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A Bibliometric Review of Research on Intelligent Personal Assistants: Present Status, Development, and Future Directions

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Abstract:

Voice assistants based on Artificial Intelligence (AI) are computer programs that use natural language processing (NLP) and machine learning (ML) algorithms to recognize and respond to voice commands and queries in a human-like way. These voice assistants use speech recognition technology to understand spoken commands and questions, process them, and provide relevant responses. The objective of this study is to examine the intellectual framework and effectiveness of voice assistants and to analyze the literature produced by renowned researchers in terms of authors, keywords, and major organizations. This review seeks to offer valuable insights into the growing body of literature on virtual assistants.

In this article, the authors have used the bibliometric method to systematically summarize the current state of voice assistant research. They analyzed 563 articles related to Voice assistants from the Scopus database between 2002 and 2023 using the R-Studio 'Biblioshiny' tool. The analysis includes an examination of the core journals, articles, authors, institutions, and relevant countries to determine the most influential voice assistants literature. This study also provides a detailed understanding of Co-occurrence network, Co-citation network and Co-word analysis. The authors have also used thematic maps to identify the different research topics of voice literature and have grouped them into four clusters, including Motor themes, Niche themes, Emerging themes, and Basic themes. The article concludes by discussing the limitations of the study and highlighting future research directions.

Keywords: Virtual Assistants, Voice Assistants, VBA, Digital Voice Assistant.

Introduction:

In recent years, Artificial Intelligence (AI) has emerged as a crucial subject of discussion for both individuals and organizations, especially in light of the increasing popularity of Voice Assistants (VAs) (Guzman, 2019). The primary aim of this research is to investigate the present condition of research on voice assistants.

Voice assistants are technological systems that utilize artificial intelligence (AI) and comprise software and hardware components. These systems are designed to interact with users and provide responses to their commands or inquiries (Verma et al., 2021) Voice assistants like Siri, Cortana, Alexa, and Google Assistant allow users to interact with their devices by voice. These software agents listen for a keyword, record the user's voice, and send it to a specialized server that processes and interprets it. Depending on the command, the server can supply the assistant with the necessary information to complete tasks, play media, or access connected devices, and the number of services and devices supporting voice commands growing rapidly(Hoy, 2018). According to (Hoy, 2018) through the use of natural language processing and machine learning, a voice assistant is able to comprehend and interpret the language spoken by the user and provide an immediate response. According to (Milhorat P. et al., 2014), voice assistants are one type of integrated AI application, which belong to a diverse and expanding range of advanced AI technologies and applications. As noted by scholars (Koehler, 2018) and (Parise et al., 2016) voice assistants and AI have the potential to revolutionize businesses by simplifying processes, automating intricate tasks, and improving customer service.

Voice assistants can perform a wide range of tasks, such as playing music, setting alarms, making phone calls, sending text messages, providing weather updates, answering trivia questions, and controlling smart home devices. Additionally, voice assistants can integrate with various services and third-party apps, allowing users to order food, shop online, and book travel, among other things.

As per (Sundar et al., 2017), due to the remarkable expansion of voice-based technology, an increasing number of individuals are engaging with voice assistants in a manner that emulates their interactions with humans in their day-to-day activities. According to (Guzman, 2019) the introduction of voice assistants on mobile devices provided people with their initial chance to communicate effectively and purposefully with artificial intelligence. Voice assistants have become popular due to their ability to provide hands-free and convenient assistance in performing various tasks such as making phone calls, sending messages, setting reminders, and controlling smart home devices. Additionally, advances in natural language processing and machine learning have made them more accurate and reliable, resulting in widespread adoption. Finally, voice assistants have been integrated into a

variety of devices such as smartphones, smart speakers, and cars, making them easily accessible to a large number of users. As technology advances, the capabilities of voice assistants are continually expanding, and they are becoming more intelligent and useful in our daily lives.

The use of bibliometric analysis has become popular in various fields for assessing research performance namely management, (Podsakoff et al., 2008); entrepreneurship,(Landström et al., 2012); innovation (Fagerberg et al., 2012); accounting (Merigó & Yang, 2017). Bibliometric approaches allow for a comprehensive evaluation of a research field, including analyses of leading researchers, countries, and institutions (Bjork et al., 2014). While primarily quantitative, bibliometric analyses can also provide qualitative insights, and they are capable of evaluating a large number of publications easily. In the present study, bibliometric analysis was employed to examine research on voice assistants and identify emerging trends relevant to the field's development.

In the past few years, studies have been conducted to analyze voice assistants worldwide using the Scopus database ((Agarwal et al., 2022); (Lim et al., 2022)). These studies have provided a comprehensive understanding of the origins and growth of research and practical applications in the area of voice assistants. (Lim et al., 2022) observed that the majority of articles (more than 65%) were published from 2019 to 2021. The author also presented insight into the multidisciplinary

scope of conversational commerce is evident in the top 10 sources that have published research on this topic, which belong to the fields of computers and digitalization, business, communication and knowledge management, and psychology.

(Agarwal et al., 2022) pointed out that The largest contributor to the area of chatbots and virtual assistants in terms of published documents is the United States, with 17% of the total production. The study has found that The Open University, Peking University, Politecnico di Milano, and Microsoft Corporation are the leading contributors in terms of the number of documents published each year in the area of chatbots and virtual assistants. This information can be useful for future researchers who want to investigate this area further.

Research Methodology:

The study on voice assistants followed a systematic process, which involved several steps to evaluate the relevant research literature. Initially, the researchers identified the relevant keywords and shortlisted the research papers based on them. Then, they applied a set of filters to refine the data set and ensure that only the pertinent research papers were considered. Finally, they selected the appropriate bibliometric and network mapping tools for conducting the research study. The methodology used in this study is illustrated in Figure 1. The research conducted in this study utilizes the literature review methodology recommended by 15 (Rowley & Slack,

2004). This methodology is widely recognized by scholars who have published bibliometric research in various fields, including (Pinto et al., 2020). This research also employed the typical five-step process of bibliometric analysis, which includes Study Design, Data Collection, Data Analysis, Data Visualization, and Interpretation, as described by (Borner et al., 2003) and (Zupic & Čater, 2015)

The primary goal of this research is to examine the present status of voice assistant research by utilizing bibliographic data obtained from the Scopus database spanning from the years 2002 to 2023.

In the Study Design stage, following were the main research questions:

What is the overview of research development in the field of voice assistants?

What are the common keywords used in the area of virtual assistants by using bibliometric analysis?

Who are the most cited authors contributing to the research?

Which universities are most contributing in this area?

Which countries have the highest number of documents in this area?

What are the main research directions and developmental trends during this period?

The study intends to achieve this by examining bibliographic data gathered from the Scopus database spanning the years 2002 to 2023.

Data collection

Database selection for literature search:

The bibliometric analysis commenced with the selection of a database for conducting the search for research papers related to voice assistants and the Scopus database was chosen for the literature search. According to Falagas et al. (2008), the Scopus database comprises more than 20,000 journals published by top publishers like Emerald, Elsevier, Inderscience, and Springer. This database houses the most extensive collection of research papers that undergo peer review across various fields, including social sciences, arts, humanities, science, and technology. Researchers frequently use them to carry out bibliometric analyses, as they make it easy to export datasets from research papers into different tools for bibliometric and network mapping purposes.

Keyword identification

Identifying relevant keywords is a crucial step in conducting bibliometric analysis, as having a comprehensive list of keywords allows for a thorough and all-encompassing search within the chosen field of study. By using a specific keyword string, such as "Virtual Assistants" OR "Voice-based Assistants" OR "Voice Assistants" OR "VBA" OR "Personal Intelligent Assistants" OR "Smart Speaker" OR "Smart Voice Assistant" OR "Intelligent Personal Assistant" OR "Digital Voice Assistant" OR "Conversational Assistants", all research articles within that domain can be included in the search. The search

terms were selected after an academic brainstorming session involving experts in the field, who identified keywords relevant to voice assistants. This search was conducted on 29th March 2023 covering the period from 2002 to 2023 which yielded 6040 papers from Scopus.

Data filtration

In order to narrow down the dataset and focus on relevant research literature, multiple filters were applied. The datasets mentioned above were refined excluding books and conference papers, resulting in a selection of 2388 high-quality research articles with final publication for analysis. Research papers within the subject areas of social sciences, business management, and psychology were included in the final dataset for time period between 2002 to 2023 which resulted in 602 articles. Articles written in English were chosen and only genuine and published findings in journals were considered for inclusion in the data set. The final dataset for further analysis consisted of the 563 research papers retrieved from the Scopus database. This marked the conclusion of the selection process. Figure 1 provides a brief methodology adopted for this bibliometric review.

Figure 1: Methodology for Bibliometric Review

Steps	Stage	Output
Step 1	Selection of Database for Literature Search	Scopus
Step 2	Study Design	Research Questions
Step 3	Keyword Identification	"Virtual Assistants" OR "Voice-based Assistants" OR "Voice Assistants" OR "VBA" OR "Personal Intelligent Assistants" OR "Smart Speaker" OR "Smart Voice Assistant"OR "Intelligent Personal Assistant" OR "Digital Voice Assistant" OR "Conversational Assistants"
Step 4	Initial Result	6040 research papers from Scopus
Step 5	Data Filtration	Research Papers in the final stage of Publication: 5941 Document type limited to articles: 2388 Time period -2002 to 2023: 2266 Subject Area: Social sciences, Business management, and Psychology:602 Source- Journal:595 English only: 563
Step 6	Bibliometric and Network Mapping Tools	R Studio: Biblioshiny

Bibliometric and network mapping tools

There are various software options available for conducting bibliometric analysis and network visualization. The chosen software for bibliometric analysis was Bibliometrix, an R-language tool that provides extensive analysis capabilities for researchers. Additionally, the user-friendly app Biblioshiny, which is available within the Bibliometrix package, was used for non-coders to conduct bibliometric analysis. The data set used for the analysis was downloaded in CSV formats from Scopus. The keyword co-occurrences analysis was conducted, including the most cited author keywords, and co-authorship links between countries involved in the domain were also examined. Furthermore, data were summarized at various points using Microsoft Excel.

Data Analysis

Descriptive statistics

Table 1 presents the primary information regarding publications related to Voice assistants between 2002 and 2023. Over the past 21 years, there have been 563 articles published on this topic across 326 journals. The ratio of authors per document is 2.89. The statistics indicate that a total of 1628 authors contributed to the articles, with an average of 2.89 authors per article and a collaborative index of 3.26. 81 (5%) articles were authored by a single individual, while 1547 (95%) were produced by multiple authors. The articles were of high quality, as evidenced by their average citation count of 13.33 per article.

Table 1 The primary results of the Scopus dataset in the field of Voice Assistants

Description	Results
Timespan	2002:2023
Sources (Journals, Books, etc)	326
Average years from publication	3.62
Average citations per documents	13.33
Average citations per year per doc	3.068
References	29599
Article	563
Keywords Plus (ID)	2274
Author's Keywords (DE)	1942
Authors	1628
Author Appearances	1774
Authors of single-authored documents	81
Authors of multi-authored documents	1547
Single-authored documents	88
Documents per Author	0.346
Authors per Document	2.89
Co-Authors per Documents	3.15
Collaboration Index	3.26

Publication Output and Growth Trend

Figure 1 displays the yearly count of published articles alongside the total number of citations. Researchers have recently become more intrigued by this topic, with a sharp rise in the number of published articles 2018 onwards. According to statistics from Biblioshiny software, the annual growth

rate is 15.05%. From 2002 to 2023, research on Voice Assistants has been increasing with some variations (as shown in Figure 2). This period can be divided into three phases: The inception Phase (2002-2009), the sustained growth phase (2010-2017), and the acceleration phase (2018-2023). During the inception phase, only 26 articles (5% of the sample) were published, which is almost equivalent to 3.25 articles per year. The steady growth period had 74 articles (13% of the sample) with an improved average of 9.25 articles per year. However, after 2018, there was a significant increase in publication trends with 463 articles (82% of the sample) published, representing an impressive average of 77.16 articles per year. The reason why the line for 2023 shows a decrease is that the data was only gathered until March 2023. Nevertheless, it's crucial to acknowledge that studies regarding this matter are still ongoing and finding a lot of research attention. During the time span of 2002-2015, there was not a significant rise in the number of accumulated citations. However, since 2015, there was a steep increase in citations due to a surge in publications.

Figure 2 Annual number of publications and its cumulative citation values in the domain of Voice Assistants
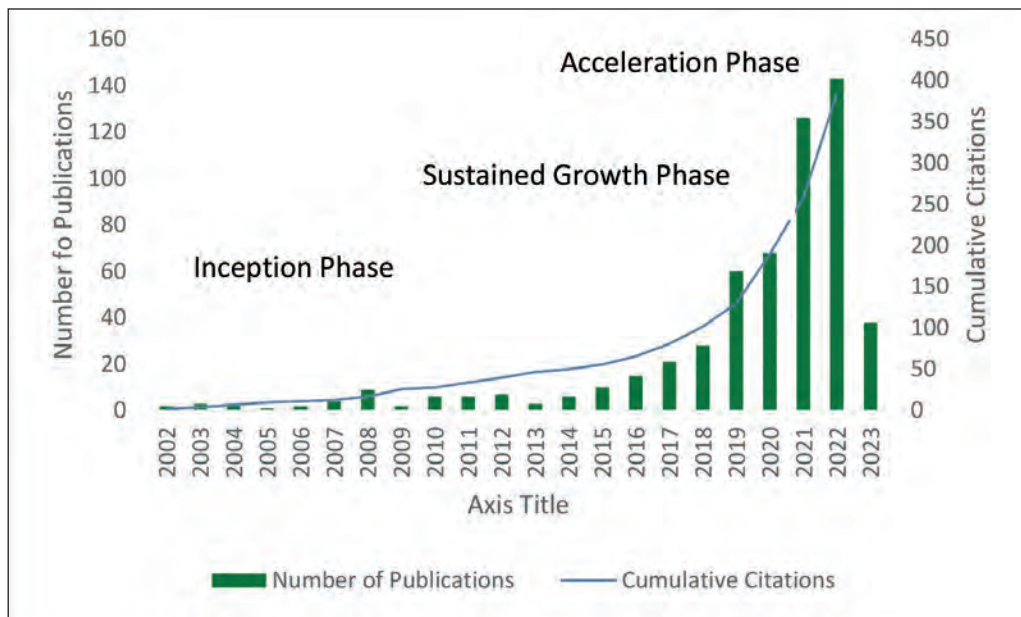
Three-Fields Plot

Figure 3 displayed below depicts a three-field plot showing the interrelationships between a list of journal names, authors, and topics. The links between these three elements are displayed in gray, starting from the journal names, followed by the authors, and then linked to the topics of their publications. The size of the rectangles in each list represents the number of papers associated with that element.

The leftmost element in the plot represents the journals. Seven journals are indexed in this plot, with the top journal being the Proceedings Of The Acm On Human-Computer Interaction, which published the most papers on the topic of voice assistants. The brown rectangle represents this journal and is connected to several authors.

The middle element contains the authors' names. The authors who published articles in the indexed journals are linked to the journal elements such as Garg R and Ahmad I who are linked to Proceedings Of The Acm on Human-Computer Interaction, while those who did not publish in indexed journals are not linked to any journal such as Lopatovska I and Dizon G. The plot shows top15 authors. The rectangle's size in the plot corresponds to the number of papers published by each author, with Lopatovaska I, Dizon G, and Mols A contributing the most to the listed journals.

Each author is also associated with frequently used keyword topics on the right. The third element contains the most frequently used keyword topics in the papers. Fourteen keyword topics are listed, with "assistants" being the most frequently used and appearing in almost all of the registered authors' publications followed by "Intelligent" and "smart".
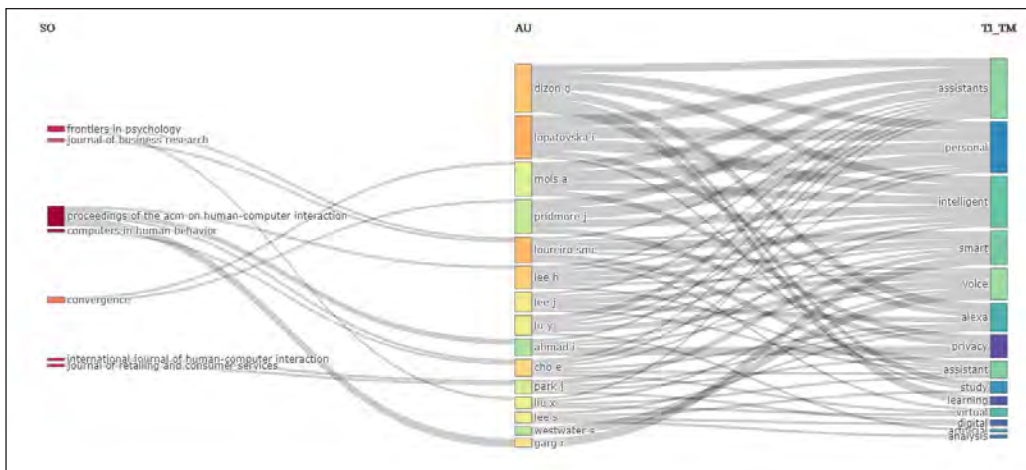
Figure 3: Three-field plot

Contribution by Nations

Figure 4 illustrates the number of articles pertaining to voice assistants, of the top 10 countries and ranging from 2002 to 2023. The USA stands out in this field with a noteworthy contribution, compared to other nations in the region followed by UK, China and India. The number of publications relating to this topic has been steadily increasing each year. While countries such as Korea and Italy also exhibit interest in voice assistants, their numbers have only slightly increased. Other countries have also conducted research in this field, but their contributions have not been consistent. Post 2020, a steady increase in the number of articles in this research area is observed.

Figure 4: Number of articles by nations in the field of voice assistants (2002-2023)
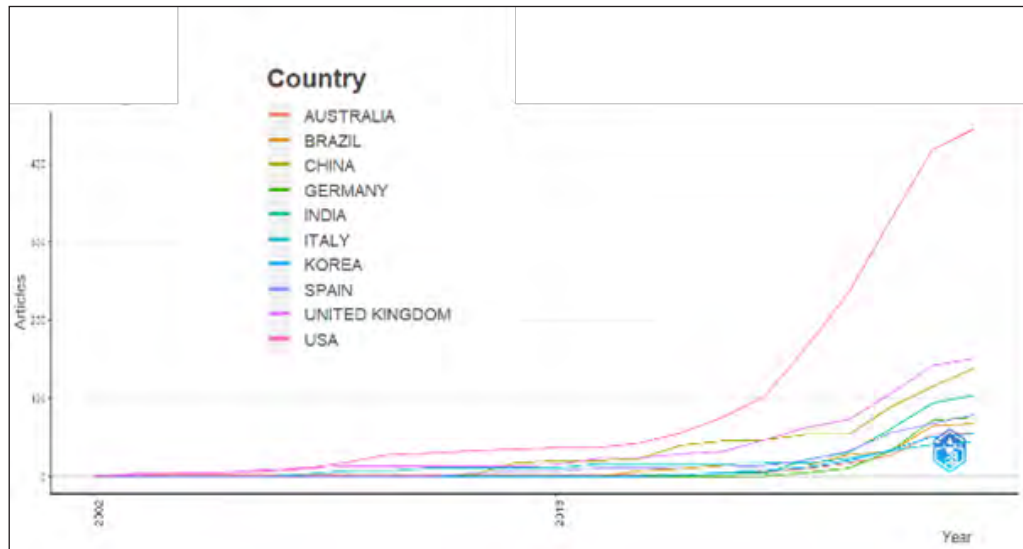
Contribution by Institutions

Table 2 displays the top 10 affiliations based on the number of articles published in Voice Assistants. Among these affiliations based on countries, United States has a maximum representation of 6 (UC, PI, UF, DU ASU, and CMU) while Korea (KU), China (CSU), United Kingdom (UN), and Australia (MU) had 1 affiliation each. UC has the highest number of publications, with 22 articles, followed by PI with 17, KU with 15, UF with 15, and CSU with 11. The list is arranged based on the number of publications from the highest to the lowest.

Table 2 Top 10 most productive affiliations publishing in the area of Voice Assistants

Order	Affiliations	Country	Articles
1	University Of California (Uc)	United States	22
2	Pratt Instituteny (Pi)	United States	17
3	Korea University (Ku)	Korea	15
4	University Of Florida (Uf)	United States	15
5	Central South University (Csu)	China	11
6	Depaul University (Du)	United States	11
7	Arizona State University (Asu)	United States	10
8	University Of Nottingham (Un)	UK	10
9	Carnegie Mellon University (Cmu)	United States	9
10	Monash University (Mu)	Australia	9

Contribution by Journals

Table 3, the quality of the top 10 journals with the highest number of articles related to voice assistants is presented. These journals are ranked based on Scopus categories, with all of them falling under Q1. The study revealed that 5 journals are from the United States while 3 journals are from Switzerland and 2 from the United Kingdom. The most frequently used journals by authors were the "Proceedings of the Acm on Human-Computer Interaction" and the "Computers In Human Behaviour" having 24 and 14 articles respectively.

Table 3: Top 10 most active journals publishing in the field of Voice Assistants

Order	Journals	Articles	Nation of Journals	Cite Score 2021*	SJR*	h-Index**	Scopus Quartile**
1	Proceedings Of The Acm On Human-Computer Interaction	24	United States	5.6	.617	38	Q1
2	Computers In Human Behaviour	14	United Kingdom	14.9	2.174	203	Q1
3	Computer Applications In Engineering Education	13	United States	4.2	.594	32	Q1

4	Frontiers In Psychology	11	Switzer-land	4	.873	133	Q1
5	International Journal Of Human-Computer Interaction	10	United States	7.3	.963	76	Q1
6	Journal Of Retailing And Consumer Services	10	United Kingdom	11.4	2.261	104	Q1
7	Journal Of Business Research	8	United States	11.2	2.316	217	Q1
8	Psychology And Marketing	8	United States	4.9	1.2	124	Q1
9	Sustainability (Switzerland)	8	Switzer-land	5	.664	109	Q1
10	Water (Switzerland)	7	Switzer-land	4.5	.716	69	Q1

Most productive authors

Table 4 provides significant information about the top 10 authors who have published the most works related to Voice assistants while Figure 5 presents the annual publication count for these authors.
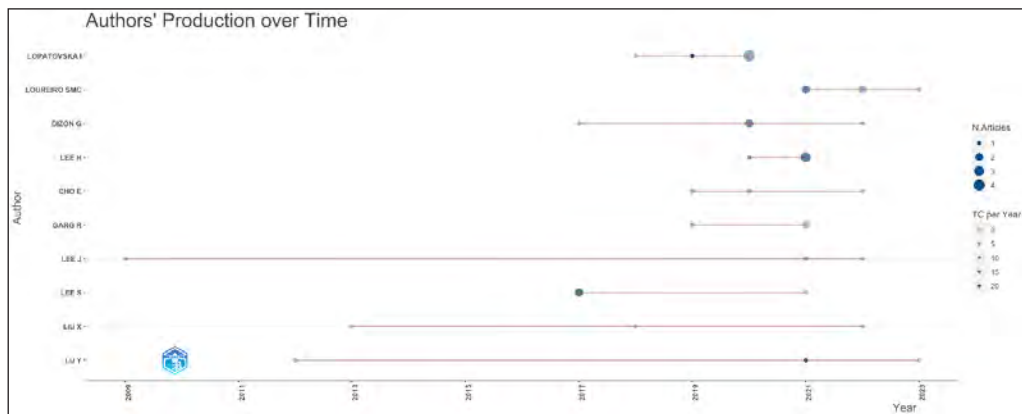
Figure 5: Authors' Production over Time

Pratt Institute's author Lopatovska Irene V. has the highest number of publications with 6 articles. Four authors have a total citation index exceeding 300, with Loureiro S.M.C. having 4583 citations. The United States has the highest number of authors (4), followed by Japan with 2 authors in the Top 10 authors list. Figure 5 shows that Lee, Joonghwa has been consistently conducting research on voice assistants from 2009 to 2022 while Lu Y has been active in this research area from 2012 to 2023. In the Top 10 authors list, most of them have been focused on this subject for the past 3 to 4 years, including the top 3 authors.

