



IILM
ACADEMY OF HIGHER LEARNING
LUCKNOW

AICTE Sponsored International Online Conference Proceedings on

Future Trends in Business: Knowledge, Skills, Sustainability, Innovation and Technology (FTB-KSSIT-2023)

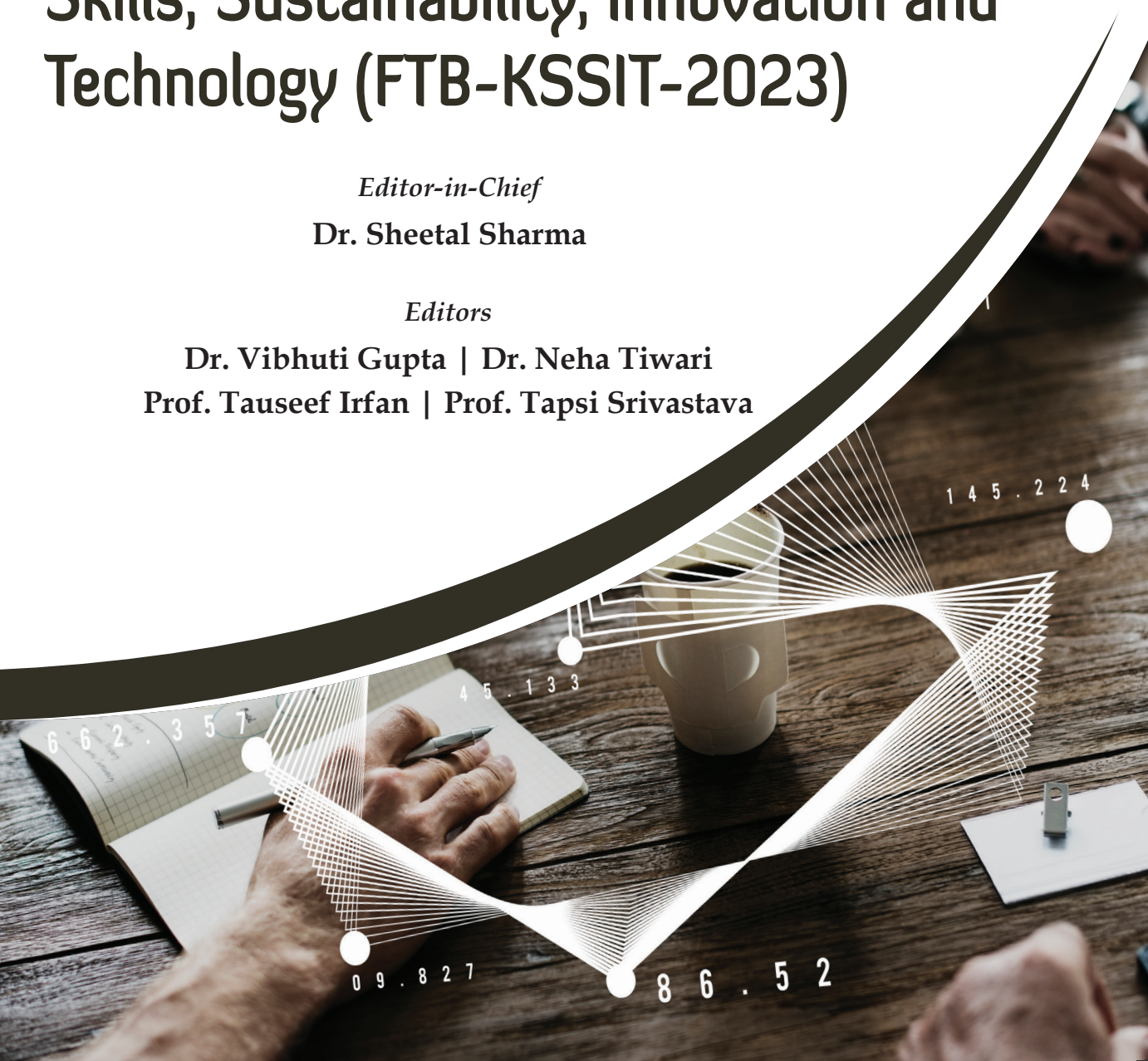
Editor-in-Chief

Dr. Sheetal Sharma

Editors

Dr. Vibhuti Gupta | Dr. Neha Tiwari

Prof. Tauseef Irfan | Prof. Tapsi Srivastava





IILM
ACADEMY OF HIGHER LEARNING
LUCKNOW

AICTE Sponsored International Online Conference Proceedings on
**Future Trends in Business: Knowledge,
Skills, Sustainability, Innovation and
Technology (FTB-KSSIT-2023)**

Editor-in-Chief

Dr. Sheetal Sharma

Editors

**Dr. Vibhuti Gupta | Dr. Neha Tiwari
Prof. Tauseef Irfan | Prof. Tapsi Srivastava**



Bharti Publications

New Delhi- 110002 (INDIA)

Copyright © IILM ACADEMY OF HIGHER LEARNING LUCKNOW, UTTAR PRADESH

Title: AICTE Sponsored International Online Conference Proceedings on Future Trends in Business: Knowledge, Skills, Sustainability, Innovation and Technology (FTB-KSSIT-2023) (English)

Editor-in-Chief: Dr. Sheetal Sharma

Editors: Dr. Vibhuti Gupta | Dr. Neha Tiwari | Prof. Tauseef Irfan |
Prof. Tapsi Srivastava

All rights reserved. No part of this publication may be reproduced or transmitted, in any form or by any means, without permission. Any person who does any unauthorised act in relation to this publication may be liable to criminal prosecution and civil claims for damages.

First Published, 2023
ISBN: 978-81-19079-77-3

Published by :
Bharti Publications, New Delhi
Phone: 011-46172797, 989-989-7381

Printed in India, by: Sagar Color Scan, Delhi

Disclaimer: The views expressed in the book are of the author and not necessarily of the publisher and editor. Author themselves are responsible for any kind of Plagiarism found in book and any related issues found with their abstract.

PREFACE

An AICTE-Sponsored Virtual International Conference on ‘Future Trends in Business: Knowledge, Skills, Sustainability, Innovation and Technology’ was organized at IILM Academy of Higher Learning Lucknow, from July 27 -29, 2023.

IILM Academy of Higher Learning, Lucknow was established in the year 2004 under the aegis of the Ram Krishan & Sons Charitable Trust, Lodhi Road, New Delhi. The Trust is running various Management Institutions under the acronym IILM in different parts of the country with Campuses in Lucknow, New Delhi, Gurugram, Greater Noida, and Jaipur. Over the years, the Institute and its founders have successfully fulfilled the extensive objective of propagating quality professional education and have made IILM a National Brand. The Lucknow Campus of the Institute offers a two-year full-time Post-Graduate Diploma in Management (PGDM) & PGDM (Finance), which is approved by the AICTE, Ministry of Human Resource Development, Govt. of India.

The objective of the conference was to provide a research platform for academicians, industry experts, researchers, and students to discuss, present and develop new ideas on the adoption of sustainable practices, emerging technologies, and innovations.

Students, Research scholars, and Faculty members from different parts of India submitted their original research articles to the conference and presented them virtually. All the articles submitted to the conference were checked for uniqueness and the research committee properly scrutinized them during the review process. Eminent professors and researchers from different organizations participated as keynote speakers and session chairs and added value to the conference.

Dr. Naela Rushdi, Professor (Finance) & Director was the Patron of the Conference. The eminent members of the advisory committee were:

Dr. Arshi Naim, Quality Program Head, King Khalid University, Saudi Arabia

Dr. Prakash Singh, Professor, IIM Lucknow

Dr. Riktesh Srivastava, Associate Professor, City University College Ajman, UAE

Dr. Sumit Gupta, Associate Professor, Arab Open University, Bahrain

Dr. Sushil Kumar, Professor, IIM Lucknow

Dr. Utkarsh Singh, Assistant Professor, IIM Kashipur

Mr. Prasoon Srivastava, Senior Analyst, Tech Mahindra, U.S.A

Dr. Sheetal Sharma, Professor (HRM& OB) & Dean (Academics) was the Conference Coordinator and Chair and Dr. Vibhuti Gupta, Associate Professor, was the Conference Co-Coordinator and Convener. The members of the organizing committee included Dr. Neha Tiwari, Assistant Professor, Prof. Tauseef Irfan, Assistant Professor, Prof. Ashish Mahendra, Assistant Professor, and Prof. Tapsi Srivastava, Assistant Professor.

We would like to express our sincere thanks to the organizing committee and advisory committee members, keynote speakers, session chairs, reviewers, and participants of this conference for their valuable support.

Contents

<i>Preface</i>	<i>iii-iv</i>
1. Impact of Influencer Marketing on Consumer Behaviour	1-9
Saloni Agrawal & Poonam Joshi	
2. Reshaping the Role of Virtuous Leadership and Work Efficiency in Hybrid Workplace System (FTB-0201)	10-20
Ms. Roopam Bhatia & Dr. Pankaj Agarwal	
3. The Role of Natural Acceptance, Prosperity and Happiness as a Key Vibration in Employees.	21-29
Mrs Vibhuti Vishnoi	
4. A Comparative Study on Consumer Preference towards Internet Banking Services between Bank of India and HDFC Banks in Bhopal	30-44
Dr. S. S. Vijayvargiya & Shristi Bhowmick	
5. Privacy and Confidentiality in Permissioned Blockchain Networks: Evaluating Security Models	45-56
Dr. Tarun Kumar Vashishth, Vikas & Sachin Chaudhary	
6. Digital Healthcare Ecosystem – A Data Driven Innovative Model to Reshape the Healthcare System and an Opportunity to Advance Health Equity	57-63
Mr. Pritam Sarkar & Ms. Arpita Gupta	
7. Internet of Things: Security and Privacy	64-75
Iram Fatima, Dr Ihtiram Raza & Mehtab Alam	
8. India’s Digital Payment System and its Impact on Economic Growth: An Empirical Study	76-83
Shivam Agarwal	
9. A Study on Sustainability in Business as a Future Trend in India	84-91
Dr. Jaspreet Dahiya & Parvinder Kaur	

- | | |
|---|----------------|
| 10. Role of User Generated Content of Social Media in Consumer Decision Making With Respect To Ott Subscription
Pranjal Roy | 92-102 |
| 11. Metaverse: The Future of Insurance Industry
Souris Bhattacharya | 103-110 |
| 12. Investigations on the Barriers of New Product Development in Manufacturing Industries: A Dematel Approach
Sanjay Kumar Borse & Dr. Devendra Singh Verma | 111-118 |
| 13. Role of Digital Marketing on Student Perception
Priya Shah, Harsh Limbachiya & Dr. Sourabh Jain | 119-125 |
| 14. Green Initiatives by Government and Corporate Sector of India
Prof Prabhjit Singh & Dr. Tejinder Kaur | 126-132 |
| 15. Evaluation of Productivity Improvement Barriers using Fuzzy-AHP
Ramesh Kumar Rawal & Pallavi Maheshwarkar | 133-140 |

1

IMPACT OF INFLUENCER MARKETING ON CONSUMER BEHAVIOUR

Saloni Agrawal

Assistant Professor, Department of Management, Lucknow Public College of Professional Studies, Lucknow, U. P.

Poonam Joshi

Research Scholar, Dr. A.P.J. Abdul Kalam Technical University, Lucknow, U.P.

Abstract

With the development of Internet and Technology and penetration of multinational companies in India, marketers have started finding various ways to gain competitive advantage in the market. Many new methods of marketing have developed in the recent time, but the aim of a marketer is to find the most effective marketing method to connect and convince its consumers. This may be beneficial to gain the attention of the prospective consumers, but the long term connect can only be established by providing quality product and good customer service only. Marketers need to understand the thinking and preferences of this new generation as the already existing methods have exhausted due to excess competition.

With the penetration of YouTube, Instagram and other social media platforms, because of low-cost internet service in India, people started exploring the social media platforms and creating content which was leaving a deeper impact in the minds of their audience. This helped them to create popularity among the people. Companies have started collaborating with such influencers to market their product to the target audience. People trust the influencers (individuals) they follow and prefer to purchase the products they are using or promoting. The objective and aim of this paper is to find the impact of recently developed influencer marketing technique on consumer behaviour and determine its impact on the consumer buying behaviour.

Keywords: *Marketers, Companies, Social Media Platforms, Effective, Influencer marketing, Consumer behaviour.*

1. INTRODUCTION

Development of digitalisation is everywhere may be its industry or in day to day works. Digitalisation introduced internet, which encouraged globalisation and digital communication and connected the whole world and increased the business activities by providing more competitive business environment. Internet provides opportunities to reach and communicate to the untapped market as well existing one. Digital Marketing becomes a potential platform of this digitalised 21st century for every organisation. Celebrities are always there for marketing communication and the now a days influencers are there for e-marketing communication and both have the same essence of marketing communication.

Celebrities have been used to communicate about products and services. As the uses of internet increased, awareness and knowledge for the brands have also accelerated and the concept of influencer marketing which is same as the celebrity endorsement is also came to the picture in e-marketing. Influencer marketing is today's way to communicate or advertise which is a paid form of communication or has some sponsored content which is advertised by an influencer by his or her art, skill, act and character. Influencers have different kind of bond and trust with their audience as people can relate themselves with them and find that they one of them which makes the bond stronger. Generation z's is more influenced by these influencers and connect with them easily. Study reveals that 40 % of consumer have great faith on influencer and they purchase many times by taking inspirations of social media and influencers who are creating content on Twitter, Facebook, Instagram, and YouTube etc. (Twitter influencer attitude and perception, format research, us, July 2015 - Jun 2016)

Millennial, Generation Z, Gen Alpha are those generations who are born in digital era or using it immensely for their daily work, these generations have seen upward rapid changes in technology. (Arora & Jha, 2020). Children are influenced by the influencer and make their parent to buy or indulge on the same activity as they seen in videos (Jha 2020). for example there is a you tube channel named **Vlad and Nikki** which is featured on two brothers age 10 and 8 is 8th most viewed and 10th most subscribed channel on you tube with 96.6 million subscribers and 75.3 billion views. They advertise, role play and pretend play in their videos and companies like hot wheels, Playmates Toys, and promote toys under their brand, and many more joined their hands with them. And kids who watch them demand for the same toys to their parents or behave the same way as watch in you tube channel. Marketers have also prepared and have joined their hands with those content creators to advertise their products. This is one of the reasons of increasing the trend of influencer marketing.

2. E-MARKETING AND 21ST CENTURY

The upshot of the automation entitled the expansion of e-marketing and e-shopping, some authors revealed that the e-marketing can be done only on the Internet, but some of them says that it consists of each type of electronic media which has wider scope. Digital marketing is nothing but the use of digital tools for making ways to find and tap potential recipients, to gain the goal by fulfilling the needs of consumers (Sawicki, 2016). (Ružić,Biloš, Turkalj,2014). Chaffey and et.al (2009) stated Internet marketing is blend of

the Internet and digital technologies at the same time using conventional tools to reach the utmost marketing goal, and the Internet marketing also consist of the EDB marketing and electronic customer relationship management. There are so many authors and all have different thoughts and definition of e-marketing, but all agree about that digital media uses different type of communication for different smaller groups by which communication activities are more compact, focused, dynamic for a particular group which helps to maintain good and long last relationship with customers (Ružić, Biloš, Turkalj, 2014).and these type of focused marketing activities are often known as viral marketing, focused grouped marketing , e- marketing, real time marketing etc. Some terms are there such as micro marketing, scrambled marketing, blog marketing, stealth marketing, content marketing, and influencer marketing and others.

3. E-MARKETING AND CUSTOMER RELATIONSHIP MANAGEMENT

As technology is changing immensely, it is not easy to maintain good customer relationship, but companies are using different strategies for different groups and using new form of communication. Companies can have direct and fast feedback from the customers through the electronic media and can make more focused and dynamic relationship with the customers. Hence, it can be concluded that up gradation of technology gives extensive grip of consumer behaviour. Consumers are using the same platform in which companies are advertising their product and implementing their strategies that is the social media. Social media provides easy and swift sharing of contents, videos, pictures, and documents among the people until it's got viral and everywhere (Andersen, 2018). It is quite difficult to control such a dynamic and complex environment as compared to conventional one, but to maintain the control companies are taking care of the content and its dispensability and evaluate the transferred content and its efficiency. The foremost motive to advertise is to pervade consumers about the product and services and to encourage them to purchase the product. Organisations are maintaining proper interaction and providing desired value to customer with the help of electronic media. (Meler, Dukić, 2007). Digital environments provide tools to make and share funny, innovative, and creative contents. A viral marketing consists of all pursuit for creating advertisement in the form of message that would be circulated from one group to the another and to individuals through different media such as e-mail, social media, SMS, MMS. And like this a creative strategy will be transferred to the desired aimed grouped by thousands of sent messages or viewing a particular content. (Akdeniz,2015).by analysing consumers' needs, marketer can easily predict next step and consumers reaction on a particular product or service and at the right time the new product is introduced in electronic environment through the right content of information which can easily hamper to target group. (Meler, Dukić, 2007), thus it can be said E-marketing is the effective tool for those companies who know their consumers very well and have flexible communication, can adjust their offer as per customer's demand and find influencers and brand ambassadors who can accelerate their information.

Social media dramatically changed the pattern of spreading information and to communicate with each other and the same way is used by organizations, communities, and individuals such as telegram, WhatsApp are the used in official communication also. now a days, people are ready to relate to their friends, relatives and want to share ever moment of their life by sharing pictures, contents, sending messages, sending audio

and video and information, and can have two-way communication by getting real time feedbacks (Gardner and Birley, 2011) but in conventional media such as newspaper, T.V. There is asynchronous communication, in social media there are interpersonal communication. One can leave its comments in public as feedback of seen content (Brown, 2013). companies can have many benefits by opting new technology of communication are focused and dynamic advertising strategies vast population, branding, maintaining good and one to one relationship with buyers, up grading business activities with the help of user's feedback, can find new suppliers and employee as well (Zimmerman and Ng, 2017). In e-marketing content has important role in spreading information and provide value for consumers. These contents can be as per Slater (2014), e-books, articles, videos, webinars, podcasts, surveys, photos, and presentations etc. Facebook or Twitter posts, as well as audiobooks can also be used or said as content, it can be anything and everything which added value to the information of the buyer. Contents are dispersed through different channels and reached to the targeted groups and this channel can be Blogs, email, messages, texts, search engines (Jefferson, Tanton, 2015). In 21st century, people all over the world are connected by social networks; hence CRM must move to social media to provide value to their potential customers and existing customers. Marketing experts can target exact consumers with précised way as per the feedback given by them in social media (Macy, Thompson, 2011).

4. INFLUENCER MARKETING

As per Association of National Advertisers (2022), influencer marketing is a subset of digital marketing in which one who have established a trust and faith for themselves among the masses, advertise products and use oriented marketing strategies. These influencers use their skills, art, style and potential to outstretch large population; now companies are using influencer marketing as new advertising tool and approaching the right person for their brands (De Jans et al. 2020).there are so many research have been done to know about influencer marketing and why companies are so much interested to use this strategy and what are the benefit of it (Backaler and Shankman, 2018). It is said that Influencer marketing is a new cost-effective marketing tool which is not considered as advertising by consumers (Ye, Hudders, De Jans and De Veirman, 2021). This is one of the best tools for companies to promote their product digitally (Abidin, 2015) organisations used to promote brands to potential audiences by many advertising tools and This strategy is as same as word-of-mouth marketing because it contains activities like sharing experience, content and blogs related to daily life (Ye et al., 2021).This user-generated content goes so popular in e-marketing as it has real, honest view for the products and services ,audience is more ready to trust and follow these views and suggestions (Djafarova and Rushworth, 2017).Social media influencers are one of the users of social media and have great number of friends, contacts, connection or followers in the same social media platform who are also the users of it (De Veirman et al. 2017).these influencers share small videos or any content, pictures of their lives, they give illusion to their followers that they know them personally.

5. OBJECTIVE OF THE RESEARCH

The research is done to know the attitudes and perceptions of users and followers for influencers, and influencer's impact on their behaviour. The main aim of the research is to know:

1. Does influencer have a significant effect on consumer's buying behaviour and
2. To know the role and signification of influencer on consumers and their buying behaviour. The hypothesis is created as per above information.

For the above objective, the following Hypothesis has been framed:

- H_a – "Influencer marketing has a significant positive impact on consumer's buying behaviour."

The assumptions are made that there is a positive, strong, correlative link between the impact of influencers and consumers' behaviour buying behaviour while purchasing products. The survey questionnaire is used to collect data for this research.

6. RESEARCH METHODOLOGY

The research is aimed to find solution of above question and intensity of suggestions given by influencers on attitude and buying behaviour of consumers. Primary research is done to gather the primary data which is collected through structured questionnaire on a sample of 250 consumers from Lucknow city. A descriptive analysis is done to know the impact and intensity of correlation between consumer buying behaviour and influencer's impact to validate the hypothesis.

7. ATTRIBUTES AND RESULTS

The basic motive of this research is to know the consumer's perception and attitudes on influencer marketing. 250 responses are collected through survey questionnaires. The convenience sampling method is used for this research and following tables are made to present and analysis the data.

Table 1: Gender of Respondents

Gender	Frequency	Percentage	Cumulative Percentage
Men	85	34%	34%
Women	165	66%	100%
Total	250		

Table 2: Age of Respondents

Age	Frequency	Percentage	Cumulative Percentage	Follow Influencers	Percentage
18-20	115	46%	46%	115	100%
21-25	55	22%	68%	55	100%
26-30	25	10%	78%	25	100%

31-35	15	6%	84%	15	100%
36-40	10	4%	88%	9	90%
41-45	10	4%	92%	4	40%
46-50	5	2%	94%	3	60%
51-55	5	2%	96%	0	0%
56-60	5	2%	98%	0	0%
61 & above	5	2%	100%	0	0%
Total	250	100		226	

It is understandable by the analysis and above table that 24 respondents are not following or concerned by influencers, these indicators will not be used for forth analysis.

The consumers or respondent are using which social networking site the most is analysed and represented by a chart given below.

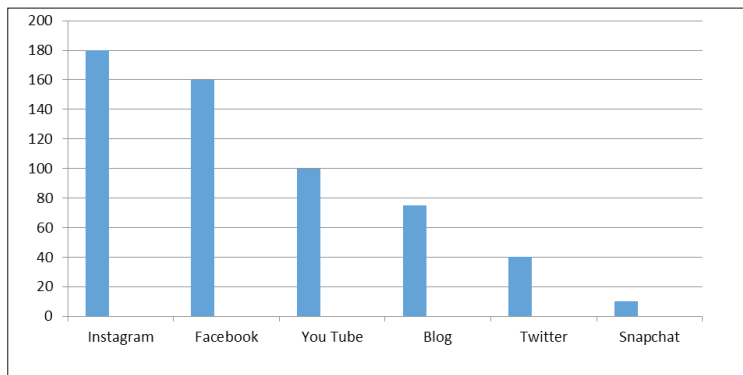


Fig. 1: Most frequently used social network

Fig. 1 shows that Instagram and Facebook are most used social networking sites and Snapchat is least used by respondents. Whereas graph 2 indicates the interest of respondents who watch content related to following heads and beauty and dance related content is viewed the most and acting is least concerned one by the respondents.

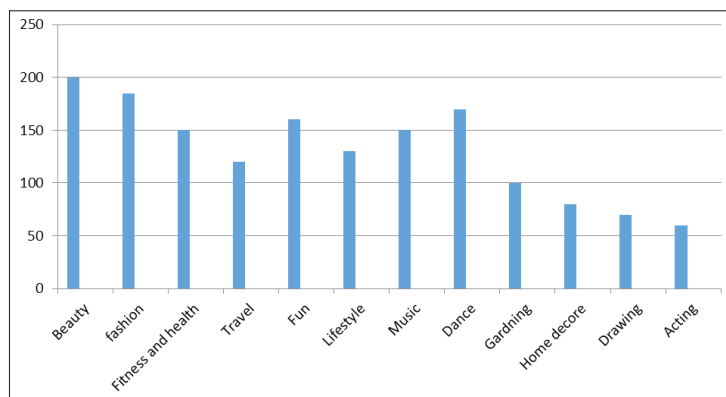


Fig. 2: Zone of interest of followers

By findings, this can be said that most of respondent spend on an average 2-3 hour daily, and the most preferred content is video followed by pictures and texts. Measures are given in the below table no 3.

Table 3: Survey Measures

	0<1Hour Daily	2-3 Hour Daily	< 4 Hours Daily
Time spent on social media	45	125	56
Content	Pictures	Texts	Video
Mode of communication	75	38	113

The following questions show the intensity of effect of influencers on users' behaviour for product and buying behaviour. The measures are given below-

Table 4: Set of Questions

Questions asked to respondents and their response	Yes	No
Does frequently made announcements have more attention toward the influencer?	130	96
Does an announcement make by influencer has impact on your buying behaviour?	106	120
Does recommended and used product by influencers is searched by you?	150	76
Does products used and recommended by influencers is bought by you?	164	62
Do you have discussion about products used and recommended by influencers with your friends?	180	46
Do you suggest products used and recommended by influencers?	170	56
If you must choose one, do you pick a product recommended by influencers?	190	36

As per the performed research, it can be suggested that if an influencer is announcing frequently then it has positive impact on consumer's attention. The respondent also uses and buy those products which is recommended by their favourite influencer and recommend it to others also.

Time to time consumers search for the product and usually buy them which is suggested by the influencer. Above research shows that 84% consumers choose those recommended products more when they must buy one amongst all. Thus, it can say influencer marketing has significantly positive impact on attitude and consumer buying behaviour so the hypothesis "Influencer marketing has a significant positive impact on consumer's buying behaviour." is valid.

8. CONCLUSION

The research is executed to know whether influencer marketing has significantly positive effect on consumer's buying behaviour and does it have anything to do with the perception and attitude of consumer for buying products and services. It is found that hypothesis

H_a is right and influencers marketing and consumer's buying behaviour have positive correlation. It is clear from the research that influencer's recommendation for a particular product or if they use any product in their content motivates the consumers and people search for the product which has been in the content. Consumers also spread good word of mouth about the product they have seen or used by the recommendation of influencer. In fact, movies and their songs are also advertised by these influencers. Sometime influencers are asked to act or made content on song to advertise the upcoming movies or a web series. As per the above results, it is known influencer marketing is one the emerging and most effective tools which affect attitude and perception of consumers for purchasing goods and services.

9. REFERENCES

1. Abidin, C., (2015) Communicative Intimacies: Influencers and Perceived Interconnectedness. *ada: A Journal of gender, New Media, and Technology*, 8(8).
2. Akdeniz, C. (2015): *Viral Marketing Explained*. bad bodendorf: Best Business Books
3. Anderson, D. (2018): *If Social Viral Marketing Doesn't Make Dollars, it Doesn't Make Sense: Gone Viral*.
4. Arora., A., Jha., A., K., (2020) Understanding pattern of online gaming addiction among Indian teenagers. *Our Heritage*, 68(1).
5. Brown, D., Hayes, N., Netlibrary, I., (2008) *Influencer marketing : who really influences your customers?* Amsterdam ; Boston: Elsevier/Butterworth-Heinemann.
6. Chaffey, D., Ellis-Chadwick, F., Mayer, R., Johnston, K (2009) *Internet Marketing: Strategy, Implementation and Practice*, Prentice Hall
7. Coll, P., (2019) Influencer Marketing in the Growth Hacking strategy of digital brands. *Observatorio (OBS*)*, 13(2).
8. De Jans, S., Van de Sompel, D., De Veirman, M. and Hudders, L. (2020) #Sponsored! How the recognition of sponsoring on Instagram posts affects adolescents' brand evaluations through source evaluations. *Computers in Human Behavior*, [online] 109(109:106342), pp.106-342.
9. De Veirman, M., Cauberghe, V. and Hudders, L. (2017) Marketing through Instagram influencers: the impact of number of followers and product divergence on brand attitude. *International Journal of Advertising*, [online] 36(5), pp.798-828.
10. Djafarova, E., Rushworth, C., (2017) Exploring the credibility of online celebrities' Instagram profiles in influencing the purchase decisions of young female users. *Computers in Human Behavior*, [online] 68(1), pp.1-7
11. Gardner, S., Birley, S. (2011): *Blogging For Dummies*. Hoboken, NJ: Wiley
12. Genú, L.S.B., (2019) Digital marketing: how the beauty market has changed with the emergence of digital influencers. *repositorio.iscte-iul.pt*. [online]
13. Harrigan, P., Daly, T.M., Coussement, K., Lee, J.A., Soutar, G.N. and Evers, U., (2021) Identifying influencers on social media. *International Journal of Information Management*, 56(102246).
14. Jefferson, S., Tanton, S. (2015): *Valuable Content Marketing: How to Make Quality Content Your Key to Success*. Kogan Page.
15. Jha, A. K., (2020) *Understanding Generation Alpha*
16. Levin, A., (2019) *Influencer marketing for brands: what youtube and instagram can teach you about*

the future of digital advertising. S.L.: Apress.

17. Macy, B., Thompson, T. (2011): *The Power of Real-Time Social Media Marketing: How to Attract and Retain Customers and Grow the Bottom Line in the Globally Connected World*. McGraw Hill Professional
18. Sawicki, A., (2016) *Digital Marketing*. Worldscientificnews.com.
19. Slater, D. (2014): *Online Content Marketing In 30 Minutes: How great online content can attract and engage customers*. i30 Media
20. Ye, G., Hudders, L., De Jans, S., De Veirman, M., (2021) *The Value of Influencer Marketing for Business: A Bibliometric Analysis and Managerial Implications*. *Journal of Advertising*, 50(2), pp.1–19
21. Zimmerman, J., Ng, D. (2017): *Social Media Marketing All-in-One For Dummies*. Hoboken: For Dummies.

2

RESHAPING THE ROLE OF VIRTUOUS LEADERSHIP AND WORK EFFICIENCY IN HYBRID WORKPLACE SYSTEM (FTB-0201)

Ms. Roopam Bhatia

*Research Scholar, Graphic Era Hill University, Dehradun
Uttarakhand*

Dr. Pankaj Agarwal

*Associate Professor, Graphic Era Hill University, Dehradun
Uttarakhand*

Abstract

A crisis like the Covid-19 epidemic is typically marked by a decline in interpersonal trust, a loss in collaboration, an itemization in communication, and a fading or diminution of happiness and fulfilment. The current situation calls for leadership that is characterized by virtue, which helps followers be happier, more content, and work more efficiently. This research's goal is to investigate how, in a hybrid workplace, a supervisor's virtuous leadership is seen by employees and in what way it affects employees' efficiency. A self-administered questionnaire was used to survey 371 IT engineers in Bengaluru, Karnataka, India. The empirical findings display that a superior's virtuous leadership, as valued by the subordinate, favourably improves engineers' job efficiency. The results show that encouraging virtuous leadership is a viable method to increase employee efficiency in a hybrid work environment, which may eventually improve both individual and organisational performance. Despite a long history of interest in leadership qualities, workers in the IT industry have a limited comprehension of this notion in terms of employee job efficiency in a hybrid work environment. This research fills this gap by investigating the relationship between virtuous leadership and workers' efficiency while building on recent developments.

Keywords: *Virtuous leadership, Work efficiency, Hybrid work system, IT sector*

1. INTRODUCTION

As a result of COVID-19, the global economy has been severely disrupted. The global health crisis and its difficulties cause anxiety and hopelessness, yet the adaptability and expertise required to address them are not always available (Hogan, 2020). Additionally, the world prerequisites "real leadership" — leadership that can hastily gauge the behest of the state and aid the much-needed retrieval and feat of objectives more swiftly and more meritoriously. According to Heorhiadi et al. (2014), crises are typically pigeonholed by the eroding of interpersonal trust, the undermining of collaboration, the cessation of communication, and the absence or diminution of happiness and pleasure. An effective and consistent reaction to the crisis may be fostered by good leadership, which can also inspire followers or people to act bravely and strengthen their resilience in the face of uncertainty and flaws (Lang et al., 2020). Everyone agrees that certain leadership traits may significantly improve the workplace atmosphere. In particular, virtuous leadership impacts positively to the general happiness and life satisfaction of the followers (Hendriks et al., 2020).

Human resource departments will be primarily responsible for re-establishing organisational culture as firms struggle to adapt to the post-pandemic environment. Therefore, it is projected that the adoption of hybrid working models, which mix remote and on-site people, will grow in the next years. The future of work may be a combination of working from home and in an office. These types of arrangements provide employees more freedom in terms of where and when they complete their professional duties, which has the potential to stimulate suppleness, sovereignty, and work-life balance (Uru et al., 2022). A relatively recent concept, hybrid work refers to a type of employment where a person splits their time between working in an office setting and working remotely (Moglia et al., 2021).

Employee productivity is boosted by the hybrid work approach. The majority of businesses throughout the globe claim that allowing workers to work remotely has upped their productivity and performance by 30% (Lenka, 2021). More fecund employees oblige liberty to work as they enjoy. Many workers trust that when they are given the autonomy to work whenever they feel most productive and do not have set working hours, they are more ingenious (Trivedi and Patel, 2022).

According to a research by Dingel & Neiman (2020), including the usual knowledge work in the IT industry, more than one-third of all employment in the US "can be performed entirely at home." According to a survey of Bengaluru-based IT workers conducted by Singh et al. in

2020, two out of every three employees worked lengthier hours on WFH, resulting in amplified efficiency and a superior work-life balance. According to a research (Haridas et al., 2021) of IT professionals who worked remotely during the pandemic, steady communication and sizeable teamwork were most sturdily allied with efficiency.

Over the past few years, India's economic progress has been dominated by the IT sector. Approximately two thirds of IT employees at WFH conveyed enriched productivity while working there, making efficient use of the time saved from travelling, besides to fulfil higher prospects, according to research on a sample of 526 IT professionals operating globally. The effectiveness of the IT employee is examined in relation

to the effect of WFH during the shutdown (Patanjali and Bhatta 2022). Foremost IT organisations have said that around 70% of their workers will endure to WFH for the estimative future, signifying that the culture of WFH will sustain even after lockdowns. Meanwhile, sources suggest that all the big IT corporations are planning for a scenario in which a sizable section of the workforce would continue to work without pay long after the lockdowns were over (PTI, 2020).

Hence, it is safe to conclude that contemporary IT firms are working hard to transition into hybrid work system. However, the pace of change is slow, as seen by the gaps in earlier publications and the ensuing research gaps. Although there is a flood of writings and research on relation concerning virtuous leadership and work efficiency of employees in various sectors and professions across the globe, still no examination has been made of this interface on IT workforce of India. Also, this research's goal is to investigate how, in a hybrid workplace, a supervisor's virtuous leadership is seen by employees and in what way it affects employees' efficiency. This research will fill this gap by investigating the relationship between virtuous leadership and workers' efficiency while building on recent developments.

2. HYPOTHESIS FORMULATION

2.1 Virtuous Leadership

According to both Aristotle and Confucius, virtue is a quality or condition of human character that predisposes people to achieve greatness. Humans have a natural tendency to want the best for themselves. According to Wang and Hackett (2020), virtuous leaders are concerned with transforming virtuous leadership into virtuous followership. A leader's aims and behaviours are influenced by his or her character, and these factors can have a significant bearing on organisational outcomes, containing those of subordinates. As a result, in the modern corporate environment, leader charisma is seen as "an indispensable component" of leadership effectiveness (Hannah and Avolio, 2011).

2.2 Work Efficiency

The capacity to yield the most with the least effort is known as work efficiency. It entails maximising efficiency, working more efficiently rather than stiffer. By augmenting efficiency, you may produce further with the same amount of input or even less. With the least amount of time and effort, the most chores and labour may be completed. High levels of productivity can result from admirable job efficiency. Organisations recurrently push workers to upsurge their job productivity since doing so can help the company prosper.

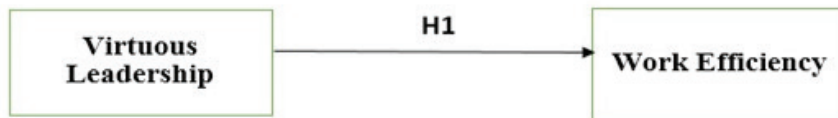
2.3 Virtuous Leadership and Work Efficiency

In a study conducted by Pancasila et al. (2020) on 355 coal mining employees of Indonesia revealed a significant positive influence of leadership on worker job performance. According to Oluseyi and Hammed (2009), effective leadership motivates people and groups to accomplish organisational objectives. Leadership is essential at every level of the organisation. According to Ivancevich and Konopaske (2012), leaders are those who can give their subordinates genuine work motivations in order to help the organisation achieve its objectives successfully and efficiently. A study conducted on expatriate general managers revealed the effect of leader competencies in enhancing

employee job performance and gradually efficiency (Swanson et al. 2020). Manzoor et al. (2019) on 130 SME employees of Pakistan observed the significant positive effect of transformational leadership on job performance of employees. The COVID-19 pandemic's effects on workers' job performance in virtual environments are the focus of Bartsch et al.'s (2020) report on leadership effectiveness. 206 service workers who were abruptly had to transition to a virtual work environment because of the COVID-19 outbreak served as the study's sample. The findings showed that in times of crisis, leadership style can influence service personnel' ability to do their jobs effectively in a virtual setting. Hence, it can be hypothesized that-

H1: Subordinates' perceptions of their supervisor's virtuous leadership positively influence their work efficiency during hybrid work system

2.4 Hypothesized Model:



3. RESEARCH PROCEDURES

3.1 Respondents and Instrument scheme

In this investigation, appellants were IT engineers from Bengaluru city of Karnataka state, India. A scrupulous review of the relatable literature was steered to scheme the questionnaire to embrace all the prospective items. In order to curtail the method bias at the recording and the reply editing phase, due assertion was given to the respondents that their individual responses would be kept confidential (Podsakoff et al., 2012). Added, successive e-mails after first, third and seventh weeks of the primary e-mail was sent to the respondents (Dillman et al., 2014).

Virtuous Leadership Questionnaire (18 items) evolved by Wang and Hackett (2016) was adapted in context to hybrid working post pandemic to measure leader character. Sample items include "My supervisor prioritizes organizational interests over self-interests during hybrid working" and "My supervisor shows concerns for subordinates' needs during hybrid working".

A 5 item scale developed by Merry (2013) was adapted in context to hybrid working post pandemic to measure employee work efficiency. Sample item include "Quality of the task completed is measured in our organisation during hybrid working" and "Most of the employees here consume less resources than are normally required for the same output during hybrid working". 5-point "Likert scale" from "Strongly disagree" notched as 1 to "Strongly agree" notched as 5 was used in both the cases.

3.2 Data Gathering

Respondents were chosen via convenience sampling. After obtaining necessary authorization, a Google form was created and emailed to the IT engineers, along with a cover message explaining the study's requirements and relevance. The engineers were told that their replies would be kept private. From November 2022 to February 2023, the sample was taken. 600 engineers were targeted, and a total of 389 retorts were acknowledged, of which 371 were useable, for a retort rate of 61.83%. The retort rate is higher than the necessary minimum of

40% for academic studies (Baruch, 1999). Table 1 depicts the engineer's demographic profile.

