

ENGAGE, SPREAD, REUSE: HARNESSING SOCIAL MEDIA FOR ADVOCATING SUSTAINABLE PRACTICES

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Abstract:

Experiments play a crucial role in high school physics education, providing a solid foundation for establishing concepts and discovering laws in physics. Experimental teaching is an essential component of the physics curriculum, as it aids students in understanding fundamental principles, developing basic skills, and cultivating scientific thinking. Relying solely on textbook knowledge and teacher lectures is insufficient for students to thoroughly grasp and comprehend physics concepts. By incorporating physics experiments, students can effectively integrate theoretical knowledge with practical exploration, facilitating the transformation of textbook knowledge into personal understanding. This article presents a specific simulated apparatus for high school physics velocity experiments, aiming to improve the accuracy and convenience of simulating physics velocity experiments through equipment enhancements.

Keywords: Physics; Velocity Experiment; Simulated Apparatus

Abstract: The dynamic landscape of economic growth, driven by technological advancements, has ushered in a paradigm shift in production and consumption patterns. This transformation has given rise to a ubiquitous internet presence, enabling consumers to transition from passive receivers to active generators of information, largely through the emergence of social media platforms. This evolution has been documented extensively (Schlosser, 2005; Shang et al., 2006; Shao, 2009) and is rooted in the profound changes in the way individuals engage with technology and communicate. Social media, encompassing a diverse array of electronic communication channels such as social networking websites and micro-blogging platforms, serves as the primary conduit through which users establish and nurture online communities. These virtual spaces facilitate the exchange of information, ideas, personal messages, and a plethora of content (Krishnamurthy and Dou, 2008). The impact of social media has been particularly pronounced, with a monumental surge in its adoption observed in both developed and developing nations in recent years. This dramatic proliferation of social networking can be attributed to a confluence of factors. The changing lifestyle preferences of individuals, coupled with the advent of online education, have engendered a tech-savvy generation that is deeply immersed in the digital realm. Consequently, this paper explores the multifaceted influence of social media on society, economy, and technology, shedding light on its far-reaching implications.

Keywords: Social Media, Technological Advancements, Consumer Empowerment, Communication Medium, Online Communities

1. Introduction

Economic growth, change in production and consumption pattern with technology revolution has evolved the communication medium and internet getting ubiquitous with consumers' empowerment from passive receivers to active generators of information with social media emergence (Schlosser, 2005; Shang et al., 2006; Shao, 2009).

Social media is a form of electronic communication such as websites for social networking and micro-blogging through which users create online communities to share information, ideas, personal messages and other contents (Krishnamurthy and Dou, 2008). There has been an unprecedented increase in social networking both in developed and developing nations in the past few years pertaining to change in lifestyle, advent of online- education and tech-savvy generation.

Globalization has led to proliferation in economic growth enhancing cross border flow of funds, technology, merchandise and intellectual property with certain adversarial aftermath on the environment as this development is at the cost of global environmental challenges (Economy and Lieberthal, 2007; Bawa et al., 2010). With evolving environmental issues threatening sustainability of future generation, consumers' environmental concern and companies operational and strategic expedient to de-escalate the environmental downturn through embracement of clean production technology, green product stewardship and waste treatment has been stimulated (Hart, 1995).

Pertaining to environmental issues we try to elicit social media community influence in adjudicating consumers' green product purchase decisions with respect to their perceptions regarding social media site usage.

2. Theoretical Background

2.1. Technology Acceptance Model

Various theoretical models have been applied to determine internet usage including the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology, the Theory of Reasoned Actions (TRA), and the Theory of Planned Behavior. TAM (Technology Acceptance Model) has been profusely adopted in prognosticating the determinants of adoption and technology usage in various settings (Lim et al., 2008).

According to TAM and theory of reasoned action, perceived ease-of-use and information quality has been theorized to be the prime positive influencers for internet usage and acceptance attitude (Teo et al., 1999; Hsu and Lin, 2008; Lim et al., 2008).

2.1.1. Perceived Ease-of-Use

Perceived ease-of use in social networking sites refers to the extent of one's belief that operating in a particular system will be effortless, less intricate and friendly (Lin, 2007). Ease-of-use in social networking sites or media symbolizes their userfriendliness or the ease-of-operation which maximizes the likelihood of adoption or usage (Lin, 2007; Lim et al., 2008).