Collaboration between author groups is depicted in Figure 6, which was generated using Biblioshiny software based on the methodology outlined in the article. 7 groups of authors collaborate on voice assistants, with 3 research groups having the most publications, headed by Loureiro Smc (Iscte – Instituto Universitário de Lisbo, Portugal) , Mols, Anouk (Erasmus Universiteit Rotterdam, Netherland) , and Ahmad, Imtiaz, Indiana University, United States.

Figure 6 Collaborative network among authors in the field of Voice assistants
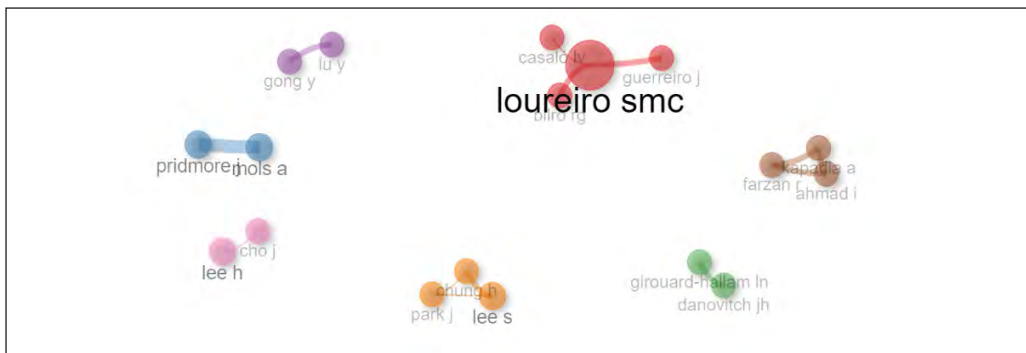
Table 4: Top 10 most productive authors publishing in the field of Voice assistant

Order	Authors	Institutions	Country	Number of Articles	H-index	Total Citations
1	Lopatovska, Irene V.	Pratt Institute	United States	6	12	720
2	Loureiro S.M.C.	Iscte – Instituto Universitário de Lisbo	Portugal	5	36	4583
3	Dizon, Gilbert	Himeji Dokkyo University	Japan	4	7	195

4	Hansol Lee	Stanford University	United States	4	2	23
5	Cho, Erin	The New School	United States	3	15	1157
6	Garg, Radhika	School of Information Studies	United States	3	6	184
7	Lee, Joonghwa	University of North Dakota	United states	3	10	309
8	Mols, Anouk	Erasmus Universiteit Rotterdam	Netherlands	3	5	83
9	Liu, Xiaochen	Ritsumeikan University	Japan	3	2	1
10	Pridmore, Jason	Erasmus Universiteit Rotterdam	Netherlands	3	10	219

Corresponding Author's Country

Figure 6 displays the correlation between the articles written by authors for single-country publishers (shown in turquoise) and multi-country publishers (shown in red). The United States, China, and United Kingdom have the most significant number of authors producing texts and materials.

Figure 6 Corresponding Author's Country
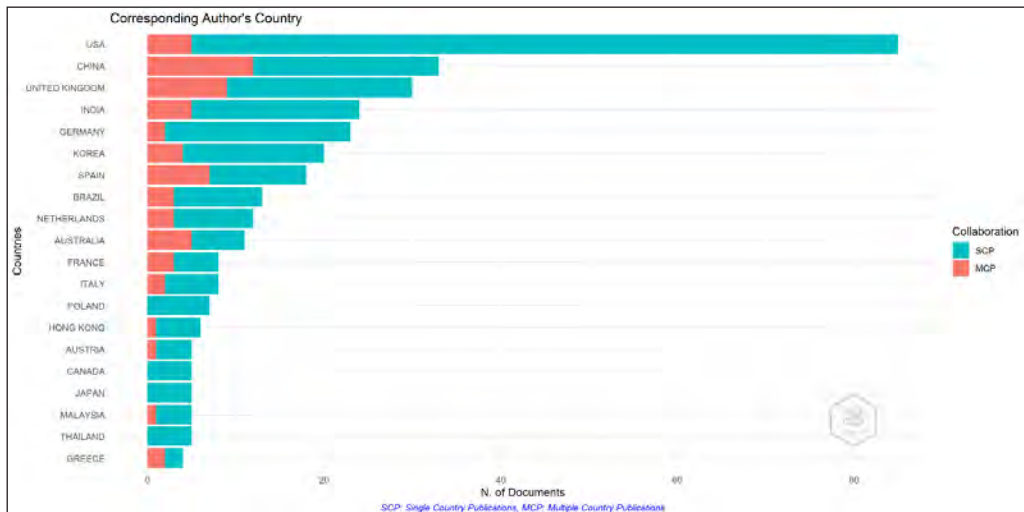
Source Dynamics

Figure 7 displays how resources have grown over the years based on annual events. The graphs exhibit the changes in different fields with each year being associated with keywords like voice assistants. There are six groups depicted in the graphs, and since 2018 production of articles that were related to voice assistants had the highest growth rates.
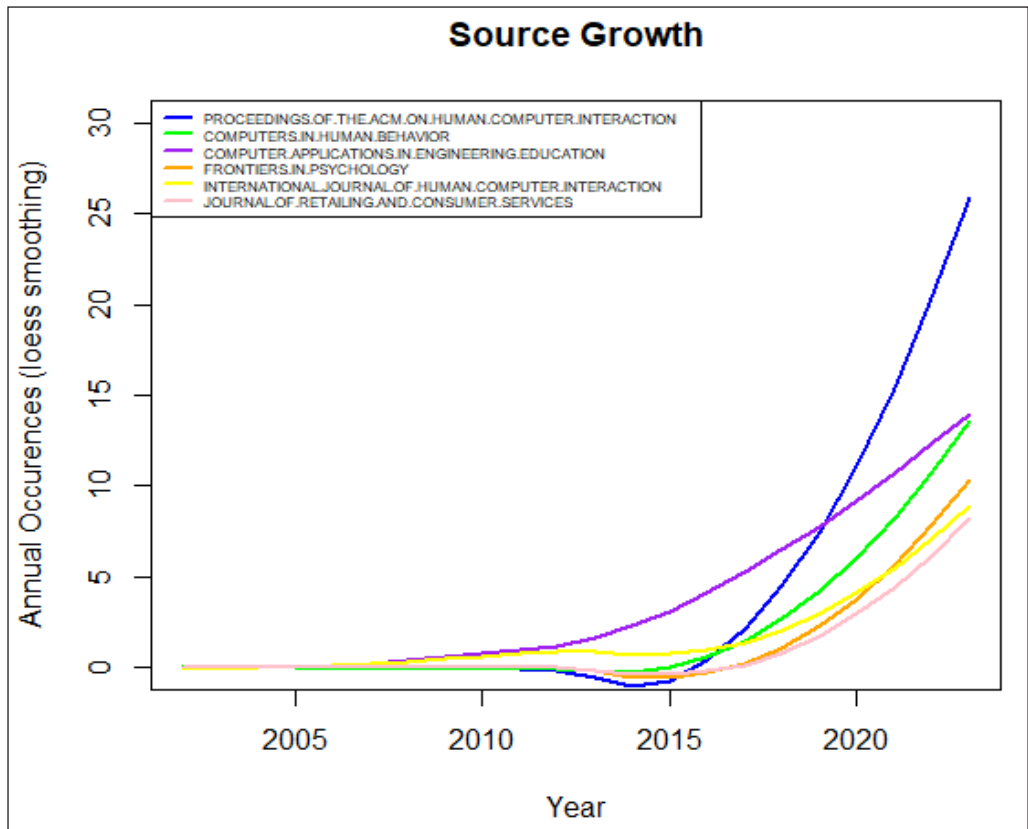
Figure 7: Source Dynamics

Highly cited papers

In Table 5, the top 100 authors with the highest citation are listed, along with a brief explanation of their content and the publishers with the highest citation.

(Hoy, 2018) with 397 citations explored the fundamental workings and shared features of modern voice assistants, along with the privacy and security issues associated with them, and possible future uses for these devices. It was recommended that as voice assistants gain greater popularity, librarians should become familiar with their functionality and consider their potential use for providing library services and resources.

(Bolton et al., 2018) aimed to investigate advancements in customer experience at the intersection of digital, physical, and social domains. It particularly

examined experiences that involve novel technology-based services, such as digital twins and automated social presence (i.e., virtual assistants and service robots). The article proposed a three-dimensional space, encompassing low to high digital density, low to high physical complexity, and low to high social presence, that produces eight octants to conceptualize future customer experiences. Additionally, it discussed important societal issues such as privacy, security, and transparency and proposes potential service innovation strategies in these areas. The conceptual framework integrated knowledge about customer experiences in digital, physical, and social realms in a novel manner, providing insights for future service research, managers, and public policy makers.

(Lau et al., 2018) examined people's reasons for and against adopting smart speakers, their perceptions and concerns regarding privacy, and their privacy-seeking behaviors regarding smart speakers. The researchers conducted a diary study and interviews with seventeen smart speaker users and non-users. The non-users cited a lack of trust in speaker companies or did not see the usefulness of smart speakers. In contrast, users expressed few concerns about privacy, but their justifications suggested an incomplete understanding of privacy risks and a complicated trust relationship with the companies. It was found that users often prioritize convenience over privacy and vary in the level of consideration they give to privacy trade-offs.

Table 5 : A summary of the articles with the highest number of citations.

Order	Paper	Total Citations	TC per Year
1	HOY MB, 2018, MED REF SERV Q	397	66
2	BOLTON RN, 2018, J SERV MANAGE	309	52
3	LAU J, 2018, PROC ACM HUM COMPUT INTERACT	280	47
4	MCLEAN G, 2019, COMPUT HUM BEHAV	217	43
5	HOYER WD, 2020, J INTERACT MARK	174	44
6	STEINHOFF L, 2019, J ACAD MARK SCI	163	33
7	PUNTONI S, 2021, J MARK	140	47
8	HAN S, 2018, IND MANAGE DATA SYS	128	21
9	LOPATOVSKA I, 2019, J LIBRARIANSH INF SCI	119	24
10	FERNANDES T, 2021, J BUS RES	118	39
11	ANGELIS A, 2017, SOC SCI MED	114	16
12	MORIUCHI E, 2019, PSYCHOL MARK	104	21
13	CHUNG H, 2017, DIGIT INVEST	102	15
14	PRADHAN A, 2019, PROC ACM HUM COMPUT INT.	84	17

Order	Paper	Total Citations	TC per Year
15	SHAH H, 2016, COMPUT HUM BEHAV	82	10
16	ABDELSALAM HME, 2006, IEEE TRANS E M	80	4
17	PITARDI V, 2021, PSYCHOL MARK	79	26
18	DE BELLIS E, 2020, J RETAIL	76	19
19	KOWALCZUK P, 2018, J RES INTERACT MARK	76	13
20	GUZMAN AL, 2019, COMPUT HUM BEHAV	74	15
21	STRAYER DL, 2017, CAN J EXP PSYCHOL	66	9
22	HU Q, 2021, INT J INF MANAGE	65	22
23	LUTZ C, 2019, HUM BEHAV EMERG TECHNOL	65	13
24	PENG H, 2012, J AFFECTIVE DISORD	64	5
25	POUSHNEH A, 2021, J RETAIL CONSUM SERV-a	61	20
26	MCLEAN G, 2021, J BUS RES	59	20
27	FOEHR J, 2020, J ASSOC CONSUM RES	55	14
28	TOADER D-C, 2020, SUSTAINABILITY	52	13
29	MORIUCHI E, 2021, PSYCHOL MARK	51	17
30	SUN Y, 2017, ACM TRANS INF SYST	49	7
31	CHOPRA K, 2019, INT J RETAIL DISRTIB MANAGE	47	9
32	DIZON G, 2017, TESOL J	47	7
33	HASAN R, 2021, J BUS RES	46	15
34	GUZMAN AL, 2020, HUM MACH COMMUN	43	11
35	CHÉRIF E, 2019, RECH APPL MARKETING	43	9
36	BAWACK RE, 2021, INT J INF MANAGE	42	14
37	STRUYFS H, 2015, J ALZHEIMER'S DIS	41	5
38	LI X, 2021, COMPUT HUM BEHAV	40	13
39	XU Y, 2021, COMPUT EDUC	40	13
40	TUBARO P, 2020, BIG DATA SOC	40	10

Word Dynamics

In order to demonstrate the changes in keyword usage within the study, the frequency of each word is analyzed and compared to others on a yearly basis. The term "dynamics" in this context refers to the behaviour of a particular element or subject across multiple dimensions. As depicted in Figure 8, the keywords "artificial intelligence" and "voice assistants" exhibited the most significant changes in the texts between 2013 and 2015.

Figure 8 Word Dynamics
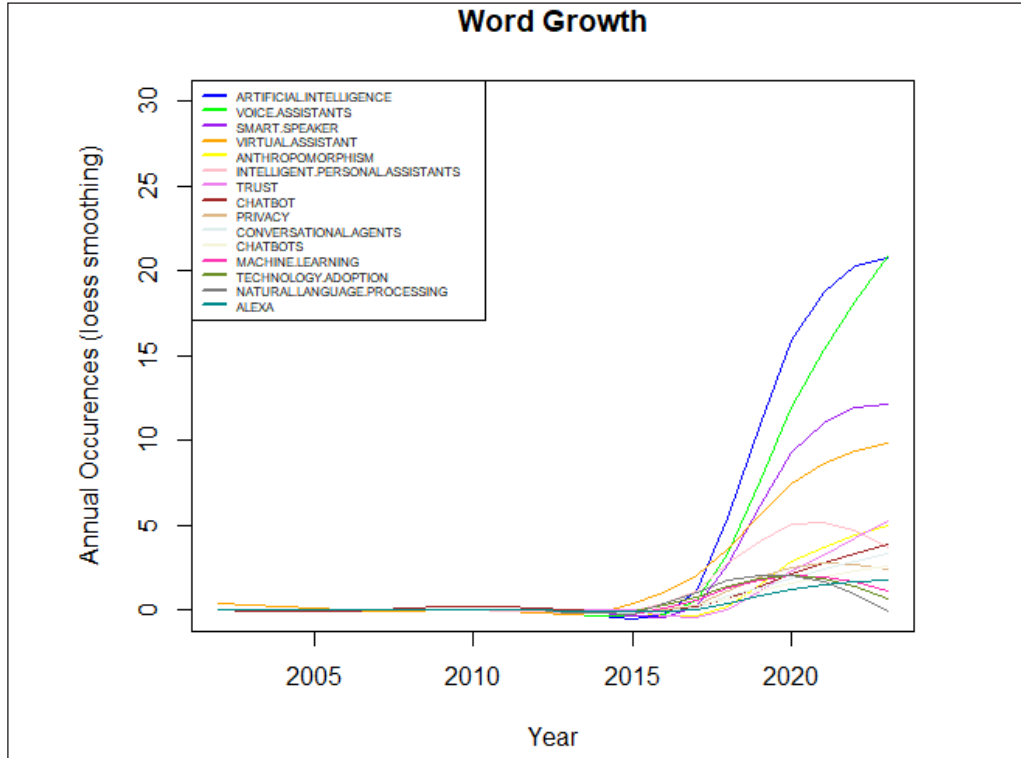
The most popular keywords

Apart from the research exploration carried out on the topics of voice assistants, Table 6 presents the commonly employed keywords and their corresponding frequency.

Table 6: The commonly used terms or phrases that are prevalent in research related to voice assistants

Terms	Frequency	Terms	Frequency
artificial intelligence	91	learning	7
voice assistants	82	vba	7
smart speaker	58	amazon echo	6
virtual assistants	51	augmented reality	6
anthropomorphism	19	conversational agent	6
intelligent personal assistants	19	deep learning	6
trust	17	gender	6

chatbot	16	google assistant	6
privacy	15	human-machine communication	6
conversational agents	13	intelligent virtual assistant	6
chatbots	11	smart home	6
machine learning	11	technology acceptance	6
technology adoption	11	autonomy	5
intelligent personal assistant	10	collaboration	5
natural language processing	10	communication	5
ai	9	digital personal assistants	5
Alexa	8	e-commerce	5
education	8	google home	5
human-computer interaction	8	iot	5
Internet of things	8	older adults	5
simulation	8	perceived value	5
social presence	8	voice shopping	5
technology	8	consumer behaviour	4
amazon alexa	7	covid-19	4
customer experience	7	customer engagement	4

Co-occurrence Network

Various techniques and methods are used to create scientific maps, which involve the use of vocabulary. Keywords play a crucial role in understanding the conceptual structure of a research domain. Researchers examine the occurrence of keywords in the title, abstract, or body of the article to determine their cognitive relation within a single set of documents. By analysing the frequency of vocabulary occurrence, researchers can identify scientific subjects and uncover their correlations based on thematic content. Comparing maps created at different periods can reveal how scientific knowledge has evolved.

This study aims to investigate how the fields of Voice Assistants are formed and interconnected. Grouping keywords in clusters can reflect their relationships. Each cluster contains a different number of subject keywords. The software used in the analysis allows researchers to view the location of a keyword to other words and clusters by clicking on it. Cluster analysis is a classification technique that helps group objects based on their similarities or differences. By using this analysis method, researchers can extract scientific subjects and uncover their relationships to the subject matter directly.

Figure 9: Co-occurrence network (Author's Keyword)
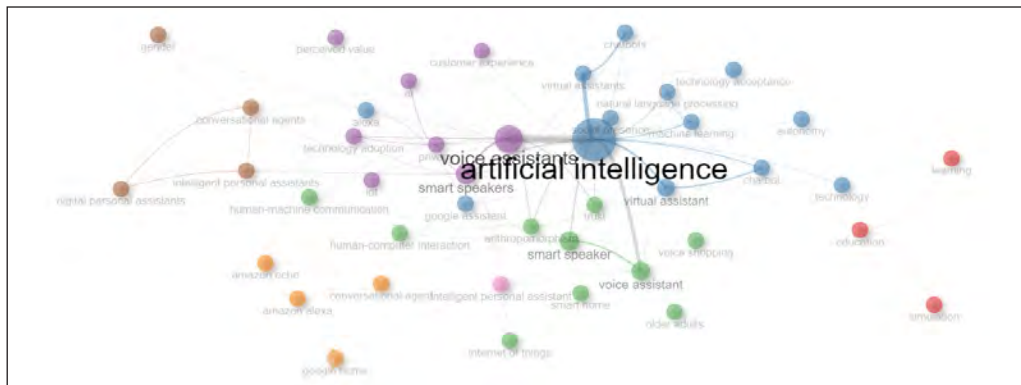
The image labelled as Figure 9 shows a co-occurrence network based on the author's keywords. The clusters in the figure are identified by blue, green, orange, purple, and red colours, which represent the related groups of keywords. Through the analysis of the documents, it was found that terms such as "artificial intelligence", "natural language processing","anthropomorphism," "chatbots", "human-computer interaction," "internet of things" "are frequently used in the field of voice assistants. By drawing co-occurrence maps at different time periods, researchers can observe the changes and consistencies in the concepts and terms related to the field of social media and information systems.

Factorial Analysis

Co-Word Analysis:- The purpose of co-word analysis is to visualize the conceptual framework of a bibliographic collection by examining the co-occurrences of words. The factorial analysis is performed using Dimensionality reduction Techniques i.e. Multidimensional Scaling (MDS) based on the author's keywords. In Figure 10 the outcomes are visualized on a two-dimensional map to illustrate the conceptual structure of the field and identify groups of documents that share similar concepts.

Figure 10 : Conceptual structure map, Factorial analysis (CA)
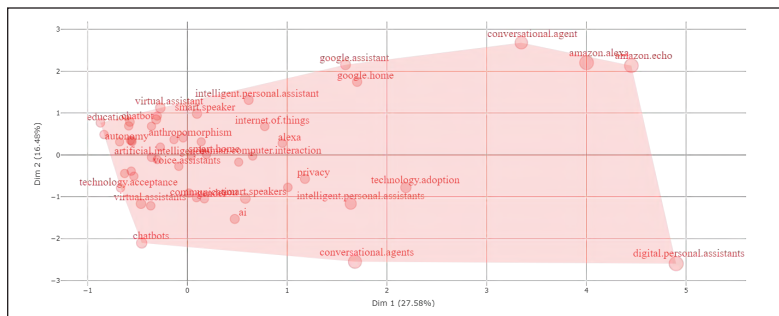
Thematic Maps

According to Cobo et al. (2011), to facilitate a more thorough analysis of the voice assistant's research topics, the identified topics are arranged into a strategic chart. Thematic analysis is a method used to analyse and track the development of thematic areas within a scientific field. This helps in identifying gaps in research and predicting future trends. Thematic maps are used for lexical analysis, and they are derived from clusters of keywords that are considered themes. Thematic maps are a powerful visual tool that helps in analysing themes based on the quadrant in which they are located. Figure 4 displays a thematic map, where the X-axis represents centrality and the Y-axis represents density. Density indicates the evolution of the chosen theme, while centrality measures the significance of the selected theme. The thematic map is divided into four quadrants based on author keywords. Author keywords provide relevance and expert judgment of the literature thus justifying optimal theme distribution of voice assistants literature.