Table 1: Demographic Profile

Demographic Profile of Respondent			
		Frequency	Percent
Gender	Male	179	48.25
	Female	192	51.75
Age	Upto 35 years	139	37.47
	35-45 Years	145	39.08
	45-55 Years	62	16.71
	above 55	25	.74
	Graduate	203	54.72
Qualification	Post Graduate	168	45.28
	Doctorate	0	0
	TOTAL	371	100

4. RESULTS

4.1 Data Analysis

Firstly, the descriptive statistics of variables has been done which include mean, standard deviation and Pearson's correlation coefficient of among constructs. Further, "Confirmatory factor analysis" (CFA) was steered to endorse psychometric properties of construct. The convergent and divergent validity of measurement model is confirmed using appropriate statistics. The analysis concludes with a description of model fit of proposed structure and hypothesis testing. For confirming the model fit, "chi-square/degree of freedom" (χ^2/df),

"Goodness of fit index" (GFI), "Comparative fit index" (CFI), "Standardized root mean square residual" and "Root mean square error of approximation" were used. The verge values for χ^2/df were between 1 to 3 and SRMR and RMSEA estimations are <0.1 as suggested by Bentler and Bonett (1980). Similarly, for GFI and CFI, it was >0.9 (Scott and Bruce, 1994).

4.2 Descriptive Analysis:

The “descriptive statistics” of the study variable is reported in Table 2. The mean value of the variable ranges between 3.237 to 3.602 in five-point scale, the standard deviation of the variable ranges between 0.787 to 0.861. The Pearson’s correlation coefficient among the variable is also below 0.7, which minimizes the probability of multicollinearity among the study variable. The correlation between VL and WE (0.489, $p < 0.01$) were found positive, as anticipated.

Table 2: Descriptive Analysis

Variable	Descriptive Statistics		Pearson Correlation	
	Mean	Std. Deviation	VL	WE
VL	3.237	0.787	1	
WE	3.602	0.861	0.489**	1

Note: ** Correlation is significant at 0.01 level (2-tailed). VL- Virtuous leadership and WE- Work efficiency

4.3 Assessment of “Measurement model”:

Figure 2 shows the “measurement model” of the study. The CFA was conducted using Amos v22. The results of the model were perfect as ensuring the necessary cut-offs as CFI = 0.992, $\chi^2/df = 1.452$, PClose = 0.821, RMSEA = 0.039, SRMR = 0.033, as stated in earlier studies the values found were satisfying. Hence the model reveals acceptable fit properties. Table 3 displays the outcomes of CFA. The factor loadings of the items are above 0.7 thus showing good internal consistency (Hair et al., 2010). The Cronbach’s alpha of all variables VL (0.936) and WE (0.929) was found above the threshold value of 0.7 which again confirms the structures’ internal coherence.

Table 3 Factor loading and Master validity

Construct	Item	Estimate	S.E.	t-Value
Virtuous Leadership	VL1	0.73		
	VL2	0.87	0.059	18.241***
	VL3	0.81	0.049	18.439***
	VL4	0.77	0.052	18.517***
	VL5	0.81	0.055	18.742***
	VL6	0.80	0.051	19.463***
	VL7	0.87	0.053	19.287***
	VL8	0.81	0.051	18.595***
	VL9	0.71	0.058	18.813***
	VL10	0.75	0.052	17.876***
	VL11	0.88	0.056	17.734***
	VL12	0.89	0.054	18.194***

	VL13	0.72	0.052	18.438***
	VL14	0.83	0.052	18.642***
	VL15	0.76	0.053	18.342***
	VL16	0.78	0.057	18.867***
	VL17	0.75	0.056	18.971***
	VL18	0.79	0.057	18.567***
Work efficiency	WE1	0.84		
	WE2	0.77	0.057	18.160***
	WE3	0.82	0.054	18.193***
	WE4	0.75	0.055	17.743***
	WE5	0.78	0.056	17.675***

Note: *** $p < 0.001$.

4.4 Assessment of reliability and validity of construct:

The value of AVE of VL (0.673) and WE (0.664) were above the threshold of 0.5. The composite reliability of all the construct were ranging from 0.929 to 0.936 which is much above the threshold value of 0.7. These values of AVE and CR confirms convergent validity of the construct (Hair et al., 2010). The diagonal values shown in Table 4 are the “square root” of their respective AVE. The MSV values of each construct are less than the AVE value, thus it satisfies the condition of “discriminant validity” (Hair et al., 2010). Thus the model ensures convergent and discriminant validity amongst the constructs.

Table 4 Reliability and validity of construct

	CR	AVE	MSV	MaxR(H)	VL	WE
VL	0.936	0.673	0.342	0.937	0.820	
WE	0.929	0.664	0.338	0.929	0.499***	0.815

Note: *** Correlation is significant at the 0.01 level (2-tailed). VL- Virtuous Leadership and WE- Work efficiency

4.5 Assessment of structural model:

For hypothesized model the results of model fit indices are GFI = 0.942, CFI = 0.992, $\chi^2/df = 1.452$, as well as RMSEA = 0.039 and SRMR = 0.033. Thus it shows the good model fit and appropriate for path analysis.

4.6 Hypothesis Testing:

The hypothesis stated that VL is positively related to WE in IT engineers. Table 5 depicts the significant positive association between VL and WE ($\beta = 0.486$, $t = 11.876$, $p < 0.01$), thus H1 is accepted.

Table 5 Hypothesis testing summary

Hypothesis	Path	Direct Effect	Indirect Effect	Total effect	Conclusion
H1	VLàWE	0.486***	NA	0.486***	H1 Accepted

5. DISCUSSION

The current study has two important variables naming “Virtuous leadership” (VL) and “Work efficiency” (WE). The nested association amid VL and WE among IT engineers working in hybrid mode and employed in Bengaluru city, India is our objective. Amidst the association between VL and WE, WE is dependent while VL is an independent variable. The result of the hypothesis exhibits a significant positive association amid VL and occurrence of WE among IT engineers which implies when the engineers are led by excellent leaders, they have ability to become more work efficient. This outcome is consistent with the preceding researches performed in other professions by Pancasila et al. (2020), Swanson et al. (2020), Manzoor et al. (2019) and Bartsch et al. (2020) which says that subordinates’ insights of their supervisor’s virtuous leadership have a significant positive relation with WE of IT employees.

6. IMPLICATIONS OF THE STUDY

6.1 Theoretical Implications

The study's findings show the degree to which VL and employee WE are associated in the IT sector in a hybrid workplace setting. The paper makes a number of contributions to the theoretical growth of the IT industry. First, the study emphasises how crucial it is for the organisation to adopt a moral leadership style since it may affect how well the goals of the team are aligned. Second, the study found that moral leadership practises frequently increase staff productivity. It provides empirical data in the context of Indian IT sector employees that lack researcher thinking. Because the literature on this topic is scarce, it might be a good starting point for additional research.

6.2 Practical Implications

Practical perspective of this study highlights a zone, namely “Virtuous leadership”, which is still being considered, particularly in developing nations like ours, and which requires a bigger aggregate of concern from establishments, administration, employees, and other concomitant parties. The contemporaneous study recognised the connotation of VL in aggregate the workforce efficiency in a hybrid work environment. The findings will aid in directing policy makers to encourage virtuous leadership styles which are excellent in nature within organizations in enhancing the efficiency of workforce, and how hybrid working may influence this relationship. Benefits of hybrid work include improved workplace accessibility for persons with disabilities; better work-life balance, reduced carbon footprint and costs from commuting (Ford et al. 2021). Despite the fact that the survey was only done on IT companies in the southern part of India, it can be claimed that the goal of the majority of organisations is to increase employee and organisational efficiency, regardless of their geographical location and kind of company. Thus, the

discovery may be applied to improving working practises and methods in many industries and nations.

7. LIMITS & UPCOMING RESEARCH ADVICES

Our study stays not unflawed as others. The limitations can create new direction for auxiliary research. According to Bloom and Reenen (2010), management practices differ amongst businesses, industries, and nations. We undertook this study, concentrating on India's IT industry, with this viewpoint in mind. The generalizability of this study is constrained by the possibility that VL practices differ between the industrial and service sectors, as well as between developed and developing nations. Thus, future investigations be conducted in other sectors in order for the conclusions to be accepted worldwide within our conceptual framework. Also, the data was collected from engineers employed in IT sector of Bengaluru city of Karnataka state only. Diverse sample from different states may help in generalizing the results. Although the literature has been extensively examined, due to limited resources and awareness, one cannot claim to have covered all of the available literature. The data was cross-sectional in nature, therefore, may suffer some limitations like "Common method bias". Although apposite for the current study, if data collection had been done at different time intervals (longitudinal study) to infer the causal connection amongst the variables, results were likely to differ. Hence, becomes a limitation for the present study. Further, the sample size, sampling technique, and empirical tools may affect inference. Hence, imminent studies must cross-check the results.

8. CONCLUSION

There is no turning around to return to the pre-academic job. Both people and organisations are forced to find new methods of operation. In this aspect, workplace digital transformation is reportedly quite successful. Collaboration across organisational, physical, and geographic borders is possible with virtual work (Kane et al., 2021). The importance of moral leadership in raising employee productivity and productivity abilities is highlighted by hybrid working. The organisations' performance and efficiency problems may be further addressed by this upgrade. The study came to the conclusion that VL has a direct impact on IT personnel' WE. This evidence may be used further and expanded upon to gain a greater knowledge of the responsibilities that a leader can play in maximising the effectiveness of their followers, particularly when working with different mediators & moderators.

REFERENCE

1. Bartsch, S., Weber, E., Büttgen, M., & Huber, A. (2020). Leadership matters in crisis-induced digital transformation: how to lead service employees effectively during the COVID-19 pandemic. *Journal of Service Management*, 32(1), 71-85.
2. Baruch, Y. (1999). Response rate in academic studies-A comparative analysis. *Human relations*, 52(4), 421-438.
3. Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological bulletin*, 88(3), 588.
4. Bloom, N., & Van Reenen, J. (2010). Why do management practices differ across firms and countries?. *Journal of economic perspectives*, 24(1), 203-224.

5. Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied psychology, 86*(3), 499.
6. Dillman, D. A., Smyth, J. D., & Christian, L. M. (2014). *Internet, phone, mail, and mixed-mode surveys: The tailored design method*. John Wiley & Sons.
7. Dingel, J. I., & Neiman, B. (2020). How many jobs can be done at home? *Journal of Public Economics, 189*.
8. Ford, D., Storey, M. A., Zimmermann, T., Bird, C., Jaffe, S., Maddila, C., Butler, J.L., Houck, B. & Nagappan, N. (2021). A tale of two cities: Software developers working from home during the covid-19 pandemic. *ACM Transactions on Software Engineering and Methodology (TOSEM), 31*(2), 1-37.
9. Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E. (2010) *Multivariate Data Analysis*, 7th ed., Prentice Hall, Upper Saddle River, NJ.
10. Hannah, S. T., & Avolio, B. J. (2011). The locus of leader character. *The Leadership Quarterly, 22*(5), 979-983.
11. Haridas, P., Rahul, P. R., & Subha, K. (2021). Impact of work from home model on the productivity of employees in the IT industry. *International Journal of Innovative Research in Technology, 8*(2), 662- 670.
12. Heorhiadi, A., Conbere, J., & Hazelbaker, C. (2014). Virtue vs. Virus. Can OD overcome the heritage of scientific management? *OD Practitioner, 46*(3), 28.
13. Hogan, M. J. (2020). Collaborative positive psychology: solidarity, meaning, resilience, wellbeing, and virtue in a time of crisis. *International Review of Psychiatry, 1-15*.
14. Ivancevich, M. J., & Konopaske, R. (2012). *Human Resource Management*. New York: McGraw-Hill Education.
15. Kane, G. C., Nanda, R., Phillips, A., & Copulsky, J. (2021). Redesigning the post-pandemic workplace. *MIT Sloan Management Review, 62*(3), 12-14.
16. Lang, E., Ovens, H., Schull, M. J., Rosenberg, H., & Snider, C. (2020). Authentic emergency department leadership during a pandemic. *Canadian Journal of Emergency Medicine, 1-4*.
17. Lenka, R. M. (2021). Unique Hybrid Work model-The future of remote work. *PalArch's Journal of Archaeology of Egypt/Egyptology, 18*(7), 2687-2697.
18. Manzoor, F., Wei, L., Nurunnabi, M., Subhan, Q. A., Shah, S. I. A., & Fallatah, S. (2019). The impact of transformational leadership on job performance and CSR as mediator in SMEs. *Sustainability, 11*(2), 436.
19. Merry, J. (2013), "Aon Hewitt's 2013 trends in global engagement: where do organizations need to focus attention", *Strategic HR Review, Vol. 13 No. 1*, pp. 24-31.
20. Moglia, M., Hopkins, J., & Bardoeel, A. (2021). Telework, hybrid work and the United Nation's Sustainable Development Goals: towards policy coherence. *Sustainability, 13*(16), 9222.
21. Oluseyi, S. A., & Hamed, A. T. (2009). Influence of Work Motivation, Leadership Effectiveness, and Time Management on Employee's Performance in Some Selected Industries in Ibadan, Oyo State, Nigeria. *European Journal of Economics, Finance, and Administrative Sciences, 16*, 8-14.
22. Pancasila, I., Haryono, S., & Sulisty, B. A. (2020). Effects of work motivation and leadership toward work satisfaction and employee performance: Evidence from Indonesia. *The Journal of Asian Finance, Economics and Business, 7*(6), 387-397.
23. Patanjali, S., & Bhatta, N. M. K. (2022). Work from home during the pandemic: The impact of organizational factors on the productivity of employees in the IT industry. *Vision, 09722629221074137*.
24. Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual review of psychology, 63*, 539-569.
25. PTI (2020). Over 70 per cent companies likely to continue work-from-home policy for next 6 month: Survey. *The Hindu*. <https://www.thehindubusinessline.com/news/over70-per-cent-companies-likely-to-continue-work-from-homepolicy-for-next-6-month-survey/article31632941.ece>

26. Scott, S. G., & Bruce, R. A. (1994). Determinants of innovative behavior: A path model of individual innovation in the workplace. *Academy of management journal*, 37(3), 580-607.
27. Singh, M. K., Kumar, V., & Ahmad, T. (2020). Impact of Covid-19 pandemic on working culture: an exploratory research among information technology (IT) professionals in Bengaluru, Karnataka (India). *Journal of Xi'an University of Architecture & Technology*, 12(5), 3176-3184.
28. Swanson, E., Kim, S., Lee, S. M., Yang, J. J., & Lee, Y. K. (2020). The effect of leader competencies on knowledge sharing and job performance: Social capital theory. *Journal of Hospitality and Tourism Management*, 42, 88-96.
29. Trivedi, S., & Patel, N. (2022). Mining Public Opinion about Hybrid Working With RoBERTa. *Empirical Quests for Management Essences*, 2(1), 31-44.
30. Uru, F. O., Gozukara, E., & Tezcan, L. (2022). The Moderating Roles of Remote, Hybrid, and Onsite Working on the Relationship between Work Engagement and Organizational Identification during the COVID-19 Pandemic. *Sustainability*, 14(24), 16828.
31. Wang, G., & Hackett, R. D. (2016). Conceptualization and measurement of virtuous leadership: Doing well by doing good. *Journal of Business Ethics*, 137, 321-345.
32. Wang, G., & Hackett, R. D. (2020). Virtues-centered moral identity: An identity-based explanation of the functioning of virtuous leadership. *The Leadership Quarterly*, 31(5), 101421.

3

THE ROLE OF NATURAL ACCEPTANCE, PROSPERITY AND HAPPINESS AS A KEY VIBRATION IN EMPLOYEES.

Mrs Vibhuti Vishnoi

Research Scholar, Babu Banarasi Das University

Abstract

Desires are meant to be fulfilled to get happiness, but as one desire is fulfilled it shows a gateway for another desire and then another, finally a vicious circle of desires is formed and it becomes almost impossible to break that circle. Meanwhile in fulfilling these desires, one tends to forget the reason behind these desires and seek happiness which remains unfulfilled. We all are working on the process of achieving happiness through different mediums as per our level of understanding, sometimes we succeed but mostly fail. But we still try to seek happiness through mediums throughout life. Everyone wants happiness continuously, not in spurts. We do not want to be unhappy even for a single moment, but how successful the organizations are in achieving this for their manpower is a serious matter of self-exploration.

Value education plays a significant role in organizational behavior by shaping the beliefs, attitudes, and behaviors of employees. It is the system of education through which employees could understand the role of Natural Acceptance and Self-exploration in the medium of attaining prosperity and happiness for their well-being.

For this, the difference between happiness and the medium of achieving happiness must be clear. Happiness is complete in itself and no medium is required for the same, but yes mediums are also indispensable parts of life and for a prosperous life they are necessary to be fulfilled.

The paper gives a clear concept of a value-based education mechanism in which happiness and prosperity are two basic aspirations for human beings and for this, organizations need to have the right understanding of the virtue of happiness, prosperity, natural acceptance and self-exploration for the betterment of their employees.

Keywords: Happiness, Natural Acceptance, Prosperity, Self-exploration, Right Understanding, Value-education.

Prof Raj Rangnath asks a question in his book, “If You’re So Smart Then Why Aren’t You Happy?” if a genie grants you three wishes, what would you ask?” over the years, thousands of people have answered this question, and it boils down to three things: “If I have more money, I’ll be happy”, “If I find love, I’ll be happy”, “If I am famous, I’ll be happy”. Prof Rangnath writes rarely does anyone say: “Genie, I just want one thing. Please give me happiness”.

VALUE EDUCATION

Value education enables us to understand our needs and visualize our goals correctly and also indicate the direction for their fulfilment. It also helps remove our confusion and contradictions and enables us to rightly utilize technological innovations.

BASIC GUIDELINES FOR VALUE EDUCATION

- **Universal:** Needs to be applicable to all the human beings
- **Rational:** Amenable to reasoning and not based on dogmas or blind beliefs.
- **Natural and verifiable:** Has to be naturally acceptable to the human being
- **All-encompassing:** To cover all the dimensions (thought, behavior, work and realization) and levels (individual, family, society, nature and existence)
- **Leading to harmony:** Ultimately is targeted to promote harmony within the individual, among human beings and with nature.

NEED FOR VALUE-EDUCATION IN ORGANIZATIONS

- **Ethical Decision Making:** Value education helps employees develop a strong ethical foundation. It cultivates a sense of moral responsibility, integrity, and ethical decision-making skills. This is crucial in ensuring that employees make ethical choices, adhere to organizational values, and act in the best interests of the organization and its stakeholders.
- **Organizational Culture:** Values are the building blocks of organizational culture. Value education helps inculcate and reinforce desired values within the organization. When employees share and embrace common values, it creates a cohesive culture that promotes teamwork, collaboration, and a positive work environment.
- **Employee Engagement and Motivation:** When employees’ personal values align with the organizational values, it enhances their engagement and motivation. Value education helps employees connect their personal values with the purpose and

mission of the organization. This alignment fosters a sense of meaning, belonging, and commitment, resulting in increased employee satisfaction and productivity.

- **Conflict Resolution and Collaboration:** Value education equips employees with the skills to effectively manage conflicts and differences. It promotes empathy, respect, and open-mindedness, enabling employees to find common ground, resolve conflicts constructively, and collaborate effectively in teams. This leads to better teamwork, enhanced communication, and improved organizational performance.
- **Reputation and Stakeholder Trust:** Organizations with a strong values-based culture and ethical behavior earn the trust and respect of stakeholders, including customers, suppliers, and the community. Value education instils ethical behavior, integrity, and responsible conduct, which contributes to building a positive reputation for the organization.
- **Leadership Development:** Value education is crucial for leadership development. It helps leaders understand their own values, develop a sense of authenticity, and lead by example. Leaders who exemplify strong values inspire and motivate their teams, creating a culture of trust and ethical leadership throughout the organization.
- **Social Responsibility:** Value education encourages employees to consider the broader impact of their actions on society and the environment. It promotes a sense of social responsibility and encourages employees to engage in sustainable practices, corporate social responsibility initiatives, and community involvement, which enhances the organization's reputation and contributes to its long-term success.

MEANING OF HAPPINESS, NATURAL ACCEPTANCE

There are some feelings that people may accept naturally and with ease. In addition, one welcomes these feelings and wants them to persist inside of them. These include feelings of future optimism, respect, and trust. When these emotions are observed, it becomes clear that these are the times when we are in harmony and that these emotions are a mirror of that harmony. Respect, for instance, is the harmony that exists between two people; I enjoy being in situations where both parties respect one another. It makes me happy.

This makes it very evident that happiness is the condition or setting in which one lives; if there is harmony or synergy within, one prefers to remain there. i.e., "to be in a state of liking is happiness" When one is in such a state of happiness, they do not experience internal struggle, contradiction, or conflict. They love this way of being and always wish to maintain its continuity.

What is happiness with respect to employees in an organization?

Happiness with respect to employees in an organization refers to the overall sense of well-being, satisfaction, and contentment experienced by individuals in their work environment. It goes beyond mere job satisfaction and encompasses a broader perspective of employee happiness and fulfilment.

It's important to note that employee happiness is a multi-faceted concept, and different

individuals may prioritize different factors. Organizations that prioritize employee happiness often see benefits such as higher productivity, lower turnover rates, and increased employee engagement, leading to overall success and well-being for both the employees and the organization.

NATURAL ACCEPTANCE

Natural acceptance is the inner consciousness of anyone. It is innately present in each of us and one can always refer to it to know what is right for us. It is constant across time, independent of location, independent of our views or previous preconditioning, and, ultimately, it is a fundamental component of every human person.

One is not orientated enough today to assess one's assumptions or beliefs and accept them as their own. One continues to live with a set of presumptions and beliefs that may or may not be accurate since they do not check within themselves. As a result, one is frequently unclear about what they believe because they have typically accepted these things without verifying them on the basis of natural acceptance.

It seems in today's scenario that one is:

- Neither verifying assumptions/ proposals kept to them on the basis of natural acceptance
- Nor are verifying what one thinks he knows, inn living.

For the simplification of this verification, first and foremost self- exploration is necessary.

WHAT IS SELF- EXPLORATION AND HOW IS IT DISCOVERED?

Self-exploration

- A debate between "who you are" and "what you really want to be";
- Self-evolution through introspection;
- A process of knowing oneself and, through that, knowing all of existence.
- The process of realizing and achieving one's relationship with each and every unit of existence.
- A process of understanding human nature and acting in accordance with it;
- A process of finding harmony within oneself and with all of existence;
- A process of realizing our intrinsic potential and working towards self-expression and self-organization.

The entire process of self-exploration can be viewed in such a way that it must be considered as a suggestion: Don't assume it to be true, verify it on your own right (not based on texts, based on reading from instruments, based on others, etc.). This verification process is Natural Acceptance; which is the practice of verifying something based on our own rights.

Everyone has an innate sense of natural acceptance. To know what is proper for oneself, one can access it at any time and refer to it within themselves. One merely needs to begin referring to it.

Self-exploration is the process of deeply and comprehensively examining oneself on multiple levels, encompassing various aspects of a person's being, including physical, mental, emotional, and spiritual dimensions. It involves a thorough exploration of one's beliefs, values, strengths, weaknesses, desires, fears, and aspirations. The goal of self-exploration is to gain a deeper understanding of oneself and cultivate a sense of wholeness and authenticity.

Self-exploration is an ongoing process that evolves over time as individuals continue to learn, grow, and gain new insights about themselves. It can lead to increased self-awareness, personal growth, and a deeper sense of fulfillment and authenticity in various areas of life. Top of Form

Some key elements and practices involved in self-exploration may be:

- **Self-reflection:** taking time for self-reflection allows individuals to introspect and examine their thoughts, feelings, and behaviors.
- **Mindfulness:** Practicing mindfulness involves cultivating present-moment awareness and non-judgmental acceptance of one's thoughts, emotions, and sensations. It helps individuals observe their inner experiences without attachment or aversion, promoting self-awareness and understanding.
- **Emotional intelligence:** Exploring and understanding one's emotions is an important part of holistic self-exploration. Developing emotional intelligence involves recognizing and managing emotions, empathizing with others, and using emotions as a source of information and guidance.
- **Values clarification:** Identifying and clarifying personal values is essential in holistic self-exploration. Understanding what truly matters to you can help guide decision-making, set meaningful goals, and align your actions with your core beliefs.
- **Strengths and weaknesses assessment:** Assessing your strengths and weaknesses provides insights into your skills, abilities, and areas for growth. Acknowledging and leveraging strengths while working on weaknesses can lead to personal development and a greater sense of self-empowerment.
- **Exploring passions and interests:** Discovering and nurturing your passions and interests is an important aspect of holistic self-exploration. Engaging in activities that bring you joy and fulfillment can enhance your sense of purpose and overall well-being.
- **Spiritual exploration:** For those who are inclined towards spirituality, exploring the spiritual dimension of oneself is an integral part of self-exploration. This may involve exploring different belief systems, engaging in practices such as meditation or prayer, and seeking a deeper connection with something greater than oneself.
- **Seeking support:** Self-exploration can be a transformative journey, but it can also be challenging. Seeking support from trusted friends, mentors, therapists, or participating in support groups can provide guidance, encouragement, and different perspectives along the way.
- Bottom of Form

HOW IS THE CONDITION TODAY?

One today is not orientated enough to critically assess their views or presumptions and instead tends to regard them as belonging to themselves. Generally, one protects them out of respect for their privacy and independence. Without actually checking them, one frequently becomes quite attached to them. One makes every attempt to find arguments and defend their own assumptions when these are at odds with one another. One deceives both oneself and others in this process. However, in this process, one's own presumptions cost them in terms of their well-being, consistency, and cordial interpersonal relationships.

WHAT IS THE WAY OUT?

At this level, it is not sufficient to simply verify one's own presumptions and views on the basis of natural acceptance; one must also experientially validate it. Living from one's natural acceptance enhances authenticity. There is no authenticity in one's actions as long as they are based on presumptions. Since no one has verified for themselves, in their own right, one does not have the confidence about things. He or she is ultimately responsible for determining what is good for them, verifying it, and understanding it.

REALIZATION AND UNDERSTANDING

In the end, realization and understanding are the outcomes of the process of verifying the aforementioned proposal on the basis of natural acceptance and experiential validation.

The responses one receives following realization and understanding are:

Assuring in the sense that understanding is developed and, in terms of satisfaction, the responses are satisfying, and they are universal in the sense that they are independent of time, space, and the individual.

If one receives responses that do not fit the criteria of assurance, satisfaction, and universality, it is likely that these responses are the result of conditioning or prior beliefs rather than natural acceptance. So, the solution needs to be double-checked.

What is referred to as "Realization" and "Understanding" is the outcome of this process, which involves repeatedly self-verifying the proposal based on one's own natural acceptance, validating it experientially, and testing the solutions for assurance, satisfaction, and universality.

PROSPERITY

A feeling of possessing or making available more than the necessary physical facilities is what is meant by **prosperity**.

Two things are necessary to determine prosperity:

- Correctly assessing the requirement for physical facilities and,
- Having the competence to produce more than what is required (through production)

These two assessments provide for a comprehensive understanding and evaluation of prosperity.

However, it is often difficult to distinguish between prosperity and wealth in today's culture.

DIFFERENCE BETWEEN WEALTH AND PROSPERITY

Wealth

Wealth refers to the abundance of material possessions, financial resources, or assets that an individual or entity possesses. It primarily focuses on tangible and measurable assets, such as money, properties, investments, and valuable possessions. Wealth is often associated with financial success and the accumulation of material resources.

In general wealth is all about

- **Material abundance:** Wealth is primarily concerned with the accumulation of material possessions and financial resources.
- **Tangible assets:** It involves the ownership of tangible assets, such as money, property, investments, and valuable possessions.
- **Financial focus:** Wealth is often associated with financial success and the ability to generate income and build financial security.
- **Limited perspective:** Wealth is primarily focused on the accumulation of material resources and may not encompass other aspects of well-being and fulfilment.

Prosperity

Prosperity, on the other hand, encompasses a broader and more holistic sense of well-being, success, and flourishing. It goes beyond the accumulation of material wealth and takes into account various aspects of a person's life, including physical, mental, emotional, and spiritual well-being.

Prosperity focuses upon:

- **Holistic well-being:** Prosperity considers overall well-being and fulfilment in multiple dimensions of life, including physical health, mental and emotional well-being, relationships, purpose, and spiritual connection.
- **Fulfilment and flourishing:** It emphasizes the idea of living a fulfilled and meaningful life, where individuals thrive and experience a sense of purpose, happiness, and contentment.
- **Balance and harmony:** Prosperity recognizes the importance of balance and harmony in various areas of life, such as work-life balance, meaningful relationships, and personal growth.
- **Individual perspective:** Prosperity is subjective and can vary from person to person. It is defined by one's own values, goals, and aspirations, rather than solely relying on external measures or comparisons.

Wealth primarily focuses on the accumulation of material possessions and financial resources, while prosperity takes a more holistic approach by considering overall well-being, fulfilment, and flourishing in various dimensions of life. While wealth may contribute to aspects of prosperity, such as financial security, prosperity extends beyond material wealth and encompasses a broader sense of fulfilment and well-being.

THE PREVAILING NOTION OF HAPPINESS AND PROSPERITY

In the current situation, everyone is primarily attempting to maximize their accumulation and consumption of physical amenities in order to obtain happiness and success. This is an effort to find happiness through enjoyable sensory experiences. Physical amenities are viewed as ways to maximize happiness rather than as ways to satisfy physical requirements. But this endeavour will ultimately fail. As it would amount to attempting to satisfy indefinite demands with finite resources, neither one could hope to experience constant enjoyment through sensory interactions, nor could they aspire to be prosperous.

CONCLUSION

The transition to human consciousness is essential for the happiness and success of the employees of the organization. This requires an examination of human emotions with common sense as a priority. The urgency in undertaking this work should be fully acknowledged and efforts to meet the need should be made accordingly. Personal development should be a priority.

Employees can feel prosperous and happy in organizations when certain conditions and practices are in place. Here are some ways organizations can foster a sense of prosperity and happiness among employees:

- **Meaningful Work:** Providing employees with meaningful and purposeful work contributes to their sense of prosperity. When employees feel that their work has a positive impact and aligns with their values and interests, it enhances their sense of fulfilment and purpose.
- **Opportunities for Growth:** Offering opportunities for personal and professional growth is crucial for employees to feel prosperous. This can include training programs, skill development initiatives, mentorship opportunities, and career advancement paths. When employees can continuously learn and develop their skills, they experience a sense of progress and fulfilment.
- **Recognition and Appreciation:** Recognizing and appreciating employees' efforts and contributions is important for their sense of prosperity. Regularly acknowledging their achievements, providing constructive feedback, and celebrating milestones and successes can boost employee morale and motivation.
- **Work-Life Balance:** Promoting a healthy work-life balance is essential for employees to feel prosperous. Encouraging flexible working arrangements, respecting personal boundaries, and offering support for employees' personal well-being can help them maintain a sense of harmony between work and personal life.
- **Positive Work Environment:** Fostering a positive work environment is crucial for employees' prosperity. This involves promoting respectful and supportive relationships among colleagues and supervisors, effective communication, and a culture of trust and collaboration. When employees feel valued, included, and supported, it enhances their overall well-being and satisfaction.
- **Employee Benefits and Perks:** Providing competitive compensation packages, attractive benefits, and additional perks can contribute to employees' sense of

prosperity. These can include health and wellness programs, flexible leave policies, retirement plans, and opportunities for work-related travel or skill-building activities.

- **Employee Empowerment and Autonomy:** Empowering employees by giving them autonomy and decision-making authority in their roles can enhance their sense of prosperity. When employees feel trusted and have the freedom to contribute their ideas, make decisions, and take ownership of their work, it boosts their confidence and satisfaction.
- **Workplace Inclusion and Diversity:** Creating an inclusive and diverse workplace environment is essential for employees to feel prosperous. Embracing diversity, fostering a culture of respect and belonging, and ensuring equal opportunities for all employees can contribute to a sense of prosperity by promoting a positive and inclusive work environment.
- **Well-being Support:** Providing resources and support for employees' well-being, both physical and mental, is crucial for their overall prosperity. This can include access to wellness programs, mental health support services, employee assistance programs, and a supportive and compassionate approach towards employee well-being.

It therefore, calls for an urgent need for organizations to correctly understand happiness and prosperity as well as the sustainable way to achieve it as happiness is a vibration that emanates from the center of the being itself and it is not dependent upon others.

REFERENCES

1. Gaur, R R Sangal, R and Bagaria, G P (2015). A foundation course in Human Values and professional Ethics, Excel Books Private Limited.<https://www.speakingtree.in/article/three-happy-habits>
2. <https://www.quora.com/If-a-genie-grants-you-three-wishes-what-do-you-intend-to-wish-for>
3. <https://static1.squarespace.com/static/645b62a626ceb6b78105391/t/645dd49f9a8b8232b5ebc660/1683870880421/71713291502.pdf>
4. <https://www.studocu.com/in/document/delhi-skill-and-entrepreneurship-university/universal-human-values/unit-3-harmony/31444547>
5. https://ccsuniversity.ac.in/bridge-library/pdf/MCA-I_HVPE-Sample-Questions.pdf
6. <https://ccsuniversity.ac.in/bridge-library/pdf/mca/MCA%20-1-%20Human%20Values%20and%20Ethics-10.pdf>

4

A COMPARATIVE STUDY ON CONSUMER PREFERENCE TOWARDS INTERNET BANKING SERVICES BETWEEN BANK OF INDIA AND HDFC BANKS IN BHOPAL

Dr. S. S. Vijayvargiya

*Professor and Head of Department (Department of Commerce)
Institute for Excellence in Higher Education Bhopal,
Madhya Pradesh*

Shristi Bhowmick

*Research Scholar, Barkatullah University Bhopal,
Madhya Pradesh*

Abstract

In today's era, the internet plays a very crucial role in making lives easier and empowering people. This advantage of the internet is incorporated by the banks to provide efficient internet banking services to their consumers so that they enjoy various benefits of it. Banks, be it private or public banks, provide these services to their consumers. But, it is observed that though people prefer to keep their money and other valuables in public banks but for internet banking services they prefer private banks over public banks. The reason is fast services with an efficient interface and helpdesk and feedback features which the public sector banks still need to improve on their part. Today, with low- cost and high- speed internet service and a lack of time, people are shifting towards internet banking services rather than physically visiting the bank. Consumers are provided with every feature in addition to some advanced options available. Even opening a bank account with zero balance is possible with the help of internet banking. These services are safe, convenient and provide better interest rates to their consumers. In this study, an attempt is made to understand consumer preference towards internet banking services between HDFC and Bank of India. To know the level of awareness that whether the consumers have knowledge of various products or just basic services used for transactions.

A survey has been taken of 118 respondents with the help of a structured questionnaire as primary data. The study is descriptive and analytical. For hypothesis testing Chi-Square test has been used. Based on the data, findings have been developed and certain suggestions through the opinions of consumers are provided for banks to improve their services and increase consumer base.

Keywords: *Consumer preference, Internet banking services, Public banks, Private banks, consumer base*

INTRODUCTION

The banking system plays a very crucial role in the development of an economy. To develop an economy, the individual systems have to develop too. Thus, banking in today's era is not constrained only by its physical boundaries; rather, it is expanding its scope to increase its consumer base and maximise consumer satisfaction. Every bank today is competing with one another to provide the best services and maintain consumer satisfaction. E-banking is one such revolution that has paved the way for banks to achieve these objectives. E-banking is a broad term in which a bank enables a consumer to do transactions through various options such as ATMs, debit or credit cards, electronic Fund transfers, mobile banking, internet banking, etc. Today, with low-cost and high-speed internet service and a lack of time, people are shifting to transacting through devices rather than physically visiting the bank. Internet banking is a part of E-banking, which enables people to do their transactions with the help of the internet. Internet banking services empower a person with very significant roles, i.e., location flexibility and 24*7 accessibility, which eventually leads to features such as timesaving, convenience, and conducting transactions such as online shopping, online ticket booking, online bill payments, money transfer, online banking services, etc. A consumer can access various online banking services such as depositing money, making payments, making balance-related inquiries, issuing a check book, opening an FD account, and downloading bank statements. A consumer can access all these services through any device connected to the internet. Internet banking enables a consumer to conduct transactions on a secure website. Place utility and time utility are provided to the consumers of internet banking. Therefore, consumer preference plays a significant role in deciding which bank to choose for accessing internet banking services.

LITERATURE REVIEW

1. N. J. Kariyawasam and Nuradhi K. Jayasiri (2016), in the study on "Awareness and Usage of Internet Banking Facilities in Sri Lanka", focused on the usage level of e-banking in the region of Sri Lanka which is at a low level as compared to other developed or developing countries. An attempt was made to understand the positive and negative that affects the usage of internet banking. The study further discovered that a majority of banking consumers were not familiar with internet banking and its usage. This resulted in low response towards the adoption of internet banking. The research is based on certain hypotheses such as awareness and usage level of internet banking, knowledge of internet and usage of internet banking, the relation

between occupation of consumers and usage of e-banking and found that consumer's occupation is one of the factors affecting the use of internet banking, education level e-banking services usage, Consumer's age and usage; and Consumer's perception of risk e-banking usage. The study is based on inadequate determinants which influence the awareness and usage of internet banking which may become a scope for further studies to incorporate more determinants for better understanding.

2. **Dr. Shruti Jha (2019)**, in the study on the usage of internet banking services across gender groups with reference to Dadra and Nagar Haveli. The study aimed to determine the frequency of internet banking usage by male and female bank customers. Data analysis shows that 53% of females and 47% of males use internet banking. The proportion of females was more than males. Therefore, the female group contributed actively to the study. The ratio of usage of internet banking may vary from state to state or Union territory which limits the study from being generalised.
3. **Hitendra Lachhwani and Archie Kanwar (2020)**, in their study on customer preference towards digital banking in Ahmedabad aim at finding the preference and adoption of digital banking services of the customers. A survey was conducted on 101 customers. The study shows that factors like Reliability, security, cyber-risk, convenience, and innovation, are key factors has a direct influence on customer satisfaction. The study is limited to few digital banking services based on which customer preference is inadequately justified. There is a scope for a more detailed view of the services is required to reach a conclusion.
4. **Deepanjali Shrestha et. al. (2020)**, studied the attitude of the consumers of an underdeveloped country towards internet banking in the Pokhara region of Nepal. The objective was to analyse the attitude of customers regarding perceived risks, usefulness and ease of use. The findings showed that perceived risks, usefulness and ease of use have a direct impact on the adoption of internet banking. The level of acceptance shows more than 50% of the consumers support internet banking services and that perceived risk did not have much impact. The study is based on perceived risk, usefulness and ease of use. In order to clearly understand the customer's attitude towards internet banking, trust and quality may also be considered as quality of the services offered and trust plays a significant role.
5. **Abeda Shaikh and Khushboo Mishra (2021)**, conducted a study to measure the impact of the system of online banking on customer preference in Mumbai and suburb Mumbai. The study focuses on the preference level of customers towards online banking, factors affecting preference, customer's awareness towards internet banking security, problems faced by them and to understand the ways in which banks maintain customer satisfaction. The study lacks proper recommendations or suggestions. The suggestions provided in the study should be based on the responses generated from customers and which further helps in the improvement of online banking services.
6. **Kavya J and Ramya Rakesh (2022)**, in the study on preference of customers towards digital banking focuses on customer preference and factors affecting digital banking along with the challenges faced by the customers. An attempt was made to understand the various digital payment modes. The results showed that the majority of customers use digital banking in their everyday life. The majority of the customers preferred

Mobile Banking for digital banking in modernity. The size of sample is inadequate to justify the level of perception and challenges faced by customers. The determinants of preference and the challenges faced by the customers in the study are limited.

