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Fuzzy Logic to Evaluate the Factors affecting the Promotion of Fashion Products through Social Media

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Abstract: ***A fashion product has to compete with a very challenging market, as the competitors of this sector increasing theatrically. As a consequence, some of the fashion houses in Bangladesh such as Aarong, Bishwarong have been successful to create a brand value by both physical store and social media. Now days, Social Media has been gaining popularity worldwide at a progressive growing rate. Motivated by this fact, fashion houses adopt different approaches of promoting their fashion products and services to consumers in order to exploit on the prominence of such websites. The aim of this research is to elucidate how specific features of social media websites foster user intention to browse fashion products. Utilitarian and Hedonic motivation theory provides the theoretical background on which isolated factors that contribute to product browsing on social media websites. Fuzzy analysis is preferred to prioritize the factors which have significant impacts on promotional activities through social media.***

Keywords: Social media, Promotional activities, Utilitarian motivation, Hedonic motivation, Fuzzy

1. Introduction

Fashion is a multifaceted approach that can be linked to a range of sociological, cultural, psychological and commercial perspectives. Fashion trend [15] changes periodically. For the time being fashion trend changes occur in clothing, footwear, lifestyle, accessories, makeup, hairstyle as well as in body proportions. Fashion is a diacritic & manufacturing-oriented manifestation conventionally tied to the fashion season with collections. Fashion should be changed constantly and ensure that the demands are being satisfied for the consumers. The latest trends in fashion requirement to be adopted as the companies monitor the demands of the consumers and this is the most suitable way for targeting majority of customers. So, fashion industry has need to changed and advanced over time which means that to follow with the craze and trend of the youth fashion. For that reasons many fashion house or company take initiative steps for their fashion products promotions.

Promotional marketing is a communication that includes a motivation to persuade the target audience to take immediate action, thereby driving some form of brand collaboration that leads to a current or future purchase. Promotion is different from advertising and other forms of marketing in that the goal is to drive immediate behavioral modification [14]. Promotional strategies normally committed in both online and offline basis. Social marketing media works as an initial marketing adventure for online promotional marketing of fashion products. Peoples can share their products image along with detail description through different websites and applications in social media which may act as apex point for promotional campaign [12].Different apps installed in the Smartphone and computers help to find out the online based products easily. Entrepreneurs may create their own brand and open a page in Facebook or twitter, by which they can advertise or promote their own fashion goods.

Actual internet users mainly browse in websites for two four ways [17]. They are; Convenience, Information availability, Product selection, Customized advertisements. Convenience is the way by which social media sites offer for product browsing. intensions. One is Purchase and another is entertainment. Here, purchase represents Utilitarian motivation and entertainment represents Hedonic motivation [13],[16]. Utilitarian motivation mainly works on Information availability is the way by which any one can be able to know about the products detail information. Then, they will go for product selection. The choice of products differs from person to person. That's why advertisement must be customized. Hedonic motivation works on these four ways. They are; Trend Discovery, Socializing, Adventure, Authority & Status. Now a days, Trend discovery is important for motivated a customer to purchasing a product. Now social media sites are providing latest information about new trends and fashions. The ability to engage in a conversation with related peers during the browsing of products on social media sites is called socializing. Adventure depends on the degree by which a social media sites provides a novel and interesting browsing experience towards users and the sense of excitement which they get from using it. The sense of authority which users of social media obtain over the platform when browsing products. These motivations[18] make promotional activities successful throw social media. The goal of this study is that prioritize these motivations factors with the help of Fuzzy logic[19]. Fuzzy is a mathematical derivation which uses to evaluate multifactor.

2. Methodology

2.1 Data collection and algorithm:

In order to meet the objectives of this research a survey study was designed to examine the factor that affect browsing the product through social media. The questions corresponding to each of these factor were applied in a questionnaire (Appendix A) which was sent out to respondents and users of social media websites, to fill out. The questionnaire was divided into three parts, the first designed to gather information about the demographics of the sample, the second to measure the utilitarian and hedonic motivation constructs, while the third was ranked the factor that these motivations have on browsing intention and intention to purchase and information sharing intention. The questionnaire was active for a period of 7 months approximately, from December 2018 to February 2019. In total 200 responses were received and retained for further analysis.

The descriptive statistics of the dataset are depicted below, in which descriptions are presented regarding distribution of, age group, gender, spending category, educational level and frequency of social media usage (Table 1). Finally, outcomes from respondent's replies confirm recent suggestions that social media users check their accounts very frequently, thus inferring that they spend a lot of time on them.