Theme map is primarily divided into 4 quadrants namely:-

1) Upper Right quadrant Q1: Motor themes

"Motor themes" refer to a significant area of research that has gained considerable momentum in terms of its development. This quadrant represents a theme in research which are most relevant and displays main or driving themes as these have high centrality and density. This cluster includes conversational agents, AI, Alexa, digital personal assistants, and e-commerce.

2) Upper Left Quadrant Q2: Niche Themes

The second quadrant on the top left, Q2, pertains to "Niche Themes," which refers to research topics that have undergone extensive development but are considered relatively specialized within the present field. This cluster includes. Such isolated themes include perceived value, augmented reality, and gender as main themes.

3) Lower Left Quadrant Q3: Emerging Themes

Represent themes that are disappearing or emerging. VBA is the main theme in this quadrant

4) Lower Right Quadrant Q4: Basic Themes

The fourth quadrant on the bottom right, Q4, pertains to "Basic Themes," which refers to fundamental themes that cut across essential or fundamental research topics.

The basic research directions include artificial intelligence, voice assistants, education and simulation.
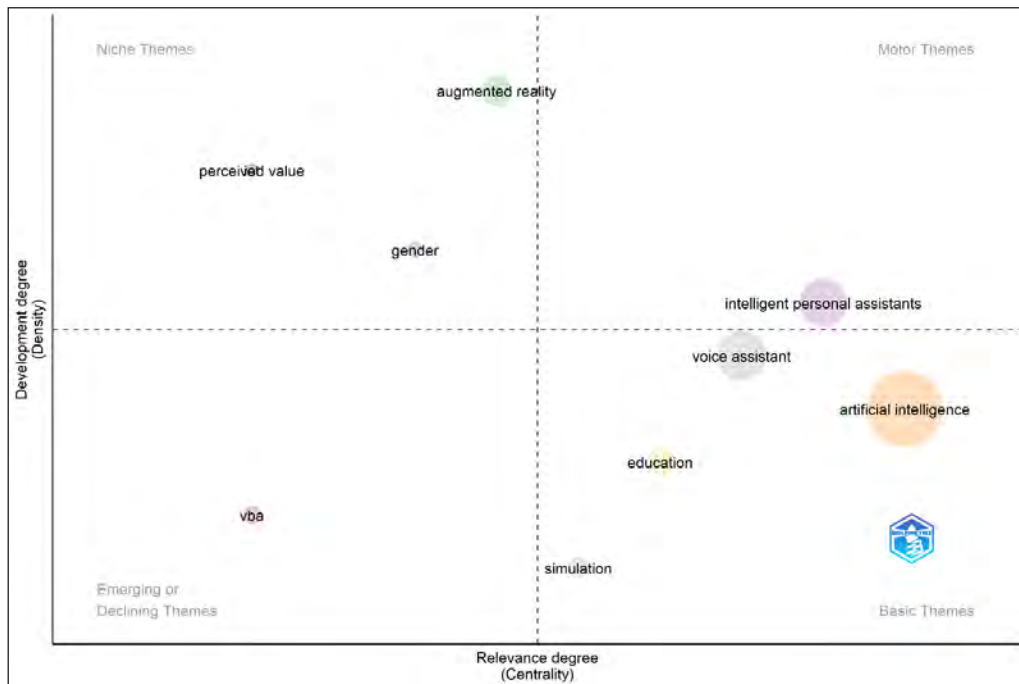
Figure 11: Thematic Maps

Table 7: Thematic Maps: Cluster wise Keywords and themes

Cluster Representation	Theme	Keywords in Clusters
Intelligent Personal Assistants	Motor theme	conversational agents, ai, alexa, digital personal assistants, e-commerce
Voice Assistants	Basic theme	voice assistant, intelligent personal assistant, internet of things, smart home, technology acceptance, communication, google home
Education	Basic theme	education, learning
Artificial Intelligence	Basic theme	artificial intelligence, voice assistants, smart speaker, smart speakers, virtual assistant, virtual assistants, anthropomorphism, trust, chatbot, privacy, chatbots, machine learning, technology adoption, natural language processing, human-computer interaction, social presence, technology, amazon alexa, customer experience, amazon echo, conversational agent, deep learning, google assistant, human-machine communication, autonomy, older adults, voice shopping
Simulation	Basic theme	Simulation

Perceived Value	Niche theme	Perceived Value
Augmented Reality	Niche theme	augmented reality, intelligent virtual assistant, collaboration
Gender	Niche theme	Gender
VBA	Emerging theme	VBA

Country Collaboration Network

The map indicates which countries have made significant contributions to the texts related to Voice Assistants. The texts were primarily produced by scientists and researchers from the United States and the United Kingdom.

Figure 12: Country Collaboration Network
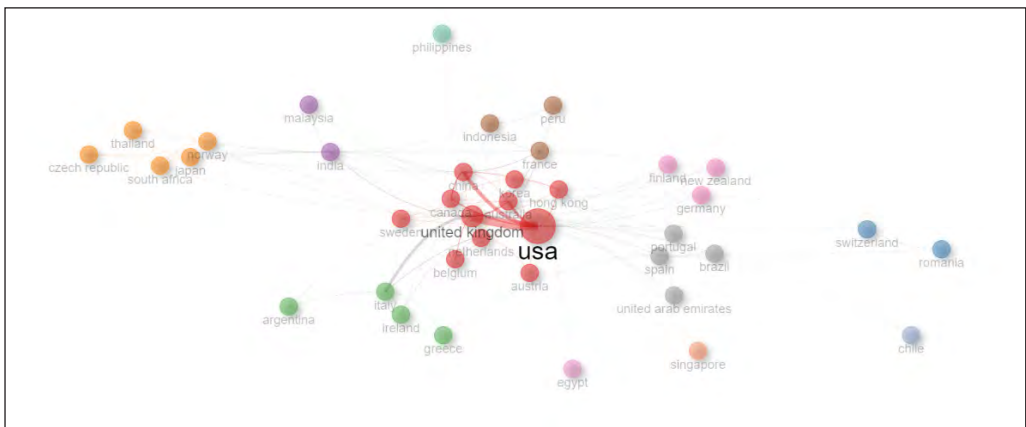
Co-Citation Network

Citation analysis is a quantitative technique used in bibliometric and scientometrics to evaluate scientific texts by counting the number of citations they receive. This method involves counting and reviewing references cited in the texts, and conducting various analyses based on the results. It aims to explore the correlation between citations and cited documents. By examining references to relevant works, citation analysis reveals that the more times a reference is cited, the more relevant it is considered to be in relation to the topic.

Based on Figure 7, Hoy M.B.(2018) is the most frequently cited reference. The primary aim of this study is to map the citation patterns of the prominent authors in the field of voice assistants using scientific articles indexed from 2002 to 2023. This research employs bibliometric methods, including citation analysis, and is science-based. By establishing citation links between authors in the field of voice assistants, the study illustrates the intellectual connections among these authors. However, not all writers in this field are necessarily considered influential authors.
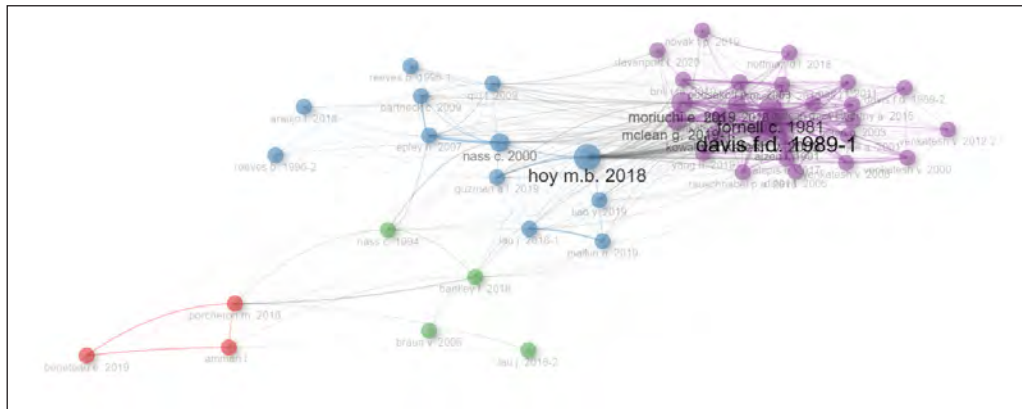
Figure 13: Co-Citation Network

Implications of the study

This study makes significant theoretical contributions in several ways. Firstly, it adds to the existing body of voice assistants research. Secondly, it analyses the trends in research production in this domain over more than two decades, providing insights into the contributions made by countries, organizations, authors, and journals. The study also employs an examination of top keywords which can help identify gaps in existing literature for future researchers.

The research study on voice assistants has significant business implications. Implementing its findings can improve customer experiences, enhance operational efficiency, and provide a competitive advantage. Optimizing voice assistants based on the study's insights leads to personalized interactions, streamlined processes, and increased customer satisfaction. Businesses can reach a larger audience through voice-enabled devices, tap into user data for data-driven insights, and

explore partnerships and integrations. By leveraging the study's guidance, businesses can differentiate themselves, drive productivity, and capitalize on the growing voice assistant market.

Future research directions

Future research in voice assistants needs to focus on enhancing natural language understanding and context awareness to enable more accurate and contextually relevant responses. Additionally, advancements in machine learning and deep learning techniques can improve voice recognition accuracy and enable more complex interactions. Exploring the integration of voice assistants with emerging technologies like augmented reality and virtual reality can open up new possibilities for immersive and interactive user experiences. Lastly, addressing privacy and security concerns to ensure user trust and data protection will be crucial for future voice assistant research.

Conclusion

Summary of Research Findings

This research study examined the patterns of global research output in the field of voice assistants. The study utilized bibliometric techniques to analyse 563 research articles published from 2002 to 2023.

This bibliometric review also employs thematic concepts and knowledge structures to analyse core journals, articles, authors, institutions, countries, and thematic maps. The findings indicate a consistent and gradual growth of research in this domain over the past decade. The analysis also revealed that a significant portion of research output is concentrated in the top ten journals, accounting for 20% of the total research articles.

Ten core journals, including proceedings of the ACM on human-computer interaction" and the "computers in human behaviour" have shown substantial interest in this field.

The study identifies influential authors in voice assistants such as Lopatovska, Irene V. From Pratt Institute, United States, and Loureiro S.M.C. from Iscte – Instituto Universitário de Lisbo, Portugal. Collaboration among researchers is evident, as articles authored by multiple authors outnumber those by single authors. The US emerged as the leading contributor in terms of the number of research articles. The study maps out research topics and clusters, highlighting emerging directions of Intelligent personal assistants which include keywords like conversational agents, ai, Alexa, digital personal assistants, and e-commerce. Artificial intelligence, voice assistants, education, and simulation are essential topics.

Overall, this research provides comprehensive knowledge and insights for researchers and policymakers in the field of voice assistants. It offers a foundation for understanding the subject, extracting relevant documents, and guiding future exploration in theory and practice.

Limitations

Similar to any other research, our study has certain limitations that could be addressed through more detailed and comprehensive investigations in the future.

To begin with, relying solely on the Scopus database may not be sufficient to capture all scientific publications related to voice assistants. It would be beneficial to use additional sources like the Web of Science and Dimensions to avoid any gaps in the analysis. Secondly, the lack of standardization of author and organizational names in the Scopus database is a major source of error in the analysis, as authors may have multiple names presented in different orders, and manual adjustments are not possible. The accuracy of the results heavily depends on the quality of the input data extracted from the Scopus database.

In the future, it would be beneficial to conduct a replication study using the Web of Science database to compare the current findings with those obtained from a different database. This would help identify similarities and differences

between the results obtained from the two analyses. Thirdly, due to the limitation posed by language barriers, the authors have limited their analysis to articles published only in English. This suggests that future studies may need to consider literature available in other languages to obtain a more comprehensive understanding of the topic.

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Factors Influencing Employees' Retention in Healthcare Organizations of West Bengal: An Empirical Study

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Abstract

Healthcare organizations provide specialized services wherein the main purpose is to cater to the patient's needs. These specialized services can be provided by experienced, knowledgeable, and talented key people who have the capability of handling difficult situations. Hiring such employees is the need and moreover, retaining these employees has become a challenge nowadays. Poaching has emerged as one of the major problems of the healthcare industry as the demand for such employees is increasing day by day. The main purpose of this study is to identify the factors which will influence the retention of employees in healthcare organizations. In this paper, both primary and secondary data were used. SPSS and AMOS software was also used. Then in this research study, the regression analysis was conducted from the factors identified in this study.

Keywords: Employee Retention, Healthcare, Poaching, Turnover, Regression

Introduction

Healthcare sector is one of the dominant sectors in India which contributes a significant part in Indian GDP. With the expansion of globalization and advancement in technology, healthcare sector has also changed a lot. Healthcare facilities are indeed a vital service which

is needed by everyone. Especially, nowadays, with the upsurge in different disease patterns, it has become essential that everyone should be able to avail the healthcare facilities. In India, healthcare system has been strengthened over a period of time. The main objective of the healthcare system is to make healthcare facilities accessible to all citizens of the country at a very reasonable cost. There is a huge transformation in the healthcare system and all can be possible with the help of healthcare professionals. However, there are few loopholes exist which creates barrier in the further development of the healthcare system. Healthcare services are affected by various factors like insufficient health workers, technological advancement, cost of healthcare services, patients and employee's expectations etc.

Employees working in the healthcare organization works diligently to cater the patients' needs, offer them comfort and help them to recover fast but unfortunately while serving to the hospital and patients their health sometimes being ignored. Especially, in the vast competitive world, they are always under psychological pressure to face the challenges in their job. In this current scenario, it is very crucial that healthcare employees should be taken care of by the management of the organization as they are the ones who are responsible for the delivering the service in the healthcare organization. The loopholes that have been discussed above all can be controlled with the support of these competent and experienced workforces. The performance of the healthcare

organization is mainly dependent on these employees' skills, knowledge and experience. So, management are encouraged to carefully watch the performance of each and every employee and also put efforts in motivating and retaining them (Macey et al., 2011).

Healthcare professional are the frontline service provider who always ready to cater patients. These employees have an indispensable role to play in delivering the services in the healthcare organization. With the increasing population and emerging new diseases, it has become essential that quality healthcare service should be provided and there should not be any shortage of employees in the healthcare organizations. There is huge demand of the healthcare employees nowadays. In order to compete with the demand, retaining employee is one of the key solutions. Employee retention means that employee will remain with the organization for a longer period of time (Francis, 2014). It is also referred to as the organization's effort in framing policies which prevents employees leaving the organization (Hao, H., Kumar, R. & Kadiresan, 2012). According to (Das, B. & Baruah, M., 2013) in order to have an edge over its competitors, management of the organization must ensure that their competent employee should remain in their organization and it totally depends on how much satisfied they are with their current job.

It is to be noted that retaining current employee is far easier and inexpensive rather hiring new employee as it involves huge cost and wastage of time

and resources (Baker, 2006). Whenever employees leave the organization, it creates void and they not only leave the organization but they also take away their skills, knowledge, experience which is indispensable (Latha, 2017). This void cannot be easily filled. It will take some time and meanwhile the organization and the patients have to go through a lot. There is also financial loss, the organization has to incur as they have to again recruit new employees, train them (Holtom et al., 2008), till then they have to use their human resource inventory or look for some temporary staffs. In one of the research studies, it has been found out that one of the reasons of employee turnover is that management seems to take care of new employees more than the current one (Hemalatha and Savarimuthu, 2013). They try to satisfy the newcomers in all possible way but unknowingly ignore their current valuable employees which make them sometimes left out and dissatisfied. So, it can be said that if management tries to satisfy their current employees needs and expectations there is a possibility that they will be successful in retaining those employees. However, it is not that easy to satisfy the needs and expectations of the employees as they are varied from individual to individual (Alnaqbi, 2011). It is the responsibility of the management that they should try to know their expectations from the organization by various means such as counselling, weekends discussions and meetings, friendly talk and sometimes by taking feedback from them about the management activities towards the employees etc.

Literature Review

Nowadays healthcare service is a dire need of everyone. With the help of the technological advancement and education, the importance of healthcare services is understood by almost everyone. In addition to that, various diseases have come into picture in the recent years which made it very clear to the human being about the importance and need of the healthcare facilities and services and also motivate them to start taking care of themselves. Now, merely having knowledge would not help until there is an expert healthcare professional. They are high in demand in healthcare industry. Retention of healthcare professionals are important as they are the ones who is going to cater the healthcare services to the patients. This will also help the hospitals grow and build good reputation in the market. Healthcare organizations should always consider employee retention policies while framing the organizational strategies and have an idea about its long-term effects on organization's productivity (Mohanty, 2009).

With the help of research papers, books and articles few factors have been found out which have an impact on employee retention in the healthcare sector. These variables directly or indirectly influence the employees to stay back in the organization for maximum period of time. It includes working culture, employee development, compensation and acknowledgement.

Employee working in the healthcare organizations have a very busy schedule. Healthcare professional spend

most their time in their workplace so, it is the managements responsibility to create a conducive working culture for their employees. They should foster working environment in such a way that ensures that all employee needs are met which may have a significant impact on their retention (Cowden et al., 2011). If the management of the organization is successful in providing a proper working environment and a certain level of privacy which employees seeks then it is likely that employee commitment towards their organization will increase and they will be motivated to be in the same organization for the long term (Wells and Thelen, 2002). Likewise supportive, caring working culture can also be encouraged by the seniors as employee perceives seniors support as a strong pillar in their workplace. Taking decisions in critical situations becomes easy with the help of senior. Seniors should also set an example for the newcomers so that they can learn (Zenger et al., 2000). Seniors should also take responsibility of keeping an eye on the newcomer's performance and give feedback whenever it is necessary. This enhances the employee's commitment towards their job and they can have the opportunity to learn from their seniors which ultimately motivates them to be remain in the organization (Morrow, 2011).

As it is very much clear that without the human asset healthcare organization will not survive. So, it is essential that management must ensure that their employees grow as the time changes. Investing in human capital is one of the major decisions which has a significant impact on employee retention (Messmer, 2000). Management must also consider employees needs and organization expectations while arranging training & development sessions. The aim of this training should be to fill the gaps where the employees' needs to learn new skills. This is beneficial for both the employee and organization as they have an edge over their competitors in the market (Tomlinson, 2002). Knowledgeable employees will be capable of delivering the best performance and can meet the challenges out there in the market (Garg & Rastogi, 2006). So, it is clear that training & development enhance the employee efficiency and knowledge and it helps in retaining employees as they feel more confident about their work (Vinesh, 2014). It is important to grow in life be it a personal or professional. When employee given a chance for their career development by the organization, it develops a sense of commitment towards the organization. It shows that organization also wants you to grow professionally. Career development could be both internal or external. Internal opportunities comprise of promotions, getting new position, learning new skills etc. whereas external opportunity includes moving to some other company. By providing such opportunities to employee, organization can retain skilled and talented employees who seeks to grow (Khan, 2014). It has been found out that internal career development enhances the employee's commitment (Meyer et al, 2003), which may help in retaining employee.

Compensation is given to the employee in response to their contribution towards the organization. It is considered as one of the most crucial elements for the employee to stay in the organization (Milkovich and Newman, 2004). Compensating employees not only includes paying salary or bonus but it also consists of free meals facilities, additional vacation etc. (Bansal, 2014). It is to be noted that in the healthcare industry, employees connect emotionally with patients and the patient party. It is difficult to measure their effort and that is why the inference can be drawn that they should be paid according to their efforts and performance they deliver to the organization which ultimately helps in employee retention (George, 2015). So, it is very much evident that reasonable salary motivates employee to stay and it has a positive impact on employee retention (Luna- Arocas and Camps, 2008). Apart from salary, incentives given to employee also plays a major role in retaining employee. Incentives are the most simple and effective way of motivating employee (Banker, 1996, Manson, 2010). Motivation plays a very pivotal role in encouraging employees to be with the organization for a maximum period of time (Schepers et al, 2005).

Acknowledging employee effort is essential to gain the employee's trust. One of the studies, (Das, 2013), shows that recognizing employee performance will increase the employee's commitment and loyalty towards their job which may influence them to remain with the organization. This is also supported by (Walker, 2001) that getting recognition

from the management, increases loyalty towards the organization. Management must also ensure that employees are being empowered to take decisions on their own. In healthcare organizations, when employees are being empowered then it facilitates the entire process and they also feel valued which leads to increased employee engagement (Markos & Sridevi, 2010) and may also have a positive impact on employee retention.

In the healthcare organizations, retaining key employee is more important as they are difficult to find. Retention is essential as the entire procedure of recruitment and selection is very expensive in terms of time as well as money. So, it becomes important for the organization to prevent employee turnover (Sajjad, A.K., 2014) In order to do that first it is crucial to find out the reasons of employee turnover which have a direct negative impact on employee retention. Furthermore, the decreasing employee productivity influences the organizations to implement a strict attitude towards their employees which creates the challenge of employee retention in the organization. Other factors like the working culture of the organization, the compensation provided to the employees by the organization, the development of the employee in the organization and also their acknowledgment in the organization influences the employee retention level.

Research Gap

The healthcare sector is a service driven industry which relies mainly on the

human resources who are responsible for delivering quality services to the people. Various studies have highlighted that the challenges faced by the employee in the industry is huge as a result of which the retention rate of the employees across the organizations continue to diminish at an alarming rate. However, very few studies have addressed this issue altogether and hence this paper is a minute effort in understanding the factors responsible for the increasing employee retention in West Bengal.

Hypotheses Development

H1: 'Working Culture' has a positive and significant impact on the 'Employee Retention'.

H2: 'Employee Development' has a positive and significant impact on the 'Employee Retention'.

H3: 'Compensation' has a positive and significant impact on the 'Employee Retention'.