7. **Papunuka Lakshmi and Dr. Thamilselvan. R (2022)**, conducted a study on customer perception of e-banking services in the region of Hyderabad. The study aimed at customer preference between public and private banks and the factors affecting customer perception towards e- banking. A survey was conducted with 102 respondents. The results showed that the respondents felt satisfied towards e- banking rather than traditional banking. The respondents believed that e- banking provides greater flexibility, fast services, accuracy and is free from errors. The study is limited to Hyderabad region only. Hence, generalization can be achieved by discovering other regions. There is a need for certain suggestions to achieve improvements in the current system of e- banking services.
8. **Dr. Krishan Lal Grover (2022)**, in “The Study on Customer’s Perception Towards Online Banking” surveyed to understand the level of awareness, factors influencing usage and non-usage of online banking services among consumers. The study concluded that consumers use online banking because of its efficient functions. The reason for non-usage includes technical issues, lack of guidance, security etc. But only a few consumers were of this opinion, and the remaining consumers were satisfied with online banking. The study is comprehensive but lacks generalizability as was conducted in the Patiala region only and the type of banks studied is also undefined. There is a scope for conducting the study in other regions of India and by specifying the type of bank in future.
9. **Dr. Rajasulochana et. al. (2022)**, conducted a study on e-banking and customer satisfaction towards public and private banks in Karnataka. The study aimed at examining the influence of the service quality of internet banking on consumer satisfaction. The major seven dimensions of the study included Efficiency, Fulfilment, Contact, System availability, Privacy, Responsiveness and Website design of service quality of internet banking. The results revealed that there is a direct relationship between service quality of internet banking and consumer satisfaction in private and public banks. The study is empirical and attempts to make contributions in the existing field. But generalization is not possible as the study is based in Karnataka only. There are still scope for different regions and different banking sectors to discover.

THEORETICAL FRAMEWORK:

The study is based on the conceptual framework. The study considers significant attributes that determine the consumer’s preference for internet banking. The study revolves around the users of internet banking at HDFC and Bank of India, in particular. Through internet banking, the relationship between the users of HDFC Bank and Bank of India in Bhopal and the banks (HDFC Bank and Bank of India) is identified. Analysis and interpretation are done to reach a conclusion that will further help the financial institutions build a better understanding of the present situation and the needs of consumers based on the suggestions.

OBJECTIVES OF THE STUDY

1. To know the level of awareness and consumer's preference towards internet banking services.
2. To understand the factors influencing consumer preference towards internet banking.
3. To know the consumer preference towards a particular bank in terms of internet banking.
4. To study the consumer's pattern of spending with internet banking.
5. To provide suitable suggestions to improve internet banking services.

RESEARCH METHODOLOGY

The study intends to understand the consumer's preference for internet banking services between the Bank of India and HDFC banks in Bhopal, Madhya Pradesh.

The method of sampling used in the study is purposive sampling. Respondents are those consumers who use the internet banking services of these two banks, respectively. A descriptive and analytical research design has been used.

Primary and Secondary data are collected for the purpose of the study. For collecting primary data, a structured questionnaire was prepared and distributed. Information from various research journals and articles is studied for secondary data collection. Ratio scale has been used as the method of scale adoption as the study contains questions related to nominal, ordinal, and interval types of data, along with questions that require an absolute zero to represent the study. The size of the sample consists of 118 internet banking users residing in Bhopal. Analysis and interpretation have been done on the basis of pie charts and bar charts. For the purpose of statistical analysis, a percentage distribution table is used. For hypothesis testing, the Chi-square test is used.

HYPOTHESIS

- I. **H₀**: There is no significant relation between consumer's occupation and preference towards internet banking services.
H₁: There is a significant relation between consumer's occupation and preference towards internet banking services.
- II. **H₀**: There is no significant difference between consumer's age and frequency of internet banking services usage.
H₁: There is a significant difference between consumer's age and frequency of internet banking services usage.
- III. **H₀**: There is no significant difference between consumer's gender and pattern of spending with internet banking services.
H₁: There is a significant difference between consumer's gender and pattern of spending with internet banking services.

ANALYSIS AND INTERPRETATION

Table 1.1 Gender

Gender	No. of respondents	Percentage
Male	74	62.7
Female	44	37.3
Total	118	100

The above data shows that the majority of internet banking users i.e., 62.7% are male whereas, 37.3% of the internet banking users belong to the female category.

Table 1.2 Age

Age	No. of respondents	Percentage
20- 30	44	37.3
30- 40	30	25.4
40- 50	28	23.7
50- 60	16	13.6
Total	118	100

The data reveals that 37.3% of the respondents belong to the age 20 to 30 years. About 25.4% are between 30 to 40 years of age. 23.7% are in the category of 40 to 50 years of age and the remaining i.e. 13.6% belongs to 50 to 60 years of age.

Table 1.3 Qualifications

Qualifications	No. of respondents	Percentage
Undergraduate	2	1.7
Graduate	44	37.3
Postgraduate	64	54.2
Doctorate	6	5.1
Other	2	1.7
Total	118	100

According to the data, the majority of the respondents i.e. 54.2% are Postgraduate followed by 37.3% graduates and 1.7% undergraduate respondents. About 5.1% of the respondents are PhD holders and the remaining has other qualifications.

Table 1.4 Occupations

Occupations	No. of respondents	Percentage
Private employee	60	50.8
Government employee	12	10.2
Self- employed	14	11.9
Professional	14	11.9

Student	12	10.2
Others	6	5.1
Total	118	100

Above data shows that more than half of the total respondents i.e. 50.8% are employed in the private sector and 10.2% are employed in the government sector. 11.9% are self-employed; similarly, 11.9% of the respondents are professionals. 10.2% are students and the remaining 5.1% are involved in other occupations.

Table 1.5 Monthly Income

Monthly Income (in Thousands)	No. of respondents	Percentage
10- 20	28	23.7
20- 30	32	27.1
30- 40	20	17
40- 50	6	5.1
Above 50	32	27.1
Total	118	100

The data above shows that 23.7% of the respondents have a monthly income between Rs.10,000 to 20,000; about 27.1% of them have a monthly income between Rs.20,000 to 30,000; 17% of the users have a monthly income between Rs. 30,000 to 40,000; 5.1% have a monthly income between Rs. 40,000 to 50,000 and the remaining 27.1% has monthly income above Rs. 50,000.

Table 1.6 Consumer’s preference towards Internet banking services

Consumer’s preference	Yes	No
Do you prefer internet banking?	114 (96.6%)	4 (3.4%)

The above data reveals the consumer’s preference towards internet banking services and about 96.6% of the respondents prefer internet banking services. 3.4% of the respondents do not prefer internet banking services.

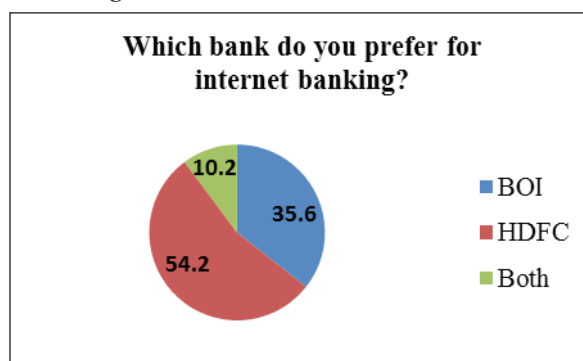


Fig. 1.1 Preference of bank for internet banking

The chart shows that more than half of the respondents i.e. 54.2% prefer HDFC bank over Bank of India (35.6%) for transacting through internet banking. The remaining 10.2% prefer both banks for internet banking.

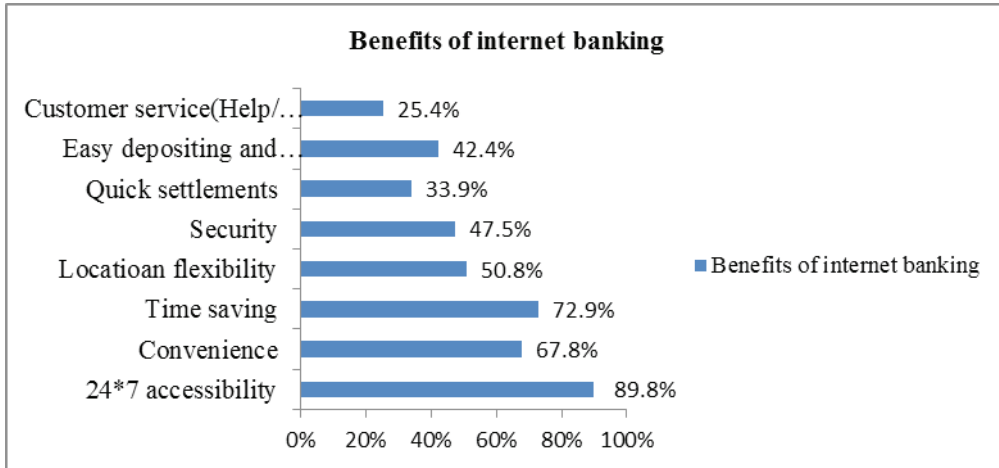


Fig. 1.2 Benefits of internet banking

Above data shows that the respondents enjoy the benefit of 24*7 accessibility of internet banking services (89.8%) followed by time-saving feature which is about 72.9% of them seek. 67.8% seek convenience and 50.8% users enjoy location flexibility. 47.5% feel that internet banking is secure and 42.4% appreciate easy depositing and withdrawal of money and the remaining users (33.9%) enjoy quick settlements.

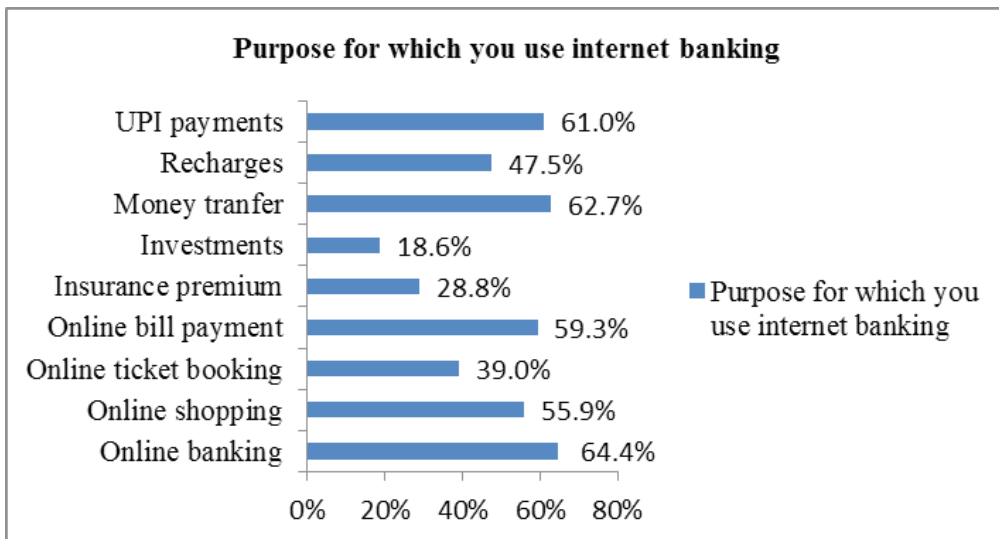


Fig. 1.3 Purpose

The above data shows that most of the respondents use internet banking for online banking services (64.4%), 62.7% use it for money transfer, 61% use internet banking for UPI payments followed by online bill payment (59.3% users) along with 55.9% online shopping consumers. The remaining 47.5%, 39%, 28.8% and 18.6% use internet banking for recharges, online ticket booking, insurance premium payment and investments respectively.

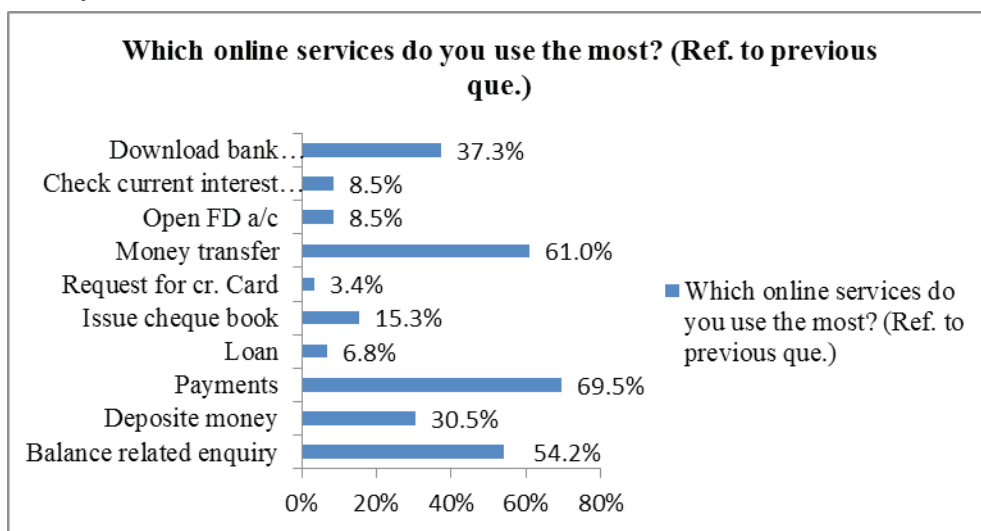


Fig. 1.4 Online banking features

Respondents were asked that if they pick online banking as their option in the previous question then which services they like to use. Majority of the respondents (69.5%) users use online banking for payments followed by 61% use it for money transfer. About 54.2% of them use it for balance- related enquiry and 37.3% use it for downloading bank statement. 30.5% users deposit money via online banking and remaining use it for issuing cheque book (15.3%), opening FD account (8.5%), checking current interest rates (8.5%), loans (6.8%), request for credit card (3.4%).

Table 1.7 Frequency of internet banking usage

Frequency	No. of respondents	Percentage
Usually	76	64.4
Sometimes	14	11.9
Occasionally	16	13.6
Rarely	12	10.2

The data above shows that 64.4% i.e. the majority of respondents use internet banking services usually followed by 11.6% users who sometimes use it for transactions. 13.6% respondents occasionally use internet banking services and the remaining 10.2 use internet banking services rarely.

Table. 1.8 Preference of the medium of internet banking services usage

Medium of usage	No. of respondents	Percentage
Bank's website	14	11.9
App (Bank's app)	72	61
Both	32	27.1

The data above shows that the respondents prefer the app i.e. app provided by the bank to the consumers on various devices (phone, tablet etc.) which may be downloaded from the play store (android) or the app store (apple). Majority of the users (61%) prefer app, 11.9% prefer the bank's website and 27.1% respondents prefer to conduct transactions or other activities through both app and website as the medium of internet banking usage.

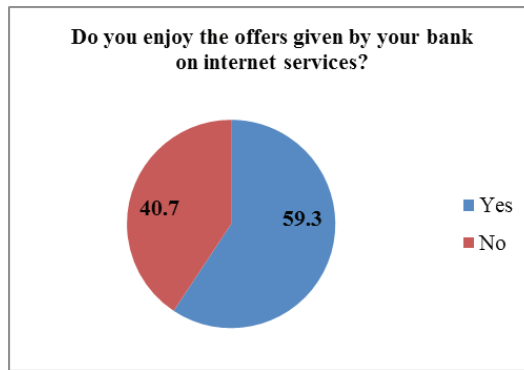


Fig. 1.5 Enjoy offers given by bank

Respondents were asked whether or not they enjoy the offers given by their bank (HDFC or Bank of India) on various transactions such as cashback, discounts or rewards received on booking movie tickets etc. It was observed that 59.3% of the users enjoy the offers provided by their bank and this is also one of the reason they prefer their particular bank for internet banking services. About 40.7% users do not enjoy the offers given by their bank.

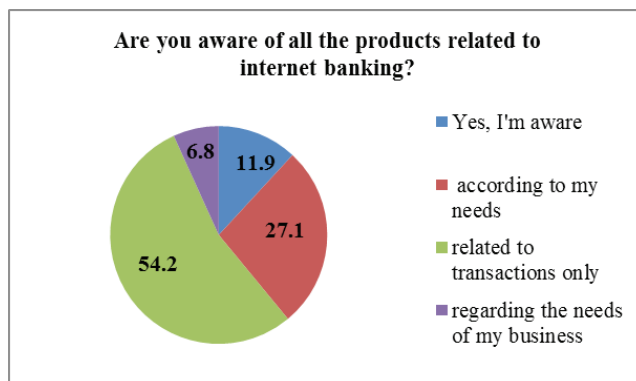


Fig. 1.6 Awareness of various internet banking products

The data above was collected to know the level of awareness of different internet banking services products among consumers. 11.9% users believe that they are aware of every product. Majority of the users i.e. 54.2% of the respondents are aware of the products related to transactions only (depositing money, payment, money transfer etc.). About 27.1% of the respondents are aware of the products according to their needs (apart from transactions, loans; insurance premium etc.) and the remaining users are aware of the products regarding their business needs (apart from basic products).

Table. 1.9 Change in spending pattern with internet banking

Change in spending pattern	No. of respondents	Percentage
No, my expenses are well managed	42	35.6
Yes, but not much	56	47.5
With internet banking, I tend to overspend	20	16.9

Changes in the spending pattern were observed in the data above with relation to internet banking services and majority of the users (47.6%) are of the opinion that their spending pattern has changed but not much and 35.6% users believe that their expenses are well managed and there is no change in their spending pattern. 16.9% users say that they tend to overspend when it comes to internet banking.

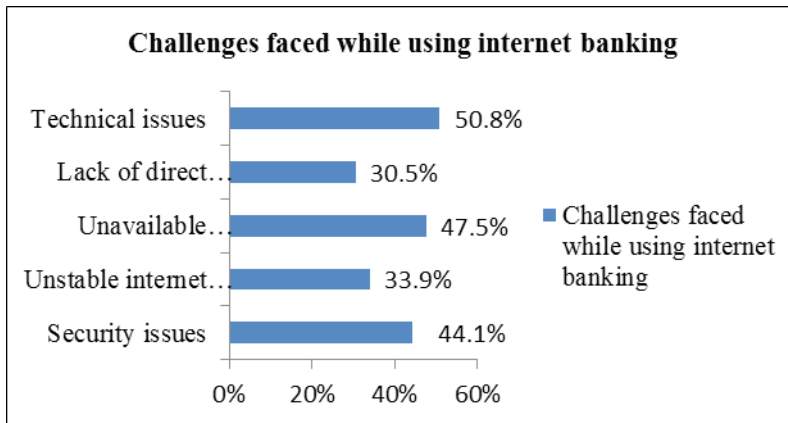


Fig. 1.7 Challenges faced

Above data shows that majority of the consumers (50.8%) face technical issues while using internet banking services. 47.5% face issues of unavailable banking server followed by 44.1% user who believe that security issues pose a major challenge. 33.9% face problems regarding unstable internet and the remaining feel that there is a lack of direct contact between users and banking staff.

TESTING

Hypothesis

- I. **H₀**: There is no significant relation between consumer's occupation and preference towards internet banking services.
H₁: There is a significant relation between consumer's occupation and preference towards internet banking services.

CHI- SQUARE Test: Relationship between occupation and preference of the respondents

Table 2.1 Chi- square test

Occupation	Consumer's preference towards internet banking services			Inference
	Yes	No	Total	
Private employee	60	0	60	X ² = 16.26 Df = 5 Level of Significance = 0.01 Table value = 15.08
Government employee	10	2	12	
Self-employed	12	2	14	
Professional	14	0	14	
Student	12	0	12	
Others	6	0	6	
Total	114	4	118	

According to the statistical test of Chi- Square the results obtained is that the calculated value is greater than the table value i.e. **Calculated value = 16.26 > Table value = 15.08 at a 1% level of significance.** Hence, the null hypothesis is rejected and the research hypothesis is accepted. It can be inferred that '**There is a significant relation between consumer's occupation and preference towards internet banking services.**' Hence, occupation plays a significant role in affecting the consumer's preference towards internet banking.

- I. **H₀**: There is no significant difference between consumer's age and frequency of internet banking services usage.
H₁: There is a significant difference between consumer's age and frequency of internet banking services usage.

CHI- SQUARE Test: Relationship between age and usage of the respondents

Table 2.2 Chi- square test

Age	Consumer's frequency of internet banking services usage					Inference
	Usually	Sometimes	Occasionally	Rarely	Total	
20- 30	30	2	6	6	44	X ² = 9.79 Df = 9 Level of Significance = 0.05 Table value = 16.919
30- 40	20	4	2	4	30	
40- 50	16	4	6	2	28	
50- 60	10	4	2	0	16	
Total	76	14	16	12	118	

According to the statistical test of Chi- Square the results obtained is that the table value is greater than the calculated value i.e. **Table value = 16.919 > Calculated value = 9.79 at a 5% level of significance.** Hence, the null hypothesis is accepted and it can be inferred that **'There is no significant difference between consumer's age and frequency of internet banking services usage.'**

I. **H0:** There is no significant difference between consumer's gender and pattern of spending with internet banking services.

H1: There is a significant difference between consumer's gender and pattern of spending with internet banking services.

CHI- SQUARE Test: Relationship between gender and spending pattern of the respondents

Table 2.3 Chi- square test

Gender	Spending pattern of the respondents				Inference
	No, my expenses are well managed	Yes, but not much	With internet banking, I tend to overspend	Total	
Male	34	28	12	74	X ² = 9.65 Df = 2 Level of Significance = 0.05 Table value = 5.991
Female	8	28	8	44	
Total	42	56	20	118	

According to the statistical test of Chi- Square the results obtained is that the calculated value is greater than the table value i.e. **Calculated value = 9.65 > Table value = 5.991 at a 5% level of significance.** Hence, the null hypothesis is rejected and the research hypothesis is accepted. It can be inferred that **'There is a significant difference between consumer's gender and pattern of spending with internet banking services.'**

FINDINGS

1. Majority 62.7% of the internet banking users belongs to the male category.
2. Majority 37.3% of the respondents belongs to the age between 20- 30 years.
3. Most of the respondents are postgraduate (54.2%).
4. More than half of the respondents (50.8%) are employed in the private sector.
5. **54.2% prefer HDFC bank over Bank of India (35.6%) for transacting through internet banking.**
6. **96.6% respondents prefer internet banking services.**
7. Majority 89.8% of the internet banking users enjoys the benefit of 24*7 accessibility of internet banking services.
8. Most of the respondents (64.4%) use internet banking for online banking services.
9. Majority of the respondents (69.5%) users use online banking for payments.

10. Majority of the users (61%) prefer app provided by bank to the consumers on various devices.
11. 59.3% of the internet banking services users enjoy the offers provided by their bank.
12. Majority of the users i.e. 54.2% of the respondents are aware of the products related to transactions only.
13. Majority of the users (47.6%) are of the opinion that their spending pattern has changed but not much. 35.6% believe that their expenses are well managed and 16.9% tend to overspend with the use of internet banking.
14. 50.8% users face technical issues while using internet banking services.
15. **Calculated value = 16.26 > Table value = 15.08 at 1% level of significance.** Research hypothesis is accepted. It can be inferred that **'There is a significant relation between consumer's occupation and preference towards internet banking services.'**
16. **Table value = 16.919 > Calculated value = 9.79.** Hence, the null hypothesis is accepted and it can be inferred that **'There is no significant difference between consumer's age and frequency of internet banking services usage.'**
17. **Calculated value = 9.65 > Table value = 5.991.** Hence, the null hypothesis is rejected and research hypothesis is accepted. It can be inferred that **'There is a significant difference between consumer's gender and pattern of spending with internet banking services.'**

SUGGESTIONS

As per the various suggestions taken from the respondents, certain points to improve internet banking services are as follows:

1. Banks should improve the help desk and provide help or solve queries more efficiently.
2. Banks should provide effective security features for gaining more consumer trust.
3. Banks should improve and provide safe internet banking services and create a convenient and easy interface for users.
4. An attempt should be made by banks to reduce the additional charges on transactions.
5. Awareness should be created about internet banking services among consumers to increase consumer usage.
6. Public banks should try to improve their internet banking services to be in pace with private banks as internet banking users prefer private bank (HDFC) more than public banks.
7. Banks should try to reduce technical issues and create user friendly environment for their consumers.

CONCLUSION

Banking in the current scenario is not constrained only by its physical boundaries; rather, it is expanding its scope to increase its consumer base and maximise consumer satisfaction. With low-cost and high-speed internet service and a lack of time, people are shifting to transacting through devices rather than physically visiting the bank. Users

enjoy the benefits of the 24-hour accessibility of internet banking services and their time-saving features. They also seek convenience and enjoy location flexibility. According to the study, the majority of consumers are in favour of internet banking services and feel that they are better than traditional banking services. Banks should understand the needs of their consumers and provide a user-friendly interface that is convenient and easy to understand. Most consumers are aware of the basic features of depositing, making payments, and money transfers. To increase their consumer base, banks should try to make their consumers aware of other products as well. Hence, consumer preference plays a significant role in the growth and survival of banks in an economy.

LIMITATIONS OF THE STUDY

The scope of this study is limited to the Bhopal region of Madhya Pradesh, and the size of the sample is 118 respondents who use internet banking services of either HDFC Bank (a private bank) or Bank of India (a public bank), so the results cannot be generalised. Any further study could be done with a larger sample size and in various regions. Different banks (ICICI bank, UCO bank, SBI bank, Axis bank, etc.) or banking sectors (Foreign banks, Regional Rural Banks, Cooperative banks) could become part of further studies. The chi-square test has been used in the current study to test the hypothesis. Therefore, any further research may incorporate other hypothesis-testing techniques.

REFERENCES

1. Rajasulochana, Murthy, S., and Sneha, R. (2022). E-Banking and Customers' Satisfaction in Public And Private Sector Banks In Karnataka: An Empirical Analysis. *Journal of Positive School Psychology* 2022, Volume 6. No. 8, 8270-8279.
2. Grover, K.L. (2022). A Study on Customer's Perception towards Online Banking. *International Research Journal of Modernization in Engineering Technology and Science*, Volume 4. Issue:04. April-2022 e-ISSN: 2582-5208
3. Lakshmi, P., and Thamilselvan, R. (2022). Customer Perception On E-Banking Services of Public and Private Sector Banks in Hyderabad Region. *International Journal for Research in Applied Science & Engineering Technology*, Volume 10. Issue V May 2022 ISSN: 2321-9653.
4. Kavya, J., and Rakesh, R. (2022). A Study on Customers Preference Towards Digital Banking in Modernity. *East Asian Journal of Multidisciplinary Research*, Volume 1. No. 8, 2022: 1545-1554, ISSN-E: 2828-1519.
5. Shaikh, A., and Mishra, K. (2021). To Study Customer Preferences Towards Online Banking System in Mumbai. *Turkish Online Journal of Qualitative Inquiry*, Volume 12. Issue 7, July 2021: 7523 – 7531.
6. Shrestha, D., Wenan, T., Rajkarnikar, N., and Seung Ryul Jeong (2020). Consumers attitude towards Internet banking services in an underdeveloped country: A case of Pokhara, Nepal. *Journal of Internet Computing and Services*. ISSN 1598-0170 (Print) / ISSN 2287-1136 (Online).
7. Lachhwani, H., and Kanwar, A. (2020). A Study on Customer Preference towards Digital Banking: A Study of customers at Ahmedabad. *SKIPS ANVESHAN*, Volume 1. Issue 2 Oct. 2020. ISSN No. 2582-4236.
8. Jha, S., (2019). Internet Banking Services Usage Across Gender Groups A Study With Reference To UT Of Dadra And Nagar Haveli. *International Journal of Commerce and Management Studies*, Volume 4. Issue 3.
9. Kariyawasam, N.J., and Jayasiri, N.K. (2016). Awareness and Usage of Internet Banking Facilities in Sri Lanka. *International Journal of Scientific Research and Innovative Technology*, Volume 3. ISSN: 2313-3759 No. 6.

PRIVACY AND CONFIDENTIALITY IN PERMISSIONED BLOCKCHAIN NETWORKS: EVALUATING SECURITY MODELS

Dr. Tarun Kumar Vashishth	<i>Associate Professor, School of Computer Science and Applications, IIMT University, Meerut, U.P.</i>
Vikas	<i>Assistant Professor, School of Computer Science and Applications, IIMT University, Meerut, U.P.</i>
Sachin Chaudhary	<i>Assistant Professor, School of Computer Science and Applications, IIMT University, Meerut, U.P.</i>

Abstract

The capacity of blockchain technology to offer secure and decentralized data management is helping it gain popularity. It is still very difficult to guarantee privacy and confidentiality in permissioned blockchain networks. This study aims to assess the privacy and confidentiality security models of permissioned blockchain networks. The RBAC and ABAC models are the two primary security models that are examined in this study. The research paper conducts a thorough analysis of existing literature on permissioned blockchain networks, security models, privacy, and confidentiality. The researchers also conduct experiments using a permissioned blockchain network to simulate real-world scenarios. Based on a number of parameters, including access control, data sharing, and data protection, they compare and contrast the two security approaches in terms of privacy and confidentiality.

The research's findings demonstrated that in permissioned blockchain networks, privacy and confidentiality may be effectively provided by both the RBAC and ABAC models.

The ABAC paradigm, however, was discovered to be more adaptable and scalable than the RBAC approach. It makes it possible for fine-grained access control, which makes it possible to manage data access more precisely and quickly. On the other side, while the RBAC paradigm is easier to install and operate, it might not offer enough security in challenging situations. The study comes to the conclusion that implementing the right security models will enable privacy and confidentiality in permissioned blockchain networks. The particular demands and requirements of the application will determine which security architecture is best. While the RBAC model is appropriate for applications that need straightforward access control, the ABAC model is more suited for those that need fine-grained access control. This study makes a significant addition to ongoing work on permissioned blockchain networks' privacy and confidentiality issues.

Keywords: Blockchain, Permissioned Networks, Security Models, Privacy, Confidentiality, RBAC, ABAC.

1. INTRODUCTION

1.1 Background:

By providing decentralized and immutable transactional systems, blockchain technology has revolutionized a number of industries. Due to their capacity to create a controlled ecosystem where only authorized players may access and confirm transactions, permissioned blockchain networks in particular have gained appeal. However, privacy and secrecy continue to be major issues in these networks, particularly when private information is kept and dispersed among users.

Participants are often obliged to abide by particular access restrictions and regulations in permissioned blockchain networks to maintain the integrity and security of the system. It becomes essential to choose the right security model in order to protect sensitive information and preserve network privacy.

1.2 Objectives:

The evaluation of the RBAC and ABAC security models in the context of privacy and confidentiality in permissioned blockchain networks is the main goal of this research study. This study attempts to offer insights into the suitability of each model for addressing privacy concerns and preserving secrecy inside permissioned blockchain systems by exploring the advantages and disadvantages of each model.

The following are the precise goals of this study paper:

- (i) Examine the fundamental components and tenets of the RBAC model and how they apply to permissioned blockchain networks.
- (ii) Examine the essential components and tenets of the ABAC paradigm and how they apply to permissioned blockchain networks.
- (iii) Determine the usefulness of RBAC and ABAC models with regard to privacy and confidentiality in permissioned blockchain networks.

- (iv) Compare and contrast the RBAC and ABAC models according to how well they can deal with privacy and confidentiality issues.
- (v) Offer suggestions and insights for choosing the best security model in light of the particular needs and traits of the permissioned blockchain network.

By achieving these goals, this research paper hopes to advance our understanding of the security models that apply to permissioned blockchain networks and help businesses and other practitioners make wise decisions about privacy and confidentiality when implementing blockchain technology. To secure the security of sensitive data and promote participant confidence, it is crucial to create strong security procedures that fit with permissioned blockchains' special features.

2. PERMISSIONED BLOCKCHAIN NETWORKS

2.1 Overview of Blockchain Technology:

A distributed and decentralized ledger system called blockchain technology enables numerous parties to carry out safe and transparent transactions without the need for middlemen. It runs on a network of nodes that jointly uphold and verify the ledger's integrity. Each transaction is stored in a block, which is connected to earlier blocks by cryptographic hashes to establish an unchangeable chain of data.

Immutability, transparency, and tamper resistance are just a few of the crucial characteristics that make blockchain technology so well-liked. It is the perfect option because of these features for applications like supply chain management, banking, healthcare, and more that require safe and auditable transactions.

2.2 Permissioned vs. Permissionless Blockchains:

There are two primary types of blockchain networks: permissioned and permissionless.

2.2.1 Permissionless Blockchains:

Ethereum and Bitcoin are two examples. To verify transactions and preserve the integrity of the ledger, these networks often rely on two mechanisms like PoW or PoS.

Participants in permissionless blockchains do not need to build trust with one another because the consensus mechanism assures that malevolent actors cannot manipulate the ledger thanks to the network's design. In contrast, the network's openness can pose problems for scalability, privacy, and legal compliance, particularly when delicate or private data needs to be shared and stored.

2.2.2 Permissioned Blockchains:

Blockchains with permissions, commonly referred to as private or consortium blockchains, function in a closed network where access is limited to a predetermined group of authorized companies. Contrary to permissionless blockchains, members in permissioned networks must first build trust and receive approval from a central authority or consortia in order to join the network.

Compared to permissionless blockchains, permissioned blockchains provide more privacy and confidentiality. Only those who are authorized can view and interact with the ledger because access to the network and transaction validation are regulated. Due to

their emphasis on privacy and regulatory compliance, permissioned blockchains are more suited for use in enterprise applications.

The selection of an appropriate security model is essential for preserving privacy and confidentiality in permissioned blockchain networks. In order to clarify that participants use features that match their roles and qualities, the RBAC and ABAC models are frequently used to design access control policies. These security models will be covered in more detail, along with how they are used in permissioned blockchain networks, in the sections that follow.

3. LITERATURE REVIEW

Privacy and confidentiality are crucial aspects of permissioned blockchain networks, as they ensure sensitive information remains protected from unauthorized access. Several security models have been proposed to address these concerns.

Bao et al. (2019) study proposes a revolutionary multi-supervised permissioned blockchain (MSPB) model that supports auditing and does away with centralized entities in the system, such as certification authority and auditing authority, in order to realize the secure governance of permissioned blockchain systems. To prove the viability, dependability, and efficacy of the suggested model, they assessed its performance and security. [1]

Ferrag et al. (2021) propose a classification of the security analysis methodologies into four groups, including BAN logic, game theory, theory analysis, and AVISPA tool. They also evaluate the performance of blockchain-based security and privacy systems for IoT networks by analyzing the performance metrics, blockchain testbeds, and cryptography libraries. We go over the key procedures to take while developing and accessing blockchain-based security and privacy solutions based on the results of the current survey. [2]

Monrat et al. (2020) focus on assessing how well-permissioned blockchain platforms perform. In contrast to public blockchains like Bitcoin or Ethereum, permissioned blockchains feature a small number of participants that are allowed to validate and add new blocks to the blockchain. Due to this feature, permissioned blockchains are able to scale more easily and perform better than public blockchains. [3]

Alfandi et al (2021) presents a survey that explores the application of blockchain technology to enhance security and privacy in the context of the Internet of Things (IoT). The IoT involves the interconnection of various devices and systems, leading to security and privacy concerns due to large-scale data exchange and potential vulnerabilities. [4]

Wazid et al. (2020) proposed a security framework for AI-enabled Internet of Things (IoT) systems used in healthcare services with the assistance of drones. The authors recognize the potential of utilizing drones in healthcare, particularly in emergency situations, and highlight the importance of ensuring security and privacy in such scenarios. [5]

Elisa et al. (2021) present a framework that utilizes blockchain technology to enhance the security and privacy of e-government systems. E-government refers to the use of information and communication technologies (ICT) to improve the efficiency and effectiveness of government services and interactions with citizens. [6]

Ismail and Materwala (2020) analyze and compare the performance of the blockchain and the client/server paradigms. The results reveal that notable performance can be achieved using blockchain in a patient-centric approach. In addition, the immutable and valid

patients' data in the blockchain can aid allied health professionals in better prognosis and diagnosis support through machine learning and artificial intelligence. [7]

Basha et al. (2020) study different Blockchain-based Privacy Models (BPMs) for IoT. The public keys are utilized as aliases correspondences with no data about genuine personalities for contingent secrecy. To keep the dispersion of forged messages, a notoriety assessment calculation is displayed depending on both direct recorded associations and roundabout conclusions about IoT devices. A lot of experiment is conducted to assess the model as far as security, privacy, and authentication in building up a BPM model. It can help in building up a privacy display with transparency. [8]

4. PROPOSED METHODOLOGY:

4.1. Role-Based Access Control (RBAC) Model

4.1.1. Definition and Principles of RBAC: Managing access permissions in accordance with the responsibilities that are given to users inside an organization is the main goal of the commonly used security paradigm known as role-based access control (RBAC). By linking permissions to roles and subsequently assigning those roles to individuals, RBAC offers a structured approach to access control. By ensuring that users only have access to the resources and actions required to carry out their assigned tasks, this model streamlines the management of access control policies and improves security.

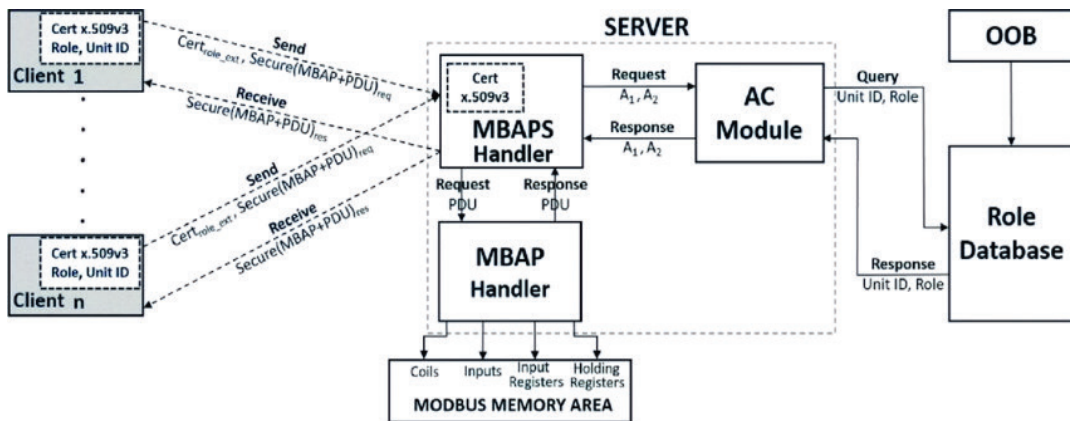


Fig:1-RBAC Network Model

RBAC's fundamental tenets include:

- (i) **Roles:** Within an organisation, roles reflect a set of duties or job functions. They specify the access rights and permissions that are granted to people who hold such jobs.
- (ii) **Permissions:** Permissions specify the particular activities or processes that users are permitted to carry out on system resources. Specific roles are connected to these permissions.
- (iii) **Users:** They are people or organizations who have been given access to the system. Each user is given one or more roles that specify the degree of access they have.

- (iv) **Role Hierarchy:** Role hierarchies are supported by RBAC, allowing roles to derive permissions from lower-level roles. The distribution of permits is streamlined and administration is made simple by this hierarchical structure.
- (v) **Separation of Duties:** RBAC ensures that contradictory permissions are not given to the same role by enforcing separation of duties. This idea lowers the possibility of fraudulent activity and helps prevent unauthorized access.

4.2 RBAC in Permissioned Blockchain Networks:

RBAC can be used to handle access control and improve privacy and confidentiality in permissioned blockchain networks. RBAC can be used in these networks to specify the responsibilities of different participants and link them to particular permits or actions inside the blockchain ecosystem.

For instance, jobs like “Manufacturer,” “Distributor,” and “Retailer” can be defined in a supply chain blockchain network. According to their various responsibilities, each role is given a set of unique permissions. Distributors may be given authority to track product shipments, whilst manufacturers may be given permission to develop and validate product information. Fine-grained access control is made possible by RBAC, ensuring that users have the rights they need to complete tasks without jeopardizing the confidentiality of confidential data.

