International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 3 Volume No.7 May - June – 2023
DOI:10.46647/ijetms.2023.v07i03.115 ISSN: 2581-4621

Deriving of ranking of design attributes of branded sports shoes

Professor (Dr.) M.K.Nair[1], Assistant Professor (Ms.) Priyanka Lamba[2]
[1]SGT University, Gurugram, India
[2]SGT University, Gurugram, India

Abstract: The objective of this study was to identify the ranking order of design attributes of branded sports shoes. Total Interpretive Structural Method [TISM] method implemented in this study. A one-on-one discussion was conducted to fill the experience survey questionnaire. The questionnaire consists of logical statements includes the choice factors F1-F6 was mentioned by the participants. On the expert's opinion of logical based statements, the level partition developed to find out the design attributes hierarchy. There are six iteration process took place to arrive the final hierarchy of design attributes.
Keywords: Shoe, Sports, attributes, Design. Material, Value.
Relevance to design practice: Participants encounter the sensation or character tics of design attributes of branded sports shoes. This order of hierarchy of design attributes of branded sports shoe reasons may help the sports shoe designers to designing in a better way.

I-Introduction

Total Interpretive Structural Modelling enables the individual or a group of them to manage the interrelations between two or more attributes at a time from the actual properties of the original issues (Morgando, 1995). TISM provides a framework for delineation of a hierarchy amongst attributes; investigate the linkages between the attributes and its influences of any project under consideration (Warfield, 1974; Sage, 1977). This kind of modelling is a useful tool that helps logical thinking for carefully approaching complex issues and then communicating the results of that thinking.
TISM is much more flexible than many conventional quantitative modelling approaches that require dimension/units to be measured on the relative influences (Sushil, 2005). Hence the TISM method was implemented on the collected data to find the objectives i.e as derivation of the order/hierarchy of design attributes in the choice selection of branded sports shoe.
A step by step process followed in TISM is shown in Exhibit-1 and explained in the following sub sections.