H4: 'Acknowledgement' has a positive and significant impact on the 'Employee Retention'.
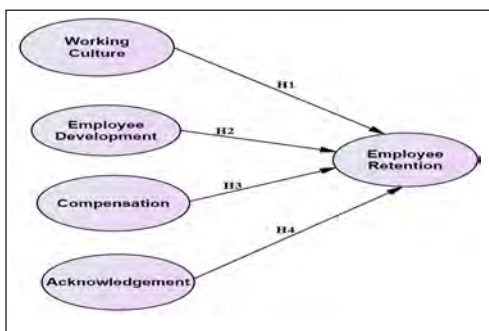
Research Methodology

In this research paper, we used cross-sectional descriptive research design framework. Here, both secondary and primary data were used for establishing the research model. We have collected secondary data from different journals, books, magazines and research reports. On the other hand, we collected primary data from targeted respondents by the help of pre-tested structured questionnaire using 5 Point Likert Scale ranged from 'Strongly Agree-5' to 'Strongly Disagree-1'. We distributed this questionnaire among the employees of 5 hospitals and pharmaceutical companies in Kolkata which is the capital of West Bengal, India. We used convenience and snowball sampling method for collecting primary data. Also, we calculated the sample size by the help of pilot study with 25 respondents. In this pilot study, we received 21 positive outcomes out of 25 respondents. Therefore, estimated *p-value* was 84% and estimated *q-value i.e.* (1- *p-value)* was 16%. Here, acceptable error between true and sample proportion was taken as ±5%. The formula, mentioned below has been used for calculating the sample size in case of infinite population (Kothari, 2004).

$$n = \frac{z^2 * p * q}{e^2}$$

n = sample size;

z = z-table value for 95% confidence level (1.96);

p = proportion of success (84%);

q = proportion of failure (16%);

e^2 = acceptable error (±5%)

$$n = \frac{1.96^2 * .84 *.}{.05^2} = 206 \sim 200$$

(nearby rounded off number)

From the above calculation, we took 200 responses for this study. The survey period was from 20th August, 2021 to 20th October, 2021. In this study, we executed Exploratory Factor Analysis (EFA), Multiple Regression Analysis by the help of SPSS-24 software and Microsoft excel as per the research requirement. Initially we checked reliability and validity of primary data which was the primary requirement for establishing 'Hypothesized Research Model' (Figure 1).

Analysis And Results

200 employees as respondents from 5 selected hospitals and pharmaceutical companies in Kolkata took part in this study. Demographic profile of the respondents is depicted in the following table (Table 1).

Table1: Demographic Profile of Respondents

Category	Classification	Number of Respondents	Percentage (%)
Gender	Male	136	54.4
	Female	114	45.6
Age	<30 Years	62	24.8
	30-39 Years	75	30
	40-49 Years	79	31.6
	50-59 Years	34	13.6
Work Experiences	<5 Years	53	21.2
	5-10 Years	74	29.6
	11-15 Years	82	32.8
	>15 Years	41	16.4
Educational Qualification	Graduate	166	66.4
	Post-Graduate	71	28.4
	PhD	13	5.2

Reliability And Validity Testing:

Cronbach's Alpha value was tested for measuring the reliability of primary dataset. The Alpha value more than 0.7 indicates that it is under acceptable range of reliability (Hair, et al., 2014). It measures internal consistency of primary dataset including dependent and independent variables. The Alpha result of 0.868 (Table 2) was a strong acceptable value.

Table 2: Reliability Statistics

Cronbach's Alpha	N of Items
0.868	20

Initially, face and content validity were tested before checking construct validity. Face validity was tested by our own judgment. Content validity was tested by taking opinions from the experts of same field. After that, Exploratory Factor Analysis (EFA) was

executed for testing construct validity. It helped to validate factors which were created with a group of appropriate variables. This data reduction method was executed through PCA (Principal Component Analysis) and Varimax Rotation Method. It clearly explained convergent and discriminant validity in this study. Convergent validity implies that there is a strong relationship among variables under a particular factor and discriminant validity implies that there is a weak relationship among variables of different factors. We executed KMO and Bartlett's Test (Table 3) for checking the appropriateness of EFA operation.

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.739
Bartlett's Test of Sphericity	Approx. Chi-Square	2226.594
	Df	190
	Sig.	.000

Here, 5 individual factors containing 2 variables each with factor loading more than 0.7were extracted by EFA (Table 4).

Table 4: Rotated Component Matrix by Exploratory Factor Analysis (EFA)

Variables	Factors				
	Employee Retention	Compensation	Acknowledgement	Working Culture	Employee Development
q9	**.957**	.008	-.018	.018	.063
q10	**.953**	-.023	-.004	.010	.013
q6	-.010	**.962**	.007	.052	-.073
q5	-.006	**.956**	.035	.050	-.124
q8	-.021	.022	**.945**	-.047	.032
q7	.002	.021	**.935**	.050	-.028
q1	.048	-.030	-.003	**.936**	-.189
q2	-.020	.138	.005	**.932**	-.106
q4	.011	-.095	-.006	-.126	**.915**
q3	.062	-.104	.011	-.163	**.907**
% of Variance Explained	18.817	17.473	16.377	16.205	14.884

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Rotation converged in 6 iterations.

Here, we identified 5 factors from literature review. We took 'Employee Retention' as dependent variable and remaining 4 factors as independent variables. Also, the 'Variance Inflation Factor' (VIF) values of less than 3 (Table 5) under acceptable range indicated that independent factors influencing Employee Retention as dependent factor are free from multicollinearity.

Table 5: Collinearity Statistics

Factors	Tolerance	VIF
Working Culture	.491	2.038
Employee development	.522	1.915
Compensation	.600	1.668
Acknowledgement	.399	2.509

Dependent Variable: Employee Retention

Here, we used Multiple Regression to find the impact of independent factors on the dependent factor 'Employee Retention'. From the Model Summary of Regression analysis (Table 6), we observed that R-value (correlation coefficient of Model 1) was 0.948. It indicated that there was a strong correlation between dependent and independent variables. Also, we got acceptable R-Square value of 0.899 or 89.9%. On the other hand, Durbin-Watson value (<2) indicated that Model-1 was free from autocorrelation.

Table 6: Model Summary (Regression)

Model	R-Value	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.948[a]	.899	.889	.329	.899	89.093	9	90	.000	1.834

a. Predictors: (Constant), Working Culture, Employee Development, Compensation, Acknowledgement

b. Dependent Variable: Employee Retention

From the following ANOVA Table (Table 7), we observed that the significant F-value of 89.093 (<0.01) proved the fitness of Regression Model.

Table 7: ANOVA Table for Regression

Model		Sum of Squares	df	Mean Square	F-Value	Sig. (P-Value)
1	Regression	86.986	9	9.665	89.093	.000[b]
	Residual	9.764	90	.108		
	Total	96.750	99			

a. Dependent Variable: Employee Retention

b. Predictors: (Constant), Working Culture, Employee Development, Compensation, Acknowledgement

From the following coefficient table (Table 5), we found that 'Work Culture' gained highest Unstandardized Coefficient (B) value of 0.170. Therefore, it revealed that work culture was the most influencing factor for employee retention. Following results of Regression Analysis (Table: 8) indicated that all independent factors had a positive and significant influence on employee retention.

Table 8: Summary of Coefficients

Model B		Unstandardized Coefficients		Standardized Coefficients	t-Value	Sig. (P-Value)
		Std. Error	Beta			
1	(Constant)	**-1.095**	.270		-4.059	**.000***
	Employee Development	**.115**	.051	.108	2.267	**.026****
	Acknowledgement	**.120**	.050	.117	2.402	**.018****
	Work Culture	**.170**	.064	.109	2.658	**.009***
	Compensation	**.154**	.042	.159	3.668	**.000***

a. Dependent Variable: Employee Retention

*& ** Significant Regression co-efficient with P<0.01&P<0.05 respectively

In this study, Regression equation can be stated as follows.

Employee Retention(Y) = -1.095 + (0.115) X_1 + (0.120) X_2 + (0.170) X_3 + (0.154) X_4

Employee Development = X_1

Acknowledgement = X_2

Work Culture = X_3

Compensation = X_4

After judging Regression Coefficients and significance level, we can conclude that all hypotheses are accepted.

Discussion:

In case of first hypothesis (H1), positive (**+.170**) path co-efficient with significant P-value (**<0.01**) supported the hypothesis. Work culture provides employee a conducive environment to work. Due to increased competition and work pressure, good working culture really matters to the employee and it has a positive impact on employee retention (Cowden et al. (2011).

In case of second hypothesis (H2), positive (**+.115**) path co-efficient with significant P-value (**<0.05**) supported the hypothesis. Nowadays, employees are very competitive in nature. In order to have a bright career ahead they have to be trained properly. Trained and knowledgeable employees are always high in demand. Management must take care of the employees' personal growth and come up with provisions like scholarship for higher education, conducting seminars and workshops which could help the employees to grow. Secured career provides employees confidence to stay in the same organisation (Rambur, et al., 2005). Employee seeing managements putting efforts for their development will surely increase their commitment level towards their organisation which

ultimately leads to employee retention (Vinesh, 2014).

In case of third hypothesis (H3), positive (**+.154**) path co-efficient with significant P-value (**<0.01**) supported the hypothesis. Compensation is considered as one of the techniques to motivate and retain employee (Gardner et al., 2004). It is given to the employees in response to their contribution towards the organization. In this study, it has been shown that it has a positive impact on employee retention.

In case of fourth hypothesis (H4), positive (**+.120**) path co-efficient with significant P-value (**<0.05**) supported the hypothesis. Employee gets motivated when they get appreciation and their efforts are being acknowledged by the management. Recognizing and rewarding employee have a positive influence on employee retention (Das, 2013).

Managerial Implications:

In order to achieve the organizational goals and sustain in the market for a longer period of time employee retention is important. Satisfying patient and dealing with the patient's parties is quite a difficult job to do. In this paper, it has been seen that retention strategy will work only if the employees are satisfied. To satisfy, management must know what are the factors which motivates the employee and helps in retaining back in the organization. This study shows that there are multiple needs and expectations of employees which should be fulfilled by the organization as much as possible.

Management must focus on the organizational as well as the employee growth because investing in their training and workshops will ultimately benefits the organization itself which will lead to the increased productivity. In order to gain employee loyalty and commitment management should empower them and enrich with the basic amenities so that they can work effectively and efficiently. Management should also focus on designing pay system and make sure that it would be perceived as fair by the employee. Higher authority should consider these variables as a target to be achieved. This helps the organization to gain loyalty, commitment, productivity, efficiency and respect from the employees and over the period of time employee will have a sense of attachment and thus employee can be retained.

Conclusion :

As the competition in the healthcare sector increases, it has become difficult for the organizations to sustain. Skilled, experienced and knowledgeable employees are required to deliver quality healthcare services to the patients. It is crucial for the organizations to retain their key employees to remain in the industry as healthcare organizations totally depend on the human asset. In this study, it was found out that working culture has the most significant impact on employee retention. Other factors like compensation, acknowledgement and employee development were also found to have a significant impact on the employee retention of the healthcare sector. Management should ensure

that key employees of the healthcare organization should be given proper space to explore themselves in various aspects. Employees like doctors, nurses and lab technicians working in the hospitals and nursing homes should be empowered enough to take decisions unanimously as and when needed. Emphasis has to be given to the importance of retaining key employees and its impact on the organization so that it becomes easier for the organization to cater to the patient's needs.

Limitations of the Study and Scope for Further Research

Some articles might be overlooked under literature review section. In this scenario, we might get more factors for revamping our research model. Few respondents had shown reluctant behavior when answering the questionnaire. It might change the research results and findings. Our sample size was only 200. Also, study was conducted in Kolkata region only. Therefore, population characteristics cannot be depicted clearly by this small sample size and small area. Therefore, we might get different results for larger area and big sample size.

This study is restricted only in healthcare organization. The further study can also be conducted in other sectors like Manufacturing, Banking and other sectors as well. Also, studies can be done by considering a larger area like state-wise survey. Further study related with comparison of global and Indian scenario of employee retention can be conducted in this aspect.

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Organizational Culture:
A Longitudinal Study of a Public Sector Bank

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Abstract :

This study aims to map cultural changes in the transformational journey of an Indian public sector bank (PSB) using longitudinal data collected at three different points. This study investigates the relationship between Organizational Culture (OC) and the financial performance. The survey was conducted out using the Organizational Culture Assessment Instrument (OCAI) based on the competing values framework. The findings revealed an emerging pattern between changing culture and financial performance of the Bank culture indicating a shift from clan culture of pre-change initiatives to market culture of phase 1 to primacy of market culture of phase 2, in phase 3 hierarchy was the dominant culture. The findings contradict the extant literature that categorizes public sector employees as resistant to change, adapting to the top leader's mission in this case. This study maps cultural change in PSB through a longitudinal study using Competing Value Framework (CVF) in an emerging market context, examining the past (then), current, and preferred culture.

Keywords: Organizational Culture Assessment Instrument (OCAI), Competing Values Framework (CVF), Longitudinal Study.

Introduction :

Cultural change in Public Sector Banks (PSBs)

The critical issue of culture is among the numerous challenges faced by public-sector organizations including banks in today's world (Thi Tran et al., 2022; Park et al., 2021). In a demanding global situation, the banking industry is undergoing a transformation where efficiency and competitiveness are critical to survival. Extensive competition from domestic and international players, rapid induction of new financial products, changing

consumer demands, intensive use of information technology, customer centricity, and prompt service have all contributed to a significant shift in the work environment (Bijoy & Samaresh, 2019; Mukherjee, Nath, & Pal, 2002). According to Hedley et al. (2007), banks would need to develop new strategies and restructuring in the coming years to survive stiff competition. The Indian banking industry has already made significant changes due to twin challenges of continuous deregulation of Indian economy and effects of subprime lending crisis in the US on global economic scenario. Banks attempting to transition from a regulated seller's market to a deregulated customer's market face difficulties due to these rapid changes. For PSBs cost of funds, internal controls, technological innovations, motivation of staff and risk and assets management became more intense since 2009 with liberalisation of foreign investments in India, albeit at a controlled pace (Mohan, 2016; Salman et al., 2020).

More focussed on customer needs, banks are now trying to attract younger customers by offering them various financial products and improved services. The customer centricity is largely determined by the performance of its staff, regardless of the advanced technology used, the facilities provided, or the ambience, thus all-encompassing culture is critical for achieving and sustaining change (Wajeeha et al., 2022). The importance and difficulty of bringing about the desired change in the working culture of PSBs is emphasised by Rao (2021).

Though the government has merged many non-performing PSBs with high-performing ones, policymakers must carefully examine the PSB work culture to make them globally competitive. However, despite intense competition, the Indian banking sector is expanding exponentially, it still has the potential to become the world's third largest by 2025 (KPMG and CII 2013). According to the report, PSBs are far ahead of private sector banks in their overseas presence. They have already begun a transformative voyage by adopting digital lending products and investing in data analytics technology. The preceding discussion illustrates that the industry's cumulative sea change requires assessing how these changes impact the operating culture of PSBs.

Organizational culture change:

Cultural change is an essential constant for corporate success (Okwata et al., 2022; Woodall, 1996) no matter how long the business has been successful. In some cases, internal environment necessitates change, while in others, the external environment (Flamholtz & Randle, 2008), for instance, shift in customer preferences, the nature of competition, technological changes, a change in leadership, structural transformation, or other external factors beyond management's control. Organizations that adapt to these changes successfully survive and grow, while those that do not may struggle and even fail (Danneels, 2010; Sarta et al., 2021). However, organizational success and growth rely more on organizational culture (OC), as almost all business

developments occur because of a high-performance culture (Azeem et al., 2021).

The open systems approach is used as a theoretical lens to interpret study findings. It recognizes organizations are influenced by their environment (Filatotchev et al., 2022; Seidl & Becker, 2006) and highlight importance of the forces of economics, politics, government, technical advances, consumers, national culture, social context, competition, and uncertainties (Scott & Davis, 2007). Many frameworks for OC view culture as a stand-alone entity within the organization (Nold & Michel, 2021), the argument being that culture is the innermost core of the organization, which does not exist in isolation, and it continues to play a vital role in the sustainability of the organization. Furthermore, the organization's performance is determined by OC and external environment.

OC, according to Deloitte's Human Capital Trends Study, had a potential competitive advantage, now recognition by top leadership that culture drives innovation, people's behaviour, customer service, and was one of the most critical business topics reported by 82% of respondents (Trends, 2016). The report also says that OC is the key in determining *Fortune* Magazine's (2022) 100 Best Companies to Work For. Several organizations attribute their success to their culture (Warrick & Gardner, 2021). OC is widely regarded as the most commonly investigated topic in traditional organizations due to its

numerous positive outcomes. According to Shin and Park (2019), OC influences people's values and behaviours, regardless of the type of organization. Previous research has established that OC significantly affects organizations' performance (Warrick & Gardner, 2021), e.g., influences job satisfaction, morale, employee engagement and loyalty, turnover, the ability to attract and retain talented employees (Warrick, 2017; Warrick & Gardner, 2021); higher competitiveness and better financial results (Calciolari et al., 2018); social and ecological well-being, ensuring the organization's sustainability (Dyck et al., 2019); employee ethical behaviour (Naranjo-Valencia et al., 2011); organizational innovation (Tian et al., 2018); and has a significant impact on employee performance (Diana et al., 2021). According to Aboramadan et al. (2019), OC fosters marketing and technology innovations and contributes positively to organizational performance. Therefore, it is critical for management to understand their current and perceived OC to maximise its value.

Competing value framework

One of the most widely used and influential models for understanding OC is the Competing Values Framework (CVF) (Yu & Wu, 2009). Cameron and Quinn (1999) define CVF as a practical toolkit that can assist managers, change agents, and academics in understanding, diagnosing, and facilitating the change of an organization's culture to improve its effectiveness. The Organizational Culture Assessment Instrument (OCAI) was created using the CVF framework

to determine the OC profile based on the core values and assumptions that set organizations apart (Cameron & Quinn, 1999). Researchers have used OCAI to better understand current and preferred cultural dimensions in various settings. For instance, using a longitudinal approach to understand the organizational development process, Davis and Cates (2018) used OCAI to identify current and perceived cultures to inform the new leader which cultural dimensions need to be changed and helped the new leader identify the cultural gap and move closer to the perceived culture. Vijayalakshmi et al. (2011) used OCAI to assess the cultural shifts in an Indian public sector bank. Ližbetinová et al. (2016) used OCAI to analyse the OC of a logistics enterprise in Slovakia. The findings indicate that the enterprises exhibited a hierarchical culture, whereas the employees preferred a clan culture. Caliskan and Zhu (2019) used OCAI to identify the students' perception of the current culture of Turkish public universities and found it to be hierarchical, followed by a market culture; so also Singh (2020) of Indian IT companies. Despite the abundance of studies using different instruments to explore various aspects of OC, several authors reported a lack of empirical evidence, especially using longitudinal approaches (Calciolari et al., 2018; Hartnell et al., 2011; Kim & Chang, 2019). For instance, authors can use a longitudinal approach to explore how resilient essence of OC is (Spicer, 2020). Does OC change when the external environment changes (either planned or unplanned) or remain the same?

Furthermore, another neglected area is how changes in OC affect performance (Spicer, 2020). The following research questions were addressed in this study using a longitudinal approach in the context of an Indian PSB to fill some of these gaps:

- Is the organizational culture constant, or does it change over time?

- Is there any relation between the change in organizational culture and financial performance?

In essence, the objectives of this study are to derive inferences using longitudinal data collected at three different points over a period of ten years to investigate the relationship between OC and the financial performance about a PSB's OC and to determine whether it remains constant or changes.

Literature Review

Organization is defined as 'the notion of a structured social grouping with a defined purpose' (Denison & Spreitzer, 1991: p.11). Just like society has a 'societal culture,' organizations also have a culture known as OC (Sinha, 2009). Previous studies have reported that culture is a socially constructed attribute of an organization that acts as a social glue to hold it together (Cameron & Quinn, 2011; Chatman & O'Reilly, 2016; Schein & Schein, 2016). Culture influences several aspects of an organization, such as how things are done and how an organization is experienced by its employees and customers (Warrick, 2017). According to Cameron and Quinn (2011), OC is defined as 'the taken-for-granted values,

underlying assumptions, expectations, and definitions that characterise organizations and their members' (p.18). According to Schein and Schein (2016), OC is 'what the group has learned in its efforts to survive, grow, deal with its external environment, and organise itself' (p.26).

It is critical to understand that there is no such thing as a single OC, as each organization has its own culture (Cameron & Quinn, 2011; O'Donnell & Boyle, 2008). The main goal of creating a culture profile is to assist the organization in determining what type of culture change is most appropriate and how culture can be modified most profitably. Since organizational success is determined by how well OC aligns with the demands of the competitive environment, scholars have developed various frameworks and instruments to assess OC (Chatman & Jehn, 1994; Hofstede et al., 1990). It includes the organizational culture profile (O'Reilly, et al., 1991), the organizational culture inventory (Cooke & Szumal, 1993), and the CVF (Cameron & Quinn, 2011; Quinn & Rohrbaugh, 1983). The CVF has been recognised as an effective framework widely used by scholars to investigate OCs (e.g., Hartnell et al., 2011). This study is based on the CVF because it has its theoretical foundation in organizational change and culture literature.

Organizations benefit from change and stability at different times. They also frequently require both change and stability at the same time. CVF allows us to understand such paradoxical

assumptions (Quinn et al., 2020). It represents two orthogonal dimensions: flexibility versus control and internal focus and integration versus external focus and differentiation (Chatman & O'Reilly, 2016). The internal focus emphasises system maintenance, whereas the external focus emphasises the system's competitive position. On the other hand, flexibility emphasises decentralisation and differentiation, whereas control emphasises centralisation and integration (O'Neill & Quinn, 1993). The four quadrants are clan, adhocracy, market, and hierarchy, each representing a different type of OC (Chatman & O'Reilly, 2016). These quadrants appear to convey opposing messages, but they are, in fact, closely related and intertwined (Quinn et al., 2020) but when considered in isolation, they appear logical, though when juxtaposed, they appear irrational, inconsistent, absurd, and create a paradox (Smith & Lewis 2011). The competing values represented in these quadrants can broaden the organization's thinking and effectiveness. The CVF can be used to create an OC profile. In this context, Cameron and Quinn described an organization's overall culture profile as follows:

Clan

It is an OC that prioritises internal maintenance while remaining flexible and concerned about people. Human resource development, trust, teamwork, participatory decision-making, and morale are emphasised in organizations with high clan dimensions. Management empowers employees and facilitates

their participation, commitment, and loyalty in this environment. Success is defined by customer sensitivity and concern for people.

Hierarchy:

The hierarchical culture describes a value orientation associated with bureaucracy in an organization which is held together by formal rules and policies: stability, efficiency, centralization, coordination, and compliance mandates. To ensure success, dependable delivery, smooth scheduling, and low cost following prescribed procedures are critical.

Adhocracy:

It is an OC that focuses on external positioning while maintaining high flexibility and individuality. Innovation, entrepreneurship, risk-taking, growth, creativity, and resource acquisition are appreciated here. In adhocracy, organizational leaders' commitment to risk-taking, experimentation, and innovation bind the organization together and keep its long-term focus on expansion and acquiring new resources. Success entails developing unique and novel products or services.

Market:

It refers to an orientation based on concepts such as competitiveness, performance, decisiveness, and goal achievement. It is a results-driven organization. People are goal-oriented and competitive; leaders are hard-driving, competitors, tough, and demanding. The emphasis on winning is the glue that binds the organization together. In this context, success is defined as market share and penetration, strongly emphasising profit or the bottom line.