4.3 Strengths and Limitations of RBAC for Privacy and Confidentiality:

RBAC offers several strengths that contribute to privacy and confidentiality in permissioned blockchain networks:

- (i) **Simplified Administration:** By classifying permissions into roles, RBAC makes it easier to maintain access control policies. This simplifies permissions distribution and lowers administrative burden.
- (ii) **Granular Access Control:** RBAC offers fine-grained access control, enabling organizations to specify and enact access policies according to certain roles. This reduces the possibility of unauthorized access by ensuring that participants only have access to the resources required for their roles.
- (iii) **Role Hierarchy:** RBAC’s role hierarchy allows permissions to be passed down from higher-level roles to lower-level roles. This encourages uniformity in access management and makes it easier to issue rights.

Despite its advantages, RBAC has some privacy and confidentiality drawbacks in permissioned blockchain networks:

- (i) **Lack of Flexibility:** Because RBAC depends on specified roles and permissions, it may not be as flexible as needed to meet the demands of dynamic access. This rigidity can be a limitation in permissioned blockchain networks because access control requirements may change often.
- (ii) **sophisticated Role Assignments:** Defining and managing roles and the rights attached to them can be difficult in big, sophisticated permissioned blockchain networks. Role structures must be carefully designed for organizations, taking into account any potential conflicts and overlaps.

4.4 Use Cases and Examples of RBAC Implementation:

The following permissioned blockchain use cases and industries have effectively used RBAC:

- (i) **Healthcare:** RBAC can be used to handle access control in healthcare blockchain networks, ensuring that medical record access is suitable for administrators, patients, and healthcare professionals while upholding confidentiality and privacy.
- (ii) **Finance:** Depending on the responsibilities of participants, such as bankers, auditors, and regulators, RBAC can be used in financial blockchain networks to regulate access to sensitive financial information, such as customer data, transaction records, and regulatory compliance data.
- (iii) **Supply Chain:** Depending on the responsibilities of the parties participating in the supply chain process, RBAC is useful in supply chain blockchain networks to regulate access to crucial supply chain data, such as product information, shipment details, and quality control records.

5. ABAC MODEL

5.1 Definition & Principles:

ABAC is a flexible and dynamic security model that focuses on managing access rights based on attributes associated with users, resources, and environmental conditions. In ABAC, access control decisions are made by evaluating the attributes of the user, the resource being accessed, and the context in which the access request is made.

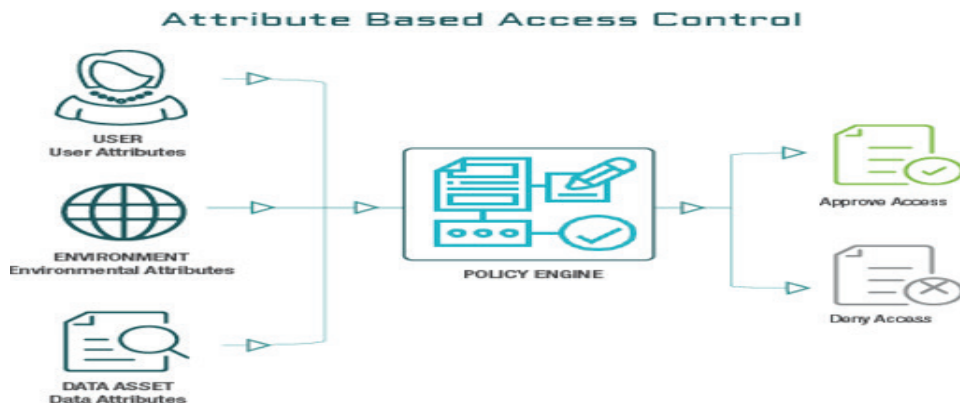


Fig:2-ABAC Network Model

The key principles of ABAC include:

- (i) **Attributes:** Users, resources, and environmental factors all have attributes that describe their qualities or properties. These characteristics may include user roles, organizational ties, geographic location, access time, and any other pertinent contextual data.
- (ii) **Policies:** Access control rules for ABAC are defined by policies based on attribute values. Policies outline the circumstances in which access should be permitted or prohibited.

- (iii) **Attribute Evaluation:** ABAC analyses user, resource, and context-specific attributes before making a judgment on access control. These assessments are carried out dynamically when an access request is made.
- (iv) **Fine-Grained Access Control:** ABAC offers fine-grained access control by taking into account several attributes and their combinations when making access control decisions. This level of specificity enables context-sensitive access

5.2 ABAC in Permissioned Blockchain Networks:

For permissioned blockchain networks, where access control must be flexible and dynamic, ABAC is a good fit. ABAC can be used in these networks to provide access restrictions based on attributes related to people, resources, and the context of access requests.

ABAC, for instance, can take into account factors like the function of the healthcare professional, the patient's consent status, the sensitivity of the medical record, and the location of the user requesting access in a healthcare blockchain network. By assessing these qualities, ABAC makes sure that only users with the right credentials may access certain medical records, improving privacy and confidentiality.

5.3 Strengths and Limitations of ABAC for Privacy and Confidentiality:

ABAC offers several strengths that contribute to privacy and confidentiality in permissioned blockchain networks:

- (i) **Dynamic Access Control:** ABAC enables access control decisions that are dynamic and flexible and based on in-the-moment attribute evaluation. Organizations can implement access regulations in accordance with the shifting demands and constraints of the blockchain network thanks to this flexibility.
- (ii) **Context-Aware Access Control:** ABAC makes access control choices while taking into account contextual data including user location, access time, and other environmental elements. This contextual awareness ensures that access is only allowed in suitable settings, enhancing privacy.
- (iii) **Fine-Grained Control:** ABAC offers granular access control by taking various attributes into account when making access control choices. Organizations can design detailed policies that comply with demands for privacy and confidentiality thanks to this level of granularity.

Despite its strengths, ABAC also has some limitations concerning privacy and confidentiality in permissioned blockchain networks:

- (i) **Complexity of Attribute Management:** ABAC relies largely on attribute management, which can be challenging, especially in large-scale permissioned blockchain networks. To efficiently gather, update, and manage attributes, organizations need reliable systems.
- (ii) **Attribute Credibility:** The credibility of the characteristics employed in ABAC is essential. Unauthorised access or privacy violations may result from the compromise or manipulation of the attributes linked to users or resources.

5.4 Use Cases and Examples of ABAC Implementation:

ABAC has been implemented in various industries and permissioned blockchain use cases, including:

- (i) **Identity and Access Management:** ABAC can be used to manage access to identity-related information, such as personal profiles, credentials, and permissions, within a blockchain-based identity management system.
- (ii) **IoT Data Sharing:** ABAC can be employed in blockchain networks that facilitate IoT data sharing. ABAC ensures that only authorized devices and users with the appropriate attributes can access

6. COMPARATIVE ANALYSIS AND EVALUATION:

6.1 Comparison of RBAC and ABAC Models:

RBAC and ABAC are two distinct access control models that offer different approaches to managing access rights. A comparison of these models can help evaluate their suitability for addressing privacy and confidentiality concerns in permissioned blockchain networks.

RBAC:

- (i) RBAC is role-based, where access control decisions are based on predefined roles and their associated permissions.
- (ii) RBAC simplifies administration by grouping permissions into roles, allowing for easier assignment and management of access rights.
- (iii) RBAC provides granular access control by associating permissions with roles.
- (iv) However, RBAC can lack flexibility in accommodating dynamic access requirements and may have complex role assignments in large and complex networks.

ABAC:

- (i) Access control decisions are made using attributes related to users, resources, and the context of access requests in it.
- (ii) ABAC enables flexible policies based on in-the-moment attribute evaluation.
- (iii) ABAC provides fine-grained control by taking into account a number of factors when making access control decisions, allowing for specific access policies.
- (iv) ABAC, however, depends on the reliability of attributes and calls for strong attribute management systems.

6.2 Evaluation Criteria for Privacy and Confidentiality:

The following factors can be taken into account when comparing the security models of RBAC and ABAC for privacy and confidentiality in permissioned blockchain networks:

- (i) **Granularity:** The model's capacity to offer fine-grained access control, enabling exact design and application of access regulations.
- (ii) **Dynamicity:** The model's capacity to quickly adjust to shifting access requirements and outside circumstances.

- (iii) **Context-Awareness:** The model's capacity to take into account contextual factors, such as the user's location and the time of access, when making access control decisions.
- (iv) **Privacy Preservation:** How well the model protects sensitive data privacy by limiting access to just those who are authorized.
- (v) **Attribute Management:** The efficiency of the model's procedures for gathering, updating, and maintaining attributes related to users, resources, and environmental conditions.
- (vi) **Complexity and Scalability:** Specifically in big and complicated blockchain networks, the simplicity of administration and management of access control policies.

6.3 Suitability of RBAC and ABAC Models for Permissioned Blockchain Networks:

With regard to privacy and confidentiality in permissioned blockchain networks, both RBAC and ABAC models have their advantages and disadvantages.

RBAC works well in situations where an established set of roles and permissions may satisfy the need for access control. For networks with generally consistent access requirements, it is useful because of its simplicity and management ease. Granular access control is provided by RBAC, which also efficiently manages permissions based on roles. However, RBAC can have complicated role assignments in big networks and may not have the flexibility required for dynamic access control settings.

ABAC, on the other hand, performs exceptionally well in situations where access control requirements are fluid and context-specific. Flexible access control policies are possible thanks to their real-time attribute evaluation capability. ABAC offers context awareness and fine-grained control, enhancing privacy and secrecy. However, ABAC depends on the reliability of attributes and calls for strong attribute management systems.

Depending on the unique needs and characteristics of the network, RBAC or ABAC may be appropriate in a permissioned blockchain network. Organizations should carefully evaluate which model best supports their privacy and confidentiality goals, taking into account factors like the network's complexity, the dynamic nature of access requirements, and the requirement for contextual awareness.

In the end, RBAC and ABAC can be combined, or components from both models can be combined, to produce a more thorough and specific approach to access control in permissioned blockchain networks.

Here's an example of how we can calculate a score for each model based on the criteria mentioned in the data analysis table:

Criteria Weightage:

Granularity: 20%

Dynamicity: 15%

Context-Awareness: 15%

Privacy Preservation: 20%

Attribute Management: 15%

Complexity and Scalability: 15%

RBAC Score Calculation:

RBAC Score = (Granularity * 0.2) + (Dynamicity * 0.15) + (Context-Awareness * 0.15) + (Privacy Preservation * 0.2) + (Attribute Management * 0.15) + (Complexity and Scalability * 0.15)

ABAC Score Calculation:

ABAC Score = (Granularity * 0.2) + (Dynamicity * 0.15) + (Context-Awareness * 0.15) + (Privacy Preservation * 0.2) + (Attribute Management * 0.15) + (Complexity and Scalability * 0.15)

Let's assume the following quantitative scores (on a scale of 1 to 10) for each criterion:

Granularity: 8

Dynamicity: 7

Context-Awareness: 6

Privacy Preservation: 9

Attribute Management: 7

Complexity and Scalability: 8

Plugging these values into the formulas:

RBAC Score = (8 * 0.2) + (7 * 0.15) + (6 * 0.15) + (9 * 0.2) + (7 * 0.15) + (8 * 0.15) = 7.75

ABAC Score = (8 * 0.2) + (7 * 0.15) + (6 * 0.15) + (9 * 0.2) + (7 * 0.15) + (8 * 0.15) = 7.75

In this example, both RBAC and ABAC have the same score of 7.75. This score reflects the overall evaluation based on the weighted criteria.

7. CONCLUSION

In conclusion, with a focus on privacy and confidentiality in permissioned blockchain networks. The goal was to evaluate these models' performance in resolving privacy and confidentiality issues in permissioned blockchain networks.

According to the analysis, both RBAC and ABAC models provide helpful security tools for restricting access to private data in permissioned blockchain networks. Access permissions are assigned based on predetermined roles in RBAC's simple, hierarchical approach to access management. Contrarily, ABAC provides a more adaptable and detailed access control model that takes into account qualities related to individuals, resources, and environmental factors.

8. FUTURE REFERENCES:

Despite the improvements made to the RBAC and ABAC models, more work has to be done in these areas. Future considerations for privacy and secrecy in permissioned blockchain networks include the following:

- (i) **Enhanced Attribute Management:** Investigating techniques for authenticating and managing attributes within permissioned blockchain networks. This covers methods for granting and rescinding attributes as well as preserving attribute integrity.

- (ii) **Integration with Privacy-Enhancing Technologies:** Investigating the integration of privacy-enhancing technologies, such as zero-knowledge proofs or homomorphic encryption, to strengthen privacy and confidentiality in permissioned blockchain networks.
- (iii) **Privacy-Preserving Access Control:** Developing techniques to enable access control without revealing sensitive attribute values, thereby protecting the privacy of users and their associated attributes.
- (iv) **Scalability and Performance Optimization:** Addressing the scalability challenges of both RBAC and ABAC models in large-scale permissioned blockchain networks. This includes optimizing access control decision-making processes and reducing computational overhead.
- (v) **Compliance with Regulatory Frameworks:** Exploring the alignment of RBAC and ABAC models with existing privacy & facilitating secure data handling within permissioned blockchain networks.
- (vi) **Real-World Deployment and Case Studies:** Conducting real-world deployment and case studies to assess the practical applicability, performance, and effectiveness of RBAC and ABAC models in different permissioned blockchain network scenarios.

REFERENCES

1. Bao, Z., Wang, K., & Zhang, W. (2019, July). An auditable and secure model for permissioned blockchain. In *Proceedings of the 1st International Electronics Communication Conference* (pp. 139-145).
2. Ferrag, M. A., & Shu, L. (2021). The performance evaluation of blockchain-based security and privacy systems for the Internet of Things: A tutorial. *IEEE Internet of Things Journal*, 8(24), 17236-17260.
3. Monrat, A. A., Schelén, O., & Andersson, K. (2020, December). Performance evaluation of permissioned blockchain platforms. In *2020 IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE)* (pp. 1-8). IEEE.
4. Alfandi, O., Khanji, S., Ahmad, L., & Khattak, A. (2021). A survey on boosting IoT security and privacy through blockchain: Exploration, requirements, and open issues. *Cluster Computing*, 24, 37-55.
5. Wazid, M., Bera, B., Mitra, A., Das, A. K., & Ali, R. (2020, September). Private blockchain-envisioned security framework for AI-enabled IoT-based drone-aided healthcare services. In *Proceedings of the 2nd ACM MobiCom workshop on drone assisted wireless communications for 5G and beyond* (pp. 37-42).
6. Elisa, N., Yang, L., Chao, F., & Cao, Y. (2018). A framework of blockchain-based secure and privacy-preserving E-government system. *Wireless networks*, 1-11.
7. Ismail, L., & Materwala, H. (2020). Blockchain paradigm for healthcare: Performance evaluation. *Symmetry*, 12(8), 1200.
8. Basha, S. M., Janet, J., & Balakrishnan, S. (2020). A study on privacy-preserving models using blockchain technology for IoT. *Blockchain, big data and machine learning*, 265-290.

6

DIGITAL HEALTHCARE ECOSYSTEM – A DATA DRIVEN INNOVATIVE MODEL TO RESHAPE THE HEALTHCARE SYSTEM AND AN OPPORTUNITY TO ADVANCE HEALTH EQUITY

Mr. Pritam Sarkar

Organization: Tata Consultancy Services

Ms. Arpita Gupta

Organization: Tata Consultancy Services

Abstract

After COVID-19 pandemic, in healthcare sector, one prevailing sentiment has become very clear; consumers preferring to avoid hospital or clinical facility. To cope with this sudden increase in demand, healthcare systems also started to evolve in different ecosystem. The researchers are working how might we create a technological advanced clinical system to treat patients in a personalized, confidential, and qualitative manner per their diagnosis anytime anywhere, maintaining the healthcare business growth intact. A robust strategy around services in the end-to-end components of an ecosystem for delivering patient-centred care. Digital health solutions using the digital tools have the potential to dramatically improve patient care and cost-effectiveness. To accelerate equity in digital health innovators can progress by aligning goals and actions to levers that prioritize diversity, equity, and inclusion. Yet achieving that at scale still has a lot of obstacles to overcome, Government and their healthcare partners should step in to support with more investments in digital platforms and tools for growth in healthcare management solutions. But maintaining the momentum and sustainability through investment and partnerships Government must be compliant with the strict healthcare privacy and security laws.

Keywords: *Personalized Healthcare, Digital Ecosystem, Health equity, Business Drivers, Governance*

INTRODUCTION

Last couple of years innovative machines, lifesaving medicines, teleconsultation became the gamechanger in the health sector . High demand for remote diagnostics and care accelerating the convergence of Technology & digitization. These reduced the Health Care Professional's load as early and accurate detection of health problems, generation of optimum treatment plans, and improved intervention process leads towards for better patient outcomes. We need to consider another important remarkable transformation with the emergence of generative artificial intelligence (AI).This latest technology could hold immense potential for revolutionising various aspects of healthcare with the ability to generating new content, predictions, and patterns . This is an invaluable resource for diagnostics, broader medical devices industry. After the pandemic the issue of healthcare inequity increased ,particularly in the rural areas among the underprivileged, minority section and the elder section. Access similarity in the affordable & quality healthcare helps for leading better quality of life. Also, this helps to take preventive measures and finally reduce untimely deaths. Living standard of patients not only improve the efficacy of healthcare systems as well as impacting the greater economy in forward direction.

The concept of digital healthcare ecosystem:

Considering all the challenges since last pandemic, the projection for healthcare market to reach \$11.5 trillion by 2023. In 2020, AI alone generated \$8.23 billion for the healthcare industry globally and is estimated will reach to \$19.4 billion by 2030, implying a CAGR of 38.1% from 2021 until. On the other hand , WHO(World Health Organization) anticipated that a demographic shift that will happen , which will put more than 22% of world population in the 60+ age bracket by 2050.Gradually this can change consumer preferences for receiving more home-based care . According to a recent report by the International Data Corporation (IDC), spending on AI systems in healthcare will reach USD 34 billion by 2025. This research indicates the potentiality of home care to unlock better quality care for patients at cheaper rate .

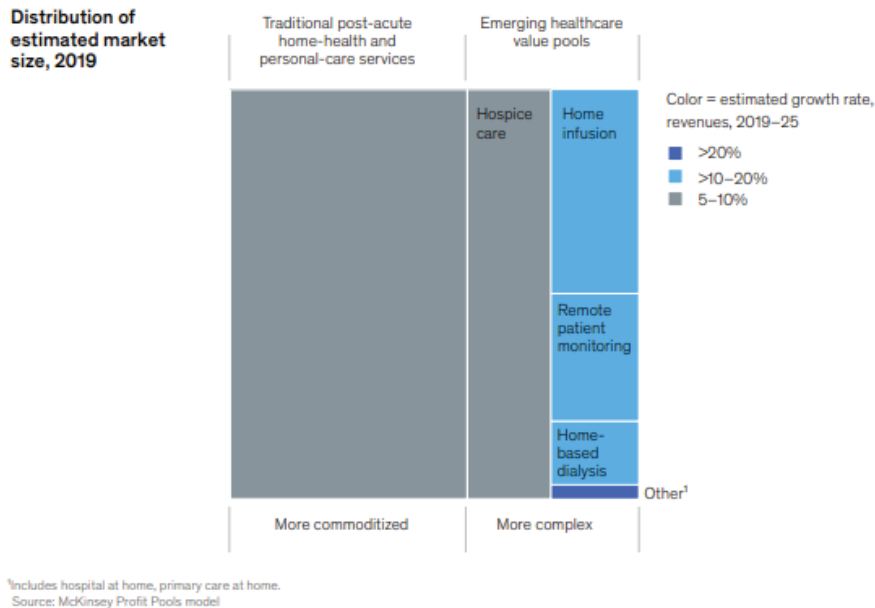


Fig 1. Within home care, emerging value pools include home infusion, remote patient monitoring, and other categories such as hospital at home.

LITERATURE REVIEW

We have studied a good number of literatures, journals and identified that no sustainable business model exists for innovators so far that can serve both affordability and availability. An ecosystem approach to connecting various actors in the health system would address that gap, benefiting patients providers, start-ups, pharma companies & payers. Ecosystem approaches help integrate digital health solutions into the existing infrastructure and create value for all participants in the traditional healthcare sector. But A research gap observed how Government and healthcare partners combinedly overcome the health sector challenges through digital platforms to continue the momentum and sustainability as well as narrowing the equity gap .

COMPONENTS OF ECOSYSTEM AND CHALLENGES

The Home-care landscape broadly categorized across two dimensions: 1.In which cases does the home care applicable in the patient's care journey ? As for example, the preventive care, the maintenance care, the acute care, and the post-acute care should be . 2. Which population of the patients is the service supports? This includes patient categories like episodic patients , chronic patients, and/or patients in critical conditions. A proper identification & mapping required at the different possible sites and modalities of care that specific populations might encounter throughout their care journey. The healthcare system started defining the wider range of ecosystem of care- bypassing the hospital and install the settings at home-to achieve the best quality treatment , better outcome as well as patient experience .

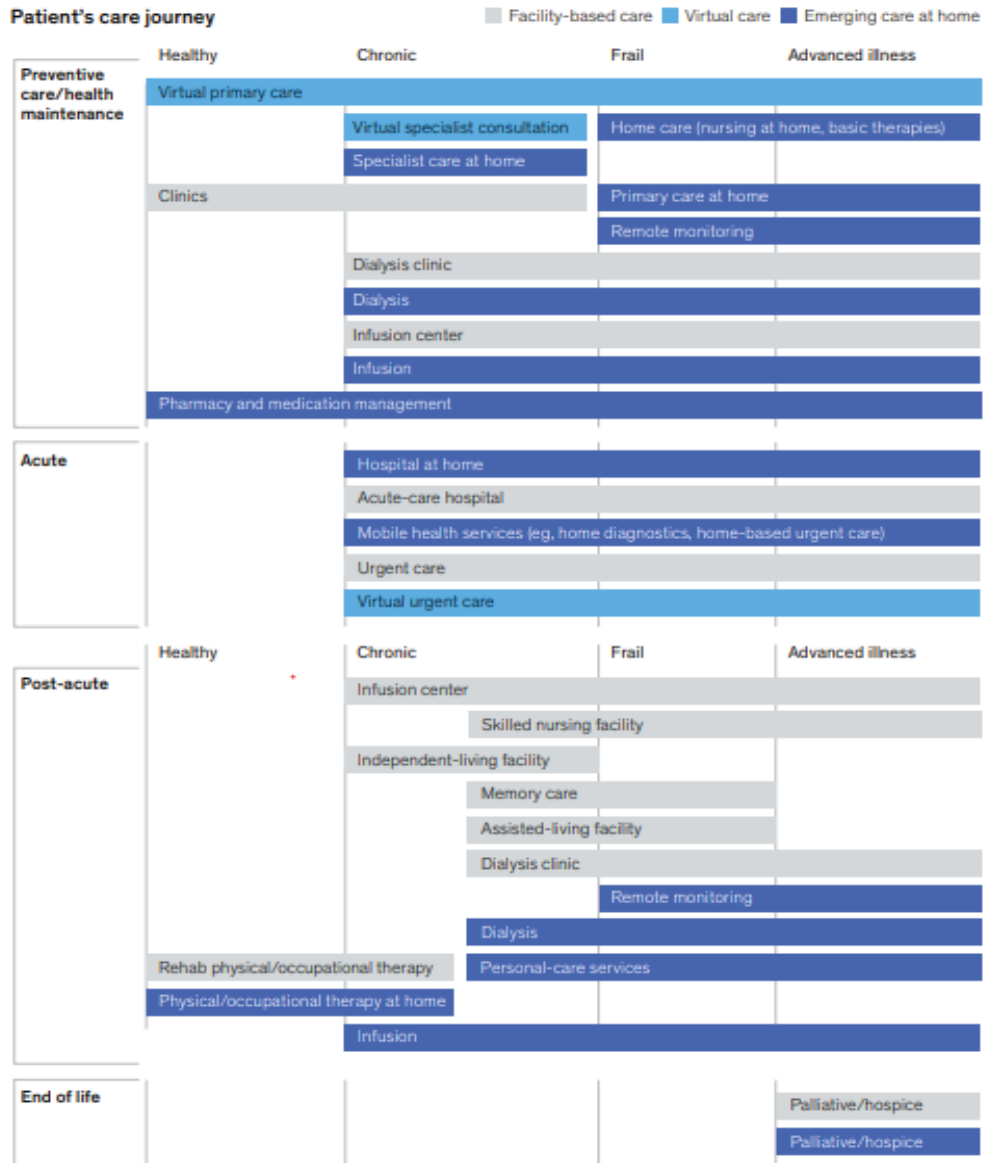


Fig 2: The home care model for future

In the current world the rapid Digital transformation taking places in every sector and one term 'collaboration ' playing as a magical weapon to accelerate the digitization. One of the examples the Covid Vaccine, where collaboration among the multinational corporations, startups, government regulatory authority, bureaucracy combinedly were able to reach the incredible feat of developing, producing, certifying, properly distributing the vaccines – resulting the half of the world's population getting at least one shot – in less than a year. The evolution of platform technologies, forming the intense collaborations within

the ecosystem made it possible. The multiple partnerships formed in the ecosystem, and it played the key success factor role for the vaccine production, proper distribution in an accelerated time scale. Collaborative approaches in the ecosystem are the key to large-scale industry disruptions to manage complex, diverse challenges.

Generative AI, nearly overnight it has become the hot innovation, promising to reshape our society and economy and driving investment in new companies leveraging this breakthrough technology. With no exception, the health care industry will go faster comparing any other, with a compound annual rate of growth of 85% by 2027.

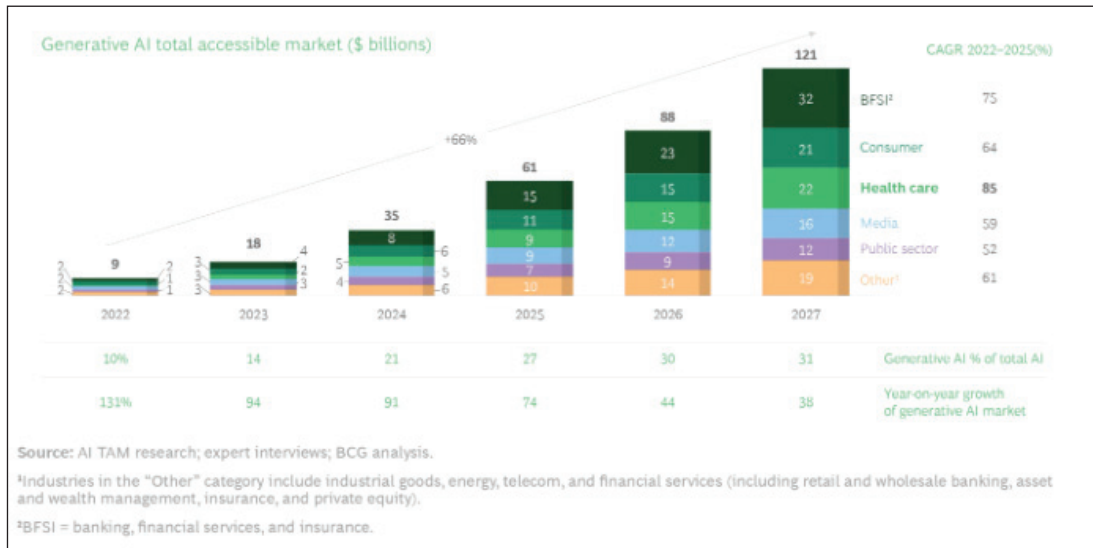


Fig 3: Generative AI growth in Health Care in comparison to other industry

The generative AI in healthcare industry has a promising future through the continuous technological advancements and wider adoption. Many ongoing future developments, including more comprehensive, robust, mature deep learning algorithms and better integration with other medical science technologies including imaging, health devices etc. This will help to support more accurate diagnoses and personalized treatment plans. On the other side of coin has challenges and drawbacks, security concerns and ethical considerations. A strict regulation is there against the patient data privacy, hence the use of generative AI in healthcare possibly raises huge concerns about issues of patient data privacy including the potential misuse or unauthorized access to the sensitive patient treatment data. Also, the ethical part, mainly the potential impact on employment in the healthcare sector must be considered while introducing generative AI. These challenges must be overcome through more Collaboration between technology, healthcare providers, researchers and industries.

HEALTH EQUITY THROUGH DIGITAL TECHNOLOGIES

Digital technologies can be key weapon to solve the health equity problem. Unexpected biases, widening the digital divide are the side effects of rapid changing technology, which finally resulting some populations continue to stay behind. The 2021 McKinsey Digital

Health Conference on Accelerating Diversity, Equity, and Inclusion in Digital Health highlighted some primary case studies, useful for development of digital solutions to narrow down health equity gaps.

Improvement in the healthcare access not just increase individual and community-level outcomes but also putting salutary effects on the broader economy. Good health along with useful treatment helps to living a healthy and productive live. Global health has a contribution of one third of all economic growth in advanced economies over the last century. To Continue a steady growth rate, design the digital health solutions such a way that it can be reachable to earlier excluded groups.

Still a lot of work to be done for bridging the equity gaps using the digital tools. Digital solutions helping patients through increasing the healthfacility access, providing the personalized health care considering the historical context.

Two chief constraints to achieve the health equity : affordability and availability. Costly treatment and little insurance coverage major barriers to care. Many digital medical start-ups already started working to lower costs for patients those lives particularly in remote areas, where little facility of healthcare providers and the travel time & costs are challenging to afford by the poor people. After COVID-19 pandemic rapidly a significant increase observed in telemedicine, that improves accessibility for those who can't attend in-person consultations. Accessing medical equipment one of the challenges in many parts of the world. To improve diagnostic imaging access, few companies offering an imaging solution for developing areas like expensive CT scan or MRI machines or X-Ray machines, at low cost. Such portable diagnostics and medical devices can reduce the healthcare expenditure and make available the unconventional healthcare settings.

Organizations for digital innovations must prioritize diversity and inclusion at every step of product cycle , starting from the research and concept design to testing and implementation of healthcare product . First important thing is finding the bias in the data in design phase . This is observed that the possibility of bias is higher in disease areas and populations where data acquisition is really challenging or possibly flawed. Though latest technologies like big data ecosystem, social media analytics ,geoinformatics helps still community outreach still primarily dependent mainly on the local relationships and people connections. Hence, to introduce new product or service certain community partnerships might help providing community level data for identifying and tracking certain gaps in caring, and ultimately supporting the solution users .

CONCLUSION

Digital innovators must consider which dimension of health inequity can be addressed in their solution. Next should focus on AI based digital solutions development aligning with the goal towards health equity . Digital innovators certainly will improve the patient's longevity, increasing the facility of digital healthcare ecosystems, and keeping additional impact on the global economy using the cutting-edge AI technologies .

ACKNOWLEDGEMENTS

Recognizing the active participation of number of collaborators, including Mr. Bhaswar Majumdar, Mr Suman Jha. The authors are solely responsible for all the statements made above. Thanks to the anonymous reviewers whose valuable comments helps enriching the content of this paper.

REFERENCES

1. Dalglish Chew, Aneesh Krishna, Michael Morley, and Nithya Vinjamoori , " how-care-at-home-ecosystems-can-reshape-the-way-health-systems-envision-patient-care-vf.", Journal of McKinsay & Company ,February 2022.
2. Dominique Argyres, Amy Hung, Kelsey Kennedy, Lucy Pérez, and Gila Tolub, "digital-health-an-opportunity-to-advance-health-equity final," Life Science Practices Journal of McKinsay & Company ,July 2022.
3. Arnaud de la Tour, Saurabh Tak, and Malvika Verma "inclusive-affordable-healthcare", Report of Boston Consulting Group (2022).
4. T. Qiu, Y. Zhang, D. Qiao, X. Zhang, M. L. Wymore, and A. K. Sangaiiah, "A robust time synchronization scheme for industrial internet of things," IEEE Transactions on Industrial Informatics, 2017
5. Errol Pierre, Carlos Pardo Martin "health-equity-activating-meaningful-change", Report McKinsay & Company ,March 2022.
6. Shelia Shah, Alexo Alan,Ned Maffot "Generative Artificial Intelligence (AI): Who (or What) Wrote This?", Special Report L.E.K Consulting
7. Cem Dilmegami, "Generative AI Healthcare Industry: Benefits, Challenges, Potentials", November 2022
8. Andres Carbonell, " Revolutionizing Healthcare with Generative AI: The Creative Code for Staying Well and Spry",May,2023
9. Suraj Kapoor, "Digital Health Ecosystem in India: Present Status, Challenges, and Way Forward" December,2022

INTERNET OF THINGS: SECURITY AND PRIVACY

Iram Fatima

Jamia Hamdard University

Dr Ihtiram Raza

Jamia Hamdard University

Mehtab Alam

Jamia Hamdard University

Abstract

The Internet of Things (IoT) is an ongoing debate in the engineering and technology industries and has been a focused headline in both specialized and general media. The widespread use of IoT devices has the possibility to drastically alter multiple facets of how we live. We are going towards a concept of the "smart home," giving additional security & energy efficiency, obliged to advance IoT customers-goods including Internet-enabled equipment, home-automation components, and energy management appliances. The Internet of Things fully hinges on approaches/plans that esteem people's sequestration and security preferences over a vast range of expectations. Concerns about privacy, security, and capable downsides may obstruct the Internet of Things from being widely adopted, even though the data streams and personal particularly made available by IoT devices may offer users a great and unique value. This implies that in order to ensure users' assurance and confidence in the Internet, linked devices, and inter-connected services, privacy and security rights as well as respect for user privacy expectations are most crucial. The Internet of Things has led to various outcomes; grave concerns have been raised about access to user data on devices and personal privacy. The security risks and privacy issues and setbacks implicated by IoT will be discussed in this paper.

Keywords: *Internet of Things (IoT), Security & Privacy, Threats, Challenges, Application and Taxonomy of IoT.*

1. INTRODUCTION

IoT alludes to the connectivity of equipment that incorporates electronics, software, sensors, actuators, and network connectivity, enabling the gathering and sharing of data. IoT involves a wide range of machines, including small and large equipment, which includes several important network types, inclusive of distributed, grid, ubiquitous, and vehicle networks. IoT can be refined with a particular technology and purpose [1]. You can select from RFID, Bluetooth, ZigBee, or Wi-Fi for communication within short ranges. ZigBee may be preferred by industrial automation equipment, while WiMAX or cellular technology may be used for long-distance communication. IoT is still a young technology that requires the development of application standards, communication protocols, and a safe, secure, global data service [2]. Ashton coined the term to highlight the possibilities of using the Internet to connect RFID tags, which are used to monitor and track objects or entities in business supply chains. This connection would enable autonomous functioning without the need for human intervention [3]. IoT communication involves a range of protocols and standards, such as IPv6, IPv4, 6LoWPAN, CoAP, TCP, and UDP. Among these protocols, Device manufacturers favour UDP because of its compact size and improved performance, which makes it a cost-efficient choice. [5].

Table 1. Wireless communication technologies [4]

[Sain M, Kang Y], Lee HJ]. Survey on security in Internet of Things: State of the art and challenges. In2017 19th International conference on advanced communication technology (ICACT) 2017 Feb 19 (pp. 699-704). IEEE]

	NFC	RFID	Bluetooth	Wi-fi	ZigBee	WIRELESS HART	6LoWPAN	WiMAX	2.5-3.5G
Network	PAN	PAN	PAN	LAN	LAN	LAN	LAN	MAN	MAN
Topology	P2P	P2P	Star	star	Mesh, star tree	Mesh, star	Mesh, star	Mesh	Mesh
Power	Very low	Very low	low	Low-high	Very low	Very low	Very low	High	High
Speed	400 kbps	400 kbps	700 kbps	400 kbps	250 Kbps	250 kbps	250 kbps	10-110 mbps	1.8-7.2 mbps
Cost Adder	Min	Min	Min	Avg	Avg	Avg	Avg	Max	Max

2. ARCHITECTURE OF IOT

The Internet of Things is often described as the next phase of the Internet, following the era of static web pages (WWW) and social networking websites. When designing an IoT architecture, key considerations include scalability, interoperability, reliable data storage, and quality-of-service (QoS) [6]. The conventional IoT architecture typically comprises three layers: the perception layer (It can also be referred to as the Recognition layer), the Network layer (or wireless sensor networks), and the application layer[7,8].

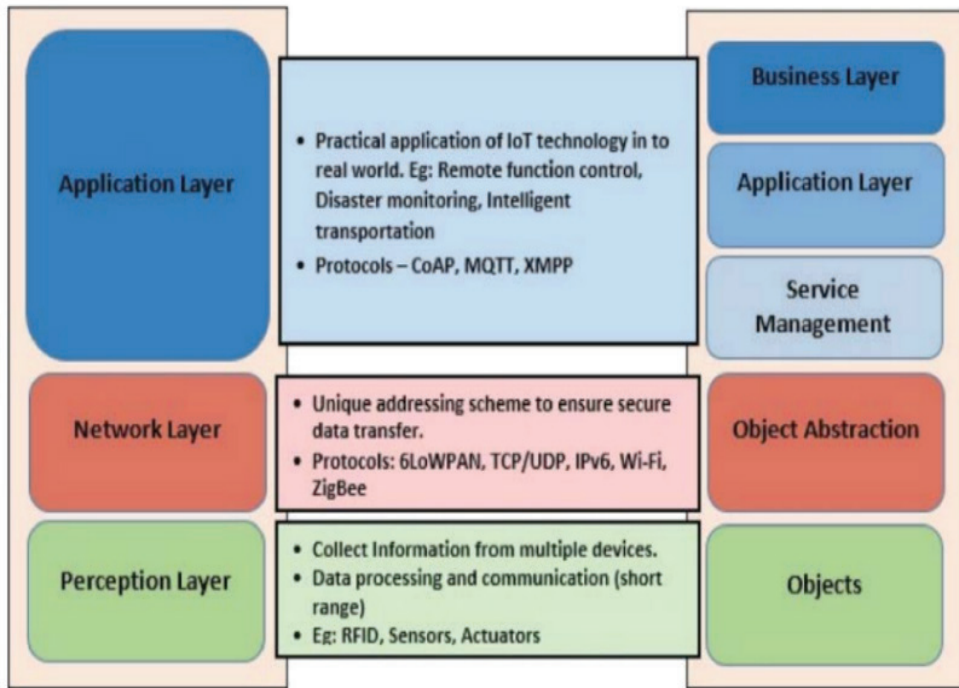


Fig 1: IOT Architecture [7,8]

3. APPLICATION OF THE INTERNET OF THINGS (IOT)

IOT is significantly influencing various fields. Each taxonomy possesses unique strengths that are influenced not only by the desired objective but also by the explicit definition and, also referring to the particular context in which the (IoT) is discussed. Both the industry and academia have put forth application domains. For instance, in the industry brochure [9], Various IoT software or programs are showcased across different fields utilizing diverse sensor boards [10] the applications have been classified into four categories that span short to medium-term objectives. Similarly [11] (year not mentioned) have conducted similar categorization efforts (2012) employing 6 classifications, while maintaining the healthcare domain, they make alterations to other areas. Significantly, they do not include the personal and social domains in their classification and instead, introduce a new category focused on security and surveillance. Adopt a revised approach to classification by conducting a comprehensive literature review[12], heavily relying on the works of [10,11]. Moreover, an additional category called “smart infrastructure” is introduced, expanding upon Atzori’s concept of smart environments and encompassing the distinctive features of transportation infrastructure [11].