II - Review of Literature

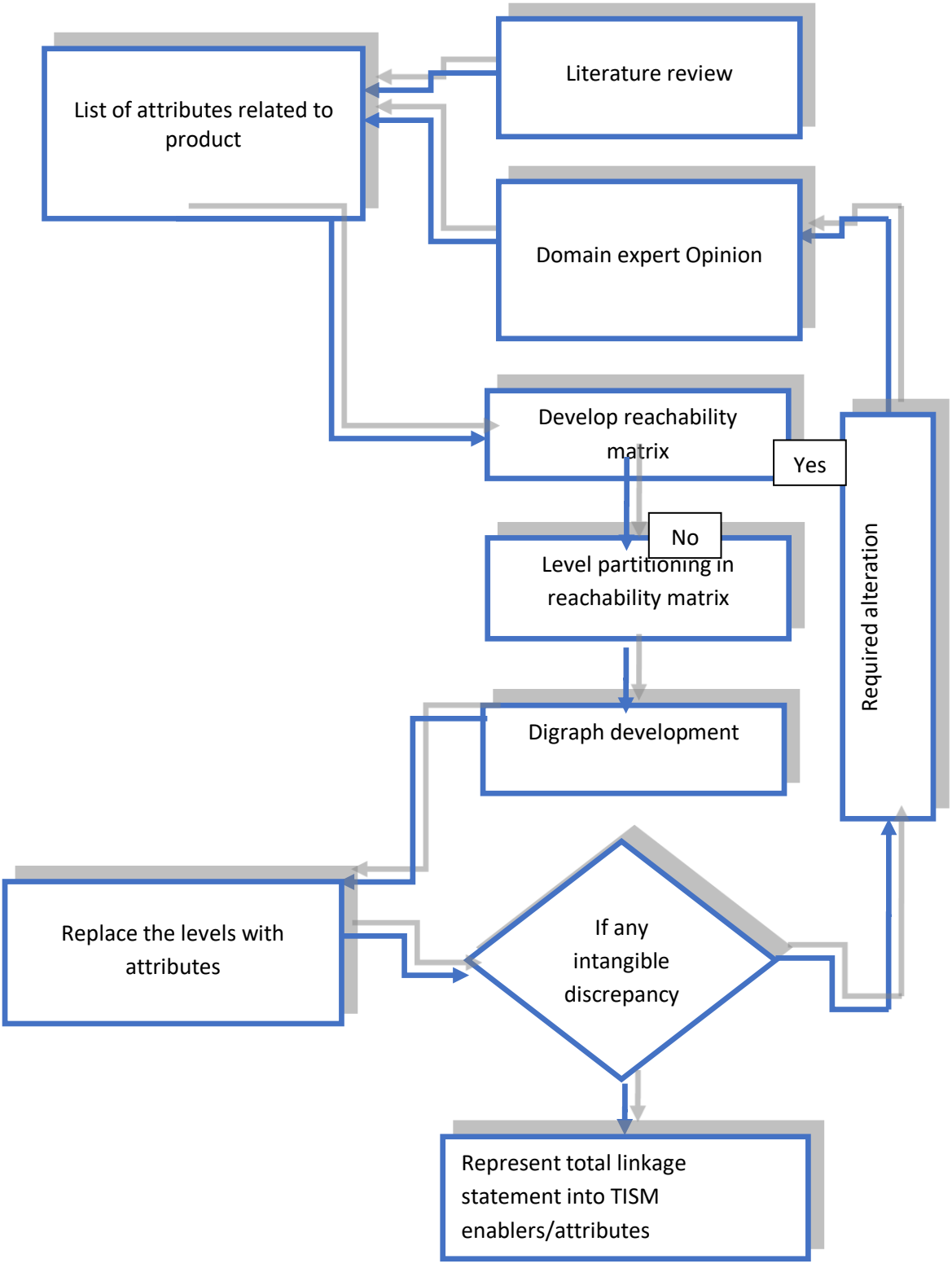
Design attributes

Design attributes such as product form and appearance are important as they serve as messengers that deliver information to customers (Nussbaum, 1994). When deciding between two products with similar prices and functions, customers tend to choose the more "aesthetically attractive" one (Creusen and Schoormans, 2005). New products with unique designs can immediately make and existing products look old fashioned and less attractive (Midgley, 1977). The product outlook expresses and strengthens the brand image (Schmitt and Simonson, 1997), Therefore, many companies attempt to maintain uniformity in using design elements such as color, form, and style.
In a study conducted in Indonesia on product design of women shoes, it was found that among the design, durability, trend and exclusivity; the product design and exclusivity had more superior in terms of design (Tyas, 2016). Omotoyo Oyeniyi in the year 2009 conducted a survey on Nigerian customers' preference towards foreign products by surveying 197 respondents. He found that the product dimensions were design, style, quality, brand and price which made them prefer foreign made products. Tantia and Krishnan (2009), found that Nike, Adidas and Reebok brands were intensifying their efforts to transform Indian customer views regarding sports shoe and its factors via durability, comfort, looks, brand, price etc, in Indian market for its overall look. Perception of customer for value creation through the product that is how well a product's utility aligns with a customers' own needs

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 3 Volume No.7 May - June – 2023
DOI:10.46647/ijetms.2023.v07i03.115 ISSN: 2581-4621

and expectations make values. Because product design encompasses translating technical solutions into products with features that enhance the value for customers (Veryzer, 1995) and it is one such firm capability that can affect firm level outcomes. From a firm perspective, design is about integrating inputs from engineers, product developers and industrial designers (Henrik Hagtvedt and Patrick, 2014) and leveraging their specific design capabilities in order to generate appropriate value creating products (Chitturi, 2015). When attributes of both function and form meet or exceed threshold values, customers' attach greater importance to the form attributes. Superior form design

Exhibit-1: Flow chart of Total interpretive structural model (TISM)



International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 3 Volume No.7 May - June – 2023
DOI:10.46647/ijetms.2023.v07i03.115 ISSN: 2581-4621

results in higher willingness to pay. Products with good form design that meet or exceed customer's hedonic needs enhance customer delight, whereas functionally superior products that meet or exceed utilitarian expectations enhance customer satisfaction. Delighting customers improves product design loyalty, as measured by word of mouth and repurchase intentions, more than merely satisfying them. According to Overmars & Poels (2015) basically, design attributes can be broadly based on the product appearance and handling or wearing the product respectively. These attributes divisions are as under.

III - Research & Methodology

Objective : To Derive the order/hierarchy of design attributes of branded sports shoes.

Step. 1. Identify the attributes: The first step in Total Interpretive Structural Modelling (TISM) is to identify the attributes. For this purpose, the design attributes are identified through expert members. The identified design attributes are style, shape, finishing, color, print, embroidery, material, texture, softness, lightweight, comfort, heel height, quality, fit and breathability. These design attributes are subsequently core categorized into Aesthetic attributes (F1), Eye catching attributes (F2), Value added attributes (F3), Physical attributes (F4), Ergonomic attributes (F5) and Functional attributes (F6).