Table 1: Sample descriptive statistics on a daily basis

Variable	Sample	Percentage (N=200)
Gender	Male	44%
	Female	56%
Education	High School	14%
	University	66%
	Post Graduate	20%
Age Group	Less than 24	37%
	25 - 34	30%
	35 - 44	18%
	45 - 54	10%
	More than 55	5%
Expense	Never Purchased online	0%
	1 – 500 taka	33%
	501 – 1000 taka	40%
	1001 – 1500 taka	10%
	1501 – 2000 taka	10%
	More than 2001 taka	7%
Frequency of social media use	Several times of a day	60%
	About once a day	20%
	3-5 times in week	12%
	1-2 times in week	8%

Furthermore, we included the option for additions of social media websites which the user used. As results indicate (Table: 2), the most popular websites among our group of respondents are YouTube, with 85% of users maintaining an active account, followed by Facebook (90%) and Wikipedia (60%).

Table 2: Social media website use

Social Media website	Numberof Users(N=200)	Percentage of user
Facebook	180	90%
YouTube	170	85%
Twitter	60	30%
Viber	120	60%
WhatsApp	100	50%
Google plus	70	35%
Slid share	90	45%
Instagram	110	55%
Gmail	120	60%

Table 3 shows the percentage value of the factor which are responsible to grow customer intention to visit product website. These factors are also having an impact on promotional activity via social media.

Table 3: Website used by social media

Construct	Sample (N=200)	Percentage value
Authority & Status (C1)	82	41%
Socializing (C2)	100	50%
Convenience(C3)	150	75%
Product selection (C4)	167	83%
Information Availability (C5)	170	85%
Customized Advertisements (C6)	76	38%
Trade Discovery(C7)	180	90%
Adventure(C8)	90	45%

2.2 Algorithm of Fuzzy Topsis

Fuzzy TOPSIS [19], [20] algorithm is used for Prioritizing the factors which have a significant impact on promotional activities by social media. This algorithm consists of 8 steps. These steps are presented in detain as follows:

Step 1: Collecting the required data containing linguistics terms. A proper scale must be chosen to represent the data. Respondents must be asked to choose the best alternative among the linguistics terms for a given question. Fuzzy numbers for the selected linguistics terms are presented in Table 4.

Table 4: Linguistic terms and corresponding Fuzzy number

Linguistic term	Fuzzy number
Low	(0.0,0.1,0.3)
Fairly low	(0.1,0.3,0.5)
Medium	(0.3,0.5,0.7)
Fairly high	(0.5,0.7,0.9)
High	(0.7,0.9,1.0)

$$D=\begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1j} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2j} & \cdots & x_{2n} \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ x_{i1} & x_{i2} & \cdots & x_{ij} & \cdots & x_{in} \\ \cdots & \cdots & \cdots & \cdots & \cdots & \cdots \\ x_{m1} & x_{m2} & \cdots & x_{mj} & \cdots & x_{mn} \end{bmatrix} \quad (1)$$

Where is a fuzzy number corresponding to the linguistic term assigned by the I the Decision Maker (DM) to the j th factor. i=1, 2…., m are the number of DMs and j = 1, 2, …,

n are the number of factors (CSFs).

Step 3 This step includes neutralizing the weight of decision matrix and generating fuzzy un- weighted matrix (R). To generate R, following relationship can be applied.

$$R=[r_{ij}]_{m*n}$$

$$r_{ij}=\left(\frac{a_{ij}}{c_j^*},\frac{b_{ij}}{c_j^*},\frac{c_{ij}}{c_j^*}\right), \quad \ldots\ldots\ldots\ldots(2)$$

Where $c^*=\max_i c_{ij}$

Step 4 Calculate the weighted normalized decision matrix

$$V=[v_{ij}]_{m*n}$$

$$i=1,2,3\ldots m \text{ and } j=1,2\ldots n \cdots\cdots\cdots (3)$$

The weighted normalized value vij is calculated as

$$\text{When } [v_{ij}] = r_{ij}*w_j \cdots\cdots\cdots\cdots (4)$$

Where $w_j$is the weight given to each decision maker. w_i= (1,1,1,1,1)$\forall j\in n$, because all the DMs are considered to have same weight for this study.

Step 5 Determine the ideal and negative-ideal solution for the CSFs

$$A^* = (v_1^*, v_2^*, \ldots., v_n^*) \quad \ldots\ldots\ldots\ldots (5)$$

$$A^- = (v_1^-, v_2^-, \ldots., v_n^-) \quad \ldots\ldots\ldots\ldots (6)$$

Since the positive and negative ideas introduced by Chen (1997) are used for the research. The following terms are used for ideal and negative ideal solution.

$$v_j^*=(1,1,1) \quad \ldots\ldots\ldots(7)$$

$$v_j^-=(0,0,0) \quad \ldots\ldots\ldots(8)$$

Step 6 Calculate the sum of distances from positive and negative ideal solution for each factor.