2.1.2. Perceived Information Quality

Continual retention of social media site users can be facilitated through usable site design, high quality features and provide precise, prompt, complete, relevant, reliable and understandable information content (Delone and Mclean, 2003; Moss et.al, 2006; Lin, 2007). Availability of high quality information will appreciate the ongoing social networking participation (Lin, 2007). The growth in blogs with information or opinions being published on various contemporary topics cites evidence of this enhanced social networking participation (Hsu and Lin, 2008). Social networks online helps in information propagation by making it incredibly easy to share and digest information on the internet (Akrimi and Khemakhem, 2012). Active participation in virtual communities on social networking sites can be enhanced through provision of quality information and user-amicable usage factor (Lin, 2007).

2.2. Social media – A marketers' Tool to Promote Consumption of Environmentally Sustainable Products

Social media has emerged as important communication channel for content creation, distribution of materials, idea sharing, expressing opinions and knowledge and information usage resulting in a power shift between consumers and traditional information producers (Denegri, 2006).

Apart from communication and information share, over time webcasting, blogging, chatting and gaming has become the essence of social media (Acar and Polonsky, 2007; Boyd and Ellison, 2008). Media has been classified into six groups - collaborative projects (Wikipedia), blogs (Green Daily), content communities, social networking sites (Facebook), virtual game worlds (World of Warcraft) and virtual social worlds (Second life) (Kaplan and Haenlein, 2010).

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Collaborative projects are websites which allow people to add or edit contents in a collective manner. Blog refer to online publications of recent events with an informal touch. Content sharing communities facilitate sharing of visual contents. Social networking sites enable individuals in socializing. Virtual gaming and social worlds are more entertainment-oriented enabling consumers to enter virtual reality. The present study has been restricted to influence blogs and social networking sites on green choice behavior.

Social media extensively influences consumer choice behavior, attitude, perception and purchase decision-making from pre-purchase information acquisition phase to post-purchase behavior phase (Williams and Cothrell, 2000; Mangold and Faulds, 2009). It connects business with consumers, building and maintaining customer relationship as customers' experience with a companies' product or service can be easily propagated in social media which may have adverse impact of the companies' value (Kaplan and Haenlein, 2010; Mersey et.al, 2010). Consumer choice behavior for environmentally sustainable products is influenced by various contextual factors like social influence, peer opinion, information from valid and reliable sources and quest for knowledge about the makes and models of green products (Sheth et.al, 1991; Bei and Simpson, 1995; Straughan and Roberts, 1999; Laroche et al., 2001). Eventually there has been escalation in number of consumers in developed countries who are taking substantive steps to reduce environmental degradation and resorting to environment friendly consumption practices (Ottaman, 1993; Laroche et al., 2001; Eriksson, 2002).

2.2.1. Social Networking Sites and its Impact on Consumers' Green Choice Behavior

Social networking via social media includes a host of on-line activities such as blogging, instant messaging, chatting, gaming and more (Boyd and Ellison, 2008). The three prominent social networking tools are Facebook for interaction; Twitter for micro-blogging and Youtube for sharing of user-generated videos (Lange, 2008; Lenhart et.al, 2010; Twitter, 2010).

Consumers' tend to devote substantive time to internet usage and social media networking (Lascu and Clow, 2008). Online social networks are groups having common interests, goals resulting in a complex matrix of associated networks (Mok et.al, 2007).

The social capital within these networks being arguably strong within certain clique sharing similar perception, attitude or belief such as green communities, negative word of mouth on the social networks about the makes, models, attributes or environmental compliance of a product could hinder the market propagation of the same . Socializing and peer opinion extensively influences consumers' environmental apprehension and green choice behavior (Sheth et.al, 1991; Bei and Simpson, 1995; Straughan and Roberts, 1999; Laroche et al., 2001).

