (MD) factors. In the sports shoes many factors influencing the customers may have fall into material based and another

DOI:10.46647/ijetms.2023.v07i04.023 ISSN: 2581-4621

design factor. The material can be similar in all brands, but the way of design of the sports shoes get difference to each other. The material is cost effective and design is customer effective, subsequently this both leads to profitability. Understand the different materials and designs of domestic branded sports shoes and its level as per the customer perspective. The current market trend as well as the customer's real requirements in terms of design have been identified. An article may create through SWOT analysis in which the brands travelling along with competition challenges. Predictable plan may achieve profitable business. In whatever way the products are being made, that have to be launched in the Market. Ultimately the market is customer centric, they deciding the Market growth or rate. Hence this kind of experimental survey's providing a smooth helping hand to the Manufactures and even Designers.

4.7. Recommendation

- These details may help a sports shoe designer to design a comfortable sports shoes to a higher level of comfort.
- MD factors (Material & Design) experience can be applied in any of the products.
- This kind of study can be conducted in different age groups, different geographical area.
- The manufactures have the opportunity to adopt the consumer views for their profitable future plans.

Reference

1. Clark, Brian (2009). "Biodegradable. Shoes?". The Daily Green. Retrieved July 23, 2012.
2. Duff, M. (1999). Niche marketing in fashion in women's sportswear. *DSN retailing today*. Vol. 38, pp 29-35.
3. Elvin Karana and Paul Hekkert (2010) User-material-product interrelationships in attributing meanings, Delft University of Netherlands, international journal of design, Vol. 4, No.3, pp. 43-52.
4. Endo, S. & Kincade, D.H. (2005). The developing direct relationship between a manufacturer and consumers: four group cases. *Journal of fashion marketing and management.* Vol. 9(3), Pp 270-282.
5. Gazie S. Okpara., Ashm V. Anyanwu. (2011). Grappling with the enduring challenges of consumption complex syndrome in Nigeria. (a survey of the footwear industry). *International journal of marketing studies.* Vol. 3, Pp 122 – 140.
6. Morris B. Holbrook (2001), The chain of effects from brand trust and brand affect to brand performance. Journal of Marketing, 182-186.
7. Vo Ngoc Mai Anh; Hoang Kim Ngoc Anh; Vo Nhat Huy; Huynh Gia Huy; Minh Ly. "Improve Productivity and Quality Using Lean Six Sigma: A Case Study". International Research Journal on Advanced Science Hub, 5, 03, 2023, 71-83. doi: 10.47392/irjash.2023.016
8. Pravin T, M. Subramanian, R. Ranjith, Clarifying the phenomenon of Ultrasonic Assisted Electric discharge machining, "Journal of the Indian Chemical Society", Volume 99, Issue 10, 2022, 100705, ISSN 0019-4522, Doi: 10.1016/j.jics.2022.100705
9. R. Devi Priya, R. Sivaraj, Ajith Abraham, T. Pravin, P. Sivasankar and N. Anitha. "MultiObjective Particle Swarm Optimization Based Preprocessing of Multi-Class Extremely Imbalanced Datasets". International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems Vol. 30, No. 05, pp. 735-755 (2022). Doi: 10.1142/S0218488522500209
10. T. Pravin, C. Somu, R. Rajavel, M. Subramanian, P. Prince Reynold, Integrated Taguchi cum grey relational experimental analysis technique (GREAT) for optimization and material characterization of FSP surface composites on AA6061 aluminium alloys, Materials Today: Proceedings, Volume 33, Part 8, 2020, Pages 5156-5161, ISSN 2214-7853, https://doi.org/10.1016/j.matpr.2020.02.863.
11. Rajashekhar, V., Pravin, T., Thiruppathi, K.: A review on droplet deposition manufacturing a rapid prototyping technique. Int. J. Manuf. Technol. Manage. 33(5), 362–383 (2019) https://doi.org/10.1504/IJMTM.2019.103277

DOI:10.46647/ijetms.2023.v07i04.023 ISSN: 2581-4621

12. V.S. Rajashekhar; T. Pravin; K. Thiruppathi , “Control of a snake robot with 3R joint mechanism”, International Journal of Mechanisms and Robotic Systems (IJMRS), Vol. 4, No. 3, 2018. Doi: 10.1504/IJMRS.2018.10017186
13. Swathi Buragadda; Siva Kalyani Pendum V P; Dulla Krishna Kavya; Shaik Shaheda Khanam. "Multi Disease Classification System Based on Symptoms using The Blended Approach". International Research Journal on Advanced Science Hub, 5, 03, 2023, 84-90. doi: 10.47392/irjash.2023.017
14. Susanta Saha; Sohini Mondal. "An in-depth analysis of the Entertainment Preferences before and after Covid-19 among Engineering Students of West Bengal". International Research Journal on Advanced Science Hub, 5, 03, 2023, 91-102. doi: 10.47392/irjash.2023.018
15. Ayush Kumar Bar; Avijit Kumar Chaudhuri. "Emotica.AI - A Customer feedback system using AI". International Research Journal on Advanced Science Hub, 5, 03, 2023, 103-110. doi: 10.47392/irjash.2023.019
16. Rajarshi Samaddar; Aikyam Ghosh; Sounak Dey Sarkar; Mainak Das; Avijit Chakrabarty. "IoT & Cloud-based Smart Attendance Management System using RFID". International Research Journal on Advanced Science Hub, 5, 03, 2023, 111-118. doi: 10.47392/irjash.2023.020
17. Nussbaum, Bruce. (1994). Hot product: Smart design is the common thread, Journal of product innovation management. Vol. 11, Pp 78 – 79.
18. Porter Michael E. (1985). The competitive strategy. The academy of management review. Vol.10.(4), Pp 873 – 875.
19. Simonson A, Bernd H. Schmitt. (2009). Marketing aesthetics. *Simon & Schuster*. Pp 368.
20. Yoshimura and Yonagi (2001), The effect of design: Journal of product innovation management. Vol-II,p 78-79.
21. Yue, Charlotte (1997). Shoes: Their History in Words and Pictures. New York City: Houghton Mifflin Company. p. 46. ISBN 0-395-72667-0. 2016-05-27.