Table 2: Application of IoT in various domains [11]

Domains	Key applications
Transportation and logistics	Logistics; assisted driving; mobile ticketing; environment monitoring, etc
Healthcare	Tracking; identification/authentication; data collection; sensing
Smart environment (home, office, plant)	Comfortable homes and offices; Industrial plants;
Personal and social Futuristic	Social networking; losses; Robberies Robot Taxi; City-Information Model;
Industry	Supply chain management; transportation-logistics; Aerospace; Aviation; automotive
Society	Telecommunication; medical technology; etc
Environment	Agriculture & breeding; recycling; disaster alerting; etc
Smart infrastructure	Smart grids; smart homes and building; etc.
Healthcare Supply chain and logistics	Monitoring individuals' well-being, providing assistance in daily living, improving healthcare practices, etc.
Social application	Integration with Facebook & Twitter; location-based interest; etc.
Industrial; social IoT; healthcare; infrastructure; security and surveillance	Aerospace & aviation; automotive; Telecommunications; medical-healthcare; independent living; etc
Smart city	Structural health of buildings; waste management; etc

4. WHY DO WE NEED IOT

In this section, we have discussed the reasons why we need IoT [13,14]

- i. Interconnectivity:** When it comes to the IoT, any object has the potential to be connected to the worldwide network of ICT framework.
- ii. Things-associated services:** Within the constraints of physical objects, the potentiality of IoT is to provide services, pertinent to these objects. These services encompass safeguarding privacy and maintaining semantic coherence between the physical objects and their corresponding virtual representations.
- iii. Heterogeneity:** The devices within the Internet of Things exhibit heterogeneity due to their utilization of diverse hardware platforms and networks. They have the ability to establish communication with other equipment's or service platforms using various networks.

- iv. **Dynamic alterations:** The condition of objects, including their active or idle state, connectivity status (connected or disconnected), as well as contextual factors like location and speed, undergo dynamic variations. Additionally, the number of devices involved may also dynamically fluctuate.
- v. **Massive scale:** The quantity of devices requiring management and communication among each other is expected to be significantly larger, by a minimum of tenfold, compared to the current number of objects/equipment linked to the Web or Worldwide.
- vi. **Safety:** While we enjoy the advantages offered by the IoT, it is crucial to prioritize safety. It is essential for both IoT creators and users to consider safety aspects. Inclusive of ensuring the integrity of our private/confidential data and safeguarding our physical well-being.
- vii. **Connectivity:** Connectivity enables easy access and compatibility within networks. Access refers to the capacity to connect to a web, while compatibility pertains to the mutual ability to both consume and generate information.

5. IOT SECURITY AND PRIVACY

Within the IoT ecosystem, a wide array of things, ranging from basic to sophisticated devices, exist. Communication between these things takes place through multiple networks. Consequently, security risks are present at each device and network layer, potentially compromising individual privacy through various avenues. As a result, it becomes imperative to thoroughly re-evaluate and address all types of attack scenarios that were previously encountered in traditional IT environments, emphasizing the need for increased vigilance.[15]

6. SECURITY CHALLENGES WITHIN THE IOT

As we have discussed the architecture of IOT, there are various layers with the coming facilities challenges also arise. Therefore, there are some security challenges as well. This section will focus on the security challenges related to different layers of architecture. To ensure comprehensive security, it is crucial to address security concerns during the early stages of the framework design process. As proposed in the literature [16], an application for assessing the security state of the Internet of Things (IoT) is presented, employing the grey correlation algorithm. This approach quantitatively evaluates the overall network based on multiple frequent attacks, considering them as security factors. The literature also outlines the precise steps involved in conducting the security state assessment using this methodology.

6.1 Perception Layer Security Problems

RFID, Zigbee, and diverse transducers constitute the essential components within the perception layer. Wireless network transmission is predominantly employed for transmitting the collected data. However, it is important to note that these signals are visible to the public, making them susceptible to monitoring, interception, and disruption in the absence of adequate safeguards. Notably, the utilization of highly effective attacks like Differential Power Analysis (DPA) further amplifies the vulnerability. The following are some examples of popular types of attacks [18]

- i. Node Capture- Attackers can readily seize critical nodes within the network, such as the gateway node. This compromise can lead to the exposure of sensitive information, inclusive of group communication keys, radio keys, matching keys, and other crucial data, thereby jeopardizing the security of the network as a whole.
- ii. Malicious Data and a Fake Node: The attackers infiltrate the system by introducing a node and injecting malicious code or data into it. They stop sending legitimate data, causing disruption to the node's normal functioning. By preventing the energy-limited node from entering its low-power sleep state, they deplete its valuable energy resources. This enables the attackers to take control of the compromised node and grants them the power to manipulate or even dismantle the whole network.
- iii. Denial of Service (DoS) Attack: The prevalent form of attack observed in Wireless-Sensor Networks (WSN) and the Internet is one that exhausts network resources and renders the service unattainable.
- iv. Timing Attack: The act of acquiring essential information by analysing the duration required to perform an encryption process.
- v. Routing Threats: By engaging in deceptive practices, tampering with data, or resending routing information, the attacker has the ability to manipulate the network in various ways. These include creating routing loops, disrupting or obstructing network transmission, altering the initial path length, generating error codes, increasing end-to-end delays, and similar actions.
- vi. Replay Attack: To attain the trust of the system, the attacker employs a tactic where they send a package that has already been received and is being reused or manipulated. by the intended destination host. This deceptive method is frequently utilized during authentication procedures and can compromise the authenticity of certifications.
- vii. SCA (Side Channel Attack): An individual attempts to compromise encryption equipment by exploiting the side channel during the device's operation. This involves leaking data through channels like analysing time usage, power utilization, or electromagnetic energy.
- viii. Mass Node Authentication Issue: Within the framework of the IoT, it is crucial to focus on addressing the efficiency of authentication for a large number of nodes.

Furthermore, Mobile intelligent terminals are set to play a crucial role as a fundamental element of the perception layer. As a result, we cannot overlook its security. Majority of the smartphones nowadays in the market use the Android Operating System (OS). Nevertheless, there are security vulnerabilities and significant risks of SMS fraud that persist across all Android devices due to the inherent features of the Android system. [18]

6.2 Network Layer Security Problems

- i. Concerns regarding old security measures in legacy communication networks can pose risks to the confidentiality and integrity of the data. Despite the presence of relatively robust security measures in current communication networks, there are still various common threats that need to be addressed. These threats include unauthorized network access, information eavesdropping, breaches of confidentiality, data integrity compromise, denial-of-service attacks, man-in-the-middle incursion, virus intrusions, and malicious exploits, among others.

- ii. Compatibility issues. The security architecture being deployed in today's network has been developed to safeguard it from hackers and other human attacks. It may not be applicable to machine-to-machine (M2M) communication. Current security techniques may result in the splitting of the logic link between IoT units. Heterogeneity deteriorates the security of networks, interoperability, and coordination. It becomes more susceptible to security flaws.
- iii. IoT encompasses a vast array of devices, and employing the existing authentication methods for authenticating each device could potentially overload the network with excessive data traffic. The existing IP technology lacks efficiency in identifying a substantial quantity of nodes. Moreover, the mutual authentication process for numerous devices leads to significant resource wastage.
- iv. Privacy breaches have emerged as a concern due to the progress made in information restoring technology and the practice of public engineering. Hackers now have the ability to effortlessly gather extensive amounts of personal information belonging to specific users.

6.3 Application Layer Security Problems

Currently, there is a lack of universal guidelines for building the application layer of IoT. However, certain organizations are implementing Machine to Machine (M2M) models in heterogeneous IoT domains for instance intelligent communities, smart homes, and healthcare. In reference [19], a proposed design scheme for an intelligent home security system is presented. Reference [20] offers several solutions based on the 6LoWPAN (IPv6 over Low power WPAN) architecture, specifically designed to support medical sensing systems.

- i. Data Access Permissions and Identity Authentication: Each application has its own set of users; each application will have a significant user base. So, in view of avoiding unauthorized user intervention, robust authentication methods need to be used. Identification and processing of spam and harmful information have to be taken into account.
- ii. Data Security and Recovery: All data needs to be secured to maintain user privacy. Techniques and algorithms used for data protection and data processing may not be perfect. This might result in the loss of data and sometimes harms catastrophically.
- iii. The Capability of handling Big Data: Due to the exponential increase in the number of nodes, and huge amount of data being transmitted. if the ability to process the data and its adaptability cannot fulfill the ever-changing requirements, disruption of the network and loss of data can happen.
- iv. Vulnerabilities in Application-Layer Software: Because programmers use non-standard coding when creating software, it might result in overflowing of the buffer and other vulnerabilities of the software program. Such vulnerabilities can be exploited by hackers in order to accomplish their goals.

7. SECURITY MEASURES IN THE INTERNET OF THINGS

In IoT, there are numerous layers. A large number of security techniques are being employed in these autonomous networks. Security in Internet networks and mobile communication

network have a diversified history. The diversity of sensor network models in IoT and resources makes the implementation of security very complicated. In the next section, we will discuss about the security technologies used in the perception layer.

7.1 Perception Layer Security Measures

i. RFID Security Measures [21]:

- a) **Access Control:** The primary objective is to safeguard user privacy and prevent unauthorized disclosure of personal information contained in RFID tags. This is achieved through measures like label failure, chip prevention, analysis of antenna energy, and other related techniques.
- b) **Data Encryption:** The selection of an appropriate algorithm to encrypt the RFID signal is important for ensuring the data security of an RFID system. In a research paper [22], a novel key technique based on displacement computation is proposed for encrypting RFID system data. This technique is characterized by its low processing power requirements and provides a high level of security even during high-speed data transmission.

ii. Based on the IPsec Security Channel:

The IPsec guidelines suite provides 2 categories of precautions: authentication and encryption. Through the access control mechanism, the intended recipient of Internet protocol communication data can validate whether the sender is legitimate or not. On the contrary, technologies that encrypt data offer protection against unauthorized listening and manipulation by attackers while transmitting data. These technologies encode the data to ensure its confidentiality and safeguard it from unauthorized access.

iii. Cryptography Technology Scheme:

Cryptography technology serves various functions within the RFID system, encompassing the key goals of security communication protocols, which are to safeguard user privacy and uphold the integrity, authenticity, and confidentiality of data. To accomplish these objectives, these protocols employ a variety of techniques, such as hash functions, random number mechanisms, server data search, logic algorithms, and re-encryption mechanisms.

iv. Physical Security Scheme:

Side Channel Analysis (SCA) poses a significant challenge in physical security, with Differential Power Analysis (DPA) being a commonly used technique in SCA. Strategies to prevent DPA are classified into hiding and masking strategies. Hiding focuses on eliminating data dependencies in the consumption of energy while masking involves randomizing intermediate values in the encryption process

v. Wireless Sensor Network Security Measures:

As a crucial component of the IoT perception layer, data is transmitted through open space. This makes it susceptible to interception and analysis by attackers. Hence, it is essential to implement appropriate protective measures based on the specific methods of attack.

- a) **Key Management:** In Wireless Sensor Networks (WSN), the security requirements for key management revolve around several key aspects. These include the security of key generation or updating of algorithms, forward and backward privacy, extensibility, protection against collusion attacks, maintaining key freshness, and source authentication. In terms of key distribution protocols, there are 4 main rules: simple key distribution guidelines, key pre-distribution agreement, dynamic key management rules, and hierarchical key management procedure. These protocols are designed to address the specific challenges and security needs of key distribution in WSN.
- b) **Secret Key Algorithms:** Key algorithms in the context of key management encompass symmetric key algorithms and asymmetric key algorithms. Common asymmetric key algorithms include RSA (Rivest-Shamir-Adleman) and ECC (Elliptic Curves Cryptography), while symmetric key algorithms include Skipjack and RC5. Considering the limited processing capabilities of perception nodes in WSN, symmetric key algorithms are widely adopted. In the domain of key management research in WSN, the literature [14] proposes an enhanced lightweight ECC key management scheme, which has garnered significant attention.
- c) **Encroachment Detection Technology:** Intrusion Detection Technology, specifically IDS (Intrusion Detection System), enables the timely monitoring of network node behavior and the identification of suspicious activities.
- d) **Authentication and Access Control:** IoT incorporates a range of authentication techniques, including lightweight public key authentication technology, Pre-Shared Key (PSK), random key pre-distribution authentication technology, auxiliary information-based authentication technology, and authentication technology relying on one-way hash functions. Access control methods commonly employ both asymmetric and symmetric cryptosystems.

7.2 Physical Security Design:

The design of the perception layer primarily encompasses the node and antenna design. Designing a node encompasses various aspects, including the design of hardware structure, the choice of security chips, chip connections, radiofrequency circuit design, and the design of the data acquisition unit. Antenna design focuses on factors like communication distance, adaptability, and stability. Addressing the security challenges associated with the perception layer requires the implementation of multiple interconnected measures, as relying on a single approach may not be sufficient.

7.3 Network-Layer Security Measures

The existing framework of the Internet of Things (IoT) relies on existing communication networks or the Internet at its network layer. However, there are certain vulnerabilities in the network layer that pose risks to the security of both Internet and IoT information services. Traditional network communication technology is not fully adaptable to the unique requirements of IoT. Traditional network routing focuses primarily on simplicity and not on security. The dynamic and unpredictable nature of IoT nodes, along with their energy constraints and unreliable communication, leads to a lack of infrastructure and a

constantly changing topology. This makes IoT networks susceptible to rapid attacks by malicious actors. To address these challenges, implementing dedicated authentication mechanisms, as well as end-to-end authentication and key agreement mechanisms is of utmost importance, Public Key Infrastructure (PKI), Wireless PKI(WPKI) for wireless communication, security routing, intrusion detection, and other security measures specific to each network architecture. Considering the massive amount of data generated in IoT, network availability should also be taken into account. Network virtualization technology is frequently utilized to reduce network administration complexity and the potential for operational errors.

IPv6 is being developed alongside Next-Generation Networks (NGN) and serves as a transport carrier network for IoT.

7.4 Application Layer Security Measures

The application layer of IoT encompasses diverse and unpredictable applications, each with its own unique security requirements. To address these varying needs, security measures can be classified into two main aspects.

Technical:

- i. Authentication and Key Agreement Across Heterogeneous Networks: It includes various security measures such as symmetric key cryptography, public key cryptography (using certificates or PKI), and certification transfer techniques.
- ii. Private Information Protection: This includes technologies such as fingerprint recognition, digital watermarking, anonymous authentication, threshold cryptography, and others.

Non-technical:

- i. Raising Safety Awareness: Educating users about the significance of information security and promoting responsible utilization of IoT services is essential to mitigate the risk of sensitive information being compromised [20,23,24].
- ii. Improve Information Security Management: This encompasses activities such as resource management, physical security information management, password management, and other relevant tasks.

8. TAXONOMY OF THE IOT SECURITY

The IoT security taxonomy should comprehensively examine security mechanisms, encompassing services and threats, and their interdependencies. Conducting this thorough examination is vital in equipping system developers and analysts with the necessary comprehension needed to proficiently design and assess secure systems. Emphasize the importance of understanding how these components of the taxonomy work together to ensure robust security in IoT environments [25]. To accomplish this objective, the taxonomy integrates [26] list of security services as a fundamental framework. As a result, the taxonomy serves as a solid foundation for conducting thorough investigations and ultimately contributes to enhancing the overall security of IoT ecosystems.

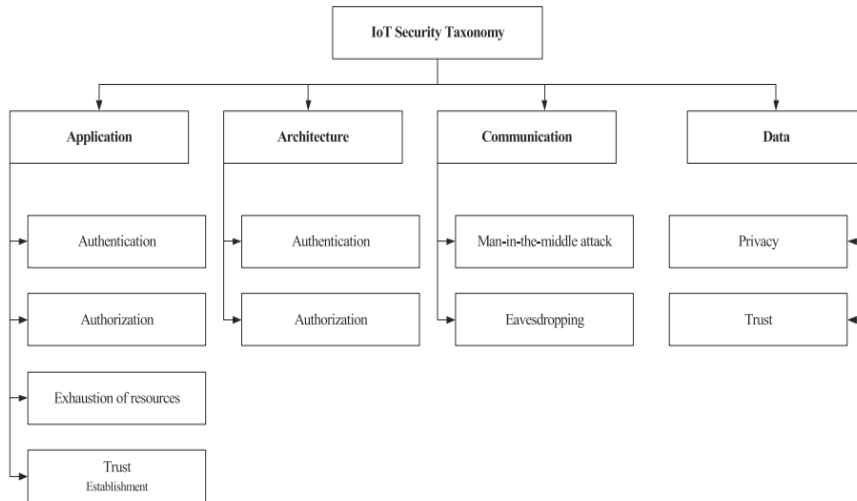


Fig2: Taxonomy of IOT Security [25]

CONCLUSION

As connectivity and communication between individuals continue to increase, facilitated by advancements in information management and communication efficiency, the Internet of Things (IoT) plays a pivotal role in shaping this interconnected landscape. With the continuous evolution of IoT, new avenues for communication and networking emerge, challenging traditional notions of connectivity and computer systems. In this contemporary era, the security of IoT development has become paramount.

This paper addresses the concerns and solutions related to IoT security across various tiers of the IoT security framework. However, due to the complex nature of IoT, which involves multiple layers of integration, numerous security issues arise during system integration. Some security concerns, such as privacy protection, cut across all layers of the IoT architecture. Although IoT security architecture is still in its early stages, it faces more profound security threats than initially anticipated. The need to address these security challenges is critical for the sustainable development and security of IoT systems.

REFERENCES

1. Bradley J. The internet of everything: Creating better experiences in unimaginable ways. Retrieved March. 2013 Nov 21;12:2019.
2. Wilton R. CREDS 2014-Position Paper: Four Ethical Issues in Online Trust. Issue Brief No. CREDS-PP-2.0. Internet Society; 2014.
3. "Radio-Frequency Identification." Wikipedia, the Free Encyclopedia, September 6, 2015. https://en.wikipedia.org/wiki/Radiofrequency_identification.
4. Sain M, Kang YJ, Lee HJ. Survey on security in Internet of Things: State of the art and challenges. In 2017 19th International conference on advanced communication technology (ICACT) 2017 Feb 19 (pp. 699-704). IEEE.

5. "Internet of things protocols & standards," Postscapes [Online]. Available: <http://postscapes.com/internet-ofthings-protocols> [Accessed September 2015].
6. Mashal I, Alsaryrah O, Chung TY, Yang CZ, Kuo WH, Agrawal DP. Choices for interaction with things on Internet and underlying issues. *Ad Hoc Networks*. 2015 May 1;28:68-90.
7. Yun M, Yuxin B. Research on the architecture and key technology of Internet of Things (IoT) applied on smart grid. In 2010 international conference on advances in energy engineering 2010 Jun 19 (pp. 69-72). IEEE.
8. Xiaocong Q, Jidong Z. Study on the structure of "Internet of Things (IOT)" business operation support platform. In 2010 IEEE 12th International Conference on Communication Technology 2010 Nov 11 (pp. 1068-1071). IEEE.
9. Maple C. Security and privacy in the internet of things. *Journal of cyber policy*. 2017 May 4;2(2):155-84.
10. Atzori L, Iera A, Morabito G. Understanding the Internet of Things: definition, potentials, and societal role of a fast evolving paradigm. *Ad Hoc Networks*. 2017 Mar 1;56:122-40.
11. Miorandi, Daniele, Sabrina Sicari, Francesco De Pellegrini, and Imrich Chlamtac. 2012. "Internet of Things: Vision, Applications and Research Challenges." *Ad Hoc Networks* 10 (7): 1497-1516.
12. Whitmore A, Agarwal A, Da Xu L. The Internet of Things—A survey of topics and trends. *Information systems frontiers*. 2015 Apr;17:261-74.
13. Whitmore A, Agarwal A, Da Xu L. The Internet of Things—A survey of topics and trends. *Information systems frontiers*. 2015 Apr;17:261-74.
14. [<http://www.reload.com/blog/2013/12/6characteristics-within-internet-things-iot.php>].
15. Hwang YH. IoT security & privacy: threats and challenges. In Proceedings of the 1st ACM workshop on IoT privacy, trust, and security 2015 Apr 14 (pp. 1-1).
16. Gao H. Study of the application for the security state assessment about the internet of things based on grey correlation algorithm. *J. Manufacturing Automation*. 2012;34(11).
17. Shancang L, Kewang Z. Principles and applications of wireless sensor networks.
18. Ranjith J. Security Challenges Prospective Measures In The Current Status of Internet of Things (IoT). In 2022 International Conference on Connected Systems & Intelligence (CSI) 2022 Aug 31 (pp. 1-8). IEEE.
19. Yang X, Li F, Xiangyong Mu, etc. Design of security and defense system for home based on Internet of things. *J. computer application*. 2010;30(12):300-18.
20. Jara AJ, Zamora MA, Skarmeta AF. HWSN6: Hospital wireless sensor networks based on 6LoWPAN technology: Mobility and fault tolerance management. In 2009 International conference on computational science and engineering 2009 Aug 29 (Vol. 2, pp. 879-884). IEEE.
21. Li L, Chen J. System security solutions of RFID system of internet of things sensing layer. *J. Net Security Technologies and Application*. 2011(6):34-6.
22. Xiaoni Wang, Guiying Wei.: Cipher algorithm in data transmission of RFID system on the internet for things. *J. Journal of Beijing Information Science and Technology University*. 24(4) (2009) (in Chinese)
23. Perrig A, Szewczyk R, Wen V, Culler D, Tygar J. SPINS: Security protocols for sensor networks. In Proceedings of the 7th annual international conference on Mobile computing and networking 2001 Jul 16 (pp. 189-199).
24. Liu D, Ning P. Efficient distribution of key chain commitments for broadcast authentication in distributed sensor networks. North Carolina State University. Dept. of Computer Science; 2002.
25. Whitmore, A., Agarwal, A., Da Xu, L., 2014. The Internet of Things: a survey of topics and trends. *Inf. Syst. Front.* 17 (2), 261-274.
26. Akhuzada, A., Gani, A., Anuar, N.B., Abdelaziz, A., Khan, M.K., Hayat, A., Khan, S.U., 2016. Secure and dependable software defined networks. *J. Netw. Comput.* 61, 199-221.

INDIA'S DIGITAL PAYMENT SYSTEM AND ITS IMPACT ON ECONOMIC GROWTH: AN EMPIRICAL STUDY

Shivam Agarwal

*Research Scholar, Department of Applied Economics,
University of Lucknow, U.P.*

Abstract

In recent year, there was an increase in number of economic transactions, which have been regulated through online or cashless methods across the globe, particularly in developed and developing nations like India. Several financial frameworks, such as Unified Payment Interface (UPI), have helped India develop as a digital economy in the past few years. One of the main benefits of digital payment is that they are convenient, fast, and cost-effective. An effective digital payment system is critical to the overall economic activity of a country, the stability of its monetary policy, and the stability of its financial system. The study evaluates the impact of digital transaction on the growth of Indian economy. The variables incorporated in this work as digital transaction proxy are: Real Time Gross Settlement (RTGS), Clearing Corporation of India Ltd (CCIL) operated systems, Paper Clearing,

Retail Electronic Clearing, Card Payment, and Prepaid Payment Instruments (PPIs). The study covers period from 2011 to 2022. Ordinary Least Square was employed, followed by Auto-Regressive Distributed Lag (ADRL) modelling. The results show a long-run relationship between economic growth and the digital payment instrument used in the study.

Keywords: *Digital Economy, Digital Payments, Retail Payments, Card Payments, Prepaid Payment Instruments (PPIs).*

INTRODUCTION

In this digitalized world, where most of the activities are occurring digitally and all the sectors of the economy are focusing on digitalization, in that case, the main economic activity has to be converted into a more secure, fast and convenient mode through digitalization. That economic activity is the economic transaction, i.e., payment system. In the past ages, these transactions were done through the exchange of goods, commonly known as the barter system. Then with ages the world changed, and the money system was introduced. But now as the world moves to digitalization, the world is also modifying this traditional method of money system and moving fast towards the modern or digitalized method of money system which can be seen through new age methods like digital currency, digital payments and others. India is becoming the front- runner in the digital payment method.

One of the objectives of the Digital India programme launched by the Indian government in 2015 was to make financial transactions at the grass-roots level “faceless, paperless, and cashless.” According to the Economic Time (2023), In just six years, India has surpassed the United States as the world leader in real-time digital payments, accounting for about 40% of all such transactions. During the COVID-19 pandemic, the widespread use of UPI has gone far beyond the urban to rural India, which have made specialist astounding. PhonePe with the Boston Consultancy Group has published a report which have shown that by 2026 India will be able to make its digital payments volume \$10 trillion while having only \$ 3 trillion in 2022. This shows the growth of the digital payment system in India, and it also shows how India at the grass root level is adapting these modern methods. In this Payment system, Unified Payment Interface (UPI) and RuPay have taken the lead to ensure that India’s Digital system can take a lead and create a boom.

As technology is advancing it is also playing a vital role in India’s growth. The Indian economy has achieved a \$3 trillion economy goal in 2022 while setting its target for a \$5 trillion economy by the year 2028. This study will help us to understand how the growth of digital payment will help India in achieving this goal.

REVIEW OF LITERATURE

According to T. et. al. (2019) study, the digital payment was found to be impacting India’s economic growth with only retail system which is significant in their model. When long run model was analysed by them, it showed there is no relationship exists. While Afaha (2019) study, on Nigeria’s economy, has indicated that electronic payments are associated with a significant increase in real gross domestic product (GDP). In Rooj and Sengupta (2020) analysis the Real Time Gross Settlement (RTGS) impact was shown on various factors like economic growth, prices, monetary policy and on the money supply. According to Rooj and Sengupta (2020), RTGS positively impacts economic growth in India. In addition, they found that economic growth has a positive impact on RTGS as well. According to Wong et. al. (2020) study, on selected OECD countries, they have found that debit card was the only impacting variable. It has a positive relationship with economic growth while other variables like credit cards, e-money and cheques have no impact on GDP. Referring to Srivastava and Rezabek (2022), which has analysed the impact of digital payments on economic growth in the Czech Republic and found that due to insufficient data for digital transactions, there is no strong evidence for accepting or rejecting this relationship.

From the above literature it was seen that their a less amount of literature on the topic as it is a new concept which is still developing, and Indian economy is capturing fast in the growth of digital payment comparing with the world. A study by T. et. al. (2019) has tried to capture this impact with reference to Indian economy, but it is to have a shorter period and during period the acceptability is also very low so that's why it been important to cover this gap by involving the period of pandemic in the analysis to know more accurate impact.

RESEARCH OBJECTIVE

This study is based on the objective to analyse the impact of digital transactions on India's economy in both short and long run.

METHODOLOGY

This study attempts to explores relationship between digital payment and the growth of Indian economy during the period from the year 2011Q1 to the year 2022Q3. The Real Time Gross Settlement (RTGS) System, Clearing Corporation of India Ltd (CCIL), Paper Clearing, Retail Electronic Clearing, Card Payments, and Prepaid Payment Instruments (PPIs) are used as proxy to measure electronic payments in India. Indian economy was measured in real terms and proxied by Gross Domestic Product (GDP). The datasets were collected from the RBI's Database of the Indian Economy (DBIE). The GDP data is a quarter-based data, while the electronic payment instruments were converted into quarterly dataset from monthly. A multivariate model was constructed to show the above defined relationship:

$$R_GDP_t = \alpha + \beta_1 RTGS_t + \beta_2 CCIL_t + \beta_3 Retail_t + \beta_4 Cards_t + \beta_5 P_Cl_t + \beta_6 PPI_t + \varepsilon$$

Where, R_GDP_t shows the value of Real Gross Domestic Product. $RTGS_t$ represents value of the RTGS. $CCIL_t$ represents value of the CCIL. $Retail_t$ represents value of the Retail Clearing.

$Cards_t$ represents value of the Card Transaction. P_Cl_t represents value of the Paper Clearing.

PPI_t represents value of the Prepaid Payment Instruments.

RESULTS

The paper employed the Ordinary Least Square method on the above model as shown in the table

1. The stationarity was measured on the variables in table 2.

Table 1: Ordinary Least Square Result				
	Coefficient	Std. Error	t-statistics	Probability
Intercept	2102114.6290	305453.40	6.882	0.0000000274 ***
RTGS	-0.0019179	0.0085947	-0.223	0.82455
CCIL	-0.0001886	0.0101832	-0.019	0.98532

Retail	0.1135099	0.0593501	1.913	0.06298.
Cards	0.6222745	0.1764739	3.526	0.00107 **
PPI	3.4477998	5.8744157	0.587	0.56056
Paper Clearing	-0.0217543	0.1268373	-0.172	0.86468
Significance classification: 0***, 0.001**, 0.01*, 0.05 .				

R ²	0.9236	Adjusted R ²	0.9121
F-stat.	80.59	P-value (F-stat.)	0.0000

Note: Authors' Calculation on RStudio.

Table 1, show that in the original model, no variable other than retail and cards are significantly affecting the real gross domestic product of India. And it can also be seen that other than retail and cards only prepaid payment instruments have a positive implication on GDP. Results can be spurious because of the non-stationarity present in the variables.

It is necessary to perform a unit root test in time series analysis, to examine the presence of stationarity in the variables for avoiding the spurious results. To test stationarity, the Augmented Dickey-Fuller (ADF) (1979) test and Phillips-Perron (PP) (1988) test were used. Table 2 shows tests result.

Table 2 shows that two variables are stationarity at level, while other variables are stationary at 1st difference. To confirm the result obtained by the Augmented Dickey-Fuller (1979), in table 3 the Phillips-Perron (1988) test was applied.

Note: Authors' Calculation in RStudio, *5% significance, **1% significance.

Table – 2: Results of Augmented Dickey-Fuller Test

Variables	At level	1st Difference
R_GDP	-4.7131**	-
CCIL	0.6796	-5.3272**
RTGS	-2.2571	-3.671*
Retail	-0.9105	-8.0294**
Cards	-2.2551	-4.2082**
PPI	-2.4724	-4.2917**
Paper Clearing	-3.9306*	-

Table – 3: Results of the Phillips-Perron Test

Variables	At level	1st Difference
<i>R_GDP</i>	-5.7409**	-
CCIL	0.0232	-9.8871**
RTGS	-2.2937	-6.229**
Retail	-0.4153	-9.2239**
Cards	-1.7817	-4.1467*
PPI	-2.4982	-6.0644**
<i>Paper Clearing</i>	-4.3045**	-

Note: Authors' Calculation in RStudio, *5% significance, **1% significance

From the result of tests, this paper is bound to imply the Autoregressive Distributed Lag (ARDL) given by Pesaran & Shin, 1999. ARDL result is provided in table 5.

Table – 4: Results of Autoregressive Distributed Lag Model

	Coefficient	Std. Error	t- statistic	Probability
Intercept	1635322.6	372431 .32	4.391	0.000137 ***
L (GDP,1)	0.392502	0.11	3.420	0.001878 **
RTGS	0.009372	0.0039 70	2.361	0.025166 *
L(RTGS, 1)	-0.019533	0.0049 03	-3.984	0.000418 ***
L(RTGS, 2)	0.011360	0.0041 08	2.766	0.009782 **
CCIL	0.012523	0.0054 83	2.284	0.029867 *
L (CCIL, 1)	-0.013292	0.0062 33	-2.132	0.041561 *
L (CCIL, 2)	0.005870	0.0063 80	0.920	0.365182
RETAIL	0.153915	0.0398 82	3.859	0.000585 ***
L (Retail, 1)	-0.110476	0.0388 62	-2.843	0.008108 **
CARD	-0.124415	0.1325 91	-0.938	0.355818

L(Cards, 1)	0.609487	0.1616 83	3.770	0.000745 ***
PPI	-0.911893	2.6712 60	-0.341	0.735285
Paper Clearing	0.245480	0.0884 70	2.775	0.009567 **
L(Paper Clearing, 1)	-0.187949	0.0983 83	-1.910	0.066017.
L(Paper Clearing, 2)	-0.281400	0.0855 83	-3.288	0.002647 **

Signification codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

R-squared	0.9907
Adjusted R-squared	0.9859
BIC Selection Criterion	1172.876
Durbin-Watson Statistic	2.5062
F-statistic	206.6

Note: Authors' Calculation on RStudio

The above shows the ARDL model affecting the Real GDP by the different digital payments' mode and through this, it can be seen that except for the Cards and PPI all other variables have a significant influence on the GDP at lag 0, while at lag 1 all variables (including GDP) have a significant relation with the dependent variable.

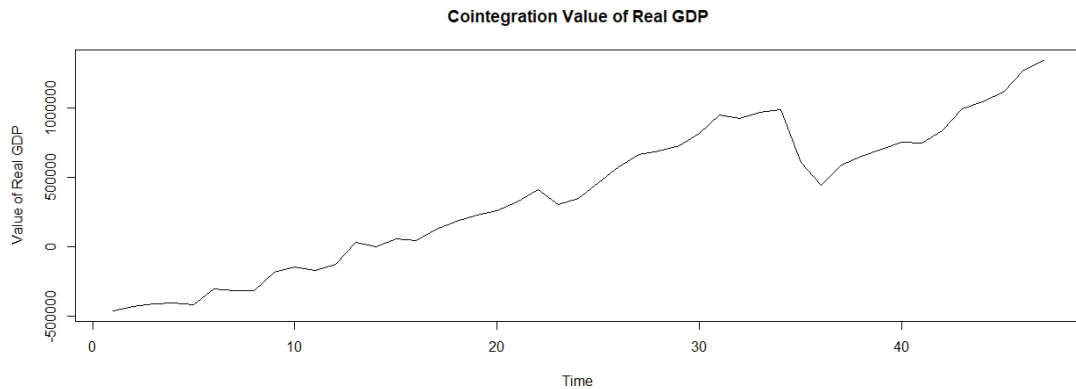
Next the study incorporates the bound test (Pesaran, Shin, & Smith, 2001) for analysing the long-run relationship between independent variables and dependent variable. The bound result is in Table 5.

Table – 5: Bound test for no Cointegration

Test	Test Statistic	P-Value
Bound F test	7.7292	0.000001
Bound Chi. sq. test	54.105	0.000001
Bound t-test	-5.2939	0.003986

Note: Authors' Calculation on RStudio

Table 5 shows that a long-run co-integration exists in the model. This proves that independent variables have a long-run equilibrium with the dependent variable. The figure 1, shows the cointegrated long-run value of dependent variable.



Note: Authors' Calculation on RStudio

CONCLUSION

From the above analysis, this paper concludes that the digital payment method of India is affecting the Real Gross Domestic Product of India and showing the long-run relationship. (T, B, M, & R, 2019) has no long-run equilibrium exists in their model. While in this paper the results have accurately been showed that all variables (except Cards and PPI) have a positive relationship with the GDP and have a long-run equilibrium. This means these variables influence the GDP and the value GDP increases with the increase in the value of independent variables. So, it can be concluded that GDP has a positive relationship with these variables and as the country is increasing the growth of these methods the economy is also growing in real terms. In today's world, the country is decreasing the use of traditional modes of payment while adopting these new payment modes. The economy is growing as the digital economy and to grow the Real GDP these methods can be useful.

REFERENCES

1. Afaha, J. S. (2019). Electronic Payments (E-Payments) and Nigeria Economic Growth.
2. *European Business & Management*, 5(6), 68-78. doi:10.11648/j.ebm.20190506.11
3. Dickey, D. A., & Fuller, W. A. (1979). Distributions of the Estimators For Autoregressive Time Series with a Unit Root. *Journal of the American Statistical Association*, 75, 427-431.
4. Economic Times (2023). *India's Digital Payments Market will more than triple to 10 trillion by 2026:Report*. The Economic Times.
5. Retrieved from https://economictimes.indiatimes.com/news/economy/finance/indias-digital-payments-market-will-more-than-triple-to-10-trillion-by-2026-report/articleshow/98522718.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst
6. Kwiatkowski, D., Phillips, P., Schmidt, P., & Shin, Y. (1992). Testing the Null Hypothesis of Stationarity Against the Alternative of a Unit Root: How Sure Are We That Economic Time Series Have a Unit Root? *Journal of Econometrics*, 54, 159-178.
7. Pesaran, M. H., & Shin, Y. (1999). An Autoregressive Distributed Lag Modelling Approach to Cointegration Analysis. (S. Strom, Ed.) *In Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium*.
8. Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16(3), 289-326.

9. Phillips, P., & Perron, P. (1988). Testing for a unit root in time series regression.
10. *Biometrika*, 75(2), 335-346.
11. Rooj, D., & Sengupta, R. (2020, April). The Real-Time Impact on Real Economy — A Multivariate BVAR Analysis of Digital Payment Systems and Economic Growth in India. *ADBI Working Paper Series 1128*. Retrieved from <https://www.adb.org/publications/real-time-impact-real-economy-india>
12. Srivastava, A., & Rezabek, P. (2022). Impact of Digital Payments on the Economic Growth of a Country - A Case of the Czech Republic. *International Journal of Economic Sciences*, XI(1), 85-104. doi:10.52950/ES.2022.11.1.006
13. T, R., B, S., M, S., & R, R. (2019, October). Impact of Digital Payments on Economic Growth: Evidence from India. *International Journal of Innovative Technology and Exploring Engineering (IJITEE)*, 8(12), 553-557. doi:10.35940/ijitee.L3432.1081219
14. Wong, T.-L., Lau, W.-Y., & Yip, T.-M. (2020). Cashless Payments and Economic Growth: Evidences from Selected OECD Countries. *Journal of Central Banking Theory and Practice* (Special Issue), 189-213. doi:10.2478/jcbtp-2020-0028

9

A STUDY ON SUSTAINABILITY IN BUSINESS AS A FUTURE TREND IN INDIA

Dr. Jaspreet Dahiya

Associate Professor, Faculty of Management & Commerce, BMU

Parvinder Kaur

Research Scholar, Faculty of Management & Commerce, BMU

Abstract

In recent years, sustainability has made significant headway in Indian culture. However, the most contentious issue in sustainability is climate change, which has evolved in popular culture into more of a political than a scientific debate, the case for sustainability as a solution which is workable for most nations and the global environmental problems have taken hold. There has never been a bigger chance for sustainability to lead to success across a variety of social sectors. Technology advancements have significantly increased the chance that environmental sustainability will have an impact.

Keywords: *Business Sustainability, Sustainability Drivers, Future Trends*

INTRODUCTION

Since the dawn of humans, technological achievements have been a component of culture. Humanity would not have developed the ability to flourish and even exist for as long as it has without the most basic technological advancements, which started with various inventions of assorted items thousands of years ago, for example, the wheel and fire.

The invention of agriculture enabled humanity to establish permanent settlements rather than continuing to live as nomadic tribes that had to move around in search of sustenance. Instead of small communities that depended on one another for survival, the settlement of various sites at the advent of agriculture immediately resulted in the development of human civilizations. In all cultures, the development of permanent settlements is the main source of culture, which includes social groups and specialized kinds of trade. By specializing trades and services, which performed artistry and offered amenities were forced to commodify and market the goods and services, which only served to further technical development.

The early 1800s saw the commencement of the Industrial Revolution, which brought about the commercialization of products and the start of an abrupt advance in production and creativity. However, this period saw the beginning of widespread resource usage. People and communities have created innovation after innovation throughout history to keep moving humanity forward. Although technology has been beneficial to humanity, it has also caused environmental stresses that technology should address. The ability of the natural environment to support people has changed significantly because of the Industrial Revolution.