Facebook and Twitteris often used by firms' for brand promotion, raising of capital, dissemination of business information and firms' value augmentation (Greer and Ferguson, 2001; Hanna et.al, 2011). Efficiency of social networking compared to other traditional communication channels has prompted industry leaders to emphasize companies' participation in Facebook, Twitter , Youtube in order to succeed in online environment through effective promotion in social media and strategic steps (William and William, 2008; Kaplan and Haenlein, 2010; Laroche et. al, 2012). A few corporate social networking websites enable consumers to exchange information of their experience with the companies' offerings thereby helping the organizations to incorporate the suggestions in their strategic action plans for both retention and creation of customer base. Information, socializing, entertainment, selfactualization being the major consumers' gratifications leading to unprecedented acceleration in social media usage among them, subsequently opening avenues of business opportunities in the form of marketing research, sales promotion, firms' value augmentation, dissemination of information among consumers' and influencing their behavior (Greer and Ferguson 2001; Stafford et.al, 2004; Krishnamurthy and Dou, 2008; Shao, 2009; Lukas , 2013).From the above discussion the following hypotheses can be deduced:

H1a. Perceived ease-of-use positively influences social networking through social media.

H1b. Perceived quality of information on social networking sites positively influences social networking through social media.

H2a. Social networking leverages green consumption and green purchase behavior.

2.2.2. Green Blogs and its Impact on Consumers' Green Choice Behavior

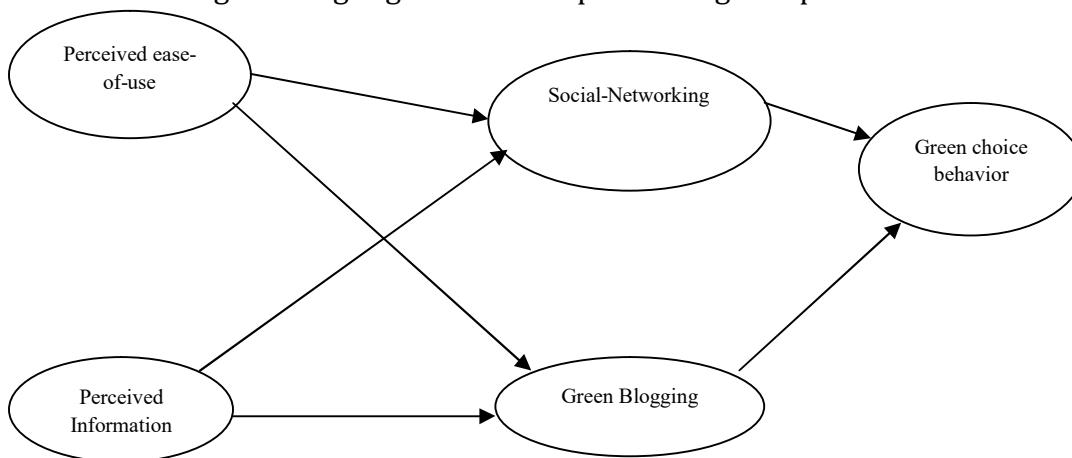
Blogs encourage and update consumers to explore new activities or habits like food or fashion blog. Many companies manufacturing consumer goods are offering their products to popular bloggers, hoping to enhance users' positive apprehension towards such products. Some popular environmental or green blogs promoting sustainable consumption and lifestyles includeTreehugger

(<<http://www.treehugger.com/>>) which is defined as a new online green space focusing on environmental news, environmentally-compatible products and events; the Daily Green, Smart Planet ,Green Thinkers (<<http://www.greenthinkers.com/>>), HippyShopper(<<http://www.hippyshopper.com/>>),Inhabitat (<<http://www.inhabitat.com/>>) and Alternative consumer(<<http://www.alternativeconsumer.com/>>) are other comprehensive consumer-centric online blogs fostering sustainable consumption by providing perpetual information about going green, green product stories, news, reviews and features. The Eco-Tech Daily provides information on sustainable developments, green energy and green tech.The aftermath of consumer led environmental blogging being power transposition from marketers to consumers fostering enhanced environmental disclosure, awareness and compliance and environment-friendly consumption (Luck et.al, 2009).

From the above discussion the following hypotheses can be deduced:

H1c. Perceived ease-of-use positively influences green blogging through social media. H1d. Perceived quality of information on green blogs positively influences green blogging through social media.

H2b. Green Blogs leverages green consumption and green purchase behavior.