$$D_j^*=\frac{\sum_{i=1}^{m} d(vi_j-v_j^*)}{m}, j=1,2,\ldots n \quad \ldots\ldots\ldots\ldots(9)$$

D ($vij - v*$)is the distance between two fuzzy numbers which can be calculated using the vector algebra. For example, distance between two numbers A1 ($a1$, $b1$, $c1$)and A2($a1$, $b1$, $c1$)can be calculated as

D (A1-A2)

$$=\sqrt{\frac{1}{3}[(a_2-a_1)^2+(b_2-b_1)^2+(c_2-c_1)^2]}\ldots(10)$$

Similarly, the separation from the negative ideal solution is given as

$$D_j^-=\frac{\sum_{i=1}^{m} d(vi_j-v_j^-)}{m}, j=1,2,\ldots n \quad \ldots\ldots\ldots\ldots(11)$$

Step 7 Calculate the relative closeness to the ideal solution. The relative closeness with respect to

$A^*$is defined as

$$CC_j=\frac{D_j}{D_j^*+D_j^-}, \ i=1,2,3\ldots..n \quad \ldots\ldots\ldots\ldots(12)$$

Step 8 Prioritize the preference order based on the order of the values of C_j.

3. Numerical Analysis

3.1 Analysis of Critical Factors

Many CSFs are common to all of these studies and these factors can be utilized as base for discussion with expert of four manager in different department of Well Group Ltd. Eight CSFs were identified after pertinent literature review including studies discussed in ‘‘Introduction’’ and discussion with the experts from the Well Group Ltd. These factors are Authority & Status (C1), socializing (C2), convenience (C3), Product selection (C4), Information Availability (C5), Customized Advertisements(C6), Tread Discovery(C7), adventure (C8).

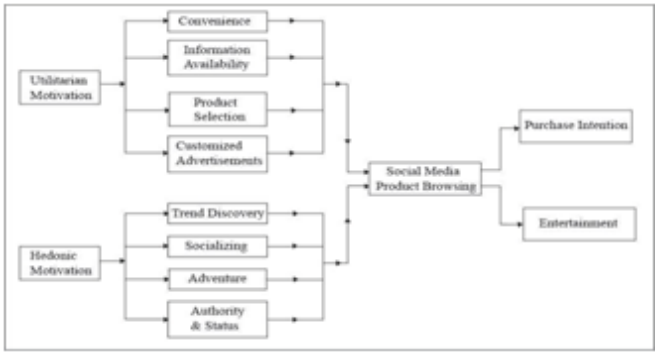

Figure: Factor that affect Promotional Activities

Table 5: Construct operational definitions

Sl	Construct	Operational Definition	Reference
1.	Utilitarian	The degree to which users perceive social media to be a useful and effective means to browse product.	[4]
2.	Hedonic Motivation	The degree to which users perceive browsing products on social media to be a fun and emotionally stimulating experience.	[4]
3.	Authority &Status (C1)	The sense of authority which users of social media over the platform when browsing products	[8]
4.	Socializing (C2)	The ability to engage in conversation with fellow peers during the browsing of products on social media.	[5],[11]
5.	Convenience (C3)	The degree of convenience which social media sites offer for product browsing	[2], [3], [9]
6.	Product selection (C4)	The selection of products found on company-hosted social media sites	[9], [11]
7.	Information availability (C5)	The amount of available information regarding products or services on social media platforms	[9], [11]
8.	Customized Advertisements (C6)	The compatibility of customized advertisements presented to users of social media based on their likings	[2], [6], [7]
9.	Tread Discovery (C7)	The effectiveness of social media sites in providing latest information about new trends and fashions	[1],[9]
10	Adventure (C8)	The degree to which a social media site provides a novel and interesting browsing experience towards users, and the sense of excitement which they get from using it	[7]

3.2 Decision maker Choosing

The fuzzy TOPSIS methodology, presented in this research paper has been evaluated in context of Well Group Ltd. Four experts from electronic companies participated in this study. Profile of the decision makers and their respective organization is given as follows and their respective organization is given as follows: First decision maker (DM1) is a marketing manager in Well

Group Ltd. Second decision maker (DM2) is an E-marketing manager in Well Group Ltd. Third decision maker (DM3) is a logistics manager. Fourth decision maker (DM4) is vice president of product development sector of same industry.