Step. 2. Reachability matrix: A questionnaire (Appendix-1) was developed to obtain the responses of experts to find out their opinion in the influence of one core attribute on the other. A frequency distribution table (Appendix- 1) was prepared based on the data received through Appendix-1, using MAXQDA processing to find out maximum responses against the column "yes: and "no". Refer the Appendix-1.

The code of the core design attributes numbers is placed on the top row and left extreme column in the reachability matrix (gray colour shade) in Table 30. The intersection of rows and columns are marked as numerical number '1' (one), if the corresponding entry in logical based attributes paired comparison (Appendix-1), was "yes", or else it was marked as '0' (zero) in Table-1 for the corresponding entry in the logical based attributes paired comparison. Transitive is the logically transformed as "yes" by researcher and it is indicated with asterisk in Table-1: because (if) the paired comparison responses is almost equal.

Table-1: Reachability matrix

Code No	**F1**	**F2**	**F3**	**F4**	**F5**	**F6**
F1	1	1	1	0	0	0
F2	0	1	1	0	0	0
F3	0	0	1	0	0	0
F4	1*	1	1	1	1	1
F5	1	0	1	0	1	0
F6	1*	1	1*	0	1	1

Source: Primary data- expert's logical responses for TISM process

Step. 3. Level Partitioning: In the level partioning we describe three kinds of sets viz reachability set, Antecedent set, Intersection set. The reachability set shall be counted the attribute matrix (1's) row wise in the reacability matrix given in Table-1. Antecedent set can be counted the attribute matrix (1's) column wise from the same table. And the intersection set is to indicate the similar attribute matrix in both the reachability set as well as antecedent set.

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 3 Volume No.7 May - June – 2023
DOI:10.46647/ijetms.2023.v07i03.115 ISSN: 2581-4621

As a result, if the attribute matrix reached similar in intersection set and reachability set, that set is from identifying to level partitioning. In this manner the level partitioning leads through different iterations till the final level are identified.
Once the levels are identified in the level partition, that attribute and the row shall be extracted from level partition process. The level partition iterations are shown in Tables 1-7.

Table-2: Level Partition – Iteration 1

Code No	**Reachability Set**	**Antecedent Set**	**Intersection Set**	**Level**
F1	1,2,3	1,4,5,6	1	
F2	2,3	1,2,4,6	2	
F3	3	1,2,3,4,5,6	3	Ist
F4	1,2,3,4,5,6	4	4	
F5	1,3,5	4,5,6	5	
F6	1,2,3,5,6	4,6	6	

Source: Expert's logical responses under TISM process

Table-3 : Level Partition – Iteration 2

Code No	**Reachability Set**	**Antecedent Set**	**Intersection Set**	**Level**
F1	1,2	1,4,5,6	1	
F2	2	1,2,4,6	2	IInd
F4	1,2,4,5,6	4	4	
F5	1,5	4,5,6	5	
F6	1,2,5,6	4,6	6	

Source: Eexpert's logical responses under TISM process

Table-4 : Level Partition – Iteration 3

Code No	**Reachability Set**	**Antecedent Set**	**Intersection Set**	**Level**
F1	1	1,4,5,6	1	IIIrd
F4	1,4,5,6	4	4	
F5	1,5	4,5,6	5	
F6	1,5,6	4,6	6	

Source: expert's logical responses under TISM process

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 3 Volume No.7 May - June – 2023
DOI:10.46647/ijetms.2023.v07i03.115 ISSN: 2581-4621

Table-5: Level Partition – Iteration 4

Code No	**Reachability Set**	**Antecedent Set**	**Intersection Set**	**Level**
F4	4,5,6	4	4	
F5	5	4,5,6	5	IVth
F6	5,6	4,6	6	

Source: expert's logical responses under TISM process

Table-6 : Level Partition – Iteration 5

Code No	**Reachability Set**	**Antecedent Set**	**Intersection Set**	**Level**
F4	4,6	4	4	
F6	6	4,6	6	Vth

Source: Expert's logical responses under TISM process

Table-7 : Level Partition – Iteration 6

Code No	**Reachability Set**	**Antecedent Set**	**Intersection Set**	**Level**
F4	4	4	4	VIth