The Hypothesized Model

3. Research Methodology

3.1. Data Collection and Sample Selection

The sample of this study consisted of 484 employees of five Multinational Information Technology companies working at the Eastern zone Head office in India. This professional group was selected pertaining to their involvement in software development and extensive social media usage. The data was collected through the use of structured questionnaires in an online platform. An invitation to participate in the study along with the survey questionnaire was emailed to the individuals. Two-weeks after the initial email was transmitted, follow-up email was sent urging the respondents to complete the survey. A total of

223 questionnaires were received, resulting in a response rate of %. Of the returned questionnaires, 201 surveys were complete and thus were able to be used for the analysis.

3.2. Measurement Items

The items in the measurement instrument aimed to measure consumers' social media usage perceptions; social networking perceptions, perceptions about greenblogs and green choice behavior.

The first part of the questionnaire consisted of general demographic questions like Gender and Qualification of the respondents followed by assessment of social networking site (Facebook, Twitter and Youtube) visit or social networking perceptions made through multi-item measures adapted from previous studies and developed to capture the dimensions of attitude towards social networking sites based on a five point scale ranging from *not at all* [1] to *quite a lot* [5].

The measurement items for perceived ease-of-use were adopted from Davis (1989) depicting respondents' agreement or disagreement with the multiple statements measured on a five-point likert scale ranging from *strongly disagree* [1] to *strongly agree* [5].

The items of perceived information quality were measured on a five point likert scale where the respondents were asked to express their level of agreement or disagreement on a scale of 1 to 5, [1]= *Strongly disagree*, [2]=*Disagree*, [3]=*Neutral*, [4]=*Agree*, [5]=*Strongly Agree*.

The third part measured consumers' green choice behavior based on a fivepoint likert scale, items being derived from attributes of ecologically conscious consumer behavior, represented by [1]=*Strongly Disagree*, [2]= *Somewhat disagree*, [3]=*Neutral*, [4]= *Somewhat agree*, [5]= *Strongly agree*.

4. Analysis and Results

4.1. Measurement Model

An exploratory factor analysis was employed for identification of the underlying dimensions in scale. All the items had factor loadings higher than 0.50 much higher the minimum threshold value of 0.40 (Ford et.al, 1986). The Cronbach's Alpha coefficients range between 0.91 and 0.68. All of them being higher than 0.60 and close to 0.70 or above, confirms good reliability of the data among attributes within each dimension.

A Structural Equation Modeling from a confirmatory perspective was applied to test the model fit, reliability and convergent validity of the proposed model to assess the impact of social media usage perceptions on social networking and green blogging and subsequent effect on green choice behavior. Data analysis was done through the application of AMOS 20.0. The overall model fitness was assessed with the help of multiple fit indices (Table 1).

The absolute fit indices used to evaluate the overall model include ChiSquare/df (CMIN/df) statistics of 1.677 indicates good fit along with other fit indices; the Root Mean Square Error of Approximation (RMSEA) value of 0.058 was used as the major misfit index, being less than 0.10 indicates good fit and the goodness-of-fit index (GFI) of 0.899. Comparative fit index (CFI) is an incremental fit index used to calculate improvements over competing models having a value of 0.946 suggests good fit as well. This model provided smaller values for Consistent Akaike's information criteria (CAIC) than the saturated and

independence models. The incremental fit index (IFI) of 0.946 and parsimonious normed fit index (PNFI) 0.749 implies a good fit to the data as well. Thus the indices suggest reasonable model fitness for the measurement model for effective estimation and interpretation of the parameter estimates. Table 2 reports the model properties of the five constructs. The significant standardized factor loadings derived from exploratory factor analysis demonstrated convergent validity and Cronbach's alpha value signified internal consistency (Chen, 2013). The Cronbach's Alpha coefficients range between 0.91 and 0.68. All of them being higher than 0.60 and close to 0.70 or above, confirms good reliability of the data among attributes within each dimension.

Discriminant validity was measured using AVE (Average Variance Extracted) were by the criteria of AVE for each construct being close to 0.50 or above (Chen, 2013) was satisfied. The inter-construct correlation matrix (Table 3) demonstrated that the Average Variance Extracted (on the diagonal) for each construct was higher than the corresponding square of the inter-construct correlations. Thus the measures discriminant validity has been validated.