These culture profiles reflect some of the underlying assumptions of OC, such as management style, strategic plans, leadership styles, and fundamental organizational values. Changing the culture requires identifying and changing these cultural elements because most organizations' cultures are invisible and taken for granted; most members have difficulty recognising or describing them, let alone changing them. In such cases, the OCAI can be especially useful, which aids in discovering aspects of the OC and measuring where the organization is and decide its future course (Cameron & Quinn, 2011).

Open systems approach:

The open systems approach has influenced many perspectives on functioning of the organizations. The predominant culture of any organization is determined by the environment in which it operates, the belief system of its employees, and its management style (Schein & Schein, 2016).

Concerted efforts are required in the public sector to instil second-order change by paying attention to human and process aspects. While studying the Bureau of State Expenditures, Attmore and Hancox (2016) emphasized resilient role of top leadership to reinforce the need for change, which involved regular training of staff, compatible attitudes, overall consensus building as the supportive culture grew and employee

advancement continued leading to a surge in their pride. Lindberg and Meredith (2012) emphasised the need to strengthen open vertical and horizontal communication to transform culture in the Health and Human Service Department. Fernandez and Rainey (2006) summarised various perspectives on managing change in the public sector and highlighted that, along with internal support and a road map for change, leadership should develop support from political overseers and external stakeholders.

Research methodology:

Selection of Public Sector Bank: CDPB

The bank under consideration, Community Development Public Bank (CDPB) is one of the leading and oldest PSBs, with more than 100 years of legacy. It is a representative case of the few high-performing PSBs in India. During the first phase of data collection (T-1), the CDPB had around 2,896 branches in India and around the world and in the third phase (T-3) over 5400 branches. It was one of the earliest to venture into the international banking arena. In phase 1, their foreign branches were 70 while in 2018 they grew to be100. Their employee strength increased from 38,000 to more than 55,600 in the third phase.

In response to the declining ranking, the then CMD (Chairman & Managing Director) of this bank undertook major transformational reforms related to products, processes, technology and focused on customer satisfaction.

During these five years, the bank's ranking improved, bringing intrinsic value of the case. It is, therefore, worth examining the trajectory of change of this bank.

Longitudinal study:

A longitudinal study was conducted to assess the culture change and its sustainability and direction by examining the same phenomenon over the years. Observation of the temporal sequence of variables at different times over a long period provides an opportunity to evaluate them objectively (Kling et al., 2017). According to Singer and Willett (2003: p. 4), a longitudinal study consists of mainly three features – (i) multiple waves of data collection from one set of cases, (ii) a substantively meaningful metric of time over which change occurs, and (iii) an outcome that changes systematically. Since the study of culture change also requires the perspective of employees, several authors argued that a longitudinal study should collect a minimum of three rounds of data to capture the trajectory of change or the relationship between variables (Chan, 1998; Ployhart & Vandeberg, 2010; Singer & Willett, 2003). Following this approach, the current study collected three rounds of data over ten years. Few earlier studies have done so (Brown et al., 2015; *Herguner* & Reeves, 2000), Barsade and O'Neill (2014) collected data after 16 months.

Data and method:

The highlight of this study is a large sample size across locations in India and collection of quantitative data

over ten years. Though the bank has a national and international presence, we found survey the most suitable method for data collection and for convenience only Indian branches were surveyed. In consultation with senior management of SDPB, we decided to collect data after a five-year gap as that was when strategic changes were initiated within the bank. The data was collected thrice: T1, T2, and T3. The CMD's five-year tenure was also a consideration as the new leadership was likely to bring in its vision and changes. In the T2 round, we approached employees working before the T1 round. Similarly, in the T3 round, employees working at least since the T2 round were reached out for data collection. Around 30-40% of respondents were the same as in the first two rounds of data collection. However, in the third phase, many youngsters were part of the study.

Instrument for data collection: Organizational Culture Assessment Instrument (OCAI)

The culture shift was measured using Cameron and Quinn's (1999) OCAI, a reliable and widely used instrument to understand their employees' perceptions about current culture, desired culture for meeting future demands, and culture shift (Cameron & Quinn, 1999; Kloot & Martin, 2007; Slack & Singh, 2018; Suderman, 2012; Van Huy et al., 2020; Vijayalakshmi et al., 2009).

OCAI assesses the essential culture dimensions, predominantly culture type, strength, and congruence (Choi et al., 2010). The OCAI yields two main cultural dimensions, each manifesting competing values: the first dimension determines whether OC is internally or externally focused, while the second dimension studies whether an organization operates with flexibility or stability. These questions lead to four types of OCs: clan, market, adhocracy, and hierarchy.

We assessed OC on a five-point Likert scale ranging from very true, true, somewhat true, true to a small extent, and not true. A scale of 1-5 was assigned, with the highest score of 5 being assigned to 'very true.' The purpose of adopting a rating scale instead of the original OCAI scale was that it was more cumbersome and time-consuming for the participants to divide the total score of a hundred among the choices. Also, we were advised by our coordinator in the bank to keep the questionnaire short and simple. Bank employees were grappling with changes and very busy; hence, we adopted a rating scale instead of a score distribution pattern. Oney-Yazici et al. (2007) adopted a similar methodology (Likert scale) to examine the cultural profile of construction organizations within the context of the Turkish construction industry, and Slack and Singh (2018) used OCAI for examining public sector undertakings in Fiji. Ideal assessments reflect members' personal preferences for the organization's culture (Chatman, 1991; Hofstede et al., 1990).

The Cronbach alpha coefficient was used to assess the scale's reliability, and the result was above the cut-off limit of .70. Therefore, we confirmed reliability was satisfactory and summarised in Table 1.

Table 1

Reliability coefficient for Organizational Culture Assessment Instrument scale

	Reliability coefficient (Cronbach alpha)		
Culture type	T1	T2	T3
Clan	0.85	.847	.91
Adhocracy	0.78	.845	.86
Market	0.77	.838	.86
Hierarchy	0.79	.818	.84

Financial performance of the CDPB

In this study, financial data was collected from the CDPB to determine relationship between the type of culture and financial performance. Scholars have advanced several metrics to measure the financial performance of banks. Some of the determinants of the financial performance of commercial banks, mainly their profitability, include Return on Asset (ROA), Return on Equity (ROE), and Net Interest Margin (NIM) (Almaqtari et al., 2019; Ongore & Kusa, 2013). ROE is a financial ratio that refers to a company's profit from shareholder equity investment. The higher the ROE, the better the company's profit generation. ROA measures the ability to generate profit by utilising company assets. Therefore, a higher ROA indicates that the company is more efficient in using its assets. NIM is a profitability ratio that measures the difference between the interest income earned and the interest paid by the bank on its average earning assets. A higher net interest margin indicates a higher bank's profitability and stability (Ongore & Kusa, 2013). This study uses ROA, ROE, and NIM as financial performance indicators.

Data Collection

Mixed sampling approach – purposive, convenience, and stratified random sampling was used to collect survey data across levels, states, and different offices in three phases. The respondents in T1, T2, and T3 were 289, 268, and 237, respectively, as shown in Table 2.

Table 2

Sample Distribution across T1, T2, and T3

Data collection time (Time)	Levels				Missing	Total
	1	2	3	4		
T1	14	79	68	102	26	289
T2	10	132	55	64	7	268
T3	32	116	79	10	00	237

Data Analysis

Several statistical techniques were used for data analysis. Descriptive analysis was used to find the dominant current and for preferred culture, one-way ANOVA was used to understand whether the change in culture from T1 through T3 was statistically significant. Furthermore a paired t-test was conducted to determine whether the relationship between current and preferred cultures is significant.

The first-time data was collected in T1, as shown in Table 2, when the CDPB was undergoing exponential transformation. We used empirical evidence to investigate the role of OC that led to so much transformation in a short five-year span. Unfortunately, we did not have any previous data to compare our results with. To fix this problem, we slightly modified the OCAI instrument. Data was collected on three temporal dimensions (against the two dimensions in the original scale: current and preferred culture): (i) Then culture: the dominant culture five years ago (pre-change initiative phase); (ii) Current culture: the current dominant culture (iii) Preferred culture: the culture that will predominate in five years. This way, we get a reference to compare our data collected in T1. However, we did not collect the 'Then culture' data for T2 and T3.

Results

This section begins by discussing the 'Then culture in T1,' which assisted us in making some assumptions about the culture pre-change initiative process.

Then we discussed the current culture in T1, T2, and T3. Following that, the preferred culture from T1 to T3 was discussed, then the results of the ANOVA and T-tests, and finally, explained the relationship between OC and PSB financial performance from T1 to T3.

Pre-change initiative: 'Then Culture'

Figure 1

'Then' Culture
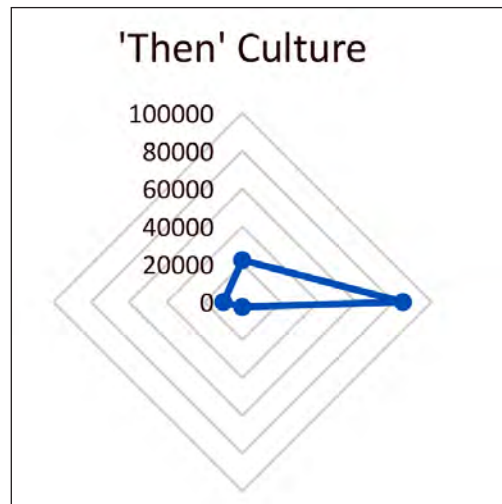
The result of the 'then culture' of the CDPB is shown in Figure 1, suggests that it was clan culture, followed by hierarchy. Market and adhocracy cultures got third and fourth place, respectively. It helped us make certain assumptions about the culture of the CDPB prior to change initiative process. Then, the paternalistic and accommodative culture was justified because the change in the external environment was not so rapid. People loved to remain in their comfort zones with little or no intention of experimenting with change. Also,

the business was running as usual, and CDPB was posting a good performance. However, this attitude became irrelevant and even counterproductive during a period of rapid change. CDPB fell from first to fourth place among nationalised PSBs lowering its market share and credit growth leading to a decline in assets and overall below average growth. It failed to push the transformation agenda as other PSBs were implementing IT-driven business strategies. When the new CMD took over, the major significant concerns faced by the PSB were the slow pace of credit growth, low retail growth, lack of emphasis on technology, and heavy reliance on treasury profits. Industry experts rated it underperforming and gave its shares a 'sell' call. However, the new CMD's sharp vision led by people-process-based transformation delivered extraordinary results, and the PSB was successfully transformed to its previous glory.

T1: Current Culture

Figure 2

'Current' Culture from T1 to T3
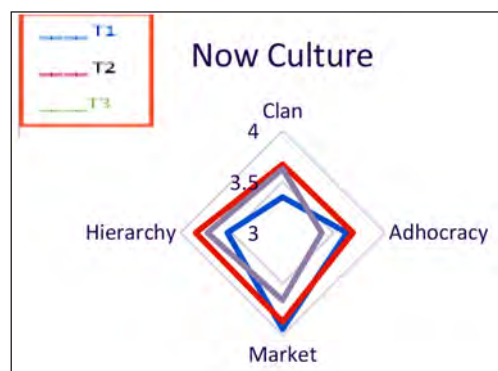
During T1, the current culture of the CDPB was dramatically changed to market culture, followed by adhocracy, as shown in Figure 2 with hierarchy and clan culture getting third and fourth place. Interestingly, the culture of the CDPB changed entirely within just five years leading to the massive transformation initiated by the new CMD. The performance of the CDPB, visible in the results, reflected the market and adhocracy culture. Some of the steps taken were as follows: effective communication of problems with the employees and seeking their assistance in solving them; breaking the existing mind-set and attitude and develop an adaptive culture marked by speed in thought and action. Further, directions to the top management to develop an attitude of change and mind-set of a leader instead of controlling outlook; HR functions were given top priority because transformation is not only a technology play but also a people-driven project. Holding of daily morning meetings with the top leaders to focus on collective problem-solving, busting bureaucratic delays, building accountability, promoting strategic thinking, and reviewing the implementation and execution of various projects. The breadth of vision and efforts put forth by the CMD demonstrated dramatic results. The CDPB doubled its performance on multiple parameters in just three years: global business, credit growth, business per employee, and profit.

T2: Current Culture

As shown in Figure 2, the dominant culture was still market culture followed by hierarchy culture, unlike the adhocracy in T1. The CDPB was riding high on the recent transformational efforts and had established itself as a premier CDPB. The employees' morale was high as it had recently received many awards and accolades. They wished to command the same respect and rub shoulders with the best private PSBs in India. It was only possible when they were result-oriented and competitive, and their leaders were hard-driving. The 'current culture' reflects this same trend. However, the rise of hierarchy culture, which got second place and adhocracy third, also indicated tension between stability and growth orientation. One possible explanation could be that during the period between T1 and T2, the entire global economy was affected by the financial crisis, which affected the PSB too. However, there was no long-lasting adverse effect of the problem on the profit efficiency of the Indian PSBs due to accommodative macro policies and sufficient liquidity in the system (Gulati and Kumar, 2016). However,

it made the PSB change its strategies. The primary focus of the CDPB was now on equipping it with more stability and growth orientation through efficient and smooth operations. It means that keeping the CDPB running smoothly was one of their top priorities.

T3: Current Culture

Figure 2 depicts the dominant culture in T3 as a hierarchy, followed by the market. Several factors seem to have contributed to cultural shift from market dominance in T2 to hierarchy dominance in T3. In the vision statements of CMDs between the periods from T2 to T3, the focus shifted towards sustaining the achievements rather than growth and innovation, and adhocracy occupied the last place. Market culture still popped up, but was no longer as prominent as it was in T1 and T2 indicating that management was satisfied with the status quo and not keen to experiment and undertake risky operations. Furthermore, whatever technological advances were required to make the CDPB competitive were already in place and now had to be harnessed to consolidate its position rather than make costly investments.

Preferred Culture from T1 to T3

Table 3

Mean values for cultures from T1 to T3

	T1			T2			T3		
	Mean	SD	SE	Mean	SD	SE	Mean	SD	SE
Current Culture									
Clan_n	3.35	0.88	.05	3.67	0.71	.04	3.62	1.16	.03
Adhoc_n	3.63	0.69	.04	3.69	0.77	.04	3.38	1.16	.03

Mkt_n	3.94	0.66	.04	3.87	0.59	.03	3.66	1.04	.02
Hier_n	3.54	0.76	.04	3.85	0.64	.03	3.74	1.04	.02
Preferred Culture									
Clan_p	4.56	0.61	.04	4.51	0.61	.03	4.05	1.02	.02
Adhoc_p	4.45	0.59	.04	4.46	0.57	.03	3.89	1.06	.02
Mkt_p	4.52	0.55	.03	4.57	0.73	.04	3.93	.99	.02
Hier_p	4.45	0.79	.05	4.51	0.53	.03	4.00	.99	.02

*n – Now; p- preferred

According to the mean scores of the culture type (Table 3), the preferred culture of the PSB is almost idealistic, with a desire to have the 'best of everything' barring a few exceptions. Clan and hierarchy were the employees' preferred choices throughout T1 to T3 (Figure 3). However, T2 was the exception when the preferred culture of the CDPB was market culture. Some possible explanations could be attributed to the employees' wanting a caring and supportive workplace, stability in their lives, good mentors, and a supportive team. The only time the adhocracy culture got some preference from the employees was in T1. Then the PSB shifted towards an online platform, installed ATMs rapidly, changed the brand logo, the working hours of the CDPB were changed, designated branches opened 24x7, appointed a new brand ambassador, and many new initiatives took place. All such decisions gelled well with the employees, and the management got their maximum possible support.

Clan culture is the preferred choice of the employees but they also wish to be

Figure 3

'Preferred' Culture from T1 to T3
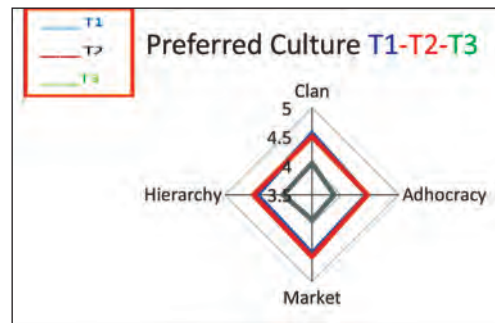
associated with the best in the industry as it gives a sense of pride and satisfaction. Thus, the CDPB's prestige and brand image were more vital to them than ever. The century-old legacy of the CDPB also guided them. The employees were aware of the transformational experience during T1, which led the CDPB to achieve a reputable brand in the industry. Therefore, in T2, when the situation was not that favourable and the Indian banking sector was not in good shape, they thought their CDPB could again achieve a respectable position by focusing on market culture.

Over the years, employees realised that the gap between the current and

ideal culture was narrowing, and organizational efforts were moving towards the desired culture. During this time, management was able to create a shared vision where employees saw their future in the growth and success of the CDPB.

ANOVA and T-Test

A one-way ANOVA was conducted to understand whether the change in culture from T1 to T3 is statistically significant or not. The results presented in Table 4 show that culture change is statistically significant.

Table 4

ANOVA test for T1 to T3

Culture Type	T1			T2			T3		
	Mean	Variance	P-value	Mean	Variance	P-value	Mean	Variance	P-value
Clan	3.36	.75	0.00	3.64	.51	0.00	3.62	.90	0.00
Adhocracy	3.64	.47	0.00	3.67	.60	0.00	3.38	.78	0.00
Market	3.94	.39	0.00	3.86	.37	0.00	3.65	.64	0.00
Hierarchy	3.56	.53	0.00	3.83	.42	0.00	3.73	.63	0.00

A paired t-test was conducted to understand whether the relationship between the current culture and the preferred culture is statistically significant or not. As presented in Table 5, the results were statistically significant.

Table 5

Paired t-test from T1 to T3

Culture Type	T1			T2			T3		
	Mean	Variance	P-value	Mean	Variance	P-value	Mean	Variance	P-value
Clan Now	3.34	.77		3.66	.51		3.62	.90	
Clan Preferred	4.55	.27	0.00	4.51	.37	0.00	4.03	.74	0.00
Adhocracy Now	3.63	.47		3.68	.58		3.38	.78	
Adhocracy-Preferred	4.45	.31	0.00	4.46	.32	0.00	3.88	.79	0.00
Market Now	3.93	.39		3.87	.37		3.65	.64	
Market Preferred	4.52	.24	0.00	4.57	.52	0.00	3.93	.66	0.00
Hierarchy Now	3.53	.54		3.84	.41		3.73	.63	
Hierarchy Preferred	4.45	.28	0.00	4.50	.28	0.00	3.99	.59	0.00

The location and level-wise ANOVA results reported no significant difference between the results, and dominant culture was found to be consistent across levels and locations.

Table 6

Financial performance of the PSB during T1 to T3

Year	Key Indicators (in %)		
	Return on Asset	Net Interest margin	Return on Equity
T1	0.72	3.05	--
T1	0.8	2.9	--
T1	0.98	2.91	19.56
T1	1.1	2.74	22.19
T1	1.18	3.12	20.31
T2	1.12	2.97	19.04
T2	0.82	2.66	14.43
T2	0.69	2.36	13.21
T2	0.48	2.31	9.3
T2	-0.8	2.05	-11.92
T3	0.2	2.19	4.21
T3	-0.34	2.43	-4.05

Organizational culture and financial performance of the PSB

The financial performance of the CDPB is presented in Table 6. The dominant culture of the CDPB, as indicated in T1, was a market culture led by adhocracy. During this period, ROA and ROE were positive. NIM was also represented as the second-best value under investigation. An upward trend is noticeable in almost all three ratios from T1 to T2. It indicates that the dominant culture is appropriate for the profitability of the CDPB. In T2, the dominant culture

of the CDPB was still market culture followed by hierarchy. A consistent decline was seen in ROA and ROE from T2 to T3 retreating into negatives. NIM had also consistently declined except for some improvement in the years. The dominance of market culture of T2 phase had changed to hierarchy culture during T3 round. The financial performance of the CDPB was at an all-time low under investigation. It indicated that the culture at the place was not conducive to the CDPB's profitability. Thus, a pattern was noticeable about the relationship between the changing dominant cultures and the financial performance of the CDPB.

Discussion

It is observed that the existing literature on culture change in the public sector focuses mainly on the developed western market context. While extant literature largely emphasises on the need for greater autonomy, transparency, horizontal integration, and change in leadership style (Hijal-Mogharabi et al., 2017; Moon, 2016; Ruijer & Huff, 2016), there is a lack of empirical studies in the emerging market context that discusses culture change issues in public sector banks. This study, to some extent, tries to fill the gap by providing empirical insights into the role of culture change and its impact on financial performance. Methodological contribution of this paper is that OCAI is used for collecting data for past (then) culture in addition to the existing format of capturing perception about current and preferred culture. One of the significant contributions is that this

paper covers ten-year-long journey of the bank through a longitudinal study.

In an open economy banking like other industries goes through turbulence and competitive phase having a ripple effect on their performance and survival. With this backdrop, a longitudinal study was carried out in three phases using a similar questionnaire. According to CVF, the market and adhocracy culture are sensitive to changes in the external environment that facilitate firms' adaptation to the developments in the market (Calcolari et al., 2018; Tseng, 2010; Zhang & Zhu, 2012). Building upon this argument, it is clear that when CDPB's culture was skewed towards the market and followed by adhocracy, its financial performance improved. It was also found that hierarchical culture breeds structural rigidity, makes adaptation to external environmental changes difficult and negatively impacts financial performance (Fekete & Bocskei, 2011). In sum, the findings of the current study are consistent with the previous studies that found OC influences the firm's market performance (Morgan & Vorhies, 2018; Ortiz & Arnborg, 2005). According to Craig (2010), market culture instils better treatment of employees so that they can continue to create customer value. Thus, market culture strikes a balance between external and internal orientation. Other inferences are that there is merit in capturing current culture and understanding preferred culture, that hierarchy was the preferred culture in T1 and T2, also the current culture of T2 and T3 indicates a shift towards hierarchical.

Framework of cultural change in the public sector:

This section draws inferences from data and assesses the findings from open systems approach, looking at the context of CDPB, top leadership and OC. The predominant culture of any organization is determined by the environment in which it operates the belief system of its employees, and its management style (Schein & Schein, 2016).