Environmental sustainability, according to the Environmental Protection Agency (2013), is “the capacity to maintain or raise living standards without endangering or depleting natural resources for present and future generations.” Sustainability should not require drastic lifestyle adjustments or affect the standard of living towards which all have grown habituated. But promoting sustainability in business and treating it as a priority in the impending developments could provide a kind of help to individuals who lack the comforts and conveniences that others take for granted. In comparison to other underdeveloped places like most of the part of Africa and of southern Asia, and the various parts of the world, like the USA, are technologically developed and have access to a large variety of conveniences and necessities and conveniences come at the expense of environmental stress and the depletion of natural resources.

At the pace that resources are being taken from the environment, the quality of living which stated that the public in industrialized nations enjoys cannot be preserved for future as well as private generations or achieved in less developed regions of the world. According to the New World Encyclopedia (2013), natural resources include things that are directly consumed by people, such as fossil fuels like oil and natural gas, natural flora like lumber, animals, and water. Although using natural resources is not intrinsically destructive, some of them, like water and oil, are finite and can be used up completely before they can be replenished. The National Wildlife Foundation defines ecosystem services as “any positive benefit that wildlife or ecosystems provide to people” (n.d.). Some resources can also be referred to as ecosystem services. Trees that turn carbon dioxide into oxygen and those that protect the banks of bodies of water from erosion and flooding are examples of ecosystem services. The greatest danger is that humanity will abuse these resources to the point that they are no longer available for use.

Renewable resources are natural resources with the capacity for regeneration and ongoing use. The increasingly widespread use of renewable resources holds significant promise for the pursuit of sustainability. Utilizing renewable resources can lessen people’s reliance on other, potentially non-sustainable sources. Humans can take advantage of some

resources' capacity for self-renewal through technological improvements, which benefits both prosperity and the ability to maintain a certain standard of living. The market for technical improvement has expanded because innovation has played such a significant role in human society for thousands of years. Increased reliance on renewable resources could not only lessen the environmental impact of using nonrenewable resources, but it could also lead to a more sustainable business environment, quality of life, and future for future generations. A more wealthy, sustainable future would result from lowering the risk of resources running out.

There is a large potential to transition to renewable resources for a wide range of resources that are used daily in the world, including sources of energy, food, water, and ecosystem services. Natural energy resources like the sun and wind can be exploited to provide a steady supply of energy rather than relying on fossil fuels, which can cause environmental disruption and pollution. Future generations can access water and food supplies without worrying about their availability thanks to alternatives to current consumption practices. For future generations, pursuing sustainability and implementing things into the personal living and models of the company will result in a safer as well as pleasant imminent.

REVIEW OF LITERATURE:

As per Ehrenfeld and Hoffman, 2013, An approach of a sustainable business model reports the environmental and social value conception, and it also leads to sustainability consistently. Lots of corporations globally show indices of sustainability. Standardization of framework has been ensured in the guidelines of sustainable reporting and thus it becomes extremely easy to understand the various parameters as per the significance level and performance level of sustainability.

According to Baumgartner and Ebner, 2010, Various kinds of Operational achievements which include innovation, cost reduction as well as resource efficiency prove to be useful for all kinds of corporation.

As per Schmallegger, 2011, the sustainability driving factors which include external pressures and legal acquiescence of the supply chain act just as a trigger to the functioning; So, it works as an area which is been rarely used for the companies which tend to enjoy the strategic competence trend.

RESEARCH GAP

Thus, from the review of literature, the various kinds of programs run for sustainability are considered for the programs which are run for some kind of improvements related to social and environmental aspects along with the aspects related to the economy.

It is also made clear from the literature review that the strategic factors belonging to internal strategic factors make a significant contribution towards performance sustainability not only at the national level but also at the globalized level. The study will provide help in finding out the importance of internal factors of strategies and help in naming these factors as the drivers towards sustainability.

OBJECTIVES OF THE STUDY

1. To understand the economic aspects of sustainability of business future trends in India.
2. To identify the benefits of sustainability of business future trends in India.

RESEARCH METHODOLOGY

This research is a Qualitative Exploratory Research on the Introduction, evolving around finding the facts towards sustainability of Business and its future trends in India and in finding how it will benefit the nation. The researcher is seeking information through journals, published articles, books, internet & websites etc. Thus, the researcher chose to base the research study on the exploratory method.

BASIS FOR A SUSTAINABLE BUSINESS

Businesses should adopt the idea of environmental sustainability to maximize output, boost competition in their niche markets, and lengthen their lifespan. John Elkington created the triple bottom line idea to address and integrate the environmental and sustainability of commercial practice. Elkington invented the concept of the triple bottom line to encompass three key elements: environmental, economic, and social characteristics, sometimes known it is so as the “three P’s” as per Timothy Slaper and Tanya Hall, the Indiana Business Review (2011)

- (A) profit,
- (B) planet,
- (C) and people (p. 4),

They contend that companies that place an equal emphasis on these three elements rather than profit and supremacy are more likely to succeed in the short and long term. While it is impossible to fully capture the triple bottom line in a single metric, such as assigning a fiscal value to communal as well as ecological accomplishment, which aims just to raise the social as well as the environmental and social profit gaining level which increases the likelihood that a company will follow by environmental laws and maintain good public relations.

The triple bottom line is an approach to business that can be used everywhere and has a great deal of potential to help a company succeed and even excel in its industry. The traditional business model of maximizing rates of production to maximize profits by any means is no longer viable, both in terms of environmental constraints and practicality, given how innovative various technologies are at the moment, from self-driving cars getting closer to mass production to having the entire Internet in one’s hands via smartphones to drones delivering packages instead of UPS and FedEx. Businesses and corporations need to adopt new strategies to effectively adapt to the changing of the times because technology is evolving at a rate that is quicker than at any other moment in human history. Businesses might expand and adapt to these changes more effectively and in a way that would generate more opportunities for future growth and development if they adopted the triple bottom line. A practice that will also aid in the production of technological and useful innovation for the company or business is the consideration of

social and environmental elements in addition to only the economic and financial aspects of the business.

INITIAL “P”: PROFIT

Most firms have profit as their primary objective. In addition to nonprofits, many businesses need to keep making money to expand and achieve greater success. Since ancient times, the idea of “profit” has been ingrained in commerce and human civilization. According to Joshua Mark’s 2014 article “Daily Life in Ancient Mesopotamia,” trade and commerce took place through the rivers Euphrates and Tigris. It is commonly accepted that this civilization, which was established more than 8,000 years ago, was the first significant civilization to resemble modern nations and towns. Mesopotamia, situated in southwest Asia between these two rivers, was a treasure trove for the development of contemporary societies. People started working in Mesopotamia outside of what was necessary for basic subsistence, just like their ancestors who had been hunting and gathering. According to Joshua Mark’s (2014) writing, local businesses started as a way of subsistence. People worked as farmers, crafters, teachers of both academic subjects and trades, merchants, religious leaders, slaves or free labourers, farmers, and a variety of other jobs. However, making money was the primary objective just to provide for own family and to preserve or raise one is standing socially. Therefore, just the concept of operating enterprises for gaining profit predates the beginning of human civilization.

Profit-making aspirations are not and should not be regarded as an unacceptable or unwanted aspect of any enterprise. Achieving financial success and making a profit are common goals of many enterprises. However, putting profit ahead of other considerations like environmental and social issues places significant restrictions on a corporation. Nonprofit organizations, which are frequently philanthropic foundations, can thrive without seeking to create a profit above and above what is required for basic operation. The emphasis was laid on revenue generation as the only driver for starting as well as sustaining a business whereas non-earning of profit is not a reliable path, even though not all firms can operate as nonprofit organizations. No kind of business can exist in the market for a longer period if it lays stress only on profit earnings instead of other aspects of running and making a business house successful. Also, a business house needs to be technologically compatible to earn profit.

According to Slaper and Hall (2011), firm revenue, the cost of underemployment, and job growth are some factors that affect profit. These elements might relate to taxes, income, or expenditures. Companies can further improve the usage of their profits by comprehending and solving environmental and social problems. In the “three P’s” sections that follow, the relationship between profit growth and the other two elements will be discussed in more detail.

THE SECOND “P” - PLANET HEALTH

The second element of the triple bottom line, or “planet,” emphasizes environmental concerns. Humans can benefit from the environment both directly and indirectly by using its services.

Reliance on these ecosystem services has grown over time as businesses and commerce have progressed. Today business houses use both raw materials as well as their derivatives

like the production of electricity with refined fossil fuels and above all redefining and reshaping the basic chattels of raw material for manufacturing any kind of product, in contrast to the past when merchants, craftspeople and agriculturalists record the kind of raw materials which is used frequently and could get their hands on. People have been reliant on the environment's capacity to provide them with goods and services since the dawn of humanity, and businesses are no exception.

The effects of people and corporations go beyond how much is taken from and consumed in terms of resources and commodities. Just like with real extraction, the use of materials and the effects of consumption can have a huge negative influence on the environment. According to Slaper and Hall (2011), using resources rather than mining them has several environmental effects. For instance, the combustion of fossil fuels can result in air pollution and chemical changes in the atmosphere, such as sulfur dioxide and nitrogen oxides.

People who routinely breathe in such contaminants may develop several respiratory problems.

THE THIRD "P" - PUBLIC WELLBEING

A wide range of elements that are related to human welfare and involvement are included in social measures. A company must be aware of the demands of both its customers and employees as well as anyone else who might be crucial to the operation and sustainability of the firm for addressing the various social commerce aspects. In the end, people are the foundation of any successful organization.

While it does not seem that technological improvements directly affect people's well-being in terms of workplace security, businesses and the security of jobs are essential elements of routine human happenings.

Every time someone starts their job, they put themselves at risk of being exposed to dangerous substances and contaminants.

Businesses need to understand how to handle such risks since they not only offer a direct threat to those who work nearby but also have the potential to amass and have a harmful influence on the environment. By addressing workplace dangers, a firm can develop a positive public perception of itself in the eyes of the public and increase employee happiness and loyalty.

MEETING CONSUMER DEMANDS @ MARKET TRENDS

Companies and firms that can successfully adapt to changes in markets and trends tend to be successful ones. The trend toward green consumption is one of the market developments with the quickest rate of growth. There is the possibility to purchase things that have minimal negative effects on the environment, even if no type of product consumption can be completely "green" because everything a person buys, consumes, and discards eventually ends up as garbage. As per the study conducted by Kanchanapibul, Lacka, Wang, and Chan (2013), customers are choosing products that are more environmentally friendly.

RESOURCE PROTECTION THROUGH CONTINUED PRODUCTION:

There are numerous ways to conserve resources.

Recycling is one of the most popular yet frequently misunderstood methods of resource conservation. One can recycle oneself in several ways. For waste pickup, placing a separate barrel with plastic, glass, and paper items on the curb is considered recycling. These materials are then transferred to facilities where they are sorted for potential usage and re-usage in various other goods. Although the process of recycling unanimously proves to help lower the use of certain recyclable materials, many products, particularly textiles, electronics, and batteries, cannot be recycled in this way.

OVERPOPULATION- SUPPLYING A GROWING PLANET:

Overpopulation is one of the main causes of ecological stress. There will be a higher demand for resources as the world's population grows. The incredible technical progress, which includes improved healthcare and medical developments, is blamed for the rise in population. However, alleviating the impact on the environment because of this rising population has trailed far behind. A problem with resource conservation is related to overpopulation as an environmental issue. The second most important adverse consequence of overcrowding is on human welfare.

People now have less access to both natural and artificial resources than in the past, in addition to the environment being overused. For managing resources, Business houses must learn to be more responsible, and they need to cater for the requirements of this expanding population if they are to survive a fast-expanding population.

SOCIAL CONSIDERATION: PROMOTING HUMAN AND BUSINESS WELL-BEING FOR SUSTAINING FUTURE BUSINESS TRENDS IN INDIA

Businesses can strive towards environmental sustainability and improve their marketability by implementing social concerns. A business can improve its reputation and lengthen its shelf life from the perspective of stakeholders if it upholds high ethical standards through charitable activity and other efforts. Businesses need to be aware of the values that younger generations hold towards social programs and technology advancements, much as consumers of the younger generation are becoming more ecologically sensitive (Kanchanapibul et al., 2013).

CONCLUSION

In recent years, sustainability has made great headway in Indian culture. Although the most contentious issue in sustainability is climate change, which has evolved in popular culture into more of a political than a scientific debate, the case for sustainability as a workable solution to many of the nation's and planet's environmental problems has taken hold. There has never been a bigger chance for sustainability to lead to success across a variety of social sectors. Technology advancements have increased the chance that environmental sustainability will have an impact.

Businesses are among the groups of people or things that might most benefit from adopting and using sustainable business practices.

Sustainability does not only benefit the environment; it also benefits people all over at the globalized level, including those in rich nations which includes developed and developing or impoverished nations like the United States, India, and China. As it pertains to maintaining the operation of the earth for future human generations, the term “sustainability” is anthropocentric. Businesses and industry, according to Ray Anderson (2009), are the ones who must guide the rest of the world out of the problems brought on by environmental instability. Sustainability needs to be a widely accepted and implemented practice for businesses to continue succeeding in the far future. The time has come to put technology to use since it is more readily available than ever before and has a greater potential to benefit people and the environment.

REFERENCES

1. Anderson, R. (2009, May). The business logic of sustainability. Retrieved from
2. https://www.ted.com/talks/ray_anderson_on_the_business_logic_of_sustainability?language=en
3. Birch, S. (2012, July 6). How activism forced Nike to change its ethical game. The Guardian. Retrieved from
4. <https://www.theguardian.com/environment/green-living-blog/2012/jul/06/activism-nike>
5. Cleaning Up Electronic Waste (E-Waste). (2017, January 23). Retrieved from
6. <https://www.epa.gov/international-cooperation/cleaning-electronic-waste-e-waste>
7. Desjardins, J. (2016, November 16). Infographic: Where Do Raw Materials Come From? Retrieved from <http://www.visualcapitalist.com/where-do-raw-materials-come-from/>.
8. Dunn, L. E. (2017, February 2). Women in Business Q&A: Angela Baker, Head, Qualcomm Wireless Reach. Huffington Post. Retrieved from
9. http://www.huffingtonpost.com/entry/women-in-business-qa-angela-baker-head-qualcomm_us_589344cde4b01a7d8e512b9d
10. Ecosystem Services. (n.d.). Retrieved from
11. <https://www.nwf.org/Wildlife/Wildlife-Conservation/Ecosystem-Services.aspx>
12. EPA. (2017, April 14). Sources of Greenhouse Gas Emissions. Retrieved from
13. <https://www.epa.gov/ghgemissions/sources-greenhouse-gas-emissions>
14. EPA’s Report on the Environment. (2013). Retrieved from
15. <https://cfpub.epa.gov/roe/chapter/sustain/index.cfm>

“ROLE OF USER GENERATED CONTENT OF SOCIAL MEDIA IN CONSUMER DECISION MAKING WITH RESPECT TO OTT SUBSCRIPTION”

Pranjal Roy

Royal School of Business, The Assam Royal Global University,
Guwahati, Assam

Abstract

In recent years, Over-The-Top (OTT) subscription services have gained immense popularity, and social media have emerged as a powerful platform for consumer decision making. The present study aims to explore the impact of information obtained by consumers from user-generated content (UGC) of social media on consumer decision making with respect to OTT subscriptions. In an attempt to explore the influence of information in tune with Uses & Gratification Theory, two constructs are selected for the study, namely 'trust in the information' from social media UGC content and 'credibility of information' from social media UGC content. The study employs approaches that assess the influence of these constructs on consumer purchase intention towards OTT subscription. The findings of this study will contribute to the existing literature by providing insights into the role of information in influencing consumers' choices for OTT subscriptions. It shall also further throw light on the kind of information consumers look into before a purchase decision. The study will hold value for managerial decision making as it will provide direction in managing online e-WOM. The results of this study will have implications for both researchers and practitioners in the field of marketing and communication.

Keywords: User-Generated Content of Social Media, e-WOM, Consumer Decision Making, OTT Subscription, Trust and Credibility.

1. INTRODUCTION

(Oladipo, 2022) mentioned in his study that user-generated content is made by users with the intention of expressing their opinions on the goods and services they have purchased online. Customers publish user-generated content because it interests them on social media. Social media users post user-generated material on a variety of social media platforms, including Facebook, Twitter, blogs, YouTube, Instagram, and blogs, in the form of text messages, audio, video, and infographics. Earlier User-Generated Content on social media was unfamiliar to people. (Mabillot, 2007) They base their purchasing decisions on advertisements they see on TV, radio, in newspapers, and in other media. A Stackla poll found that 86% of consumers consider user-generated content to be a reliable predictor of the calibre of a brand or product. Additionally, UGC is more authentic than brand-created content, according to 60% of customers (Stackla, 2017). 90% of consumers agree that UGC influences their purchasing decisions more than any other form of advertising, according to a Turn to Networks survey. The survey also discovered that UGC can boost conversion rates by as much as 161% (Network, 2017). After making a purchase or providing a service, the user leaves a comment. There are two different kinds of posts: (a) one is from a happy user who shares his or her knowledge of the product and applications. (b) A consumer who is unhappy with the product or services made a post. The other users decide whether or not to buy the product based on both post types of user material. Other users develop brand awareness and trust thanks to the high quality of user-generated content. Before reading the comment or other content made by other users, (Hall, 2020) a new user might not be familiar with all of the brands that are available online.

OTT INDUSTRY INSIGHTS

The Over-The-Top (OTT) industry has become increasingly important in the business world, transforming the way content is created, distributed, and consumed. OTT platforms, such as Netflix, Amazon Prime Video, and Disney+, have gained immense popularity, disrupting the traditional television and film industries. One of the key reasons for the growing dominance of OTT platforms is their ability to personalize content based on individual preferences and viewing habits. Additionally, OTT platforms have revolutionized the advertising landscape by offering precise targeting capabilities. User-generated content (UGC) plays a pivotal role in the success of OTT platforms, allowing users to create and share their own content, which reduces production costs for OTT providers and enhances user engagement and fosters a sense of community.

OTT has emerged as a game-changer in the business world, providing a new and innovative way to distribute and consume content. Businesses that embrace the OTT model and harness the power of user-generated content will have a competitive edge in capturing and retaining a significant portion of the market. Additionally, UGC is a potent marketing tool for companies. Potential clients' purchasing decisions can be significantly influenced by favourable user evaluations and suggestions. OTT platforms may efficiently market their offerings and gain the audience's trust by showing user-generated content. User-generated content (UGC) is a significant asset for promoting customer acquisition and retention, since users frequently trust the insights and experiences of their peers.

ELECTRONIC WORD OF MOUTH

(Chu, 2021) mentioned in their study that the advent of digital technology made it possible to communicate via multiple social media platforms. The old-fashioned method of unpaid customers marketing any good or service is word of mouth. E-WOM referral has been used for a longer period of time. The same communication technique is converted to electronic mode. When E-WOM is shared with several family members, friends, and community pages on social media, it becomes well-known. User-generated material can be recommended and shared after it has been developed and posted on social media. There is a connection between user generated content and online word of mouth. User-generated content (UGC) spreads information about the products and services that are offered, whereas e-WOM reaches a huge user base. Online shoppers or users are the ones who produce user-generated content. (Chu, 2021) (Rosario, 2020) Users post text, audio, and video content that is user generated. The online post's content is spread via electronic word of mouth by posting the referral link on social media.

2. REVIEW OF LITERATURE

User generated content

User-generated content (UGC) is a growing trend in the tourism industry, with consumers increasingly using tools like blogs and social networking sites like Facebook to gather information and share opinions. This has led to increased trust in user-generated content, which has been shown to influence purchasing intentions.

Manap & Adzharudin (2013) investigated the use of social media in positioning tourism-based goods and services by leveraging UGC. They found that while social networking platforms are widely used, they are not yet considered as reliable or trustworthy as traditional sources of travel information. UGC serves as an extra source that travelers consider when conducting their information search. Hutter (2013) investigated the impact of social media activities on the auto industry's Facebook platform and how user interactions with brand-related activities affect how consumers perceive brands. They concluded that user interaction and social media participation generate the best ideas when deciding what to buy. Kim & Mira Lee (2017) conducted an empirical study with 285 college students to determine the benefits of user-generated content tied to brands. They found that close friends benefit more from brand-related user-generated content, as they can trust the information they hear. However, using celebrities to spread information is considered paid advertising. A growing trend in social media and word-of-mouth (WOM) is peer-to-peer discussion on a product's use. In social media, knowledge sharing, brand strategy, attributes related to financial gain, and the aim to endorse the product are more popular. The study concluded that peer-reviewed online content is more reliable than celebrity endorsements.

Electronic word of mouth

Eric and Kevin (2014) conducted a study using logical analysis to combine trust theory with variables like e-WOM, trust, value co-creation, and purchase intention. The study found that electronic word of mouth has a direct and indirect impact on consumers' propensity to buy, with co-creation of value and purchase intention having a positive relationship

with trust. The study concluded that this research will be helpful to future academics as it provides in-depth information about social networking sites. Ismail and Chris (2016) investigated whether recommendations from friends on social networks affected online purchase intent more than reviews left by individuals on shopping websites. They found that customer purchase intent is affected by online word-of-mouth conversations on social media platforms. The Information Acceptance Model impacted consumer behavior and online word of mouth. Devkant and Chaubey (2018) found that e-WOM messaging can increase brand recognition and encourage consumer purchases. They discovered that brand image serves as a bridge between e-WOM and purchasing intent, and user-to-user contact is trustworthy. Non-commercial sources of advice have a significant impact on customer behavior when making purchases and developing business strategies. Carla et al. (2018) demonstrated the strong social impact of e-positive WOM on large online user communities. They found that the presence in social media predicts favorable e-WOM, and positive internet reviews from actual and future customers had a significant impact on tourism services and consumers' influence. Internet user communities have developed as e-commerce promotion tools, and they have remained connected in e-WOM for related products.

Trust

Anas Hidayat et al. (2021) conducted a study on the factors affecting Indonesian consumers' propensity to make online purchases, focusing on trust, buying intention, and perceived value determinants. They found that factors related to online shopping, such as purchasing interest, trust, and perception of value, significantly impact consumers' intentions to make purchases. They concluded that social media firms need to increase client confidence while streamlining and securing transactions. Mainardes & Cardoso (2019) assessed the impact of social media on online consumer trust, loyalty, and purchasing intent. They found that trust is influenced by social media use, user-generated content, and corporate communication. Increased trust affects customer loyalty to retailers, and loyalty and trust have a positive impact on intents to make purchases in physical stores. Seo and Park (2018) identified three informational characteristics of airlines' social media: information quantity, information quality, and information credibility. They found that eWOM material posted on social media affects brand recognition and trust, and users have confidence in the information provided by knowledgeable consumers who have made online purchases of goods. Di Virgilio and Antonelli (2017) aimed to increase understanding of how social media platforms influence consumers' intent to buy. They developed the anticipated behavior model, which helps users integrate factors including trust, eWOM, and purchasing intention. Social media platforms enable interaction between customers and business personnel, and individuals who are active on social media are directly linked to online merchants. Hyuk and Margaret (2008) compared producer-generated material's credibility with user-generated content. They found that user-generated content is more trustworthy than producer-generated content when it comes to believing product information provided by another user. Users are satisfied with information provided by users who have purchased items or services, even though they have a predisposition to trust products.

Credibility

In a study by Mayrhofer et al. (2019), 293 college students found that credibility of information directly promotes purchase intention when compared to other brand advertisements. User-generated content on social media networks like Facebook can make products appear more realistic. Nawras et al. (2021) studied how user-generated material and credibility of information affected Jordanian consumers' decision to buy cosmetic products, using brand recognition as a mediator. The study found that user-generated content has a significant influence on consumers' views and behavior in purchasing beauty items. Michael Trusov and Koen H. Pauwels (2008) argued that Facebook is the most popular social media platform, but many companies and organizations still view social media and its user-generated content as a commodity.

Purchase Intention

Longa and Nga (2020) studied the impact of Facebook marketing on consumers' propensity to buy products using four variables: engagement, awareness, perceived benefit, and risk. The research found that effective social media marketing can increase users' purchase intentions, and this can be beneficial for enterprises and companies to grow their sales. Poturak & Softic (2019) examined the effects of social media communication on brand equity and purchase intent, finding that electronic word-of-mouth helps build brand equity and purchase intentions. The study found a positive influence of social media communication and electronic word-of-mouth on brand equity and purchase intention. Duffett (2017) studied millennials' behavioral perspectives in South Africa, focusing on social networking sites like Facebook and Instagram. They found that millennials in South Africa have a stronger social media impact and have gradually boosted their purchasing intentions. The frequency with which users update their profiles on social media contributes to more effective Facebook marketing, helping developing nations transition from traditional marketing to the latest trends. Kian et al. (2017) discussed the influencing factors for e-commerce websites, highlighting trustworthiness, social influence, perceived usefulness, user friendliness, and enjoyment. The study concluded that modern marketers employ various social networking platforms to draw in customers and earn from doing so. Social media and electronic websites have given people a new form of two-way communication called social commerce. Rehmani & Khan (2011) investigated the elements that affect Pakistanis' intention to buy, focusing on seller-created material, electronic word-of-mouth, perceived quality, and knowledge acquisition. They concluded that social media has a noticeable influence on consumers' intentions to buy, and social media sites like Facebook and Twitter are effectively used to increase purchase intention.

Research Gap

While the literature review provides valuable insights ON the influence of user-generated content (UGC) on consumer decision-making, there is a need for more specific research focusing on the role of UGC in the context of online service purchase behaviour like OTT subscriptions. Most of the studies mentioned in the literature review explore the impact of UGC on various industries or product categories, but there is limited research specifically addressing the OTT subscription market. Given that the OTT industry is booming and expected to grow in the near future, it is an important platform for the marketers to reach

their target audience. Furthermore, there is a gap in understanding how UGC specifically affects consumer decision-making processes related to OTT subscription services. Factors such as trust in UGC sources, credibility of information remain unexplored in the context of OTT subscription. In addition, the literature review scarce comparative analyses between different social media platforms and their respective impacts on consumer decision-making for OTT subscriptions. The studies predominantly revolve around Facebook, and there is limited exploration of other social media platforms and their unique UGC dynamics. There has been limited research conducted on the exact types of user-generated content (UGC) on social media platforms that affect consumers' intentions to purchase OTT subscription in Tier III Cities.

Objectives of the study:

1. To examine the preference of social media content with respect to OTT.
2. To determine the impact of user generated content on social media on consumer decision making regarding OTT subscription.

3. THEORETICAL FRAMEWORK

The uses and gratification hypothesis is used to investigate how social media users consume user-generated content to satisfy their information demands for OTT subscriptions. The study examines the relationship between user-generated content, consumer trust, information credibility, and consumer decision making regarding OTT subscriptions. Trust and credibility are crucial in shaping consumer decision making, as they determine the reliability and authenticity of information shared. Trustworthy user-generated content enhances platforms' credibility, fosters informed decision-making, and promotes a healthy digital ecosystem. Consumers value content generated by first-hand experience, and credibility is crucial in determining the influence of UGC on consumer decision making. Trust in UGC leads to more positive reviews and recommendations, as well as social proof.

Hypothesis

- H_{01} : There is no significant influence of trust of the source of user generated content in social media on OTT purchase intention.
- H_{a1} : There is a significant influence of trust of the source of user generated content in social media on OTT purchase intention.
- H_{02} : There is no significant influence of credibility of the information of user generated content in social media on OTT purchase intention.
- H_{a2} : There is a significant influence of credibility of the information of user generated content in social media on OTT purchase intention.

4. RESEARCH METHODOLOGY

This exploratory and descriptive research design was conducted in Guwahati, Assam, covering the field of management. Data was collected from two sources: primary sources, which were prepared and circulated through a structured questionnaire, and secondary sources, which were collected through literature review, published works, and online

sources. A structured questionnaire was used to collect primary data, adapted from two papers: Beheruz N. Sethna, Sunil Hazari, and Blaise Bergiel’s research paper in 2017 and Ruohan Li and Ayoung Suh’s 2015 paper. The data collection period was 4 weeks, from May 1st to June 1st, 2023. The sampling method was non-probability sampling, and convenience sampling technique was used to collect the sample. A sample size of 403 respondents was included, consisting of residents of Guwahati using social networking sites. The research instrument used was a structured questionnaire adapted from two papers.

MEASUREMENTS OF THE CONSTRUCTS

Constructs	Items	Scale Source (adapted)	Reliability
Trust of the source	User reviews of OTT content on social media are more beneficial than manufacturer provided information.	Beheruz N. Sethna, Sunil Hazari and Blaise Bergiel, Influence of user generated content in online shopping: impact of gender on purchase behaviour, trust, and intention to purchase, 2017.	0.889
	I trust user comments/reviews of OTT contents on social media to be reasonably accurate representations of OTT products such as movie, TV show, series etc.		
	I would trust OTT contents review posted by an average user more on social media than a product (movie, Tv show, Series, etc) review posted by an expert.		
	I trust reviews regarding OTT content from friends or people I follow on social media.		
	I trust user comments/reviews regarding OTT content on social media from people who have purchased the OTT subscription.		
Credibility of information	In general, the information regarding OTT content on social media is accurate.	Ruohan Li & Ayoung Suh, Factors influencing information credibility on social media platforms: evidence from facebook pages, 2015	0.881
	In general, the information regarding OTT content on social media is objectively presented.		
	In general, the information regarding OTT content on social media is easy to understand.		
	In general, the information regarding OTT content on social media is sufficiently timely.		
	In general, I think information regarding OTT content on social media is is factual.		
	In general, I think information regarding OTT content on social media is credible.		
	In general, I think information regarding OTT content on social media is is believable		

OTT Purchase Intention	I feel good purchasing a OTT subscription that has positive user comments/reviews on social media.	Beheruz N. Sethna, Sunil Hazari and Blaise Bergiel, Influence of user generated content in online shopping : impact of gender on purchase behaviour, trust, and intention to purchase, 2017.	0.931
	If the majority of user comments/reviews are negative social media, I would not purchase the OTT subscription.		
	If the majority of user comments/reviews are positive social media, I would purchase the OTT subscription.		
	User comments/reviews of OTT content on social media are important while making a purchase decision.		
	Reading user comments/reviews of the OTT content on social media would change my mind about purchasing a product.		
	User comments/reviews regarding OTT content on social media have in the past influenced my purchase decision.		
	User comments/reviews regarding OTT content on social media are likely to influence my future purchase decisions.		

5. DATA ANALYSIS

Regression analysis between trust of the source and OTT purchase intention

Independent Variable	Dependent Variable	β	β'	R	R ²	Adj. R ²	Sig.
Trust of the source	OTT Purchase Intention	.588	.560	.860 ^a	.734	.721	.000

The Pearson correlation between trust of the source of information and purchase intention is 0.860, with a positive direction and strong magnitude. The Adjusted R Square is preferred for reporting regression results, accounting for 72.1% of variation in purchase intention due to uncontrolled factors. The regression sum of squares is 82.390, with a mean square of 82.390. The unstandardized coefficient (B) is 0.588, and the standard error is 0.043. The standardized coefficient (beta) is 0.560, and the t-values are relatively high, indicating statistical significance. The alternative hypothesis rejects the null hypothesis and accepts the alternative hypothesis. Regression Equation 1: OTT Purchase Intention=0.978+0.588(Trust of the source)

Regression analysis between credibility of the information and OTT purchase intention

Independent Variable	Dependent Variable	β	β'	R	R ²	Adj. R ²	Sig.
Credibility of information	OTT Purchase Intention	.681	.587	.887 ^a	.744	.723	.000

The Pearson correlation between credibility of information and purchase intention is 0.887, with a positive direction and strong magnitude. The Adjusted R Square is preferred for reporting regression results, accounting for 72.3% of variation in purchase intention due to uncontrolled factors. The regression sum of squares is 90.314, with a sample size of 401. The F statistic is 210.346, and the P-value is 0.000, rejecting the null hypothesis and accepting the alternative hypothesis. The constant term represents the average value of the dependent variable, while the unstandardized coefficient represents the estimated change in the dependent variable associated with a one-unit change in the independent variable. The t-value and significance value are high, indicating statistical significance. Regression Equation 2: $OTT \text{ Purchase Intention} = 0.733 + 0.681(\text{Credibility of information})$

6. FINDINGS

The study found that 67% of respondents were female, while 33% were male. The majority of respondents (74%) were aged 21 to 25, with 53% being post-graduates, 44% being graduates, and 3% having higher secondary education. 67% of respondents were students, 24% were employed, 4% were self-employed, and 5% were unemployed. Regarding social media posts, 58% preferred video-based posts on Facebook, 54% on Instagram, and 7% on Twitter. Gender-based preferences varied across platforms, with male respondents preferring text-based posts on Twitter, image-based posts on Instagram, and video-based posts on Facebook. Age-based preferences were also observed, with respondents aged 21-25 preferring video-based posts on Instagram, image-based posts on Facebook, and text-based posts on Twitter. User-generated content (UGC) engagement was found to be a significant factor in consumer decision-making regarding OTT subscriptions. The frequency of encountering UGC varied across platforms, with Instagram having the highest frequency. Respondents had different levels of engagement with UGC on different platforms. Seeking information about OTT was also influenced by platform preferences, with Facebook being preferred by male respondents and Instagram preferred by female respondents. Trust and credibility had a strong positive correlation with purchase intention, with a significant relationship between trust, credibility, and purchase intention. Overall, the findings highlight the importance of user-generated content on social media in consumer decision-making regarding OTT subscriptions.

7. MANAGERIAL IMPLICATIONS

The study highlights that male customers are key decision-makers when it comes to OTT subscriptions, so marketers should focus on engaging and targeting female consumers. Younger consumers are actively making decisions about OTT subscriptions, so marketers should provide UGC that speaks to their age group's preferences and interests. Facebook postings with videos are preferred, and marketers should prioritize producing and distributing interesting video content on Facebook. A significant proportion of respondents shared their thoughts and experiences on social media sites, and marketers should encourage users to share their positive experiences and interact with UGC by liking, commenting, and sharing. This fosters a sense of belonging and trust, which may affect the choices made by other customers. Marketers should actively participate in the UGC ecosystem to increase trust, bolster brand reputation, and positively affect customer decision-making. Younger consumers prefer text-based posts on Twitter, image-based

posts on Facebook, and video-based posts on Instagram. Marketers should focus on improving content related to OTT on Facebook and Instagram and create more content for Twitter to help in business growth. A significant positive link between trust and purchasing intention was found in the regression analysis, suggesting that marketers should focus on establishing trust with consumers by highlighting positive experiences, testimonials, and reviews. Emphasizing the dependability and reputation of OTT subscription services can encourage trust and positively impact customers' buying intentions.

8. LIMITATIONS OF THE STUDY

- I. Due to time constraint only two factor was taken to understand the impact of user generated content on consumer purchase intention. However, more factors could have been taken as it would have been useful.
- II. The study is limited to Guwahati city only.

REFERENCES

1. Long, P. D., & Nga, D. Q. (2020). Factors Of Facebook Advertising. *Eurasian Journal of Business*, 625-637.
2. Mainardes, E. W., & Cardoso, M. V. (2019). Effect of the use of social media in trust, loyalty and purchase intention in physical stores, *The International Review of Retail, Distribution and Consumer Research*, 229-238.
3. Seo, E. J., & Park, J. W. (2018). A Study on the Influence of the Information Characteristics of Airline social media on e-WOM, Brand Equity and Trust. *The Open Transportation Journal*, 289-300.
4. Virgilio, D., Francesca, Antonelli, & Gilda. (2017). Consumer behavior, trust, and electronic word-of-mouth communication: Developing an online purchase intention model. *International Journal of Advanced Computer*, 80-96.
5. Yang, S. B., Lee, K. Y., Animesh, A., & Akhlaghpour, S. (2015, december 11). Electronic Word of Mouth and User Generated. *Asia Pacific Journal of Information Systems*, 718. Retrieved from <http://www.koreascience.or.kr/article/JAKO201515262489438.pdf>
6. Beveridge, C. (2022, january 13). What is User-Generated Content? And why is it Important? Retrieved from hootsuite: <https://blog.hootsuite.com/user-generated-content-ugc/>
7. Cheong, H. J., & Morrison, M. A. (2008). Consumers' Reliance on Product Information and Recommendations Found in UGC. *Journal of Interactive Advertisin*, 38-48.
8. Chu, S.-C. (2021, 09 22). Electronic word-of-mouth. Retrieved from oxford bibliographies: <https://www.oxfordbibliographies.com/display/document/obo-9780199756841/obo-9780199756841-0267.xml>
9. Dollarhide, M. (2023, 04 14). Social Media: Definition, Effects, and List of Top Apps. Retrieved from Investopedia: <https://www.investopedia.com/terms/s/social-media.asp>
10. Duffett, R. G. (2017). Influence of social media marketing. *Influence of social media marketing*.
11. Garg, & Sahu. (2020). The impact of user-generated content on consumers' purchase intention: An empirical study on social media platforms. *Journal of Retailing and Consumer Services*, 52, 101924., 16.
12. Griffin, A. (2023, march 6). content marketing. Retrieved from social pilot: <https://www.socialpilot.co/blog/guide-to-user-generated-content-ugc>
13. Griffin, A. (2023, March 6). What Is User Generated Content and Why It Is Important? Retrieved from Social pilot: <https://www.socialpilot.co/blog/guide-to-user-generated-content-ugc>

14. Hall, B. (2020, March 6). The 5 Stages of the Consumer Buying Process. Retrieved from Blyp: <https://www.blyp.ai/a/blog/the-stages-of-the-consumer-buying-process>
15. Hidayat, Anas, Wijaya, Ishak, & Catyanadika, E. (2021). Consumer Trust as the Antecedent of Online Consumer Purchase Decision. *The International Review of Retail, Distribution and Consumer Research*, 145-156.
16. Kian, T. P., Boon, G. H., Fong, S. W., & Ai, Y. J. (2017). Factors That Influence the Consumer Purchase Intention in Social Media Websites. *International Journal of Supply Chain Management*, 2018-214.
17. Kudumula, D. (2022, April 19). What Are the Types of social media? Retrieved from digimind: <https://blog.digimind.com/en/insight-driven-marketing/what-are-the-types-of-social-media>
18. Mabillot, D. (2007). User Generated Content: Web 2.0 Taking the Video Sector by Storm. *communications strategies*, 49.
19. Manap, K. A. (2013). The Role of User Generated Content (UGC) in social media. *ICT and the Changing Landscape of Global Tourism Distribution*, (p. 52).
20. Nawi, N. W., Alsagof, S. A., Osman, M. N., & Abdullah, Z. (2020). NEW MEDIA USE AMONG YOUTH IN MALAYSIA: A MEDIA DEPENDENCY THEORY PERSPECTIVE. *Palarch's Journal of Archaeology of Egypt/Egyptology* 17(9) (2020). ISSN 1567-214X., 16.
21. Network, T. (2017). New Study Shows User-Generated Content Tops Marketing Tactics by Influencing 90 Percent of Shoppers' Purchasing Decisions.
22. Oladipo, T. (2022, 06 6). What is user generated content. Retrieved from Buffer: <https://buffer.com/resources/what-is-user-generated-content/>
23. Poturak, & Softic. (2019). Influence of Social Media Content on Consumer. *Influence of Social Media Content on Consumer*.
24. Rehmani, M., & kKhan, M. I. (2011). The Impact of EMedia on Customer Purchase Intention. *International Journal of Advanced Computer Science and Applications*, (IJACSA), 100-103.
25. Rosario, A. B. (2020, 05 5). Electronic Word of Mouth: What Marketers Need to Know. Retrieved from DANIELS COLLEGE OF BUSINESS: <https://daniels.du.edu/blog/electronic-word-of-mouth-what-marketers-need-to-know/>
26. Stackla. (2017). *Consumer Content Report 2017*. SAN FRANCISCO: Stacla.