Table 1: Goodness of fit statistics of the structured model

Index	Value	Recommendation*
Chi ² /df	1.677	<2
RMSEA	0.058	<0.10
CAIC	481.130	Saturated Model=1077.865 Independence Model=1872.101 Best fit if less than both
GFI	0.899	>0.90
CFI	0.946	>0.90
IFI	0.946	>0.90
PNFI	0.749	>0.50

*Tseng et.al, 2013

Table 2: Properties of the Model

Items	Loadings	AVE	Alpha
GBL	0.49	0.72	

Green blogging enhances my online communication skills and environmental knowledge.	0.75		
Green blogs provide useful information on environment, sustainable products and living.	0.70		
I often participate in green blogging to spread awareness on environmental issues and sustainable consumption practices.	0.64		
I always visit green blogs and post comments to spread environmental awareness.	0.70		
GCB	0.49	0.69	
I care about buying environmentally friendly domestic and personal products.	0.68		
I don't buy products that cause potential damage to the environment.	0.69		
Being exposed to two alternatives, I buy the one less harmful to environment.	0.69		
I purchased more expensive energy efficient electronics.	0.74		
PIQ	0.51	0.68	
I find social media as a reliable source of information.	0.78		
Information on the social networking sites are authentic, appropriate and current.	0.52		
I find blogs as a valid source of information on various current issues.	0.81		
EOU	0.77	0.91	
I find it easy to use the social media sites.	0.90		
Social media sites can be explored easily.	0.87		
It is easy to acquire the skills necessary for social media site access.	0.87		
I feel social media sites can be operated with ease.	0.88		
SNW	0.59	0.79	

Social networking enhances my online communication skills and performance. 0.77

Social networking provides useful information. 0.72

Social networking is enjoyable and exciting. 0.81

GBL [Green Blogging]; GCB [Green choice behavior]; PIQ [Perceived Information Quality]; EOU [Perceived Ease-of-use]; SNW [Social networking]

Table 3: Inter-Construct Correlation and Square of Correlation Coefficient

Constructs	GBL	GCB	PIQ	EOU	SNW
Green Blogging	0.49	0.09	0.14	0.05	0.003
Green choice behavior	0.299**	0.49	0.07	0.03	0.002
Perceived information quality	0.373**	0.268**	0.51	0.02	0.001
Perceived ease-of-use	0.232**	0.177*	0.127	0.77	0.19
Social networking	0.061	0.047	-0.039	0.439**	0.59

GBL [Green Blogging]; GCB [Green choice behavior]; PIQ [Perceived Information Quality]; EOU [Perceived Ease-of-use]; SNW [Social networking]

4.2. Path Analysis

The model tries to prognosticate consumers' attitude towards products with green credential under the impact of social media in the form of social networking and green blogging motivated by social media usage

perceptions. The standardized regression coefficients are depicted in Table 4. The squared multiple correlations (R^2) explaining the percentage of variance in green choice behavior of 0.180 is explained by social networking and green blogging. The perceived ease-of-use and perceived information quality as social media usage perceptions explain 35% and 48% variance in social networking and green blogging. A path is considered to be significant if the tvalue exceeds ± 1.96 at 0.05 significance level. Four out of six hypotheses have been significantly supported as being shown in Table 4 and Figure 1.

Table 4: Standardized Regression Estimates

Path	Estimate	p-value	Results
EOU \rightarrow SNW	0.58	0.000***	H1a is supported
PIQ \rightarrow SNW	-0.12	0.116	H1b is not supported
EOU \rightarrow GBL	0.25	0.000***	H1c is supported
PIQ \rightarrow GBL	0.65	0.000***	H1d is supported
SNW \rightarrow GCB	0.03	0.694	H2a is not supported
GBL \rightarrow GCB	0.42	0.000***	H2b is supported