In the public sector, the influence of the larger public sector domain and primacy of political influence, bureaucratic structure, complex ecosystem with many stakeholders, intricacies of tasks are prevalent to a much greater magnitude. General environment of the public sector is as competitive as that of the private sector. Rao (2021) highlighted that the progressive reforms in PSBs could not bring the desired change in the working culture of the PSBs due to government monitoring. Environmental complexities in the PSBs require multidirectional and multilevel coordinated efforts. However, the industry environment continued to be turbulent and competitive. Nayak's committee (2014) also pointed out that there is little scope for improvement in PSBs till the public sector character is maintained. Schraeder et al. (2005) argue that failure to adapt to the external environment may lead to inertia that could erode confidence in the public sector. Hence, sustainable cultural change would not happen unless change flowed from a larger circuit of the public sector. In this regard, a study in South Asian context highlighted importance of looking into organizational factors in

fostering regulatory reform in the public sector when public sector organizations are more receptive to external changes and organization is headed by a strong leadership and evolve less authoritarian organizational culture (Park et al., 2021).

Overall business environment: Moderately competitive————————————highly competitive			
Public Sector context: political influence, bureaucratic		Industry context: Banking – regulated sector	
CDPB Culture shift			
T-THEN (Pre-change initiative phase)	T1	T2	T3
Clan Hierarchy	Market Adhocracy	Market Hierarchy	Hierarchy Market
Internal focus	*External focus*	*External – internal focus*	*Internal-external focus*
Role of leadership			
Fulfil stakeholders value	*Transformation of PSB*	*Sustained performance in challenging environment*	*to be a top PSB committed to fulfil stakeholders' values through care and competence*
Socio-cultural context: hierarchical, contextual, paradoxical			

The findings suggest that though the industry environment is instrumental in embarking on a different voyage, the sustainability of change is dependent on culture change (Fietz and Günther, 2021). Banking being a regulated sector, process orientation is embedded in the operating environment of the day-to-day functioning.

The summation of this longitudinal study (refer figure 4) is that for hundred years, PSB exhibited hierarchical and clan cultures that are internally focused and stability-oriented. Though transformation leader initiated a shift towards external focus (T1), yet, cultural transition has not stabilised in a decade as revealed in this study and classical bureaucratic contours are revived (T3), however over the years there was some appreciation for market orientation. According to Zalami (2005), alignment

between current and preferred culture determines whether culture change promotes or retards reforms. Schein (2009) argues that leadership and culture are two sides of the same coin, and one cannot be understood without the other. In PSBs, there is a dual influence of CMD and public sector culture. Organizations like Google, Microsoft, Toyota, Amazon develop an inherent organic ability to bring change in culture as per environmental requirements. It is noticeable that the leadership felt the necessity for change, as reflected in the mission statement (refer figure 4), whereas the mission statement of succeeding CMD was stability-oriented. Hence, these findings indicate that OC requires far more concentrated and continuous focused efforts to change deeply embedded cultural values and assumptions.

El-Taliawi (2018) argues that general view is that bureaucratic institutions as naturally resistant to change and innovation, which may not necessarily be true. However, this paper corroborates that though employees responded reluctantly to the initiatives undertaken by top management initially but with the passage of time positive results (refer table-6) started showing adaptive changes in employees' behaviour. These findings contradict extant literature which categorized public sector employees as resistant to change. While in this case they adapt with top leader's mission. Hence we can infer that culture shift happens due to employees' responsiveness to changes aiming at growth and expansion. Much

of the above analysis reveals that public sector employees are responding to change, and much of the extant literature undermines their readiness for change. In a recent study in Indian context, Rakatu et al (2022) found public sector banks have a consistently and considerably superior workplace culture, job performance, and employee engagement than private banks.

Knein et al. (2020) discuss the interplay between organizational cultural values and national cultural settings and suggest that this influences the behaviour of individuals within organizations. It also reveals that deep-rooted cultural values have the edge over employee demographics. Interestingly, by the time the third phase of data collection was undertaken, the bank had many younger generation employees, yet bank policies reversed to a hierarchical culture. Indians' desire for both competing values of OCAI is a reflection of paradoxical Indian culture. This shift in culture toward hierarchy can be attributed to alignment between an organization's culture, a CMD's culture, an industry's culture, and a nation's culture. Last but not least, India is characterised by a hierarchical culture, and the case supports the cascading effect of national culture and public sector domain on OC. At the same time, Indians are known for manifesting the trait of resilience, and their contextual sensitivity allows them to adapt to a variety of situations (Sinha & Kannungo, 1997).

Foregoing discussion highlights complexity and interplay of context, top leadership and OC. Therefore,

we propose that culture change in the public sector is complex and requires alignment among three dimensions: top leadership cultural values, OC, and industry culture. We found that its financial performance improved when the CDPB was aligned with these dimensions in the first phase (T1). In contrast, subsequent data collection rounds revealed a regression in culture to hierarchical and internally focused culture. Hence, change modules need to be revisited for crafting sustainable culture change in the public sector.

Implications, Future Research Directions, and Limitations

A comprehensive response is needed to deal with shortcomings in the existing system, which requires a turnaround in culture. PSBs are on the brink of such fundamental change. Hence, only structural and procedural modifications and competitive product lines do not guarantee culture change. This study offers another implication that there is a need to have an alignment between operating culture, top leadership vision, and industry culture.

Concerning practical implications, culture is a critical design element for the organization's performance, success, and growth. This study offers practical suggestions for government policy-making and strategic planning relating to public sector cultural change. There is a need to revisit educational courses on public management to prepare personnel to work in an uncertain environment, cope with the challenges of the public sector, and develop resilience. CMDs should be given more autonomy and

longer tenure to ensure continuity of change initiatives. Policy regarding encouragement and reward for public sector employees should be well crafted. The public sector should conduct a series of sessions and workshops to inculcate a change orientation among employees.

Future research may examine whether values that are considered dominant by employees are in line with the values of top management. Researchers can conduct comparative research at the industry level to explore the culture of public, private, and multinational banks. Future studies could also empirically investigate the relationship between changing culture and the financial performance of the PSB. Later studies can examine the relationship between top leaders' values and the organization's culture.

The limitations of the paper lie in covering only quantitative data, and subsequent studies should offer qualitative data collected during the longitudinal study. These findings are non-generalizable as the study is based on a single PSB. However, because of the similarities in the functioning of public sector organizations, these findings may provide some insights for other public sector organizations in developing nations.

Conclusion

Culture change is critical to public sector reforms to compete in today's volatile business environment. There have been few longitudinal studies on PSBs using CVF in an emerging market context, examining the past,

current, and preferred culture. This study fills an important gap in the literature by arguing that a market culture followed by an adhocracy culture is most beneficial to the firm's financial performance. Hierarchical culture appears to be out of step with today's volatile environment, providing only internal stability and preventing organizations from being proactive and customer-focused. Given the potential role of market and adhocracy cultures, organizations should prioritise the development of an externally focused culture. Longitudinal studies show that culture change is a slow process and that if sustained, concentrated efforts are not made, an organization can revert to its original culture.

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Predictive Analytics of Manpower Estimation using Markov Chain Model: A Real time Case on a Manufacturing Plant in Odisha

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Abstract:

Manpower management is one of the core functional area of any business operations. In practice, right deployment of manpower at right positions in right time is very crucial. People usually join their corporate life in multiple times in a calendar year at various positions. They also move across various levels due to usual corporate HR interventions at different times in a year as well. So, optimization and successful prediction of work-force movement in the verticals by aligning its way to reduce surplus and shortage is key to survival in business. Right prediction of work-force position movements at right time is crucial to every organization success.

This article focusses on insight of the optimization of human resources for key success of the organization. Results obtained from this study indicated the model validation when compared to actual data. The study took the data of a large steel making company in the state of Odisha and found this model useful for practice. The results indicated towards some suggestions for the company in employee hiring plans in future. Out of the available models available this 'Markov Chain' model application actually intends to show a positive direction towards decision making in managing and controlling the employee base.

Keywords: Predictive Analytics, Manpower Estimation, Markov Chain Model, Manufacturing Plant.

Introduction:

'Markov Chain Model' is instrumental in forecasting employee's transition from one position to another in both vertical and horizontal way. Modern corporates who are adopting various scientific approaches in corporate human resource planning are always in search of options to operate with minimal time and effort (Abaza, 2015). More algorithms are available to plan the human resources (Huang, 2004). Markov analysis, has got its significance to prove the inflow of manpower to respective positions from external as well as internal sources in different sector like Technical, financial and Logistics. Careful investigation and usage of some algorithm will help in developing various models to predict manpower flow across career levels inside the organization. Large companies often face challenges when they try to track the movement of employees internally. 'Markov Chain Model' was devised in year 1922 by Andrey Andreyevich. Markov is utilized by companies, to predict and validate the internal flow of employees that happened due to HR follow up actions like promotion or superannuation etc., apart from voluntary shedding of responsibilities and jobs by the employees themselves.

All professionally managed organizations should rely upon scientific models like 'Markov Chain Model' while doing manpower forecasting to avoid resource waste, (V. S. Narayan Rao, Economic Times). While tech savvy organizations use various models the 'Markov model' proves handy for even traditional companies. This research is aimed at interpreting the results of model application and compares the organization's actual flow to understand its applicability in Indian context.

The manpower planner has the usual responsibilities to foresee the demand and supply of human resources at different levels in the firm (Herbert G. Heneman, 1997). Effective use of manpower planning always focusses on solving problems on staffing functions including development and deployment of infrastructure facilities in the organizations (Udom, 2014.)

Further to development and deployment, planning includes building organizational hierarchy by assigning profiles of manpower to functional levels (Babu, 2017). Organization structure or hierarchy is paramount to functional effectiveness along with planning and aligning employees to their allocated unit (McClean, 1997). But certain situations like shortage or surplus of manpower always poses challenges the system. To cross over delicate situations like these, 'Markov model' proves an effective tool to support the efficiency and effectiveness of the manpower planning. 'Markov' analysis is considered as an effective model to handle the prioritizing of objectives by using suitable sequences of action with regard to the efficient utilization of labor under reasonable cost and rewards (McClean, 1997). 'Markov' analysis supports various other functions like future manpower requirement through suggested volume of recruitment either in way of outside

invitation or by internal transfer. It identifies the wastage of manpower as well.

Review of Literature:

In absence of required systematic method estimating the manpower requirement, companies may be in a sticky situation facing the hiccups in managing human resource. The absence of deputing right persons at the right time may make matters worse for accomplishment of corporate objectives. There is high possibility of experiencing losses if the organization is unable to utilize the opportunities. All these factors potentially affect both manpower demand as well as supply forecasting (Belhaj, 2013).

Manpower planning includes forecasting personnel inventories for a long-term plan for recruiting, assigning, and developing personnel. (uan Varela and Sergio, 2011).

Quantitative forecasting analysis on internal and external supplies in an organization is indicated by the turnover ratio of enterprise's human resources. Traditionally human resource department in an organization used to rely on manager's personal experience laced intuition and that's usually qualitative in nature. But in practice, often this creates a pseudo professional HR environment eventually resulting in either a shortage or surplus type of situation. On the contrary, an efficient planning based on a scientific model leads to a better understanding of the 'in' and 'out' of an employee. This scientific process would help to resolve

any employee shortfall or surplus issue in organization. One of such scientific and quantitative methods preferred by the organizations to solve this type of problem is 'Markov Chain Model'.

This article holds the key element for influencing the organization performance through infrastructure facilities and proper allocation of man power using 'Markov' model for organizational success. (Guerry, 2010). Predicting is the process of making decisions about future events whose actual significances have not been seen yet. Manpower planning dwells up on two serious steps. One is on estimating the manpower demand accurately and the second one is to ensure the manpower supply to meet the demand in future (V.S. Narayanrao, Economic Times). Demand and Supply forecasting of manpower goes concurrently. Manpower planner's job is to take suitable steps to bridge the gap between Demand and Supply. This process is mainly intending to optimize to ensure sound organizational health. (Hugh Courtney, 1997).

Manpower planning is very important task to make use the effective resources as per the company needs. Only if proper manpower resources are planned effectively and efficiently the objectives of the organization can be reached. Human resource planning is the process of getting the right number of qualified people into the right job at the right time. The process of matching takes place with the supply of manpower towards the requirements of the organization.

According to (A.C. Georgiou, 2022) successful attainment of human resource

planning can be possible only taking reference to the existing inventories. (Maurer, Conceptualizing and Measuring The Economic Effectiveness of Human Resource Activities, 1998). The inventory classification takes place with the personal in an organization in addition to counting their number. Main objective of this Markov analysis is to fit the personnel available to various positions in an organization.

Out of various techniques available to forecast internal labor supply 'Markov analysis' is one of the most useful and relevant technique. The processes of 'Markov analysis' helps the organization plan for human resource in the organization. Unsuccessful human resource planning may lead to organization saddled with employees with irrelevant qualification and poor skills or loaded with unwanted employees whose pay and benefits may cost a business dearly.

Methodology and Data interpretation

The research took one Indian large-scale steel manufacturer as sample. 'Rourkela Steel Plant' in Odisha is one of the largest steel producers managed by Government of India owned 'Steel Authority of India Limited'(SAIL). Apart from steel plant in Rourkela, SAIL has other steel manufacturing plants at other places like Bokaro, Bhilai in India. Alike other corporates every year there is a flow of manpower across the levels in the plant. With an intention to test whether the predicted value aligns with the actual real time, value one hypothesis was taken into consideration and the statistical tool of Chi-Square test of significance of 95% was considered for testing the hypothesis. The hypothesis taken into consideration is basically a test of significance to check the real time usage of the model fitness. The concept of the model observed values and the actual flow of manpower is getting compared. The residue year value is getting compared with the predicted value for that year. In this context the historical data of past 5 years is considered and last year data where the actual data is available is compared with the model predicted value and the difference is analysed.

Table – 1 (Data of actual manpower levels of 6 years from 2015 to 2020)

Years Designation	2015	2016	2017	2018	2019	2020	Exit	Total
AGM	38	42	45	46	48	49	163	431
Asst Manager	16	20	22	23	23	30	84	218
Junior Manager	36	37	39	42	49	49	27	279
Junior Officer	186	186	186	186	389	389	72	1594
MTT	300	310	310	326	337	342	80	2005

H$_o$ There is no significant difference between actual and estimated value of manpower flow.

The above table depicts the real manpower flow in the company 'Rourkela Steel Plant'. In total, 7 designated officials are considered for this research. The levels from 'Assistant General Manger' to 'Junior Manager' is considered where people get their position changed due to internal promotions or transfers. Some people come from outside the organization in way of deputation. But a large chunk of people leaves the organization and marked as 'Exit'. Every year a lot of manpower leave across the levels. For example, in the AGM level in year 2015 total number of officials were 38 then 4 people were added within a year to make it 42 in year 2016. So actually these 4 people are not necessarily coming from immediate below level like 'Assistant Manager'. They have come from far below level like 'Junior Manager'; by giving departmental examinations. As it is said earlier the company might have brought people from other corporate houses on 'Deputation' basis for a particular period. So the internal movement of people on actual basis is displayed in next table for two year of 2015 and 2016. Again, in the table the total exit of people in all these six years (2015 to 2020) is 163. So when we calculate the numbers of exit as per level we take a summation of all these years exit.

Table – 2 Data for two years on various positions showing the internal movements.

2015/2016	AGM	AM	JM	JO	MTT	Deletion	Total
AGM	38	2	0	0	2	66	108
AM	0	16	3	1	0	33	53
JM	0	0	36	1	0	14	51
JO	0	0	0	186	0	15	201
MTT	0	1	0	1	300	30	332

While the table -1 showed a composite figure of manpower position for 6 years this table -2 shows the flow for 2 years of 2015 and 2016. The table-2 explains various positions and their movements inside the company. For example, in year 2015 the AGM positions was having 38 people but in next year of 2016 it went up to 42 so we come to know that 4nos of people were added to the position. These 4 people were in fact are promoted from the lower rank. 2 people promoted from 'Assistant Manager level and another 2 joined directly from MTT rank. Similarly, in next year 2017 the position saw 45 people (refer table no-1) indicating 3 more people were promoted from lower ranks. Likewise, the corporate database saw the historical data of various profiles. Internal movements are natural and due to reasons like promotion, demotions, lay off, retrenchment, attrition, or superannuation etc.

Table 3; Transition Matrix (for 2 years from 2015 to 2016)

2015 / 2016	AGM	AM	JM	JO	MTT	Deletion
AGM	0.351	0.018	0	0	0.018	0.611
AM	0	0.301	0.056	0.009	0	0.622
JM	0	0	0.705	0.019	0	0.274
JO	0	0	0	0.925	0	0.074
MTT	0	0.003	0	0.003	0.903	0.090

As per Markov chain model a transition matrix to be developed to show the real movement of manpower in any standard or trouble free 2 years to get movement weightage so to calculate its future movement predictions. A standard or normal year indicates where the company did not see any huge change either in loss or profit. The movement matrix is calculated for replication in proceeding years to get full movement matrix for all levels. For example, the company manpower flow here is considered for 2 years of 2015 and 2016. In the years 2016 the number of officers is 38 who were at the same position in year 2015 as 38. But the additional numbers of 4 were added to make it 42 in 2016 from 38 in 2015. This happened because of a direct promotional entry of 2 officers from Assistant Manager level and 2 officers from MTT level. The total number of manpower at the level of AGM in year 2016 is 108 including 66 deletions. So it is assumed that from year 2015 to year 2016, 38 people moved in same rank, 2 people promoted from Assistant Manager to AGM rank, 2 people moved from MTT level to AGM rank and 66 people left the organization

taking the total number to 108. Now the transition matrix is developed by dividing all these numbers from total number. For example, the 38 number is divided from 108 to get a score of .351. Similarly, the number 2 is being divided from 108 to get a score of .018. The deletion vectors are coming by division of 66 to 108 to get .611. In this way the interim transition matrix is being developed for future use to predict the movement of people. Likewise, all the other levels are also calculated to get a complete transition matrix.

Now the transition matrix will be used for predicting further movement of manpower. As per the record of the company the 2019 actual manpower position is as follows.

AGM – 48, AM – 23, JM – 49, JO – 389, MTT – 336

Now as per the model requirements the manpower position of 2019 will be used to get a predictive position in next year of 2020. Then the 2020 actual value of the company is getting compared with the Markov Chain model estimated value to taste the efficacy of the model in real sense.

Table 4 (Function of Transition Matrix and Base Year2019 to predict for year 2020)

2019 / 2020	AGM (48)	AM (23)	JM (49)	JO (389)	MTT (337)	Deletion	Numbers in year 2020
AGM	0.351 x 48 = 16.848 = 17	0.018 x48 =.864 or 1	0 x 48=0	0 x 48=0	0.018 x 48= 1	0.611 x 48 = 29.328 or 29	48
AM	0 x 23=0	0.301 x 23=20.723 or 21	0.056 x 23= 1.288 or 1	0.009 x 23= .207 or 0	0 x 23=0	0.622 x 23=14.306 or 14	36
JM	0 x 49=0	0 x 49=0	0.705 x 49=34.545 or 35	0.019 x 49=.931 or 1	0 x 49=0	0.274 x 49=13.426 or 13	49
JO	0 x 389=0	0 x 389=0	0x.389=0	0.925 x =359.825 or 360	0 x 389=0	0.074 x 389 = 28.786 or 29	389
MTT	0x337=0	0.003 x 337=1.011 or 1	0x337=0	0.003 x 337=1	0.903 x 337 = 304.311 or 304	0.090 x 337=30.33 or 30	336

Markov Chain Model prescribed estimated manpower position in year 2020 is a function of transition matrix vectors and real position in the year 2019. See the table above to get the estimated values for year 2020. The position wise numbers of year 2019 are multiplied by the transition matrix values to get a summarized value for each level.

Table – 5: (Chi-square calculation to prove Hypothesis)

Actual Value 2020 (Observed)	Estimated Value (E) 2020	(O – E)	(O - E)²	(O – E)²/ E
49	48	1	1	0.020
30	22	8	64	2.133
49	49	0	0	0
389	389	0	0	0
342	336	6	36	0.105

To test the hypothesis the Chi-square test is considered here. The null hypothesis goes as no significant difference between the observed(O) and estimated (E) value of the manpower position of the company in the year 2020. The actual flow or the position of manpower is available and getting compared with the calculated value or estimated values derived by the model.

From the above (Table.4) observation, it is to infer that, if the critical value is less than the   estimated or calculated value at the significance level of .05 then we are to reject the Ho. on the contrary if the critical value is greater than the estimated or calculated value then we are supposed to accept the Ho. As per our calculation here our df is 4 and sig..value is .05 so we get a critical value at 9.488 by referring the statistical value of Chi-square. Now as per the method, when we calculate the value we are getting an estimated value at 2.258 whose detailed calculation is given below.

Estimated or Calculated Value = $\sum$ (O - E)^2 / E = 0.020 + 2.133 + 0 + 0 + 0.105 = 2.258

As on principle, if the critical value of 9.488 is greater than the estimated or calculated value of 2.258 then we are going with the null hypothesis, which is happening here. So if we accept the null hypothesis it is statistically proven that there is no significant difference between the observed as well as the estimated or calculated values by the model. So in the company the actual manpower flow is showing the same as per the model estimation or in the statistical meaning there is no difference between the model calculations and actual flow. So this model can be worked out for further predictions.

Discussion and conclusion

As per the above calculation the critical value is higher than the estimated value which should have been reverse if at all the null hypothesis is to be rejected but, in our research, we found it to be opposite. As the critical value of 9.488 is much higher than the model estimated value of 2.258 so we accept the null hypothesis saying that there is no difference between the two values. Hence the Markov Chain model is perfectly working in this research and any company can use it to successfully predict their manpower position by using a previous year actual data. In this process, further yearly calculation can also be done as much as the years required for the company to know its predicted manpower positions to be ready to tackle any shortage or surplus issues of manpower.

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Entrepreneurial Cluster Branding Influencing Sustainable Cashew Market: A Case Study

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Abstract:

Entrepreneurs who express their unique individuality tend to remain competitive in the market as they confront challenges and cultivate a strong brand image. Cluster branding, a strategy that unites businesses within a specific geographic region under a common brand, is a rare occurrence, as seen in the case of cashew production in Palasa, Srikakulam district, Andhra Pradesh. Despite Palasa's well-known reputation, cashew entrepreneurs predominantly opt for individual branding instead of harnessing the location's image for cluster branding. This silence surrounding cluster branding implies that there are both positive and negative attitudes toward the idea of collectively promoting all cashew merchants under a single brand. The study's primary objective is to identify various determinants, categorized as either promoting or hindering cluster branding within this context. The research methodology employs a descriptive design and a quantitative approach. Data is gathered from the target population of Palasa's cashew entrepreneurs through a semi-structured questionnaire, using stratified random sampling and a cross-sectional survey. The collected data is analyzed using descriptive statistics to assess demographic characteristics. Additionally, a factor analysis is conducted to extract key variables that are likely to have a significant impact on the sustainability of the cashew business in Palasa. The findings not only identify factors that positively influence cluster branding but also shed light on negative factors that can complicate individual business development. These insights offer valuable guidance for management decisions, and recommendations are put forth to pave the way for sustainable progress in the cashew industry.