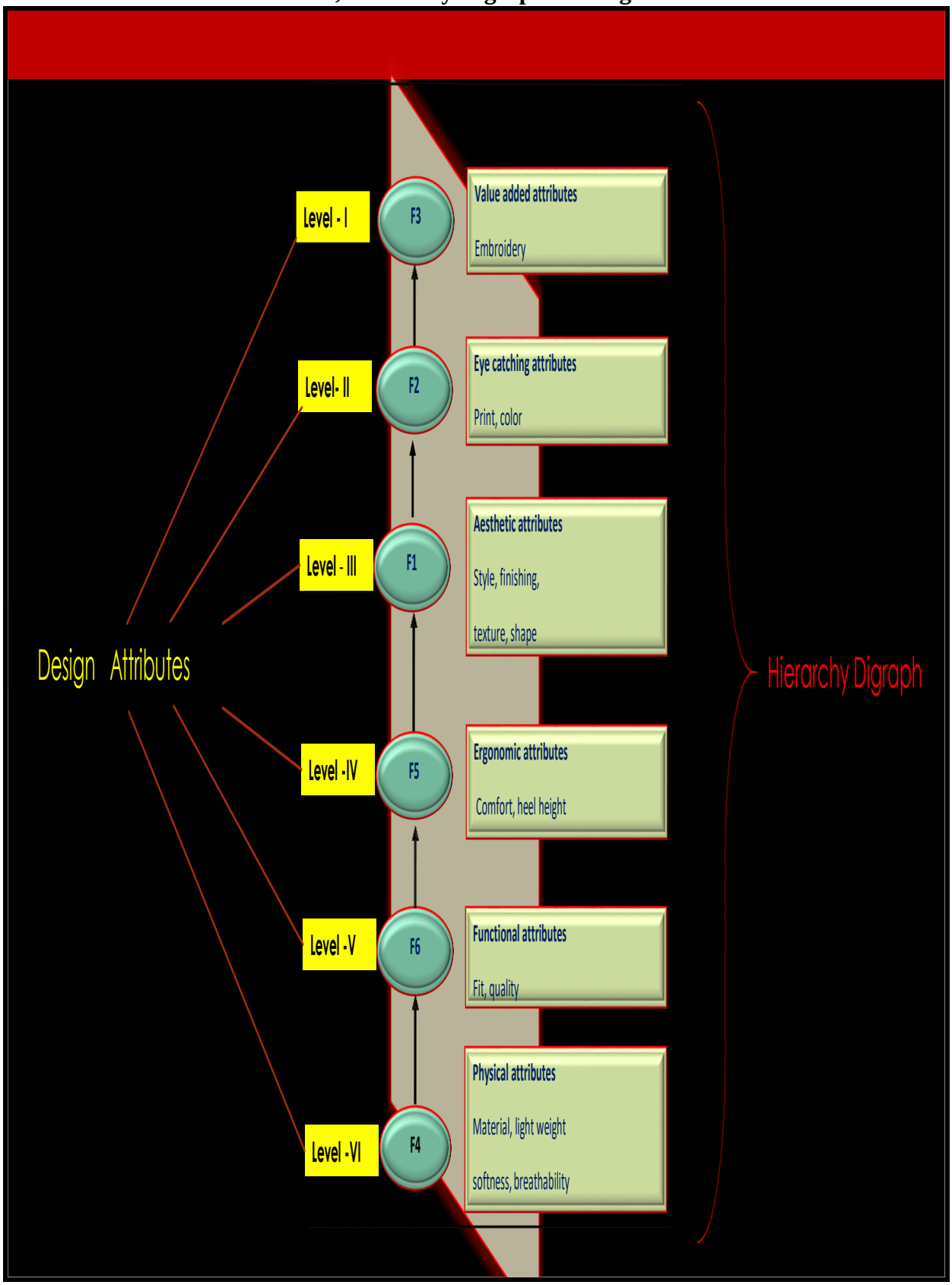
Source: Expert's logical responses under TISM process

Step. 4. Digraph development: The design attributes are arranged graphically in levels as per the hierarchy order. Digraph is used to represent the attributes and it gives information about hierarchy among the identified attributes. Tables 1-7 (iterations 1-6) shown the levels directed a digraph is developed from reachability matrix.

The hierarchy shall be arranged graphically as per the level drawn by the attributes in the level partition and is shown with an arrow directed in the digraph. This is shown in Exhibit-6.

International Journal of Engineering Technology and Management Sciences
Website: ijetms.in Issue: 3 Volume No.7 May - June – 2023
DOI:10.46647/ijetms.2023.v07i03.115 ISSN: 2581-4621

Exhibit -1, Hierarchy Digraph of design attributes



Source: Expert's responses undergone TISM process and find hierarchy digraph of le design attributes

Result: D**esign attributes hierarchy**

DOI:10.46647/ijetms.2023.v07i03.115 ISSN: 2581-4621

The level VIth physical attributes (F4) is placed at the bottom as a root or base in the design attributes hierarchy. Second position in the digraph is level Vth functional attributes (F6) and the third position is occupied by level IVth ergonomic attributes (F5). Fourth place is level IIIrd aesthetic attributes (F1) followed by the fifth position in the hierarchy is level IInd eye catching attributes (F2). And the last sixth position carried out by level Ist value added attributes (F3) which is clearly articulated in the digraph (Exhibit-6).