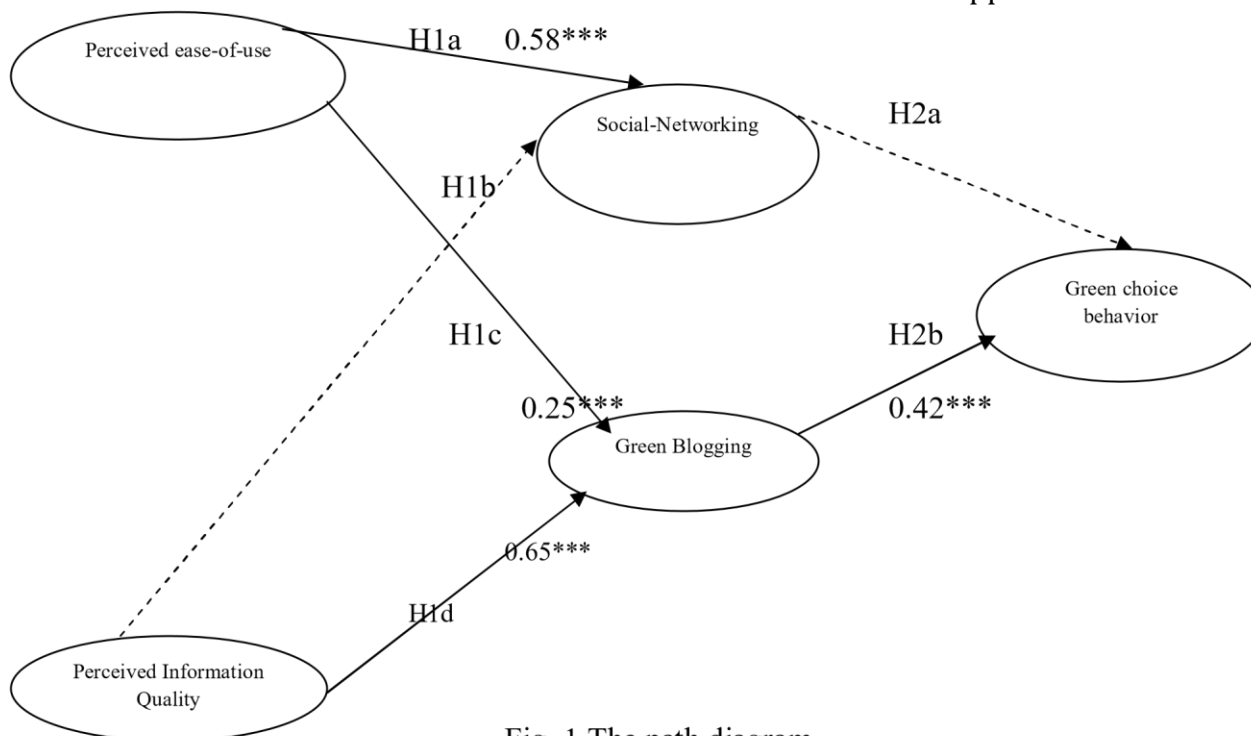
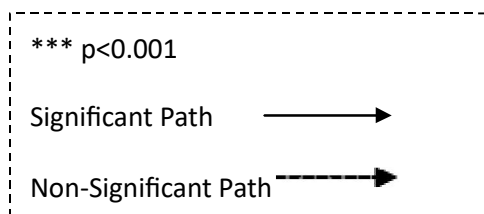


Fig. 1 The path diagram



4. 3. Analysis of Variance to Measure Green Choice Behavior Based on Social Media Usage

A one-way Analysis of Variance was performed for the respondents grouped into two categories who were either regular or occasional visitors to the social media either to the social networking sites like Facebook, Twitter or Green Blogs such as Hippy shopper, Daily Green, Green thinker or more.

The regular visitors to social media were substantially in quantum than the occasional users thus sensitizing the high social media usage which affirms ease-of-use of the social networking sites or blogs and trust in the quality, authenticity and timeliness of information available. The regular users of social media (68%) tend to differ significantly from the occasional users (32%) in terms of their green choice behavior.

Influence of frequency of usage or accessibility or exposure to social networking or green-blogging has tilted the regular users more towards green purchase intention adoption or green consumption than those involving themselves in social media usage in an interrupted manner. The higher social media usage perceptions – EOU and PIQ for the steady segment clearly demarcates the two groups (Table 5).