3.3 Data Analysis

Table 6: Decision matrix using linguistic variable

Factor	Decision Maker			
	D1	D2	D3	D4
Authority & Status (C1)	FH	M	FL	M
socializing (C2)	FH	M	M	FH
convenience(C3)	M	FH	H	M
Product selection (C4)	FH	FH	FH	M
Information Availability(C5)	FH	FH	M	H
Customized Advertisements (C6)	M	L	M	FH
Tread Discovery(C7)	H	H	FH	FH
Adventure(C8)	M	H	M	M

Table 7: Decision matrix using linguistic variable

	Decision Makers			
	D1	D2	D3	D4
C1	(.5,.7,.9)	(.5,.7,.9)	(.1,.3,.5)	(.3,.5,.7)
C2	(.5,.7,.9)	(.3,.5,.7)	(.3,.5,.7)	(.5,.7,.9)
C3	(.5,.7,.9)	(.5,.7,.9)	(.7,.9,1)	(.3,.5,.7)
C4	(.5,.7,.9)	(.5,.7,.9)	(.5,.7,.9)	(.3,.5,.7)
C5	(.5,.7,.9)	(.5,.7,.9)	(.3,.5,.7)	(.7,.9,1)
C6	(.3,.5,.7)	(0,.1,.3)	(.3,.5,.7)	(.5,.7,.9)
C7	(.7,.9,1)	(.7,.9,1)	(.5,.7,.9)	(.5,.7,.9)
C8	(.3,.5,.7)	(.7,.9,1)	(.3,.5,.7)	(.3,.5,.7)

Here all decision maker weight is 1 and $A*$is (1,1,1) and $A-$ is (0,0,0). So the table for Normalized fuzzy decision matrix for criteria and weighted normalized alternatives, FPIS and FNIS are same.

Table 8: Distance D_j^* for criteria

Factors	Decision Maker				
	D1	D2	D3	D4	Average
C1	.342	.525	.719	.525	.528
C2	.342	.525	.525	.342	.434
C3	.525	.342	.183	.525	.394
C4	.342	.342	.342	.525	.388
C5	.342	.342	.525	.183	.348
C6	.525	.876	.525	.342	.567
C7	.183	.183	.342	.342	.262
C8	.525	.183	.525	.525	.440

Table 9: Distance D_j^- for criteria

Factors	Decision Maker				
	D1	D2	D3	D4	Average
C1	.719	.526	.342	.526	.528
C2	.719	.526	.526	.719	.622
C3	.526	.719	.879	.526	.662
C4	.719	.719	.719	.526	.670
C5	.719	.719	.526	.879	.710
C6	.526	.183	.526	.719	.89
C7	.879	.879	.719	.719	.796
C8	.526	.879	.526	.526	.614

Table 10: Closeness coefficients (CCi) of the three alternatives

Sl	Factor	$D*$	$D-$	C	Priority
1	Authority& Status (C1)	.528	.528	.500	7
2	Socializing (C2)	.434	.622	.590	5
3	Convenience(C3)	.394	.662	.627	4
4	Product Selection (C4)	.388	.6708	.634	3
5	Information Availability(C5)	.348	.710	.716	2
6	Customized Advertisements (C6)	.567	.489	.463	8
7	TreadDiscovery(C7)	.262	.796	.752	1
8	Adventure(C8)	.440	.614	.582	6

4. Discussion

In this research customers descriptions are classified where it presented by its distribution of, age group, gender, spending category, educational level and frequency of social media usage. Only respondents that maintained at least one social media account were qualified to participate in the research. Female participation is more than the male participation in social media with respect to gender is observed, with a tendency of younger user groups being active in social media websites. The distribution of ages is justified since the vast majority of social media users also belong to these age categories less than 24 age. With respect to spending habits online, the descriptive indicate that almost all users are accustomed to purchasing, therefore exhibiting a familiarity with online purchasing. Finally, outcomes from respondent's replies confirm recent suggestions that social media users check their accounts very frequently, thus inferring that they spend a lot of time on them on a daily basis.

We included the option for additions of social media websites which the user used. Facebook, YouTube, Twitter, viber, whatsup, Google Plus, Slide Share, Instagram, Gmail are among them. As results indicate the most popular websites among our group of respondents are Facebook, with 90% of users maintaining an active account, followed by YouTube (85%) and Wikipedia (60%).

Then the research gives the percentage value of the factor which are responsible to grow customer intention to visit product website. These factors are also having an impact on promotional activity via social media. Here we get “Trend Discovery” as the most responsible factor and “Customized Advertisements” as the less responsible factor. Fuzzy Topsis method is use to ranks these factors that grow interest on user to visit product website for purchasing or getting information from it. The prioritization of CSFs was obtained and is shown in table 10. The overall prioritization of CSFs is CSF7> CSF5> CSF4> CSF3> CSF2> CSF8>CSF1> CSF6

5. Conclusion

The results of this study add to increase knowledge and open up new avenues of thinking about the impact of social media on the promotion of fashion products marketing. This view, that regards social media not only as a set of tools and applications that enable users to engage in communication with fellow users, but as an integral part of Promotional activity. The paper will aid to evaluate the reason behind why a businessman select online promotion for the fashion product & further study will help to evaluate the contribution of social media on the promotional activities of not only fashion products but also other daily products.

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