Keywords: Palasa Cashew, Cluster Branding, Positive determinants, Negative Determinants, Factor Analysis

1. Introduction

The introduction of cashew trees to India can be attributed to the Portuguese. They initially introduced cashew cultivation in Goa, and from there, it spread throughout the country. Today, commercial cashew farming is practiced in eight Indian states, with a concentration along the west and east coasts. Notably, Andhra Pradesh stands as a significant contributor to cashew plantations, while Maharashtra leads in both production and productivity.

The cashew processing industry is categorized as an agro-based sector, playing a pivotal role in the Indian agricultural landscape. However, it is important to note that this industry remains highly unorganized and fragmented. Despite its decentralized nature, it plays a crucial role in generating employment for a substantial portion of the population, directly or indirectly providing wages. An interesting aspect is that the cashew industry largely relies on a female labor force, constituting approximately 90% of its workforce, thus making it a source of improved living standards for both men and women.

The emergence of the COVID-19 pandemic had a profound and adverse impact on the global cashew market. The global lockdowns, which were imposed to curb the spread of the virus, disrupted distribution channels, negatively affecting the cashew industry. This disruption hindered value addition activities and subsequently reduced the availability of cashew nut end-products in the market.

Cluster branding presents numerous advantages to the cashew industry in Palasa. It fosters high sales volume, unites entrepreneurs, enhances competencies, and provides geographical recognition. Furthermore, it leads to market expansion, facilitates export marketing, reduces overall costs, stabilizes pricing, promotes shared infrastructure, suppliers, and distribution networks, and unlocks a plethora of market opportunities. Cluster branding also elevates brand trust, fosters brand awareness, visibility, and loyalty, while promoting growth and competitiveness for regional products. This approach enables scalability, increased productivity, and rapid growth, thereby reducing consumer search costs. It also enhances the industry's reputation, fosters knowledge sharing among partners, reduces risks and complexity, and strengthens product brands. Cluster branding promotes transparent market price information, lowers operational costs, fosters opportunities for innovation, new business ideas, expansion, and paves the way for international market penetration.

The focus of this research study is to comprehensively analyze the factors influencing cluster branding in the Palasa cashew industry, specifically exploring the positive and negative determinants affecting this region's cluster branding. The research aims to offer insights and recommendations for the implementation of cluster branding in the Palasa cashew industry, shedding light on its potential benefits and challenges.

2.   Research Objectives

The objective of the study is:

- To study the overall operations of cashew industry in Palasa.

- To identify the absolute factors influencing cluster branding in Palasa Srikakulam District.

- To assess the impact of extracted positive and negative factors influencing cluster branding.

3.   Literature Review

Numerous scholars and experts have delved into the intricacies of branding and cluster branding, shedding light on the significance, challenges, and potential benefits of these concepts. Let's explore and expand on the insights provided by these scholars.

Clusters represent concentrated geographical hubs comprising a network of closely interlinked companies, specialized suppliers, service providers, and associated institutions, all operating within a specific industry or field. This concept, as introduced by Porter in 1990 and further elaborated in 1998, highlights the geographical proximity of these entities as a crucial factor in their interactions and collaborations.

In the extensive body of cluster literature, there is a consensus that firms located within clusters stand to gain a multitude of benefits directly related to their geographic proximity. These advantages, in turn, have a positive impact on a firm's competitiveness and its prospects for international expansion. Notable scholars like Enright (1995)

and Porter (1998, 2000) have affirmed the existence of these benefits.

Scholars and experts in the field have underscored the significance of cluster reputation as a driving force in the success of firms operating within clusters. Research conducted by Porter (1998), Lundequist and Power (2002), and MacGregor and Hodgkinson (2007) has emphasized the pivotal role of cluster reputation.

Farhan (2012) emphasized the multifaceted nature of a brand, defining it as a blend of name, symbol, and offer. This amalgamation creates a unique brand identity that stands out among various choices. Different brand strategies aim to build brand awareness, which is crucial for customer recall during the purchase process. This underscores the importance of crafting a distinct and memorable brand image.

Marcus Anersson (2012) highlighted the advantages of cluster reputation, including recognition, reduced risk, and complexity. Managing a brand's identity, positioning, and audience targeting are key responsibilities of the brand owner. However, cluster branding presents challenges related to ownership and control. While often seen as a communication challenge, the strategic aspects and place-making elements are sometimes overlooked, leading to difficulties in differentiation.

Hongbo Tu (2011) emphasized the objective of the cluster-brand clusters model: increasing brand recognition at all levels, particularly focusing on cluster brand development and delivering high-

value market offerings. This approach aims to establish a strong and pervasive brand identity across various segments of the market.

Aihua Xiong & Fuhua Wang (2007) underscored the exponential development of competitive abilities through cluster branding. Continuous competition under a shared brand fosters mutual respect and credibility. The cluster brand can drive businesses into a more cooperative phase, moving away from harmful competition and toward a deeper understanding of the market.

Kasabov, Edward and Usha Sundaram (2016) acknowledged the mixed results of promoting a brand aligned with geographical identity. They suggested that effective management of conflicts, differences, and discord is essential for such branding endeavors. However, in cases where a cluster, such as Palasa cashew, has a strong and cohesive identity, achieving success may be less challenging.

Ozlem Ozkanli and Erdal Akdeve (2006) stressed the importance of innovation in clusters for enterprise competitive advantage. Small and medium-sized enterprises (SMEs) within clusters stand to gain the most from innovation. The benefits of clustering extend to increased profits, exports, economic growth, competitive advantages, innovations, knowledge diffusion, technological growth, and productivity.

Zhao Jing's study in 2012 delved into the realm of enterprise branding within the context of cluster branding.

Employing signalling theory, Zhao Jing investigated the intricate relationship between cluster branding and the brand value of individual enterprises. This research provided valuable insights into how the broader cluster branding efforts influenced the perception and value of each enterprise's brand.

In a parallel exploration, Liu Qin, in 2004, adopted game theory as the foundational framework for a study examining the decision-making processes of enterprises within clusters. The research aimed to elucidate how the presence and dynamics of cluster branding influenced the strategic choices of individual enterprises operating within the cluster environment. The application of game theory shed light on the intricate interplay between cluster branding and enterprise strategies.

Zhao Guanghua, in 2009, conducted a comprehensive analysis of the evolution mechanism and potential avenues for enhancing industrial cluster branding. This research culminated in the formulation of the rapid development diamond model, a conceptual framework designed to accelerate the growth of clustered enterprises. By delving into the mechanisms that propel the evolution of cluster branding, this study contributed to the development of effective strategies for industrial clusters.

Shifting the focus to the consumer perspective, the impact of cluster branding on consumer behavior came into sharp relief. In 2009, Bi Nan employed empirical analysis to establish that cluster branding exerted a significant

influence on consumers' perceptions of product quality under specific conditions. The study highlighted the intricate interplay between the cluster brand and consumer perception and suggested that these perceptions were shaped by certain contextual factors.

Niu Yongge, in 2011, embarked on an in-depth data analysis endeavor to discern the multifaceted impact of cluster branding on consumers. His findings were particularly illuminating, revealing that the effect of cluster branding on consumers was not universally positive. Instead, the impact varied depending on the nature of the industrial cluster. Some clusters were found to be well-suited for the development of cluster branding, while, for others, it was deemed less appropriate due to potential negative effects on consumers.

The exploratory analysis in this study seeks to uncover the significance of branding by investigating the specific contexts and the types of consumers for whom branding holds importance. Through this examination, the analysis identifies and distinguishes three distinct clusters of buyers: the "branding receptive" cluster, the "highly tangible" cluster, and the "low interest" cluster (Susan Mudambi, 2002).

In summary, these insights from various scholars featured the intricate nature of branding and the promising prospects of cluster branding. They also accentuate the challenges associated with cluster branding and the potential for substantial benefits in terms of innovation, competitiveness, and economic growth. Understanding these perspectives is essential for businesses and regions considering cluster branding as a strategic approach.

4. Method Mix

This research project was carried out in the vibrant and significant region of Palasa in the Srikakulam district of Andhra Pradesh, India. Palasa, with its population of over 57,000 residents, stands as a notable municipality in the northern coastal region of the state. The economy of Palasa is primarily driven by agriculture, including cashew cultivation, which has gained prominence over the years. The cashew industry is one of the major economic activities in the region, and it has contributed to the town's growth and recognition. It is home to a thriving cashew industry, boasting many processing units and numerous cashew factories. Palasa's cashews have gained a strong brand image in the market due to their quality and geographical origin. The name "Palasa Cashew" is recognized and sought after by consumers worldwide.

The researcher adopted a positivist stance, which seeks to uncover reality, causality, relationships, and outcomes through systematic and empirical investigation. The research was grounded in the belief that by understanding the underlying factors influencing loyalty, it would be possible to draw meaningful conclusions and make informed decisions. To achieve this, a combination of research methods, including surveys and the application of descriptive and inferential statistics, was employed to collect and analyse data.

The study followed a mixed research approach, combining both qualitative and quantitative methodologies, primarily relying on survey questionnaires. The research population encompassed entrepreneurs within the Palasa cashew industry. With a total of 500 cashew processing units of organized and unorganized, distributed across societies as follows

1. The Palasa Manufactures Association, Palasa, established in 1954 has 298 registered member as of now

2. Andhra Pradesh Industrial Infrastructure Corporation Ltd-Industrial Area Local Authority (APIIC – IALA) Palasa, established in 2004 with registered members of 148

3. Sri Chandeswari Cashew Association, Bahadapalli an unregistered association, established in 2017 is having 9 members

4. Haripuram Cashew Manufacturers, Haripuram, is having No of companies 22

5. Mandasa Cashew Manufacturers Association, Mandasa is having No of companies:23

For the population of 500, the size is determined through the formula:

Sample Size (n) = [Z^2 * (p) * (1 - p)] / E^2

n = (1.96^2 * 0.5 * 0.5) / 0.05^2

n = (3.8416 * 0.25) / 0.0025 = 384.16

So, for a population of 500, a sample size of approximately 384 would be sufficient to achieve a 95% confidence level with a margin of error of 5%.

Researchers randomly selected 385 individuals from the population of 500 by using a random number generator to ensure that your sample is representative of the population.

To achieve the research objectives, both primary and secondary data sources were utilized. The reliability of the data, as measured by a Cronbach's alpha coefficient of 0.703, indicates a good level of internal consistency, providing confidence in the data's reliability. Additionally, the validity of the research instruments was ensured through thorough validation tests conducted by experienced consulting experts.

The primary statistical analysis methods applied in this study was the Factor Analysis to identify the high loading factors through extraction process.

5. Analysis and Interpretation

5.1 Factor Analysis: The study has undergone with the factor analysis since the central aim is the methodical simplification of a number of interrelated measures which describes the data using many fewer dimensions than original variables. This is conducted to verify the data decreased to smaller set to understand more and better as well as the hidden patterns are found so as the overlaps.

Table 5.1: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.916
Bartlett's Test of Sphericity	Approx. Chi-Square	1.684E4
	Df	528
	Sig.	.000

As shown in table 5.1, the value of The KMO Measure indicates the variance proportion in the variables triggered by underlying factors is 0.916 which is good enough to undergo factor analysis with the data. Significant level of 0.00 signs sound to get along with factor analysis which may be useful with the data.

Table 5.2: Communalities

	Initial	Extraction
1. High sales volume will be generated through cluster branding	1.000	.735
2. Unity among entrepreneurs with respect to business operations is possible with cluster branding	1.000	.762
3. Competencies from outsiders will be increase and business will be developed through cluster branding	1.000	.789
4. Geographical identity of cluster branding will be advantageous	1.000	.712
5. There is a possibility of market expansion through cluster branding	1.000	.782
6. There are ample chances of export marketing through promoting cluster brand	1.000	.617
7. Overall costs are decreased while promoting the product through cluster branding	1.000	.700
8. Logistical resources are used with high optimization through cluster branding	1.000	.750
9. There is a Stability in pricing through cluster branding	1.000	.724
10. There is a chance of sharing infrastructure , suppliers and distribution network	1.000	.581
11. Strategies can be made jointly to promote cluster branding	1.000	.644
12. There is a possibility of brand trust through cluster branding	1.000	.791
13. There is a possibility of increasing brand loyalty through cluster branding	1.000	.782
14. There is a chance of independent dynamic development of region through cluster branding	1.000	.819
15. There is a possibility of providing the product with high and unique quality through cluster branding	1.000	.815
16. There is possibility of scaling the real growth of palasa cashew	1.000	.696
17. There is a possibility of increasing productivity through cluster branding	1.000	.814

18. Cluster branding reduces the consumer search cost	1.000	.861
19. Cluster branding boosts the industry reputation as a whole	1.000	.802
20. There is a possibility of high exchange of knowledge among the business players through Cluster branding	1.000	.676
21. Cluster branding reduces the business risk	1.000	.645
22. Cluster branding reduces the complexities in businesses	1.000	.725
23. Cluster branding enables the consumer to identify the brand easily without any confusion	1.000	.804
24. There is a possibility of guaranteed business volume through Cluster branding	1.000	.773
25. It creates confusion and conflict for ownership among marketers through cluster branding	1.000	.779
26. There is a possibility of not having control on operations	1.000	.702
27. There is a possibility of conflict for individual profit and growth	1.000	.791
28. Different Production processes with quality differences can't be promoted with cluster branding	1.000	.749
29. Individual branding will be completely damaged with negative image.	1.000	.757
30. There is no common agreement for different level of investors for cluster branding	1.000	.752
31. There is a possibility of conflicts in Overall operations through cluster branding	1.000	.792
32. Cluster branding does not allow any individual branding to have a positioning strategy	1.000	.664
33. Unorganised selling practices will be taken place through cluster selling	1.000	.809
Extraction Method: Principal Component Analysis.		

As can be seen in Table 5.2, the communalities specified as the variance estimates in all variables accounted for by the components. It can be understood that the communalities are considerably high and thereby shows extracted components representing variables to the considerable extent. Communalities of "Cluster branding reduces the consumer search cost" is high with 0.861 and "There is a chance of sharing infrastructure, suppliers and distribution network" is low in principal components extraction with 0.581

Table 5.3: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	19.970	60.514	60.514	19.970	60.514	60.514	13.486	40.866	40.866
2	3.609	10.935	71.449	3.609	10.935	71.449	7.482	22.673	63.538
3	1.018	3.085	74.534	1.018	3.085	74.534	3.628	10.995	74.534
4	.913	2.766	77.300						
5	.820	2.486	79.786						
6	.707	2.144	81.929						
7	.588	1.783	83.712						
8	.550	1.667	85.379						
9	.497	1.505	86.884						
10	.432	1.309	88.193						
11	.392	1.189	89.383						
12	.362	1.096	90.478						
13	.346	1.048	91.526						
14	.309	.937	92.463						
15	.282	.854	93.318						
16	.262	.795	94.112						
17	.253	.768	94.880						
18	.222	.674	95.554						
19	.204	.617	96.171						
20	.181	.547	96.719						
21	.149	.453	97.172						
22	.142	.430	97.602						
23	.124	.375	97.977						
24	.108	.328	98.305						
25	.098	.298	98.603						
26	.088	.267	98.870						
27	.080	.244	99.114						
28	.071	.215	99.329						
29	.057	.174	99.502						
30	.052	.156	99.658						
31	.050	.151	99.810						
32	.040	.120	99.930						
33	.023	.070	100.000						

Extraction Method: Principal Component Analysis.

There is a clear understanding that the requested extracted initial eigenvalues greater than 1 has resulted into three first components extending 74.534 percent of cumulative initial eigenvalues. Among the 33 listed variables, three components show the variability of 75% approximately. So the complexity of the dataset can be reduced through these three components with almost 25% of lost information.

Table 5.4: Rotated Component Matrix[a]

	Component		
	1	2	3
High sales volume will be generated through cluster branding	.779		
Unity among entrepreneurs with respect to business operations is possible with cluster branding	.822		
Competencies from outsiders will be increase and business will be developed through cluster branding	.805		
Geographical identity of cluster branding will be advantageous	.780		
There is a possibility of market expansion through cluster branding	.767		
There are ample chances of export marketing through promoting cluster brand	.636		
Overall costs are decreased while promoting the product through cluster branding	.644		
Logistical resources are used with high optimization through cluster branding	.603		
There is a Stability in pricing through cluster branding	.810		
There is a chance of sharing infrastructure , suppliers and distribution network	.530		
Strategies can be made jointly to promote cluster branding	.772		
There is a possibility of brand trust through cluster branding	.822		
There is a possibility of increasing brand loyalty through cluster branding	.825		
There is a chance of independent dynamic development of region through cluster branding	.694		
There is a possibility of providing the product with high and unique quality through cluster branding	.862		
There is possibility of scaling the real growth of palasa cashew			.578
There is a possibility of increasing productivity through cluster branding	.832		
Cluster branding reduces the consumer search cost			.710
Cluster branding boosts the industry reputation as a whole	.816		
There is a possibility of high exchange of knowledge among the business players through Cluster branding	.701		

Cluster branding reduces the business risk	.669		
Cluster branding reduces the complexities in businesses	.733		
Cluster branding enables the consumer to identify the brand easily without any confusion			.598
There is a possibility of guaranteed business volume through Cluster branding	.823		
It creates confusion and conflict for ownership among marketers through cluster branding		.840	
There is a possibility of not having control on operations		.813	
There is a possibility of conflict for individual profit and growth		.761	
Different Production processes with quality differences can't be promoted with cluster branding		.830	
Individual branding will be completely damaged with negative image.		.834	
There is no common agreement for different level of investors for cluster branding		.799	
There is a possibility of conflicts in Overall operations through cluster branding		.821	
Cluster branding does not allow any individual br0anding to have a positioning strategy		.684	
Unorganised selling practices will be taken place through cluster selling		.850	

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
    a.   Rotation converged in 5 iterations.

The first rotated factor is highly correlated with "high and unique quality through cluster branding", "increasing productivity through cluster branding", "increasing brand loyalty through cluster branding", "guaranteed business volume through Cluster branding "These variables are not specifically correlated with other components.

Second component correlated with" Unorganised selling practices will be taken place through cluster selling", "confusion and conflict for ownership among marketers through cluster branding" , "Individual branding will be completely damaged with

negative image", "Different Production processes with quality differences can't be promoted with cluster branding".

Third component is correlated with "Cluster branding reduces the consumer search cost", "Cluster branding enables the consumer to identify the brand easily without any confusion"," There is possibility of scaling the real growth of palasa cashew".

6. CONCLUSIONS

•   Palasa, a well-recognized region, boasts a bountiful cashew land, and its cashews are esteemed by consumers worldwide, owing to

the strong brand image associated with its geographical identity. This brand image, acquired from its geographical origin, presents an opportunity that could be harnessed to benefit all entrepreneurs, and it warrants attention and support from the government.

- While the concept of Cluster Branding, exemplified by "Palasa Cashew," has the potential to boost sales, it may not necessarily translate to increased individual profits. Furthermore, there may be challenges, including unauthorized pricing and underselling practices that could undermine the stability of the industry, necessitating robust regulatory measures by both the societies and the government.

- Cluster branding offers numerous advantages, including enhanced search ease, reduced confusion, streamlined distribution, and cost-effective promotion strategies, all of which can contribute to overall profitability. These benefits deserve attention and concerted efforts from all industrial entrepreneurs.

- The concept of ensuring a common baseline business for all

entrepreneurs has the potential to empower smaller players, promoting their sustainability alongside larger enterprises. This harmonious integration could be a significant step toward fostering inclusivity within the industry.

- The collaborative approach of shared investment in certain promotional practices could significantly reduce promotional costs, creating a win-win scenario for entrepreneurs and the industry as a whole.

- Pricing fluctuations are a common occurrence in the world of branding, and this is particularly expected in cluster branding. Therefore, proactive planning and strategies should be put in place to address these fluctuations effectively.

- However, it's important to note that maintaining control over operations may prove challenging with cluster branding. A loss of control can lead to a negative image and potential damage to the geographical identity of the product. Careful management is essential to ensure that cluster branding maintains its positive impact.

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Socio-psychological and Economic Impact of Covid Pandemic on Slum Settlers: An Assessment

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Abstract:

The study articulates the multifaceted impact of the Covid pandemic on slum dwellers. Specifically, the impact of the pandemic on economic endurance, social prevalence, and health occurrence of the informal settlers is enumerated and intrigued. Research papers in different forms are collected from Open Athens, Scopus, and Google Scholar databases. Search terms like "economic impact", "social impact", "Socio-psychological impact" "health and sanitation", "slums" "slum dwellers", etc. are used for assembling literatures. A mixed method of traditional review with bibliometric analysis is adopted for the study. The process of developing the concept, gathering of information, selection and rejection, analysis, and interpretation has been applied to replicate the research findings. By synthesizing the process, it was found that the pandemic has shaken the economic condition of the inhabitants in terms of loss of employment, degradation of income level, the burden of emergency circumstances, etc. In addition, overcrowding in tenements restricted isolation and fostered infection. It is pertinent that health problems and social issues have a large, negative, and long-lasting impact on slum habitats. On the other side, prolonged socio-economic issues created stress and anxiety for them.

Keywords: Economic Endurance, Social Prevalence, Health Issues, Covid Pandemic

1. Introduction

India is the largest growing populated country in the world.and replaced China in the recent past. With the growing population, currently, India is dealing with a variety of issues, the rise of slums is one of them. The growth of slums creates many challenges (Isunju et al., 2011) and at the international level as well (Gambo, et al., 2012). Such growth of informal settlement is said to be linear with the growth of the size and number of cities (Sahasranaman & Bettencourt, 2021) and the velocity and volume will hill in the future as well (Mahabir et al., 2016).

It has been seen that a large number of people are migrating from rural to urban areas which leads to an increase in the urban population and ultimately result in the formation of slum areas. There are a lot of reasons for the migration of the population. The main reason can be identified as the employment and for the settlement in the area having proper and basic facilities are easily and adequately available. From various studies, it can also be found that accessibility of good and quality education also gives rise to migration and displacement of youth from rural villages to urban towns. The peoples who are migrating are mainly job seekers, municipality workers, daily wage laborers, housemaids, students, etc. More than one billion people are residing in urban slums globally. Urban slums are defined as regions lacking necessities like water, toilets, sewers, drainage, and adequate housing. Slum dwellers are the most vulnerable urban populations, and they face more difficulties than people

who are residing in megacities (Deb & Rao, 2020). The slum dwellers are confronting lots of challenges for their survival. The basic challenges, they are confronting can be categorized in terms of Socio-psychological, Economic, and Health. Social issues like lack of drinking water, overcrowding, low level of education, social discrimination, etc. declined their standard of living in society. They are forced to live miserably as their hope died. The economic issues and challenges which act as a barrier to their growth include a low level of income, temporary employment, and non-availability of the fund during emergencies, no proper future plan, and no savings for future contingencies. It has been found that the people residing in slum areas are not exposed to good health and sanitation facilities. They faced problems like malnutrition, drainage problem, poor sanitization, hygiene problem, poor ventilation, etc. In spite of all these issues, they are not getting proper health services due to which they became susceptible to a variety of contagious diseases.