Table 5: Results of Analysis of Variance

Indicators	OV	RV	F-value	Sig
	[N=32%]	[N=68%]		
GCB1	2.86	3.63	18.031	0.000***
GCB2	3.17	3.77	11.764	0.001***
GCB3	3.17	3.79	10.343	0.002**
GCB4	3.12	3.53	5.021	0.026*
PIQ1	2.99	3.27	23.295	0.000***
PIQ2	3.05	3.81	22.132	0.000***
PIQ3	3.38	3.35	0.014	0.906
EOU1	4.05	4.10	0.184	0.668
EOU2	3.94	4.18	3.141	0.078
EOU3	3.57	3.77	1.206	0.273
EOU4	3.79	4.09	5.589	0.019*

GCB [Green choice behavior]; PIQ [Perceived Information Quality]; EOU [Perceived Ease-of-use]; OV [Occasional visitors]; RV [Regular visitors]

5. Discussion and Conclusion

The proposed model enumerates the linkage between social media usage perception, social networking, green blogging and green product purchase behavior. The ease-of-operation of social networking or ease-of-creating user accounts and handling user generated contents on social networking sites fosters extensive

social networking. Users may find the information on social networks unreliable or outdated or inapt. Consumers' adoption of social networking is analogous with the positive perception about ease-of-usage (0.58) rather than for want of information (-0.12).

About 32% of the respondents' being occasional visitors to social networks with low perception about ease-of-use highlights the intricacy in the technical aspects of social networking may impact social networking.

Green blogging is extensively leveraged by the social media usage perceptions. Reliance about the authenticity of information on popular green blogs tends to drive users towards green blogging activities. Thus marketers' promotion of green products may be substantiated through creation and aggressive promotion of green blogs involving comments, opinions of experts or experiences of consumers on companies' products' with green credential. Green blogging seems to be a prominent motivator (0.42) for adoption of green choice behavior. Thus extensive green blogging and necessary promotion of the same will substantially improve the market share of green products.

Involvement in social networking although don't seem to leverage green product adoption but however with extensive affluence in social networking practices and improvement in information quality by virtue of authentication and aggressive monitoring and prevention of spread of misleading or controversial information on social networking sites may motivate consumers' to rely on information pertaining to environmental and sustainability issues. The reliance of such information quality may help to sway them to resort to green product consumption.

6. Managerial Implications

First, our study discovers the consumers' motivation to adopt sustainable consumption behavior.

Firstly, the perceived ease-of-use of social networking sites substantially raises the usage rate. The regular visitors on the social networks tend to adopt green products at a faster rate than the occasional visitors whose perception about ease-of-use of social networks or green blogs are lower than the former group. Thus social media usage factors can act as a constraint in social medium participation thus the technological barriers associated with its usage should be minimized by effective coordination and collaboration among such sites thus enabling enhancement in usage and sharing via social media. Users' different evaluative criteria like unambiguous usage procedure, wide information coverage, pleasure, distant connectivity should be meted out to enhance the level of usage by the management of different social media networks.

Green companies may collaborate with different social media networking sites and emphasize in environmental blogging, advertisements, spread of videos on hazardous environmental impact and probable solutions to tackle environmental issues in the form of green product usage, thereby exhibiting role in environmental management and green product promotion.

Secondly, the suggested framework reflected the influence of both perceived ease-of-use and information quality on green blogging. The sustained green bloggers are environmentally more apprehensive and resort to sustainable green consumption. Companies may create their own environmental blogs for promoting

the environmental competencies of their products, inviting consumers' participation in opinion sharing with regard to product experience and satisfaction. These factual details available on a companies' green blog will enable the extensive promotion and green product adaptation.

Thirdly, Government may also spread awareness on several ecological issues through social media for awakening conscience among different demographic segments as social media usage is increasing at an unprecedented pace with thousands of potential consumers joining the group every day. Active messages and contents on environmental degradation its cause, consequences and probable ways to tackle environmental downturn can be aggressively promoted by government agencies and non-government social groups working on environmental issues through social networking sites which may lead to mass awareness, and day to day probable measures that can be taken in the form of saving water, electricity, recycling should be promoted in environmental blogs focusing on sustainable consumption and lifestyle practices.

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