METaverse: THE FUTURE OF INSURANCE INDUSTRY

Souris Bhattacharya

*MBA (Finance) Final Year Student, Indira Gandhi National
Open University*

Abstract

Metaverse technology aims to promote automation and increase customers' value the financial sector in an effective manner. The application of augmented reality and virtual reality offers an innovative customer experience. In this paper, an attempt has been made to give a brief introduction to the concept of metaverse technology and its application areas in banking operations. A rapid change in technology creates a new dimension of banking operations and creates "value" for the customers. In brief, metaverse technology is expected to have a positive impact on the "value creation "process for the customers and would be able to address customers' expectations.

Keywords: *Metaverse, AR, VR, Digital Banking, Insurance, Automation.*

INTRODUCTION

The rate of technological advancement has taken an accelerated speed in the course of this new decade. We are now talking about virtual spaces being a new dimension for humans to live in that is not limited to the peripheral requirement of mere gadgets and electronic circuitry. We are in the process of achieving the platform that will give us human participation in virtual space with most of its senses being involved. In the near future, we will have achieved more prominence in daily functionality and relationship with digital platforms that mere 2-D screens could ever give us. Along with this race to advancement

the most prominent component of any financial framework “Banking Sector” has also geared up itself to release the potential it has in the new dimension of virtual reality. India has a great opportunity for leading Web 3.0 for the globe.

THE CONCEPT OF METAVERSE

The concept of the metaverse is far from just a technological breakthrough. It is a breakthrough in how humans perceive things in this dimension. We can say that apart from a different physical dimension that nature has gifted us, the metaverse is the dimension that we humans have created for ourselves, it's like being inside another world, where you can select the body (our digital representation) and do all the jobs that we do in the real world. It is a new dimension of system automation. The greatest benefit is that we won't be harming nature in any way anymore. (Let us use our imagination here), we get up every day to start our life we go to work or to school college etc, we are accustomed to the ideologies of AR and VR in our lives in some way or the other as we use different apps or headsets and other such peripherals to experience them, but we still haven't understood the idea of completely living into a different dimension (Seth *et al.* 2022). In the metaverse, we can change dimensions of reality like getting up in the real world, then connecting ourselves online into the metaverse and waking up there from where we left off the last day, say in our virtual home in the metaverse our digital projection will live there just like we live in our natural world. Whenever we feel like coming back we get offline and back to our nature-gifted reality. The concept gets easier if we think about the possibility that every day we get online in the net via our gadgets what if someday we immerse into the virtual world itself and get online in all senses of human understandability.

ORIGIN OF THE CONCEPT OF METAVERSE

The word “metaverse” is the combined form of two different concepts, namely ‘meta’ and ‘universe’. Famous novelist Neal Stephenson coined the term ‘metaverse’ in ‘Snow Crash’, a famous science fiction novel written by him in the year 1992. As per the description, the ‘metaverse’ was illustrated as a world based on virtual reality (VR), where people interact and roam around by using their ‘avatars’. This world is imagined as a virtual place, which is free from dreadful reality. The author envisioned the concept as the replacement of the Internet.

TECHNOLOGICAL ASPECTS OF METAVERSE

Metaverse is a virtual dimension where people can interact digitally. They can even have digital entities occur in the real world. For the conversion of the envisioned concept of ‘metaverse’ into a real phenomenon, technology will play an important role (Sarkar, 2023). Key technologies that would contribute towards the successful implementation of the ‘metaverse’ concept into reality, the following technologies will play an important role:

- **Virtual reality (VR):** Virtual reality is a space created in the digital dimension, it is where the functioning of digital character lies for example say we are playing a video game, our experience is limited to the screen but when we put on a headset specially designed to give us a virtual space experience we find ourselves into the very realm of the game. We look at ourselves as resembling the avatars we have selected and we play the game as if we are really into that situation. Experiencing a game or a movie as

if we are really into it is what the concept of virtual reality stands for *Virtual* for it is not the real physical world, *Reality* for most of our senses that make the judgment of what is real gets manipulated and this makes us feel as if we have achieved our entrance into a different plane.

- **Augmented reality:** We have all seen cartoons and animations in our childhood. Most of us must have had this constant urge to have those characters with us in real life, but we all have been told that these fictitious characters are virtual in nature and they can't be in the real world. Now growing up to be a part of this era we can actually let our childhood dream come true with the help of *augmented reality*. *Augmented Reality* is all about having virtual characters and entities interacting with us in real life as if they are a part of our world. It gives us a sense of trueness, unlike virtual reality where we are actually immersed in a different dimensional reality together. Such kind of technology seems as if the characters have come to life.
- **Mixed reality:** Mixed reality is the convergence of virtual reality and augmented reality. It creates the very platform on which the metaverse is thriving. Mixed reality means the integration of virtual space with real physical space along with the interaction of virtual characters with real-life characters. For example, you are in Mumbai and wanted to spend Diwali together with friends and family but couldn't come home, in the present time the most you could do is arrange for a group chat or face time apps but in Metaverse you will have more choices. Firstly you can let your digital representations actually get in a virtual space where you will invite the digital representations of your family members and friends.
Mixed Reality (MR) = (Virtual environment + Augmented virtuality) + (Augmented reality + Real environment)
- **Artificial Intelligence:** The role of AI is immense in metaverse. AI is a technology that has the capability of the human mind thinking, it can perform well in choices based scenarios and produce possible results and different outcomes for the same given situation. AI is an artificial mechanical human and it is the building block of metaverse. The dimension of metaverse needs "relatability" with present world, it is based on dynamism that only a human mind can evaluate. The human mind has restrictions to storage and evaluation of gallons of data and different scenarios that AI can accomplish by working in different fields simultaneously in a speck of a moment; it can understand our needs and form the very basis of the metaverse. Its interacting capability makes it unique from any other computer advancement achieved.
- **Cryptocurrency:** This is the medium of exchange in the world of metaverse. Physical currencies need to be converted into cryptocurrencies for purchasing Non- Fungible Tokens (NFTs) and also virtual real estate.
- **Blockchain technology:** Services in the metaverse would run on blockchain. Data privacy and a high degree of transparency can be ensured in this technology. Blockchain technology is the integrated form of several functions including asset transfer, ownership authentication, and record keeping of transactions and data.
- **Internet of Things (IoT):** This technology is used for connecting real-world elements with internet through sensors and devices for the collection of user information.

The collected data can be used by machine learning and AI for the betterment of the optimization process for ensuring a better experience in the metaverse environment.

- **3 Dimensional reconstructions:** This technology includes specially built 3D cameras and reconstruction technologies for creating a realistic model.
- **5G and edge computing:** Basically 5G technology makes the use of metaverse technology cost-effective. On the other hand, edge computing technology ensures quick data transfer with minimum delay. This ensures an immersive experience in the metaverse world.

OPPORTUNITIES OF FINANCIAL SERVICE IN METaverse ECOSYSTEM

The opportunity of the financial sector in metaverse is immense. Insurance is the means of different services to its customer, the basic step up for the banks would be to be able to operate in two dimensions simultaneously. The pervasive nature of the metaverse technology and the subsequent increase in economic activities that would be conducted by the avatars is expected to create new customer value creation opportunities and it requires insurance businesses to adopt a different approach in serving the customers. The metaverse technology would accelerate the digitization of operational and administrative procedures for asset management and customer relationship management in the form of crypto assets and NFTs.

INSURANCE VALUE CHAIN

Let us discuss some more avenues that could be an opportunity for financial service in metaverse.

- **The system of payment in metaverse:** The system of payment in metaverse will be unique, here there will be no need for a particular standard currency to be chosen for exchange, one can pay say in rupees and that will be in the virtual space automatically be converted to the opted choice of currency of the seller say pounds. Hence there can exist different currencies altogether without the need for one single currency choice due to the fact that metaverse automatically transforms the currency according to the required one. Although they are decentralized interoperable systems, ensuring cyber safety is very important that need to be firmer to protect people against attacks inside the virtual mode. Payment or receipt, any transaction whatsoever will be saved, and detailed history stored in the form of blockchain. This also provides assurance about the authenticity of the digital exchange currency used. It will help in future analysis and information base about the pattern of transactions performed by the individual.
- **Credit scoring using Artificial Intelligence:** Credit creation is one of the primary work zones for any financial institution, with the credit creation process comes the question of “ who is eligible for the credit facility”, “what collateral they can offer” and “ will they be able to pay back”. In metaverse we have programs that store transactional data of every person, it records the timeline, kind of payment or purchase, and it keeps a record of websites visited and frequented, types of services or products purchased, and a whole lot of history about the exchange currency. Now this should mean that getting hold of a pattern of transactions will be easy in metaverse but actually, it's

not. In the metaverse although everything is connected to everything, for security and privacy reasons some data may be haphazardly placed which makes it difficult for data collection about the credit credibility of the customer. Along with this for online safety, different addresses will be used by the customers which will make it even more difficult to reconcile the said person's transacting pattern. Here comes the job of artificial Intelligence. AI-based programs help to search and correlate all possible websites and transaction modules, opted for, and used by the customer, and make a database out of it to form a pattern. Then it runs a preset algorithm to understand the probability of the person transacting in different sectors. With the establishment of virtual contracts, the job becomes easier, here the customer is asked to go into a virtual contract that will protect his / her metaverse data and usage pattern and only highlight the required information for credit analysis.

- **New work culture** – If metaverse comes to its full potential then the need for a revised and well-versed work culture implementation is necessary. The dimension of metaverse introduces the digitization of the objects in this real world, hence the way of customer interaction, database keeping, transaction keeping, and functionality of the whole bank will change, and the types of employee needs, types of training needs all will be transformed. All banks will need software oriented learn up employees, the need for security will change from mere person-oriented physical job to technical computer based cyber security, along with this banking experience will become diverse, not only for the customer but also for the employees.
- **Use of digital currency:** According to the Reserve Bank of India, Central Bank Digital Currency shall be launched after the enactment of the crypto bill in the parliament. As per the Finance Act 2022, CBDCs shall be considered as bank notes as well as fiat currency.
- **Virtual bank branches:** The implementation of virtual bank branches would enable the customers in receiving financial services independently. It would be possible for banks to provide services to clients with the help of virtual agents. Customers can have unlimited access to the services. Bank scalability can be increased on the basis of the “connectivity-based business model”. The model would help the banking and financial institutions to deepen relationships with existing and potential customers.

CHALLENGES OF THE METAVERSE-ENABLED FINANCIAL SYSTEM

Although the metaverse seems to be the framework that will help remove the lacking of the banking sector and help it unlock its whole potential, yet there are some dangers that need to be perceived and thought about before diving into this new dimension.

- **Operational failure** – The interconnectivity of all the virtual activities gives better access to information on any matter faster but it also creates a huge amount of data processing requirement. When the internet slows down due to too much activity being done at the very same time, this can be a hurdle to work, but when everything will be online including us, that time operational failure will not be so easy situation to handle. With the complex structuring of the metaverse having banking workability stops all over the verse or gets fragmented due to any processing failure or virus attack can mean data is lost forever. This will be a very problematic situation. The digital

platform is based on computerized data that can vanish. Real-life objects will not just cease to exist or get lost forever in a way digital objects can. Operation failure might make the experience of banking in the metaverse a hurdle and anxiety-oriented job for consumers.

- **Virus and cyber-attacks** – Metaverse will be prone to virus attacks and bug attacks, this can make the virtual branches cease to be operational and can lead to damage of data or loss of data, as everything will be virtual, the viruses can completely exterminate the branch from the metaverse space which may create a huge digital chaos.
- **Security problems** - Metaverse is prone to viruses and cyber-attacks as mentioned above. This means the security of customers is in more danger than ever. With the whole details being in the verse there won't be any information left unturned by the criminals, they will get every detailed information about the victim customers that can render the consumers unable to function in the metaverse altogether.
- **Privacy-** Every activity being done is monitored in the metaverse. All information be it financial or nonfinancial are available to the virtual banks and every other institute present in metaverse Even though we know the privacy assurance contracts and programs functions to safe keep the information, truly stating, once online no matter how hard and strict the security is the criminals will find a way to breach it and create chaos. Such will hamper the personal interest of the consumers, and along with this the unethical behavior of the institution might render the data to be sold to third parties which are not sanctioned by the customer or the banks involved. In such a case the risk of privacy encroachment becomes a greater headache for a customer as well as the bank branches.

Apart from the technical aspects, there are certain psychological and organizational factors that would create constraints for the application of metaverse technology in the financial system. The factors are as follows

1. **Mindset** – People are not really equipped yet to handle the concept of complete virtuality, having a digital avatar and going to a digital bank might be still a science fiction ideology to some. A rigid mindset towards orthodox ways may be a very prominent reason for a few sectors to be divided in their opinion about metaversal banking.
2. **Fear** – Obvious reason as mentioned earlier the threat of cyber security will be tripled with everything being online and digital, the chances of people being completely robbed off or data being breached is a very justified reason for not being drawn towards virtual banking, until the whole security and safety process is developed in a substantial manner.
3. **Not being able to adapt** – People of diversified classes, creeds, backgrounds, and ages will participate in the metaverse. Where smartphones are still a mystery to the majority of the older population, the metaverse concept will be very difficult to be understood let alone properly utilized. In such circumstances, virtual banking will be difficult to be handled by the older people which may lead to a disparity of interest in this context.

4. **Equipment** - Metaverse though has already started to perform in certain arenas in the banking sector yet there is the requirement for huge gadgets changes, headsets smart glasses, proper net connectivity, and other such devices are yet to be properly available to all people involved in the banking sector.
5. **Cost** – The gadgets involved and the technology adapted is highly advanced and costly, most people may not be able to afford such goods right away.
6. **Different course of study** - Metaverse is a whole new technological dimension by itself it requires different techniques and training for the employees to be able to function in the metaverse, the whole system and framework of banking official courses have to be altered that is troublesome in this point of sudden transition.
7. **Government participation** - when the whole economy and financial framework will be set and the government regulation will be set in the metaverse arena and the functioning will be regulated safe and stable for common people only then the government will allow complete exposure to normal citizens to function in avatar or digital projection basis, until then the banks in virtual mode will not have the same repute and reliability as in physical form in the real world.
8. **The risk factor of mental disturbance** – Metaverse is a digital virtual world, and the concept of virtuality may have a very deep-rooted impact on our primitive set-up brains, human beings are made for natural real objects, and virtuality can confuse us, our brains may get stuck in different reality which might lead to detrimental health hazards, nobody is certain how our body and mind will actually react to such exposure.

CONCLUSION

Metaverse is a new concept of human interactions that have resolved the problems of space and speed of action along with connectivity to the world. Banking being a very society-oriented business framework sure does benefit a lot from the introduction of this new ideology. No matter what the shortcomings are today, with time and advancement they will be resolved to give us a better and much more different experience in the field of banking. Future always relates to the dynamism and the metaverse is the new “possibility”, the growth banking sector will come to a point of saturation in the present world, then the change and variables provided by the metauniverse will be the option for banking to grow its potentiality on a whole another level. The fact that banks have already accepted and started approaching and utilizing the concept gives us hope that we are going to jump into a different century of technologically developed world.

REFERENCES

1. Seth, D., Gupta, M., & Singh, B. J. (2022). A Study to Analyse the Impact of Using the
2. Metaverse in the Banking Industry to Augment Performance in a Competitive Environment. In *Applying Metalytics to Measure Customer Experience in the Metaverse* (pp. 9-16). IGI Global.
3. Anggara, M. R. H., Davie, M. R., Margani, M., & Aulia, M. (2022). THE PRESENCE OF COMMERCIAL BANKS IN METAVERSE'S FINANCIAL ECOSYSTEM: OPPORTUNITIES AND RISKS. *Journal of Central Banking Law and Institutions*, 1(3), 405-430.
4. Duan, H., Li, J., Fan, S., Lin, Z., Wu, X., & Cai, W. (2021, October). Metaverse for social good: A university campus prototype. In *Proceedings of the 29th ACM International Conference on Multimedia* (pp. 153-161).

5. Ning, H., Wang, H., Lin, Y., Wang, W., Dhelim, S., Farha, F., ... & Daneshmand, M. (2021). A Survey on Metaverse: the State-of-the-art, Technologies, Applications, and Challenges. *arXiv preprint arXiv:2111.09673*.
6. O'Hare, J. J., Fairchild, A., & Ali, U. (2022). Money & Trust in Digital Society, Bitcoin and Stablecoins in ML enabled Metaverse Telecollaboration. *arXiv preprint arXiv:2207.09460*.
7. Katterbauer, K., Syed, H., & Cleenewerck, L. Financial cybercrime in the Islamic Finance Metaverse.
8. Zhang, T., Lu, C., & Kizildag, M. (2018). Banking "on-the-go": examining consumers' adoption of mobile banking services. *International Journal of Quality and Service Sciences*.
9. Rahi, S., & Ghani, M. A. (2018). The role of UTAUT, DOI, perceived technology security and game elements in internet banking adoption. *World Journal of Science, Technology and Sustainable Development*.
10. Rahi, S., Ghani, M., & Ngah, A. (2018). A structural equation model for evaluating user's intention to adopt internet banking and intention to recommend technology. *Accounting*, 4(4), 139-152.
11. Fedorko, I., Bačik, R., & Gavurova, B. (2021). Effort expectancy and social influence factors as main determinants of performance expectancy using electronic banking. *Banks and Bank Systems*, 16(2), 27.
12. Sarkar, S. (2023). Banking in Metaverse Opportunities and Challenges. *The Management Accountant Journal*, 58(1), 63-67.

INVESTIGATIONS ON THE BARRIERS OF NEW PRODUCT DEVELOPMENT IN MANUFACTURING INDUSTRIES: A DEMATEL APPROACH

Sanjay Kumar Borse

Department of Mechanical Engineering, Institute of Engineering and Technology, DAVV, Indore (M.P.)

Dr. Devendra Singh Verma

Department of Mechanical Engineering, Institute of Engineering and Technology, DAVV, Indore (M.P.)

Abstract

The present research work is dedicated to the investigations on the relationships among the barriers in new product development in manufacturing industries. For this purpose, first, a list of barriers was created with the help of available research and experts' opinion, and the relationships among the barriers were investigated using a well know MCDM (multi criteria decision making) technique, DEMATEL (Decision-making trial and evaluation laboratory).

Keywords: *New product development, Decision-making trial, and evaluation laboratory (DEMATEL), Manufacturing industries, Multi criteria decision making (MCDM).*

1. INTRODUCTION

The evolution of products has Innovation, according to Jelilov and Bahago (2017), is "the process of delivering a new product to customers or improving the quality of an existing product. The term *product development* is used to describe the realization from the first idea till the final product's release, testing, and customer feedback. In other words, the lifecycle of a product is an integral part of the product creation process. It allows businesses to evaluate the waters with novel product concepts, get early feedback from

consumers, and refine their offerings to better meet the needs of their target demographic, all while contributing to the company's bottom line. Every day, people all around the world have ideas that lead to modern technology, which in turn alters customer demand and necessitates fresh product creation (Hughes, 2021). Considering these aspects, the present research work is devoted to the investigations on product research and portrays the relationships among different barriers which hinder it. For this purpose, a well-known multi-criterial decision-making technique, DEMATEL, shall be used. Following are the objectives of the research:

- a) Determination of the relationships among barriers in new product development.
- b) Rankings of barriers with respect to the intensity of their importance.

2. LITERATURE REVIEW

One component of the marketing mix is the product itself, while the other three are pricing, placement, and promotion towards meeting the needs of the target audience. The other components of a marketing strategy cannot be determined without first having a product to promote. Although it may refer to a variety of different things, "Product" most often refers to a solution to a problem that people buy or use. Both physical and immaterial items, such as services, may be considered part of a product. Unlike ethereal goods, which cannot be physically seen but whose effects may be felt, tangible products can be immediately managed, seen, and even tasted. Tomato goods, for instance, are a kind of physical product manufactured by businesses and have several attributes, such as content, packaging, pricing, and so on.

Experts in marketing have had to reevaluate their methods considering the dynamic nature of the modern market. Indeed, there are periodic shifts in consumer preferences, desires, and requirements, as well as the emergence of new forms of competition. Therefore, it is crucial for a company to evolve and innovate to get an edge in the market and succeed (Kotler et al., 2002). Any product, service, or concept that is seen as unique or new by a consumer is considered innovative (Kotler et al., 2002).

When a customer makes a purchase, they get both material and intangible benefits, as defined by Musa (2019). Anything that may be brought to the notice of the market for the purpose of purchase, usage, or consumption in the hopes of satisfying a demand or need is considered a product. The strategic level of an organization is always on the lookout for new product and service development prospects as part of their continuing product development process.

Before a product goes to market, several considerations must be made. Moment of initiation; if the economy is struggling, for instance, it could be best to hold off on releasing the product until the following year. However, the corporation may push for an earlier launch of the new product if rivals are also planning to debut similar offerings. Some of these elements are dependent on the company's degree of knowledge, which may be changed either directly or indirectly through the organization's connections to promote knowledge generation and transfer. Following points represent the gaps in the research:

- a) There is extremely limited research which focuses on the interrelationships among new product development barriers; and
- b) There is extremely limited research which focuses on the ranking of new product development barriers.

3. SOLUTION METHODOLOGY

The present research used the DEMATEL technique for solving the research problem. DEMATEL is a pairwise comparison-based decision-making technique. It is used in the process of studying the model of causal linkages that exist between the variables. The primary benefit of using this strategy is that it enables the experts to feel more at ease while sharing their ideas on the variables. This is the primary advantage of using this technique. The method is broken down into its component parts as shown in the following points:

Step 1: Generation of Direct relation Matrix (X)

It is used to investigate the relations among the n criteria, an n × n matrix is first generated, as follows.

$$X = \begin{bmatrix} 0 & \dots & x_{n1} \\ \vdots & \ddots & \vdots \\ x_{1n} & \dots & 0 \end{bmatrix} \quad (3.1)$$

Step 2: Computation of Normalized Direct-relation Matrix (N)

In the next step, N was created, as follows.

$$N = \frac{1}{k} * X \quad (3.2)$$

$$\dots \text{ were, } k = \max \left\{ \max \sum_{j=1}^n x_{ij}, \sum_{i=1}^n x_{ij} \right\}$$

Step 3: Computation of Total Relation Matrix (T)

In the next step, T was created, as follows.

$$T = N \times (I-N)^{-1} \quad (3.3)$$

Step 4: Setting of Threshold Value

The following phase was determining the value of the threshold that would be used to access information for further analysis. In the current body of study, the value of the threshold was determined to be 0.142.

Step 5: Final Output and create a Causal Diagram

In the next step, final outputs in the terms of D+R and D-R are calculated, using the following expressions, and cause effect diagram is created.

$$D = \sum_{j=1}^n T_{ij} \quad (3.4)$$

$$D = \sum_{j=1}^n T_{ij} \quad (3.5)$$

Step 6: Interpretation of Results

The subsequent phase involves the interpretation of the findings based on a cause-and-effect diagram. D+R is a representation of the degree of significance that each element has in relation to the system, while D-R is a representation of the degree to which each factor has an impact on the system.

4. CASE STUDY

Figure 4.1 represents the stages of obtainment of solution of the research problem.

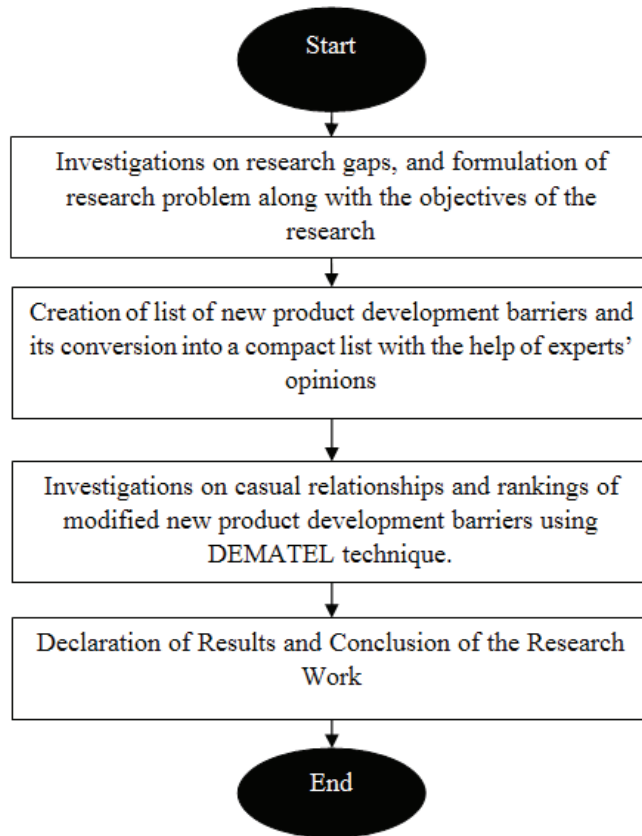


Figure 4.1: Stages of obtaining solution from Research Problem

The details of various stages involved in the case study are as follows.

- First, from a survey of available literature and experts' opinion the research gaps, formulation of problem as well the finalization of the objectives of the research were accomplished.
- In the next step, barriers to the new product development were identified, again from the survey of available literature as well as expert opinion, the details of which are presented as follows.

Table 4.1: Barriers in New Product Development

S. No	Barrier
1.	Top management support and commitment
2.	Lack of skilled manpower
3.	Lack of research facility
4.	Financial barriers
5.	Lack of awareness

c) In the next step, a systematically designed questionnaire was sent to a group of experts and their responses were used to find the inter-relationships among barriers, using DEMATEL method. The detailed procedure of obtaining solution from DEMATEL method is presented as follows.

i. First, with the help of experts' opinions, the X was drawn as shown below.

Table 4.2: Direct Relation Matrix

	Top management support and commitment	Lack of skilled manpower	Lack of research facility	Financial barriers	Lack of awareness
Top management support and commitment	0	4	4	3	3
Lack of skilled workforce	4	0	2	3	3
Lack of research facility	2	3	0	3	3
Financial barriers	3	2	2	0	1
Lack of awareness	2	2	2	2	0

ii. In the next step, normalization values for direct relation matrix elements were investigated. The details of normalized direct relation matrix are presented as follows.

Table 4.3: Details of N Matrix

	Top management support and commitment	Lack of skilled manpower	Lack of research facility	Financial barriers	Lack of awareness
Top management support and commitment	0	0.286	0.286	0.214	0.214
Lack of skilled manpower	0.286	0	0.143	0.214	0.214
Lack of research facility	0.143	0.214	0	0.214	0.214
Financial barriers	0.214	0.143	0.143	0	0.071
Lack of awareness	0.143	0.143	0.143	0.143	0

iii. In the next step, the total relation matrix was constructed, the details of which are presented as follows.

Table 4.4: Details of T Matrix

	Top management support and commitment	Lack of skilled manpower	Lack of research facility	Financial barriers	Lack of awareness
Top management support and commitment	0.663	0.886	0.833	0.837	0.785
Lack of skilled manpower	0.813	0.586	0.669	0.759	0.711
Lack of research facility	0.656	0.699	0.481	0.702	0.658
Financial barriers	0.604	0.554	0.522	0.426	0.462
Lack of awareness	0.534	0.532	0.501	0.532	0.374

iv. In the next step, the total relation matrix using the threshold value of 0.631 was constructed as follows.

Table 4.5: Total- relationships Matrix by Considering the Threshold Value

	Top management support and commitment	Lack of skilled manpower	Lack of research facility	Financial barriers	Lack of awareness
Top management support and commitment	0.663	0.886	0.833	0.837	0.785
Lack of skilled manpower	0.813	0	0.669	0.759	0.711
Lack of research facility	0.656	0.699	0	0.702	0.658
Financial barriers	0	0	0	0	0
Lack of awareness	0	0	0	0	0

v. In the last step, the final output as well as casual diagram was created as follows.

Table 4.6: The Final Output

	R	D	D+R	D-R
Top management support and commitment	3.27	4.004	7.274	0.734
Lack of skilled manpower	3.256	3.538	6.794	0.281
Lack of research facility	3.006	3.196	6.202	0.19
Financial barriers	3.255	2.568	5.823	-0.688
Lack of awareness	2.989	2.472	5.462	-0.517

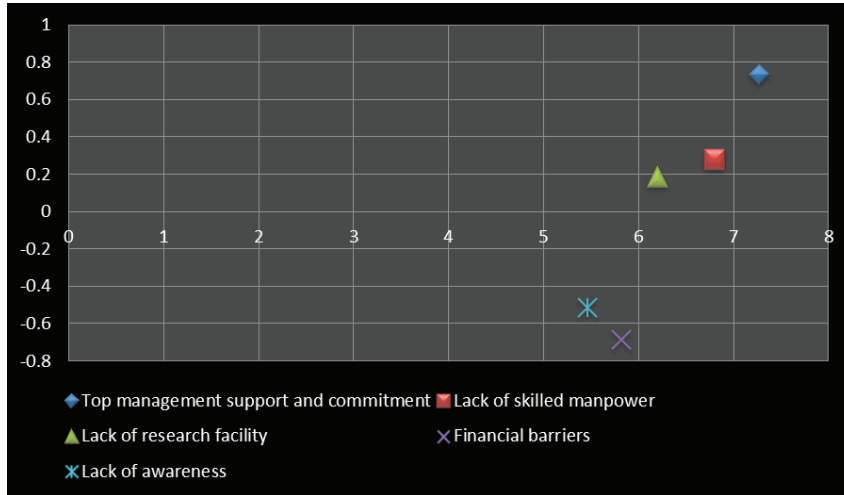


Figure 4.2: Cause-Effect Diagram

According to the diagram and table above, each factor can be assessed based on the following aspects:

- D + R shows the degree of importance between each factor. In other words, (D + R) indicates both factor's impact on the whole system and other system factors' impact on the factor in terms of degree of importance, Top management support and commitment is ranked in first place and Lack of skilled manpower, Lack of research facility, Financial barriers and Lack of awareness, are ranked in the next places.
- D-R shows the degree of a factor's impact on the system. In the reesearch work, Top management support and commitment, Lack of skilled manpower, Lack of research facility are considered to be as a causal variable, Financial barriers, Lack of awareness are regarded as an effect.

5. CONCLUSION, LIMITATIONS AND FUTURE SCOPE OF THE RESEARCH

Following points represent the conclusion of research work:

- a) In terms of degree of importance, Top management support and commitment is ranked in first place and Lack of skilled manpower, Lack of research facility, Financial barriers and Lack of awareness, are ranked in the next places; and
- b) In this study, Top management support and commitment, Lack of skilled manpower, Lack of research facility are considered to be as a causal variable, Financial barriers, Lack of awareness are regarded as an effect.

Following are the limitations of the research work:

- a) The research work is limited a particular number of new product development barriers; and
- b) The research work is also limited to investigations using DEMATEL technique, only.

Following points represent the future scope of the research work:

- a) A broader research work involving a greater number of barriers may be initiated; and
- b) Extensive research consisting of a large number of investigation techniques may be started.

REFERENCES

1. Hughes, M. (2021). Entrepreneurial passion and technological innovation: The mediating effect of entrepreneurial orientation. June. <https://doi.org/10.1080/09537325.2021.1948986>.
2. Jelilov, G., & Bahago, K. A. (2017). AgroAllied Industry and its Relevance on Economic Performance: Evidence from Nigeria. *Nile Journal of Business and Economics*, 3(6), 25. <https://doi.org/10.20321/nilejbe.v3i6.93>
3. Musa, S. (2019). A Framework of Intra Organisational Knowledge Sharing Practices in Implementing Bim Within the Malaysian Construction Industry. 363.
4. Kuka, M. G. (2018). *Product Development and Management Strategies*. London: Intech Open Limited. <https://doi.org/10.5772/intechopen.74527>.
5. Kotler, P., Armstrong, G., Saunders, J. and Wong, V. (2002), *Principles of Marketing*, 3rd European edition, Prentice-Hall, Maldon.
6. Lovelock, C. (1996), *Services Marketing*, 3rd ed., Prentice-Hall, London

ROLE OF DIGITAL MARKETING ON STUDENT PERCEPTION

Priya Shah	<i>BBA-4 Sem., SOB, ITM (SLS) Baroda University, Vadodara, Gujarat</i>
Harsh Limbachiya	<i>BBA-4 Sem., SOB, ITM (SLS) Baroda University, Vadodara, Gujarat</i>
Dr. Sourabh Jain	<i>Assistant Professor, SOB, ITM (SLS) Baroda University, Vadodara, Gujarat</i>

Abstract

Digital marketing has become an integral part of modern educational institutions' strategies to attract and engage students. This research paper explores the significant role of the digital marketing in shaping student perceptions and influencing their decision-making process. Digital marketing empowers students to make informed decisions by providing them with readily available information about programs, courses, admission requirements, and campus life. Through engaging website content, online videos, virtual tours, and webinars, educational institutions can display their facilities, faculty, and student testimonials, creating a comprehensive and immersive experience for prospective students. Purpose- The main objective of the study to clarify the role of digital-marketing on students' perception. Methodology: - This study combines qualitative and quantitative methods to effectively examine the relationship and impact of digital marketing on student perceptions. A structured questionnaire was designed for to collect the data on the dimensions related to the digital marketing and student's perception. The sample size of the study of two hundred students, which are studying the higher secondary schools, and undergraduate courses in Gujarat & Madhya Pradesh. The convenient sample technique was used for the data collection. Various statistical tools like correlation, regression and ANOVA used for the testing of hypothesis. Findings: This study shows digital marketing has a profound correlated and influence on prospective students' perceptions of educational institutions.

Keywords: *Digital Marketing, Students Perception, Educational Institutions.*

INTRODUCTION

The development of digital marketing is closely intertwined with advancements in technology. It has evolved over the years as modern technologies have emerged and become more accessible. In the initial stages, digital marketing relied on basic technologies like email and databases. Ray Tomlinson's invention of email in 1971 laid the foundation for sending and receiving files through different machines. As computer storage capacity increased in the 1980s, companies began utilizing operative digital techniques such as index in marketing system to track customer information more effectively. The term "digital marketing" was invented in the year of 1990s where the invention of the internet and the popularity of personal computers. People have started searching for products and making purchasing decisions online, leading to a shift in marketing strategies. Social media platforms like Facebook, YouTube, and Twitter gained prominence, and marketers had to adapt to reach consumers across different channels. The development of digital marketing in the 2010s witnessed exponential growth with the increasing accessibility of digital media. Online advertising and digital media spend grew significantly, and businesses started employing Online Behavioural Advertising (OBA) to tailor advertisement to the net users. However, this increases the concerns about consumer privateness and protection of the data. Digital marketing has become a prevalent and efficient method for brands and businesses to connect with humans. It utilizes various digital media channels, including mobile apps, websites, computers, and interactive devices, to attract potential customers and fulfil their needs. The evolution of digital marketing has enabled businesses to communicate and engage with humans in new and innovative ways, improving business development and brand value. In the context of the educational sector, digital marketing has also become crucial. Higher education institutions have embraced digital marketing to target prospective students, enhance enrolment, build credibility, and engage with students and parents. The digital landscape offers opportunities for educational institutions to attract, communicate, and provide valuable services to students, including career counselling, alumni networks, and online learning. The role of digital marketing in the Indian context is particularly promising. With a large population, a growing economy, and increasing digital literacy, India has the potential to become a hub for digital creativity. The digital landscape is rapidly evolving, and marketers are focusing on strategies to engage consumers effectively through compelling content and personalized experiences.

LITERATURE REVIEW

Digital marketing has become an integral part of educational institutions' promotional activities. In an increasingly competitive landscape, institutions are utilizing various digital marketing strategies to attract and engage prospective students. Understanding the influences of these strategies on students' decision-making measures and its awareness of educational institutions is essential for enhancing enrolment rates and maintaining a positive brand image. This study aims to explore and analyse the influence of digital marketing efforts on students' perceptions in choosing an educational institution. Digital Marketing encompasses every type of marketing efforts using electronic appliances and the internet. It involves leveraging digital techniques like various internet social networking websites to connect with students. It is also known as online marketing, internet marketing, or web marketing. Digital marketing utilizes various tactics and

channels to engage customers online. This includes activities such as digital advertising, email marketing, and online branding assets, forming a broad range of channels under the shade of “digital marketing.” “Digital marketing is the marketing of products or services using digital technologies, primarily on the Internet, but also encompassing mobile phones, display advertising, and other digital mediums.” Digital marketing has expanded the boundaries of education. Nowadays, it is no longer difficult for educational institutions around the world to promote themselves to their audience or suffer from a lack of brand awareness. Due to extension of the great boom in information technology, educational institutions have a chance to show the possibilities that students could get from the services they provide, now not only in the domestic market, but in the global market. (Partruti Baltes, 2015). Daradoumis & Rodriguez (2010) argues that to enable educational institutions to build understanding of students and accordingly increase the turnover of retained students. Digital marketing in the education sector is considered important especially for the intense global competition. Therefore, it is important for universities to understand ways to attract students and promote themselves (Kusumawati, 2013). In article “Digital marketing trends for higher education in 2017”, Joly (2016) is of the opinion that higher education marketing leaders must master the art of blending a strong and personal customer experience with the science of measuring and optimizing the impact of their initiatives. This proves that today’s highly educated managers or directors must work hard to get quality graduates. In this case, no different from other industries, the competition between universities to attract prospective students depends very much on the brand strength of each university, regardless of the quality of college administration and the quality of postgraduate programs. There is a relationship; Quality factors determine the strength of a college’s brand, in addition to other elements that build brand strength. As such, digital marketing in higher education is an important part of the recruitment, retention and communication process for stakeholders, governments, or stakeholders. From learning to campus awareness, creating an effective digital strategy helps colleges and universities target the right students for school and reach others who may be part of their personal needs but do not know. Digital marketing in universities is important in connecting with alumni who can become boosters and active supporters or re-engage with specific strategies (Spilker, 2017). The phenomenon of digital media has begun to influence higher education and student decision making. Students looking for colleges or potential colleges to attend use social media and other new online communication channels to get information and other university information. Educational institutions are looking for different tactics and strategies to present their programs to attract potential students. Kusumawati (2019) investigate the impact of digital marketing of universities on students’ decision-making and find that students use social media to research university information before choosing the right one researchers Krishnamoorthy and Srimathi (2019) found that educational institutions involve a professional team in content validation, video marketing and analytics because their own team has limited experience with advanced technology. In a study, Bateman (2021) It is concluded that academic social networks provide a collaborative environment for communication across time and space. Public or private educational institutions represent prospective students and parents on their websites. Anamika Srivastava (2019) learns how public and private universities present themselves on their website. The findings revealed that private universities upload multimodal content (high-resolution images, videos, 360-degree images). On the other hand, public university

websites focus only on text and images. In further study, Thi Van Yen Hoang and Isolda Rojas-Lizana (2015) Content marketing is one of the digital marketing tools used primarily to spread awareness about programs offered by educational institutions. Loredana (2015) Content marketing is defined as “what a company creates and usually tells its story.” In other words, content is created “to provide customers with the information they are looking for.” (Gupta, 2015).

OBJECTIVES

Observing the aspects above, this research provides a good foundation for the researcher, so the purpose of the research is stated below:

1. Define the role & dimensions of Digital Marketing of Students Perception.
2. Measure the relationship between metrics of Digital Marketing and Students Perception.
3. Measuring the impact of Digital Marketing on Students Perception.

HYPOTHESES

Hypothesis-I

H₀ There are no meaningful relationship between dimensions of Digital Marketing and Students Perception.

H₁ There are meaningful relationship between dimensions of Digital Marketing and Students Perception.