Conclusion of hierarchy of design attributes

As per the objective the hierarchy of design attributes of branded sports shoes identified and it is level wise arranged and the result shown that the base of the design attributes is started from Physical attributes and ends with Value added attributes as shown in exhibit-1.

Technically for the sports shoe making the very basic requirement is material. It should be light weight because the shoes carry out by the users while walking etc. Lightweight sports shoes give more comfort and allow to wear the shoe in a longer period. The allied design parameters are softness and breathability. A good soft material absorbs body jerk and sophistication. Breathability substance provide a micro comfort for the user. These all are physical components as well as very basic need for the sports shoes hence it is ranked as 1st in the hierarchy.

The 2nd ranked of hierarchy is fit and quality of functional attributes. How these physical attributes are functioning? Is it fit properly or not? is important queries in the customer mind.

Followed by functional attributes, ergonomic attributes or comfort and heel height fall in 3rd rank in the hierarchy digraph. Because the above discussed attributes must be fixed and placed properly. It is more into technological involvement to develop the high quality sports shoes.

The forth ranked Aesthetic attributes are style, finishing, texture and shape. The user expects all these attributes after satisfactory of physical, functional and ergonomic attributes. How the shoe looks wise, shape wise? Weather the shoe finishing is correctly done or not? How the texture of the shoe looks like? are the user's general views towards choice selection of sports shoe.

If all attributes satisfied the user, then the concentration moves to print and color of the shoe. It attracts the eyes of the customer and adds value to the shoe to encourage the customer for the positive chose selection.

Finally, the sixth ranked attribute embroidery additionally adding value for the sports shoe. Sometime, the unique and nicely embroidered design attract the user and due to this design, shoe appeal nice for the customer.

These, hierarchy of design attributes ranked based on expert's data. It is important to understand and appropriately using this values while manufacturing and to produce good quality sports shoe.

Reference

Chitturi.R, (2015). Design for affect: a core competency for the 21st century. Growth from Knowledge Marketing Intelligence Review (GFKMIR) Vol. 7.(2), Pp 17 – 21.

Creusen, Mairelle E.H. and Jan P. L. Schoormans. (2005). The different roles of product appearance in consumer choice. The journal of product innovation management. Vol. 22, Pp 63-81.

Henrik Hagtvedt., Patric V.M. (2014). Consumer response to over styling: Balancing aesthetics and functionality in product design. Journal of psychology and marketing. Vol. 3, Pp 518-525.

Midgley, David. F. (1977). Innovation and new product marketing, New York, John wile and Sons. Ins. Pp 17.

Morgando E.M., (1995). Extending the analysis of key issues in information technology management" Proceedings of the Sixteenth International Conference on Information systems. Amsterdam, Netherlands, December. Pp 13-216.

Nussbaum, Bruce. (1994). Hot product: Smart design is the common thread, Journal of product innovation management. Vol. 11, Pp 78 – 79.

Schmitt Bernad H. and Alex Simonson. (1997). Marketing aesthetics: The strategic management of brands. Identity and image. New York: press. Pp, 2 – 18.

DOI:10.46647/ijetms.2023.v07i03.115 ISSN: 2581-4621

Omotoyo Oeniyi. (2009). Analysis of Nigerian consumer's perception of foreign products. University petrol. Vol. LXI, StiinteEconomice. Seria. Pp 18 – 26.
Overmars, S., & Poels, K. (2015). A touching experience: Designing for touch sensations in online retail environments. International Journal of Design, 9(3), 17-31.
Sushil (2005). Interpretive matrix: a tool to aid interpretation of management in social research", Global Journal of Flexible System Management. Vol; 1., No. 1. Pp 22-32.
Tyas Ajeng Nastiti, S.T (2016). Study of Visual Perception of Woman Shoes for Product's Design Reference Case Study: Online Small Medium Enterprise, International Journal of Management and Applied Science, 2394-7926 Volume-2, Issue-9. Pp 67-72.
Tantia and Priti Krishnan, (2009) IBSCDC. Reebok vs Nike in India: Reebok's covert marketing strategies. www.ibscdc.org. pp 1 – 6.
Veryzer R.W. (1995). The place of product design and aesthetics in consumer research. Advances in consumer research. Vol. 22, Pp. 641 – 645.
Warfield. J.N. (1974). Towards interpretation of complex structural models" IEEE Transactions: Man and Cybernetics, Vol.4 No. 5, pp. 405- 417.