Hypothesis-II

H₀₁ There are no significant impact of Digital Marketing and Students Perception.

H₁₁ There are significant impact of Digital Marketing and Students Perception.

RESEARCH METHODOLOGY

Area of study	Respondents are taken from Educational Institutions/ Universities from the Gujarat & Madhya Pradesh
Research design	Empirical Research Design
Size of Sample	The total sample size of the study has 200 where 195 responses received but the study of 190 responses (because of 05 responses not response properly)
Sampling Methods	For the Data we used the convenient sampling.
Data collection	Primary data is collected through structured questionnaire. Researchers have used the Likert Scale to conduct the survey. Secondary data is collected through various sources like journals, white papers, web references and articles.
Tools Used for Analysis	Correlation, Regression & ANOVA analysis tools used for analysis.

DATA ANALYSIS

Table-1: Demographical variables

Gender	Male	Female					
	99 (52.11%)	91 (47.89%)					
Age	18-25	25-30	30-35				
	118 (62.10%)	50 (26.32%)	22 (11.58%)				
Degree	Undergraduate		Postgraduate		Ph. D		
	100 (52.63%)		82 (43.16%)		08 (4.21%)		
Course	Management	Engineering	Pharmacy	Medical	Computer Application	Law	Others
	66 (34.74%)	38 (20.00%)	32 (16.84%)	18 (9.47%)	17 (8.95%)	11 (5.79%)	08 (4.21%)

Table 1 represents the demographic analysis of the respondents.

Table-2: Reliability analysis

Metrics	No. of items	Cronbach's Alpha
Online Marketing & Branding	04	0.778
Online Content and Blogging	04	0.756
Social Media & Video Marketing	04	0.746

Table 2 represents the reliability analysis of dimensions of Digital Marketing. The value represents of Cronbach's Alpha for all the items used in our research are more than 0.600 which clearly indicates that the data is dependable for study.

HYPOTHESES TESTING

Hypothesis-I

H_0 There are no meaningful relationship between Dimensions of Digital Marketing and Students Perception.

H_1 There are meaningful relationship between Dimensions of Digital Marketing and Students Perception.

Table-4: Correlation analysis:

Correlations					
		SP	OMB	OCB	SMVM
SP	Pearson Correlation	1	.822	.823	.824
	(Significance 2-tailed)		.000	.000	.000
OMB	Pearson Correlation	.822	1	.973	.959
	(Significance 2-tailed)	.000		.000	.000

OCB	Pearson Correlation	.823	.973	1	.980
	(Significance 2-tailed)	.000	.000		.000
SMVM	Pearson Correlation	.824	.959	.980	1
	(Significance 2-tailed)	.000	.000	.000	

Table 4 represents the correlation analysis and how the dimensions of Digital Marketing and Students Perceptions are related to each other. The relationships of the dimensions of Digital Marketing and Students Perceptions functions are accepted. Pearson correlation was applied on the data to check the relationship between Student Perceptions with Online Marketing and Branding ($r=.822$), Online Content and Blogging ($r=.823$), Social Marketing and Video Marketing ($.824$). The results indicates that all the dimensions of Digital Marketing are statistically significant correlated and accepted on ($p<0.05$).

Hypothesis- II

H_{01} There is no significant impact of Digital Marketing and Students Perception.

H_{11} There is significant impact of Digital Marketing and Students Perception.

REGRESSION AND ANOVA ANALYSIS

Table-6: Regression Analysis

Model	R	R ²	Adjusted R ²	Standard Error of the Estimate	Significance of F Change
1	.832 ^a	0.692	0.687	0.459	0.00
a. Predictors: (Constant), OMB, OCB, SMVM					
b. Dependent Variable: SP					

Table-7: ANOVA

Model		SS	df	MS	F	Sig.
1	Regression	87.82	3	29.293	139.287	.000 ^b
	Residual	39.117	186	.210		
	Total	126.99	189			
a. Independent Variable: OMB, OCB, SMVM						
b. Dep. Variable: SP						

Table 6 represents the analysis of multiple regression and Table 7 represents the model of ANOVA. In present study the value of level of significance is 0.000. The value of $r^2=.692$ (69.2%). The results are significant (i.e., the null hypothesis is rejected, and alternate hypothesis accepted). This result represents that there is significance influence of Digital Marketing on the perception of Students.

FINDINGS AND CONCLUSION

In this above research, it is clearly express that there is a strong relationship between Digital Marketing and Students Perception. All the dimensions of Digital Marketing under study

have more than 0.700 related with each other. The result of Analysis of Variance (ANOVA) shows the Probability value (i.e., P) to be 0.00. It means there are null hypothesis is rejected and our result is statistically significant. In other words, there is significant impact of Digital Marketing and Students Perception. This may happen because our dimensions under study (Online Marketing and Branding, Content and Blogging and social media and Video Marketing) are being strongly affected to Student Perception for any institute. There are some major findings of the research as-

- Digital marketing significantly influences students' decision-making process when selecting educational institutions.
- Online resources, such as institution websites and social media programmes, play a key role in providing information that change the students' decisions.
- Digital marketing efforts positively correlate with increased brand awareness among students.
- Digital marketing enhances the overall educational experience by providing virtual tours, interactive content, and personalized communication.
- Personalized communication and tailored messaging create stronger connections with students.
- Institutions that invest in digital marketing strategies have a greater opportunity to attract and engage prospective students effectively.

REFERENCES

1. Patrutiu Baltes, L. (2015). Content marketing - the fundamental tool of digital marketing. Bulletin of the Transilvania University of Brasov. Series V: Economic Sciences, 8 (2), 111-118.
2. Joly, K. (2016), 'Digital marketing trends for higher education in 2017,' accessed on January 7th, 2018, from <https://www.universitybusiness.com/article/digital-marketing-trends-higher-ed2017>.
3. Dr. S. Sivasankaran (2017). Digital Marketing and its Impact on Behaviour of Youth. International Journal of Research in Management and Business Studies (IJRMBS 2017), Vol-4, 38
4. Kusumawati, Andriani. (2019), Impact of Digital Marketing on Student Decision-Making Process of Higher Education Institution: A Case of Indonesia, Journal of e-Learning and Higher Education, Vol. 2019, ISSN 2277-8616, pp. 3326-3329.
5. Krishnamoorthy, A and Srimathi, H. (2019), Digital Marketing and Strategic Planning in Higher Education, International Journal of Scientific & Technology Research Volume 8, Issue 10, October 2019.
6. Rashika, Shetty (2019), Youth's Perception Towards Digital Marketing, International Journal of Advance and Innovative Research, Vol. 6, Issue-2, (XVII), April-June 2019.

GREEN INITIATIVES BY GOVERNMENT AND CORPORATE SECTOR OF INDIA

Prof Prabhjit Singh

*Associate professor, PG dept of Commerce and Management,
SGTB Khalsa college Sri Anandpur Sahib*

Dr. Tejinder Kaur

*Assistant professor, PG dept of Commerce and Management,
SGTB Khalsa college Sri Anandpur Sahib*

Abstract

Over the last years, awareness towards environmental issues has emerged as an important aspect. Environment as well as human and animal health, is being affected by the pollution caused by human himself as it is human who uses chemicals for food and animal adulteration which resulted into various diseases like low birth rate, cancer, asthma etc. It has increased consumer, government, and corporate concern for ecological balance. Most of the companies in India are now shifting their priorities from cost saving to environment protection. Companies like Disney, Fisher, Ebay is considering the environmental issues seriously as they are now investing for environment. Government is also making efforts to save environment by taking some legal actions and preparing laws. The Ministry of Environment, Forests, and Climate Change has advised states and union territories not to use plastic for poll preparation. The current study is an attempt to provide information on various efforts undertaken by businesses and governments to promote green practices.

Keywords: *Green practices, Environment, Climate change etc.*

INTRODUCTION

As the population is continuously growing, role of conservation is becoming critical. Most of the experts who have studied the natural sciences have focused their attention on various solutions to environmental challenges. New methods for reducing the pollution, such as reducing danger emissions from factories, developing water treatment plants, and creating fuel-efficient and electric vehicles have undoubtedly contributed to a clean and safe environment. Despite these efforts, there is growing acceptance that technology alone cannot solve all environmental problems. Ecological crises are not solely technological issues; they are often attributed to maladaptive behavior (Maloney and Ward, 1973). Major environmental problems, such as water and air pollution, carbon emissions, and global warming, are widespread at a global level. The origins of these problems can be traced back to the industrial revolution and changes in human lifestyle. Presently, the degradation of the environment caused by human activities is a major issue. It is recognized that the root cause of environmental problems lies in human behavior.

According to Rajita Patni the government is providing important amenities like toilets to the people, but the problem is that we are stubborn to change. The problem is not with the government but with the people. Cherian. J& Jacob. J (2012) conducted a study on green marketing which focused on attitude of consumer towards environment friendly products. They concluded that although customers were aware of the different ways in which non-green products harm the environment, they were unfamiliar with the idea of green marketing. The origins of environmentally friendly behavior can be traced back to the 1960s and 1970s. At the time, western countries began to consider alternatives to fossil fuels. Organic products are becoming increasingly popular around the world.

OBJECTIVE OF THE PAPER

To study the various efforts made by government and corporations for environment protection and ecological balance.

GOVERNMENT PLANS AND ACTIONS FOR ENVIRONMENT PROTECTION

Indian parliamentary elections are an unparalleled democratic achievement. They are trying to reduce the use of plastic this year. The Election Commission of India has directed to the political parties to use environment friendly material for poll instead of hazardous publicity material. The ministry of environment, forest and climate change has directed all the states and union territories not to use plastic for poll preparation India intends to sniff out single-use plastic by 2020 to protect the environment. Environmental issues all over the world have attracted various organizations to take some serious measures to save the environment. Following are some major programs which have been started at global and country level.

United Nation Environment Programme (UNEP): -

It was founded in 1972 with the objective of encouraging collaboration in environmental care by inspiring people from other countries to improve their lifestyles for the benefit of the environment. Its head quarter is situated in Kenya and has offices in some other countries also.

Inter Government panel on climate change (IPCC): -

It was established in 1988 to determine technical, scientific and socio-economic information pertinent to the risk of human created climate change.

World Meteorological Organization (WMO): -

WMO is an organization which includes air pollution research, climate change and ozone depletion studies. It was utilized to promote accurate weather information services for public, private, and commercial use through global scientific efforts. The organization also contributes to the safety of people and the preservation of the environment.

The United Nations Conference on Environment and Development (UNCED): -

It was an Earth summit which was held on 3-14 June 1992 in Rio de Janeiro. Its main aim was to provide a global strategy for harmonizing development needs with environment protection.

GLOBAL ENVIRONMENT FACILITY (GEF)

It was created to model worldwide cooperation and funding in response to major challenges to the global environment. For this purpose, an agreement is created between the World Bank, UNDP and UNEP. The Constitution of India explained that it is the duty of every state to protect and improve the environment and to safeguard the 'forests and wildlife of the century'. For that purpose, Department of Environment was established in India in 1980 to ensure a healthy environment for the country, which became the Ministry of Environment and Forests in 1985. After that a large number of laws came into existence a few of them are discussed below: -

- The water (Prevention and Control of Pollution) Act (1974)
- The Air (Prevention and Control of Pollution) Act (1981)
- The Air (Prevention and Control of Pollution) Amendment Act (1987)
- The Municipal Solid Wastes (Management and Handling) Rules (2000)
- The Ozone Depleting Substances (Regulation and Control) Rules (2000)
- The Biological Diversity Act (2002)

Government at centre and state level has put forward some actions for the safety of environment. Such as planting more trees, ban on single use plastic, cleaning rivers by arranging awareness programmes etc. Article 51A of the Indian constitution imposes an obligation on every citizen of India to maintain and safeguard the environment. In the light of above some of the environment legislations are formed: -

The National Green Tribunal Act 2010: -

It has been enacted in year 2010 with the objective to early dispose of all the cares relating to protection and conservation of forest and natural resources.

Environment Protection Act 1986:

It was established in 1986 for the protection of environment. It provides a framework for the coordination of centre and state government for the same. It defines the term environment

very widely as it includes air, water and land their interrelationship and human, another living species, plants property and micro-organism etc. Central government under this act set up some standards for discharging of pollution. For the non-compliance of violation of the act responsible will be punished for 5 years imprisonment and fine for Rs 1,00,000 of both.

Hazardous wastes Management Regulations:

It means any waste cause by chemical, physical or by other means which can cause danger to health or environment. For these hazards waste several legislations are enacted like Hazards waste rules 2008, Bio medical waste rules 1998, Municipal solid waste rule 2000, E-waste rules 2011, and Batteries rules 2001etc.

Indian parliament added to articles in the constitution of India 1976 as 48A and 51A regarding protection of environment. Late Prime Minister Smt Indira Gandhi took an initiative for environment protection by setting up the National Council of Environment planning and coordination (NEPC). After that, on the recommendation of Tiwari committee the Department of Environment was set up in 1980. Beside these there are so many national and international agencies, organizations and programmes working for the environment such as Earthscan, Environmental protection agencies, Earthwalks, Project Earth etc. Government of India has started Paramparagat Krishi Vikas Yojana (PKVY) a center known for the free certification programme for organic farmers. These laws do not permit any compromise. The problem of implementation of law is always there in India due to diversity in religion caste, creed etc. The lack of willingness among the citizens is the uppermost cause for the problem of implementing any law. According to the 2018 report on the implementation of PKVY highlights that all the states except Tripura, Odisha and Karnataka, have failed to utilize even 50 per cent of their funds under the scheme.

CORPORATE INITIATIVES FOR ENVIRONMENT AND GREEN INITIATIVES

Yale and Columbia University has published EPI (Environmental Performance Index) of various countries in year 2013. This EPI has ranked India on 144th place among total 178 countries all over the world. Which was considered as improved in last 10 years. Environmental awareness programmes by government, corporations and green initiatives of corporation were positively considered as contributory for this. At present the concept of green initiatives or environmental CSR come into force. In the light of above most of the corporations changes the production process, started to use green technology for environment concern. The annual reports of most of the companies reflect their CSR activities towards environment. A corporate social responsibilities survey of year 2015 disclosed considering 11% of the total CSR activities apart from other activities. Environment related activities advantage more attention instead of others. According to a report human can reduce PM 2.5 emission by switching green crackers. By taking an action for environment protection and safety the Supreme Court had banned the manufacture of normal crackers in 2018.

Most of the companies in India are now shifting priorities to save not only costs but environment also. The continued depletion of natural resources has led companies that have large energy requirement to become more environmentally aware than ever. It

helps companies to promote their brand value as well. Companies that are recognizing as being environmentally sensitive turn to create a vision of care. Most of the companies like Ford Motor Company, Disney, Fisher Investment, Nike, Ebay etc are considering the environmental issues seriously. Company Johnson & Johnson has taken lead in manufacturing personal care product that is environment friendly. It also has initials that reduce waste in the course of manufacturing & distribution. Google Company demonstrates its commitment to going green through various initiatives. Camlin a top selling company of mechanical pencils started to produce eco pen and pencil which are made from recycled plastic. Followings are the few companies which are using green activities in different ways to protect environment:

GOOGLE COMPANY

For the purpose to promoting sustainability in our environment Google focus on designed technology without using of more natural resources. For the better future for new generation company takes initiatives to carbon free energy and building better devices so that proper use of natural resources has done in greater extent. Google data centre while designing, building and doing operational activities gives importance to better environmental performance. Due to that their demand for product has raised. For promoting or increasing good working conditions for employees Google has established sustainable workplace in which employees can work under healthiest environment. Google Company has committed to less environmental impact. It promotes highly ethical standards which results in positive social change promote or communities.

FORD MOTOR COMPANY

According to CSR/ESR ranking report Ford Motor company scored 78 ranks among the 18302 companies. Ford Company under "GREEN" initiatives focus on sustainably strategy like eco-friendly vehicle technology, use advanced engines which involves fewer polluting fuels and transmissions. Another resolution adopted by ford under green initiative is to reduce CO₂ emissions in great extent. While promoting green initiative, Ford Motor company received 'A' Grade from CDP for promoting water security efforts. Supporting good health for People Company established 'Sanjeevi' centre in Chennai which is working for last 19 years for surrounding villages. For betterment of community, social security programs like Red Cross, Blood Donation camps are organized. Company's employees always team up for such safety campaigns. Company regularly conducted or host Green Club programs which helps to promote environment awareness among the local communities. Not only for profit making but company is also working for Good Community Life, Education, Sustainability and Driving Safety.

HONDA

An automobile company Honda has taken initiative to be 100% at par for environment protection. For this purpose, company has invested a lot for producing the vehicles that are fuel efficient. Company also doing research for various methods to develop hydrogen fuel cell powered vehicle. Among auto producers in the US Honda is ranked one of the most fuel-efficient companies in their feelings towards environment. Company promises to cut down the carbon dioxide emissions. The research department of company is continuously conducting various research to replace the gasoline fuel with hydrogen fuel.

TOYOTA

Toyota which is very well known as world's largest car manufacturing company now focused on producing innovative cars which can reduce the carbon emission. With this motive they produced their most innovative car named as Prius model which is well known as the world's first hybrid vehicle. This model of car is sold to more than thirty-eight countries worldwide. It is considered as efficient in fuel consumption. UK categorized it as 3rd least carbon emitting vehicle.

APPLE

For sustainability issues apple has pledged to empower it's all centres with 100% renewable energy. 13th annual supplier responsibility report which was released in March 2019 stated that company made efforts to reduce the waste with initiative to zero waste to landfill. Company conserve water and reduce greenhouse gas emissions, as all the devices of company are certified zero waste to landfill. It has 116 suppliers for Apple clean water program and with this it saved 7.6 billion gallon of water in 2018.

CONCLUSION

It must be stated here that one of the professional lawyers Mr. Kamaljeet Singh of Ferozpur district has dropped his legal profession and changed his lifestyle to adopt organic life. He started to produce organic farming and attended many seminars and conferences to gain the knowledge about organic and health food. He even uses his own created rainwater pond for the farm. States like Sikkim and Andhra Pradesh was moved towards organic farming, but in Punjab farmers are still resistant to switchover conventional farming. Kamaljeet Singh has set up a model for farmers in Punjab to move towards organic. On dated 1 January 2019 Government of Punjab had receiving "Jaivik India Award" for promoting and implementing organic farming. Mr Sibin C managing director of Punjab agro has received this award from the union minister in New Delhi.

REFERENCES

1. Anwasha Chattopadhyay And Priyanka Khanzode (2019) "An Empirical Study on Awareness and Consumption Pattern of Organic Food in Bengaluru City, The It Capital of India: An Analysis with Respect to Different Demographic Factors and Availability of Organic Food Products in Bengaluru" 'International Journal of Research – Granthaalayah' 7(1) pp (276-296)
2. Athena Prince (2018) "A Study on The Consumers' Perception Towards Organic Food Products with Special Reference to Kollam City" 'International Education and research Journal (IERJ) 4(5) pp (49-52)
3. Cherian. J & Jacob. J (2012) "Green Marketing: A Study of Consumers" 'Attitude towards Environment Friendly Products, Asian Social Science' 8(12) pp (117-126)
4. Cynthia L. Curl, Richard A. Fenske, Kai. E (2003) "Organophosphorus Pesticide Exposure of urban and suburban Preschool children with organic and conventional Diets" 'Environmental Health Perspectives' 111(3)
5. Dr. P. Sankar (2017) "A review on Consumer Perception on Organic Food and its Consumption in Indian Context." 'International Journal of Science and Research (IJSR)' 6(2) pp (1786-1789)

6. Dr.D. Geetha & D. Jenifer. A (2014) "A Study on Consumer Behaviour towards Purchase of Eco-Friendly products in Coimbatore." 'Abhinav International monthly refereed Journal of research in Management and Technology.' 3(3) pp (1-8)
7. E. Frank, M. Paul, R. Mahesh (2005) "The impact of organic cotton farming on the livelihood of smallholder." 'Research report (FiBL)'
8. Paull.J(2008)" Green Food in China" 'Journal of Bio Dynamic Tasmania' (91).
9. Pearson, David, Henryks Joanna, Sultan Parves, Anisimora Tatiana (2013) "Organic food; Exploring Purchase frequency to explain consumer behaviour" 'Journal of Organic system' 8(2)
10. Peter Midmore, Susane Padel, Heather Mccalman, Jan Isherwood, Susan Fowler and Nic Lampkin (2001) 'Attitude towards conversion to organic production system' 'A study of farmers In England' Institute of Rural Studies university of Wales.
11. Rashid. N.A (2009) Awareness of eco label in Malaysia's green marketing initiatives. International journal of business and Management 4(8) PP (132-141)
12. Sanjay Kumar Yadav and Nikhil Yadav (2017) "Emerging Trends of Eco-Friendly Marketing in India" 'Indian J. Environmental Protection' 37(3) pp (252-256)
13. Seyed. A.S, Seyed. A.S, Hossain. S.F and Parastoo. T.T.D (2010) "Survey Consumer attitude towards Barriers of Organic products in Iran: A case studying in Gorgan city" 'World Applied Sciences Journal' 8(11) pp (1298-1303)
14. Shafie. F.A and Rennie. D (2012) "Consumer perceptions towards organic Food" 'Proceedia Social and Behavioral Science' 49 pp (360-367)
15. Environment P.D. Sharma 13th edition ecology and environment Rastogi Publication
16. A differentiated product example" Resource and Energy Economics 26(3) PP (281-293)
17. Chan, R.Y. (2001) "Determinants of Chinese behaviour", Psychology and Marketing vol 18(4) PP (389-413)
18. Worsley, Emma. Lea (2005) "Australians organic food beliefs, demographics and values", Boilish Food journal, Vol 107 (11) PP (855-869)
19. Facebook.com/down2 earth posted on 16 marches 2019.

EVALUATION OF PRODUCTIVITY IMPROVEMENT BARRIERS USING FUZZY-AHP

Ramesh Kumar Rawal

*Research Scholar, Department of Mechanical Engineering,
Oriental University, Indore (M.P.) Bharat*

Pallavi Maheshwarkar

*2Associate Professor, Department of Mechanical Engineering,
Oriental University, Indore (M.P.) Bharat*

Abstract

Today, all the industrial sectors are looking for more and more efficient techniques for productivity improvement, but due to barriers, fail to do so. Considering this fact, the present research work is dedicated to the evaluation of productivity improvement barriers using Fuzzy-Analytical Hierarchy Process (FAHP). During the research work, first of all, a list of three potential barriers as well as four criteria was identified using the survey of available literature as well as experts' opinion and in the next step, after getting the responses from a questionnaire, the rankings of barriers was accomplished using Fuzzy-AHP technique.

Keywords: *Productivity, Barriers, Manufacturing, Fuzzy-Analytical Hierarchy Process (FAHP).*

1. INTRODUCTION

The ratio of total output to total input is referred to as productivity. It gauges how effectively a production process transforms inputs into outputs (Banker et al., 1984). Evidently, this conversion process involves a large number of inputs, outputs, and complex actions. According to Kao et al. (1995), the majority of people will concur that increased work effort alone cannot, in the long run, significantly boost productivity, especially given the trend towards ever-rising labour costs in the industrialised economies of the world. Actual progress can be achieved through making capital investments in better manner, machinery, and other tools. The present research work is devoted to the productivity improvement and focuses on the ranking of its barriers, for which a well-known technique Fuzzy Analytical Hierarchy Process (FAHP) has been used.

1.1 Objectives of the Research

Following are the objectives of the research:

- a) Investigations on the barriers in productivity improvement;
- b) Ranking of barriers in productivity improvement.

2. LITERATURE REVIEW

Following are some of the noted contributions of the researchers in the field of productivity improvement and its barriers:

- Latif et al. (2023)
This study presents the challenges of empowering employee voice in lean problem-solving teams, adding to the literature on operations management, particularly in lean manufacturing. This work gives managers fresh information to address issues and opportunities to guarantee ethical employment and boost productivity.
- Ofori et al. (2022)
In order to further inform the development of policies and initiatives to improve the performance of the sector's productivity, this research examined the obstacles to high construction productivity in Singapore.
- Seva et al. (2021)
This research attempts to describe the working environment, stress levels, and psychological detachment of workers who worked from home and explore their link to productivity and musculoskeletal complaints.
- Rodriguez-Pose et al. (2020)
In this research, we use data on 22,380 manufacturing businesses across 11 European nations to analyse the correlation between credit limitations and economic performance (as measured by labour productivity) from 2009 to 2016.
- Lackie & Murphy (2020)
Researchers claim that defining productivity, or the ratio of outputs to inputs, is challenging due to the fact that the variables used to assess productivity vary based on the kind of study being conducted. Measures often prioritise measurable

factors (like hours/patient day) above immeasurable ones (like skills). However, in the context of human services, the idea of quantity (of time or of resources) may not be a straightforward proxy for quality since other variables, such as the scale and organisation of labour and/or the availability of other kinds of resources, also affect productivity.

➤ Elkhairi et al. (2019)

The core objective of this research work is to determine the obstacles to and important success criteria for implementing Lean Manufacturing in SMEs.

➤ Birch (2018)

The core objective of this research work is to better understand the challenges and possibilities facing Kenya's agricultural sector as it seeks to improve its long-term, sustainable production.

2.1 Gaps in the Research

Following points represents the gaps in the research:

- a) There are very limited number of research papers which focus on the workable list of barriers; and
- b) There are very limited numbers of research papers which focus on the ranking of barriers.

3. SOLUTION METHODOLOGY

In the present research work, the fuzzy analytical process (FAHP) is used, the details of which are presented as follows (Putra et al., 2018). The Analytic Hierarchy Process (AHP) was modified to use fuzzy logic theory to create the Fuzzy Analytic Hierarchy Process.

Step 1: Define the problem as well as objectives of the research

During this step, the goal, criteria as well as alternatives are determined.

Step 2: Creation of comparison matrix

In the next step, comparison matrix is created, the equation of which is follows.

$$a_{ij} = \frac{w_i}{w_j}, i, j = 1, 2, \dots, n \quad (3.1)$$

Once the comparison criteria have been established, the data is transformed into a matrix with each column normalised by dividing its value in column i by its biggest value in row j.

$$a_{ij} = \frac{a_{ij}}{\max a_{ij}}, \forall i, j \quad (3.2)$$

Step 3: Checkng for Consistency

When all of the pairwise comparisons have been made, we use the Eigen value,, to determine a consistency index, CI:

$$C.I. = \frac{(\lambda - 1)}{(n - 1)} \tag{3.3}$$

Where n is the matrix size. Judgment consistency can be checked by taking the consistency ratio (C.R.).

$$C.R. = \frac{(C.I.)}{(R.I.)} \tag{3.4}$$

.....where R.I. stands for Random Consistency Index, the relevant values of R.I. are provided in Table 3.1 implies that any value of C.R. below 0.10 is acceptable. If the CR is larger than 0.10, the judgements should be corrected. To create a consistent matrix, the judgements should be evaluated and repeated.

Table 3.1: Average Random Consistency Index [33]

Matrix Size	1	2	3	4	5	6	7	8	9	10
R.I.	0.00		0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49

Step 4: Set up Triangular Fuzzy Number (TFN)

The F-AHP scale ranges from the lowest (L) through the middle (M) to the highest (U) possible score. So, as shown in Figure 3.2, each fuzzy set will be split in half.

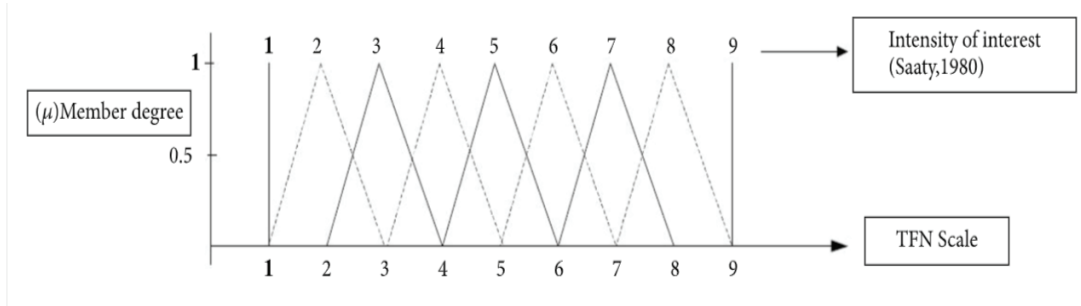


Figure 3.2: Triangular Fuzzy Numbers (Putra et al., 2018)

Table 3.2: TFN Scale (Putra et al., 2018)

TFN Scale	L	M	U
1	1	1	1
2	0,5	1	1,5
3	1	1,5	2
4	1,5	2	2,5
5	2	2,5	3
6	2,5	3	3,5
7	3	3,5	4
8	3,5	4	4,5
9	4	4,5	4,5
0,5	0,666667	1	2
0,333333	0,5	0,666667	1
0,25	0,4	0,5	0,666667
0,2	0,333333	0,4	0,5
0,166667	0,285714	0,333333	0,4
0,142857	0,25	0,285714	0,333333
0,125	0,222222	0,25	0,285714
0,111111	0,222222	0,222222	0,25

Step 5: Calculation of weight of the fuzzy vector

After the AHP comparison value is transformed to F-AHP scale value, fuzzy synthesis value is calculated. The process to get fuzzy synthesis value is shown using equation of the following formula [32]:

$$S_i = \sum_{j=1}^m M_{gi}^j X \frac{1}{\left[\sum_{i=1}^n \sum_{j=1}^m M_{gi}^j \right]} \tag{3.5}$$

S_i = fuzzy synthesis value

$\sum_{j=1}^m M_{gi}^j$ summing the cell value in that column starting from column 1 in each row matrix

After the comparison of fuzzy synthesis values, we will get the defuzzification ordinate value (d'). From the above calculation, we can calculate the values of v and d' , using following equation.

$$= \begin{cases} 1, & \text{if } m_2 \geq m_1 \\ 0, & \text{if } l_1 \geq u_2 \\ \frac{l_1 - u_2}{(m_2 - u_2) - (m_1 - l_1)}, & \text{etc} \end{cases}$$

Calculating the value of the fuzzy vector weight (W'), calculation of the fuzzy weight value is shown using the equation of the following formula:

$$d'^{(A1)} = \min V (S_i > S_k) \tag{3.7}$$

$$\sum W' = (vsk1, svk2... \dots vskn) \tag{3.8}$$

$$\sum W' = (d'(A1), d'(A2)... \dots d'(An)T \tag{3.9}$$

Step 6: Ranking and selection

In this step, the rankings of alternatives are obtained, based on which the decisions are suggested.

4. CASE STUDY

In the present research work, evaluation of productivity improvement barriers has been targeted, the stepwise procedure of which is presented as follows.

- a) First of all with the help of literature review as well as experts’ opinion, criteria as well as alternatives were investigated. The investigated criteria were top level management support and commitment, lack of awareness, finance involved, organizational structure and culture, whereas the alternatives were ineffective communication, lack of recognition and awards and lack of training;
- b) In the next step, for the purpose of understanding the problems, a hierarchical model was developed, as shown below.

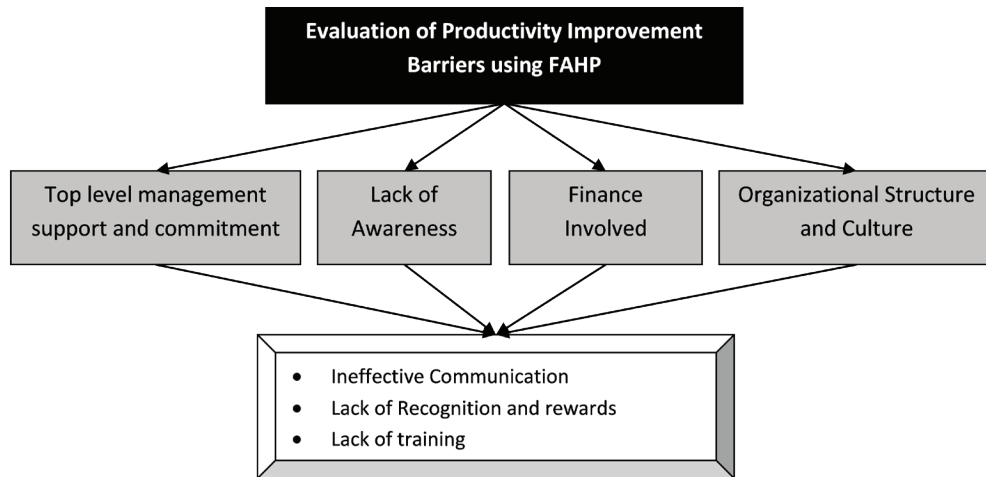


Figure 4.1: Model Development for the Research Problem

- c) Considering default priorities of criteria (0.25 each on the basis of experts’ opinion) and solving the procedure on the basis of responses obtained from questionnaire sent to the experts, the following priority values of the alternatives were obtained.

Table 4.1: Priorities of Alternatives

S. No	Name of Alternative	Priority
1	Ineffective communication	0.322
2	Lack of recognition and rewards	0.359
3	Lack of training	0.318

5. RESULTS AND DISCUSSION

Table 5.1 represents the results of the research work.

S. No	Name of Alternative	Priority	Rank
1	Ineffective communication	0.322	2
2	Lack of recognition and rewards	0.359	1
3	Lack of training	0.318	3

According to the Table 5.1, the barrier Lack of recognition and rewards is the first priority. Next priorities are assigned to Ineffective communication and Lack of training according to the obtained weights. These results emphasize on the role of human resources in productivity improvement. Literature also advocates that if an efficient employee doesn't find the proper recognition and rewards for the work he does, he/she shall definitely leave the job and shall affect the productivity of that firm.

6. CONCLUSION, LIMITATIONS AND FUTURE SCOPE OF THE RESEARCH

Following points represent the conclusion of the research work:

- The investigated barriers in productivity improvement were ineffective communication, lack of recognition and rewards and lack of training; and
- The barriers lack of recognition and rewards score the rank first, the barrier ineffective communication scored rank second and the barrier lack of training scored the rank third, in the research work.

Following points represent the limitations of the study:

- The research work was bounded by a limited set of barriers; and
- The research work was made limited by applying a particular analysis technique (FAHP).

Following points represent the future scope of the research work:

- A broader research involving a greater number of barriers may be called; and
- An extensive research work involving a greater number of solution techniques may be initiated.

REFERENCES

1. Banker RD, Charnes A and Cooper WW (1984). Some models for estimating technical and scale efficiencies in data development analysis. *Mgmt Sci.* 30, 1078-1092.
2. Birch, I. (2018). Agricultural productivity in Kenya: barriers and opportunities. K4D Helpdesk Report. Brighton, UK: Institute of Development Studies.
3. Elkhairi, A., Fedouaki, F., & El Alami, S. (2019). Barriers and critical success factors for implementing lean manufacturing in SMEs. *IFAC-PapersOnLine*, 52(13), 565-570.
4. Kao, C., Chen, L. H., Wang, T. Y., Kuo, S., & Horng, S. D. (1995). Productivity improvement: efficiency approach vs effectiveness approach. *Omega*, 23(2), 197-204.
5. Lackie, K., & Murphy, G. T. (2020). The impact of interprofessional collaboration on productivity: Important considerations in health human resources planning. *Journal of Interprofessional Education & Practice*, 21, 100375.
6. Latif, M. A., Vang, J., & Sultana, R. (2023). Individuals' psychosocial voice barriers in lean problem-solving teams. *International Journal of Productivity and Performance Management*, 72(5), 1321-1337.
7. Ofori, G., Zhang, Z., & Ling, F. Y. (2022). Key barriers to increase construction productivity: The Singapore case. *International Journal of Construction Management*, 22(14), 2635-2646.
8. Putra, D., Sobandi, M., Andryana, S., & Gunaryati, A. (2018). Fuzzy analytical hierarchy process method to determine the quality of gemstones. *Advances in Fuzzy Systems*, 2018.
9. Rodríguez-Pose, A. (2020). Institutions and the fortunes of territories. *Regional Science Policy & Practice*, 12(3), 371-386.
10. Seva, R. R., Tejero, L. M. S., & Fadrihan-Camacho, V. F. F. (2021). Barriers and facilitators of productivity while working from home during pandemic. *Journal of occupational health*, 63(1), e12242.

Editor in Chief



Dr. Sheetal Sharma is the Dean-Academics & Professor - HR & Organizational Behavior at IILM Academy of Higher Learning, Lucknow. She has 18 years of experience. Her qualifications include UGC-NET & JRF, Ph.D., MBA & PGDM. She has contributed quality research papers to various reputed journals and designed study material for the Country's top Universities. Her jointly authored book titled "Personal Growth and Training & Development" by Excel Book Publishers has been released and received commendation by Former President of India Prof. A. P. J. Abdul Kalam and has also received the Book of the Year Award 2009-10 by ISTD (Indian Society for Training & Development). She is on the review panel of prestigious international journals and PhD Guide & Evaluator for leading universities of India. She has also participated and presented her research work in various seminars and conferences at national and international levels and gained international exposure while being associated with a University in Russia for a teaching assignment.

Editors



Dr. Vibhuti Gupta is Associate Professor (HRM & OB) at IILM Academy of Higher Learning, Lucknow. She has more than 12 years of experience. Her qualifications include UGC-NET, Ph.D., MPA, MBA, PGD-HRD, MSE and Proficiency in French. Her areas of interests include Emotional Intelligence, Stress Management, Negotiation and Conflict Management, Ikigai and Mindfulness. She has presented her research work in various national and international conferences. She has published her research work in various high-quality peer reviewed national and international journals in the area of Emotional Intelligence, Mindfulness, Happiness at Work, Organizational Citizenship Behavior to name just a few, amongst a diverse population like students, police, health and corporate professionals.



Dr. Neha Tiwari is Assistant Professor (HR & OB) at IILM Academy of Higher Learning, Lucknow. Her qualifications include Ph.D in the area of Women Entrepreneurship. She qualified UGC NET and Junior Research Fellowship in Management. She completed her MBA in Human Resource Management from University of Lucknow. Her areas of interest include Women entrepreneurship, Micro, small and Medium enterprises, Organizational Behavior and Design thinking. She has presented her research work in national and International conferences of repute. She has publications in the area of Entrepreneurship, Women entrepreneurship, Human Resource issues in small enterprises in C category Journals indexed in ABDC and UGC CARE.



Prof. Tauseef Irfan is Assistant Professor in the area of Operations. His educational qualifications include UGC-NET, MBA-Operations/Marketing and B. Tech (EEE). He is pursuing Ph.D from Khawaja Moinuddin Chisti Language University, Lucknow. He has 18 years of rich academic experience. His areas of interest include Business Statistics, Operations Research, Supply Chain Management and IT. His research areas include Green Supply Chains, and Reverse Logistics. He has actively participated and presented his research work in various National and International conferences. He has publications to his credit in areas of Retail Operations and Green Supply Chain management in high quality peer reviewed national and international journals.



Prof. Tapsi Srivastava is an Assistant Professor in the area of Finance. Her academic credentials include UGC-NET and Master's in Commerce. Additionally, she has earned NISM V-A Certification. She is currently pursuing her Ph.D. at the University of Lucknow. Her interests lie in the fields of Behavioral Finance, Mutual Funds, Wealth Technology, and Fintech. She has presented papers on her studies at reputable National and International Conferences. She has publications in the area of Fintech, Financial Inclusion and Sustainable Development in Journals indexed in UGC CARE and EBSCO.



Bharti Publications, New Delhi

E-mail: bhartipublications@gmail.com, info@bhartipublications.com.

www.bhartipublications.com

ISBN 978-81-19079-77-3



9 788119 079773