The slum-dwelling population in developing countries, which represents one-third of the total urban population was deemed to be the most vulnerably affected by the infection of Covid-19 (Akter et.al, 2021). It is true that the pandemic is indiscriminate and does not victimize on the basis of class, caste, ethnicity, or sex as its core, but few events have brought attention to the vast gaps in global public health as the Covid-19 pandemic has. The covid-19 pandemic has affected the place where

most social interaction occurs, as the coronavirus mainly spreads through contact with the affected people (Brotherhood et.al, 2022). Orders to remain at home and adhere to isolation rules are challenging to carry out in large cities where a significant section of the population lives in poverty and overcrowding (Ferrante et.al 2021). The emergence of Covid-19 impacted the lives of slum dwellers to a greater extent. The severity of the coronavirus was prove to be unbearable for the slum dwellers which changes their entire life. Due to corona infection, many of them lost their lives because of not getting proper treatment and isolation facilities. The corona pandemic took not only many lives but also made many people homeless, and jobless and many people are forced to migrate to other places also. Government agencies have worked vividly to uplift the condition. Government framing various policies making schemes for the slum dwellers. But all these are in vain unless and until these are not properly reaching the slum dwellers. So it is necessary to conduct a proper study on the socio-economic condition of the slum dwellers. Then a better policy can be framed as per the requirement and will help in making the country slum-free.

2. Objectives

The paper tried to explore the multi-faceted impact of Covid-19 on slum dwellers. The paper also analyses the socio-psychological impact based on overcrowding, social discrimination, and exclusion, lack of drinking water, low level of education, and vulnerable community. Economic concerns like low levels of income, temporary unemployment, no emergency fund, no future plan, and fewer savings have also been studied. Health and sanitization impact on the basis of drainage problems, malnutrition, poor ventilation, poor sanitization, anti-mosquito facility, road facility, unhygienic pit latrine, etc. are also analyzed.

3. Methodology

This article examines current literature on the multi-dynamic impact of Covid-19 on slum dwellers including socio-economical, socio-psychological, and health. A mixed method of the research of traditional literature review and bibliometric analysis has been adopted for materializing the objectives. Search engines like Open Anthem and Google Scholar were used to acquire research articles for the traditional review and the Scopus database is used for bibliometric analysis. The keywords which are used for the search purpose include "slum dwellers", "covid-19 pandemic", "socio-economic issues", "health and sanitization", "Psychological impact" etc. A total of sixty-five research papers from the year 2020 to 2022 have been taken for several analysis. A research design as suggested by Gibson & O'Connor (2003) in idea generation, collection, classifying, selection and interpretation has been drawn.

The workflow of the study started with selecting the keywords and database followed by an analysis of the data and interpretation of the results which is replicated below.

Figure 1: Workflow of the study

Source: Authors' compilation

4. Discussion

4.1 Socio-psychological Impact

The slums represent the highest level of urban poverty and constitute a case of particular vulnerability due to their overcrowded housing condition and lack of basic amenities that make it challenging to adhere to social distancing policies (Macchia et. al, 2021). (Nuwematsiko et al., 2021) found that as a result of the overcrowding and tight quarters of residents in Kampala's slums, social distancing, a crucial prevention tactic in the fight against Covid-19, is difficult to implement. Additionally, the lack of access to essential basic services including food, water, sanitation, and medical care makes slums even more vulnerable. The majority of the slum dwellers are poor. The number of Covid-19 positive cases has steadily increased, raising the question of whether the preventive measures are effective because they have forced slum dwellers to spend more time in crowded, dilapidated, single-roomed, low-quality shanties where people are required to share even occasionally overflowing toilets and bathrooms. Additionally, extended families wind up squashed in small houses, endangering the lives of senior individuals who work and fragile youngsters (Nyadera & Onditi, 2020).

Social discrimination and exclusion embedded by many such issues resulted in mental stress for the dwellers. Pandey et al., (2022) observed that the slum settlers were mentally worried due to the fear of infection by the virus. (Koly et al., 2021) traced that 53% of the respondents from slums have suffered from mild to severe anxiety and insomnia. The pandemic has affected the denizens of several nations both physically and mentally but slum dwellers suffered a lot due to their nature of habitant and societal conditions. Substantiated by Solymari et al. (2022) that the detrimental effect of the pandemic on slum dwellers is due to the degraded socio-economic conditions.

4.2 Economic Impact

The novel coronavirus (Covid-19) infected millions of people at an

alarming rate. Low-income groups and marginalized sections have suffered a lot both socially and economically. In this context, Shah et al., (2022)hormonal, neuromuscular, and environmental factors. Herein, we describe a case of 12-year-old scoliotic girl with a double curve of initially 26° thoracic and 23° lumbar, seeking chiropractic care. The therapy was provided three times/twice a week for 6 months. Adjustments of the spine through chiropractic, both soreness and mobility, were shown to improve. A total correction in Cobb angle of 6° (23% analyzed that the Covid-19 pandemic had unprecedented effects on the socioeconomically disadvantaged segment, and those effects are catastrophic. They were found to have extremely inadequate housing conditions and safety measures which could enhance the chance of Covid-19 transmission (Rahaman et al., 2021). In order to lessen the pandemic's effects on this vulnerable population, the public, commercial, and nonprofit sectors have all acted, particularly in the areas of health care and food security, because these economically challenged people make up a significant proportion of the population. In line of it, Aberese-Ako et al., (2022)in Ghana, most COVID-19 mitigating packages are not focused on vulnerable populations. Methods Concurrent mixed methods design was used to examine the socio-economic and health effects of COVID-19 among rural and urban-slum dwellers in Ghana. Four hundred respondents were sampled for the quantitative arm of the study, while 46 In-depth Interviews (IDIs opined that Covid-19 had negative socio-economic

effects on employment and food prices. During the lockdown female, household heads, daily wage earners, unemployed people, and tenants were a risk for poor food consumption status in both slums and non-slum areas (Buzigi & Onakuse, 2023)household food consumption scores (FCS. Other impacts included anxiety and depression as well as a fear of entering a hospital even when ill. The socio-economic implications of Covid-19 were more likely to affect young people (18-32 years old), men, urban slum dwellers, married people, employed persons, and low-income earners. During the Covid-19 epidemic, a higher percentage of low-income workers lost their income than workers in other occupations. Consequently, this worldwide economic crisis affected less skilled workers than skilled laborers (Pongutta et al., 2021).

4.3 Health and Sanitization Impact

After the pandemic, the situation was degraded for urban slum inhabitants and low-income groups. Before the epidemic had started, they already had a problem with the lack of access to health and sanitation services. Therefore, it is expected that accepting this large global epidemic will be a difficult task for them (Shermin & Rahaman, 2021). One of the key subjects in the fields of sustainable planning and public health is sanitation service. It is evident that low-income populations like slums or informal settlements cannot access basic sanitation services. In order to stop the transmission of this lethal disease, precautions such as deliberate hand washing, effectively

using water, and maintaining social distancing should have been practiced which is difficult for the slum dwellers. The preventive factors which include handwashing stations, the latrine's water supply system, and the number of users per latrine are closely tied to sanitation service and its quality. The health impacts of the Covid pandemic in slum areas might be intensified by poor and inadequate access to healthcare services in those areas. Slum dwellers infected with the virus or those in need of medical attention for other conditions may struggle to find accessible and high-quality health care and may be turned away due to a lack of resources in places where there is no universal health coverage and access to primary health care is already difficult (Tampe, 2020).

4.4 Bibliometric Interpretations

Most Relevant Words

The top relevant word articles are shown in Fig. 1. The word that received the most citation is 177 and is reflected in the bar chart which is claimed by the word "Covid". The second largest relevant word is claimed to be "Slum" and the word has been used 134 times in the research area. The remaining eight words have different numbers of relevant sources at levels 87, 80, 61, 53, 50, 47, 45, and 32, indicates by deep blue and light blue.

Figure 2: Most Frequent Words
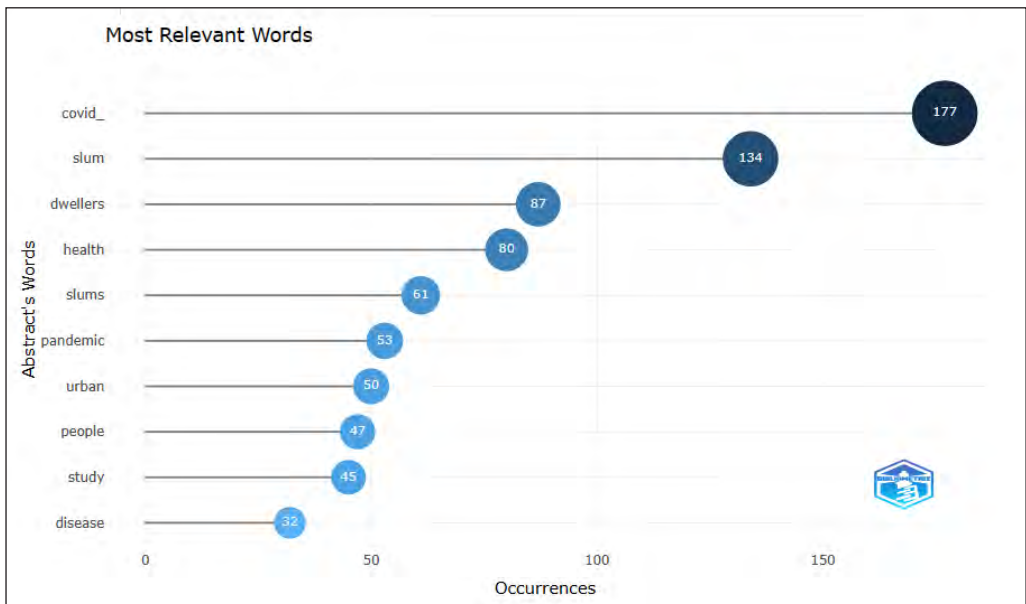
Source: Authors' Compilation

Word Cloud

The magnitude of the terms in the word cloud here reflects how frequently they appear. Although the order of the phrases is somewhat random, the most important ones are given a large size and placed in the center to make them more noticeable.

Figure 3: Visualizing the word cloud
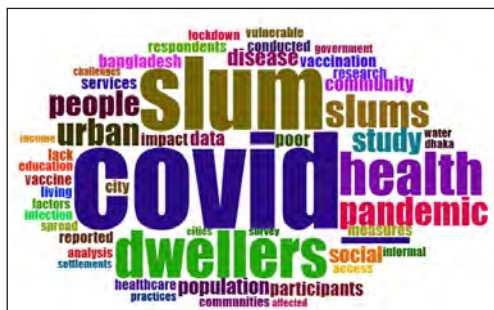
Source: Authors' Compilation

The word cloud in Fig. 3 displays the words that were most frequently used in the papers discussing the these of the current research work. The most common word is "COVID", the second most common word is "SLUM", and the third most common word is "DWELLERS" followed by Health, and Pandemic which implies that the researchers have studied how the Covid pandemic has affected slum Dwellers health and occupation.

Thematic Map

A thematic map is created, and divided into four topological regions based on density and centrality. The result came from a semi-automatic evaluation of the titles of all the papers which are selected for the study as well as additional relevant keywords (Other than the author's keywords) to catch deeper variations. The upper right quadrant contains "Motor" or "Driving" which are indicated by high density and centrality. The top middle quadrant contains specific and under-represented topics.

The emerging and vasic themes replicate covid, pandemic, health, and social. It can be inferred that even after a year fromm pandemic, still research opprtunities exists in socio-economic and health conditions of slum dwellers.

Figure 4: Thematic map with four topological regions

Source: Authors' Compilation

Thematic Evolution

The picture below shows how the themes changed from 2020 to 2022. The data shows a number of frequently utilized topics. On the left side, a few of the motifs that will be popular from 2020 are shown. There are three themes listed each with a different size depending on how commonly utilized it is. The most popular themes from the years between 2020 and 2021 are represented in the middle section, which has a total of four themes. In the year 2021 and 2022 the most popular topics are shown in the

right section. Five themes are listed, each habing a specifc size dependent on how it will be used.

The left section shows that in 2020. The word "Slum" has been first added to "Covid". The second word "Government" is added to "Covid" and "Disease". The third word "Country" is added to "Disease". In the middle section, the thematic evolution is reflected from the period of 2021. The first word "Covid" was added to "Slums", "Measures", "Covid", "Health" and "Future". The second word "Social" is added to "Slums" and "Measures". The third-word "Disease" is added to "Measures" and "Covid". And the fourth-word "Slums" is added to "Slums". In the right section, the theme from the period 2022 is shown. The word "Slums" is added to "Covid", "Social" and "Slum", the word "Measures is added to "Covid", "Social" and "Disease" Whereas the word "Covid" is first added to "Covid" and "Disease" and the last two-word "Health" and "Future" add to "Covid". The thematic evolution infers the pandemic effect on slum dwellers. All the slum dwellers are measuredly affected by the Covid pandemic.

Figure 5: Thematic Evolution
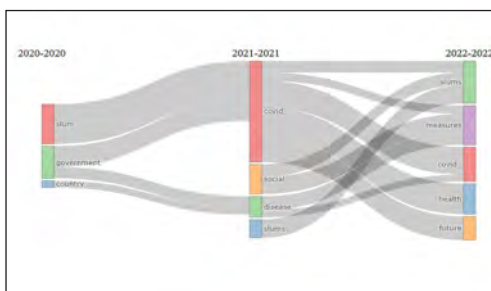
Sources: Authors' Compilation

5. Implication

The social and economic exclusion triggered the challenges for the slum dwellers during the pandemic. Social disruptions have many ill and odd effects (Sholihah & Shaojun, 2018). In addition, health aspects of many civilizations around the world have changed as a result of the Covid-19 pandemic. The pandemic and the ensuing government actions had severe effects on people living in urban informal settlements, both directly and indirectly. Curfews, lockdowns, and working from home are among the most widely used precautions against the virus, but they have ignored the fate of slum inhabitants, who are forced to choose between life and a living. Despite the lockdown policies and curfews, slum dwellers to spend more time in crowds, single-roomed houses, and run-down and common toilets are forced to share even at times of overflowing bathrooms and toilets. Use of such toilets creates several issues in form of contagious diseases for them (Isunju et al., 2011).

Mobile clinics with critical stocks can be strategically placed in slums to make up for the few health facilities by distributing e-food, and e-medical vouchers, utilizing technology and community health professionals to reach out to residents deep inside the slums. When it comes to handling the increasing number of cases of gender-based violence, social workers can be extremely helpful. Additionally, they can help the worrying number of teenage girls who became pregnant while the school was under lockdown by

providing counseling and advice. These at-risk groups might not contract the virus, but the circumstances in which they find themselves as a result of the pandemic's indirect effects necessities a serious reaction from the government and other stakeholders. Slum settlers' issues should not be dealt solely from physical point of view. Yeboah et al. (2021) emphasized that economic components are necessary for the regeneration of slums.

6. Conclusion

The paper lucidly elucidated the economic and socio-psychological impact of the pandemic on informal settlers. The research work is assumed to be first of its kind to address the socio-psychological issue of an emergency occurrence like pandemic and to entrench it with economic distortions and health disruptions. The nexus among all these three variables viz. economic exclusion, social commotion and health disorders proliferates chaos resulting stress and anxiety among the informal settlers. This finding of the study matches with the explications of Pandey et al., (2022) and Koly et al., (2021).

On the other side, despite the disease's harmful effects on the world as a whole, it should serve as a wake-up call for governments, particularly in regard to how those who live in informal settlements are handled. Short-term and long-term phases can be used to accomplish this. The government must immediately guarantee that these preventive measures are successful and appropriate for the problems faced by people from various socio-political and economic backgrounds. These can comprise a slum-specific policy document outlining socio-assistance programs for slum residents. For instance, given that lowering direct taxes may not have as much of an effect on the unorganized sector, the government may create another poor subsidy that would directly help those living in slums. Long-term remedies might be provided by the government by incorporating some of the lessons learned from Covid-19. For instance, a slum rehabilitation program may use less expensive technologies to create well-organized prefab dwellings. It is worth mentioning in this regard that relocation sites under rehabilitation programmes should be located near to the slums (Killemsetty, et al.,2021) by availing other economic and social benefits. Slum reintegration strategies across the world have failed miserable due to considering the only physical attributes and not accounting the socio-psychological factors. Similar incidents were witnessed in Nigeria (Ilesanm, 2012), Chennai, India (Nagarajan, 2017), Seoul, Korea (Dennis, 1990). In addition, beneficiary participation is key for the revival policy (Atia, 2019).

Numerous social, economic, and health-related issues will be addressed by these types of projects, which will improve the living condition of slum people. For instance, carefully through-out-low-cost housing efforts will give locals improved access to sewage, water, and electrical services. To help those living in informal settlements, the government

must engage social workers and their services more during and after the pandemic. The consequences of relying solely on government resources during the pandemic are obvious. Different stakeholders can deal with various problems that the pandemic is bringing up. Social workers must be classified as essential workers during the lockdown and curfew in order to allow them freedom of movement and access to the desperately needed services for slum inhabitants.

7. Future Direction of the Research

The present study has collected research articles from Open Anthem and Google Scholar databases. Dimensions, Scopus, and other popular databases could have been used for more effective research work. The number of literature reviews is limited to thirty which could have been significantly increased to obtain an optimum result. In addition, the core dimension of the study is categorized into social, economic, and health problems of slum dwellers. Other micro areas like financial literacy, bank accessibility, slum dwellers' knowledge and attitude, and financial behavior are ignored, the inclusion of all these factors could have provided more value to the study conducted. A model can be developed with the constructs

Figure: 6: Proposed Model
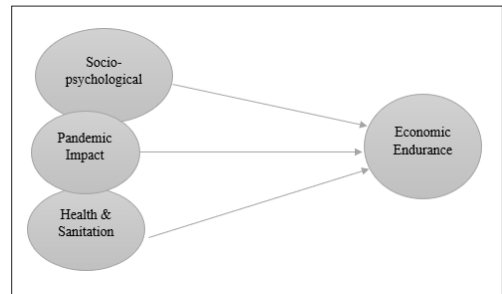
Source: Authors' compilation.

containing Socio-psychological, Pandemic Impact, Health and Sanitation with Economic Endurance that can be empirically tested. The proposed model is as follows.

8. Funding

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An Empirical Analysis of Volatility and Asymmetric Behaviour: Case of NSE and BSE

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Abstract:

The price, return and different events in stock market are uncertain but this uncertainty can provide insight for making investment decisions, if volatility is measured through appropriate model. In this research work, efforts are made to examine and compare the symmetric and asymmetric volatility in two major stock markets of India through the application of econometric models i.e. GARCH, TGARCH and EGARCH. Daily closing prices of NSE (Nifty-50) and BSE (Sensex) from 1st April 2010 to 31st March 2022 is used for the examination purpose. The results show that volatility in Indian market is persisted for a long time The asymmetric behaviour of volatility is also observed in Indian market. Findings are useful to design dynamic pricing, hedging and portfolio management strategies to all market participants.

Keywords: Stock Market Volatility, GARCH Models, Volatility clustering, TGARCH, EGARCH

Introduction:

Financial markets are considered as a barometer of economic growth of a country. The daily movements and fluctuations in the prices of financial instruments are reflected by these markets. The frequency at which prices of a security over a given period increase and decrease is understood as volatility. Volatility is calculated traditionally by taking daily changes in price and then annual standard deviation of these changes. High volatile stocks carry the risk of losing capital and investors avoid to invest in these stocks. It is generally assumed that increasing volatility is bad and difficult to establish link between volatility and economic growth. The financial markets organize the savings in more productive areas if economy is stable. The efficient allocation of savings and resources by financial sectors enhance economic efficiency. When financial markets work efficiently, the resources are moved to their best productive areas.

Volatility in stock market, is not surprising but it depends on overall performance of an economy. It is termed as random ups and downs in stock markets (Stock & Watson, 2004). The price, return and different events are uncertain and these are reflected by high level of volatility in concerned stock market (T. Bollerslev, 1986; Engle, 1982; Floros & Economics, 2008). Risk seekers can earn abnormal profits and risk averse investors can avoid their risk through proper measurement of volatility (Goudarzi & Ramanarayanan, 2011) (Ezzat, 2012). Volatility provides

high returns with high risk. Before taking investment decisions, investors should probe into market volatility for risk management (Arouri, Jouini, & Nguyen, 2012) (Kyriakou, Pouliasis, & Papapostolou, 2016) (Moreira & Muir, 2017). The high volatility shows that the values of securities have more potential to fluctuate in a given time, while in case of low volatility, the values of security has low potential to fluctuate dramatically. The increased market return results in an increased volatility in the stock market (Dixit & Agrawal, 2020).

Indian stock market is very renowned as it is one of the oldest and most robust market in Asia. It is outperforming consistently and continuously from last decades. The expanded returns integrate it with other stock markets globally (Kundu & Sarkar, 2016). It has become popular among international investors to obtain benefits of diversification. (Xuan Vinh and Ellis, 2018). So, requirement is to re-investigate the nature and pattern of stock market volatility.

The present study investigates the movements in two major stock markets (BSE and NSE) of India that represent the whole Indian stock market and explores the existence of asymmetric behaviour there. Following the introduction, Section two includes review of literature, section three explains the techniques used to model the volatility, section four explains the interpretation of results, section five includes conclusion, section six future implications of the study and last section explains the scope for further research.

Literature Review:

The stock market return series display the feature of volatility clustering, leptokurtosis and leverage impact (Fama, 1965) and (Black, 1976). Modeling volatility is treated the most important concept in finance. Various econometric models are proposed by researchers to efficiently capture the characteristics of stock market behaviour. In this series ARCH and GARCH models are given by Engle (1982), and Bollerslev (1986) respectively and later on some advance versions of these models are propounded by researchers. The brief review of empirical findings of researchers globally in different time frames is as follows:

There are several methodological review conducted to find out the best model to measure the volatility, some concluded GARCH (1,1) model as the best model to describe and measure the stock market volatility and these studies also identified that leverage impact can be sufficiently measured through asymmetric GARCH models. (Gokcan, 2000) proved that GARCH (1,1) model was efficient in volatility prediction in emerging markets. The Athens stock market showed the asymmetric impact of news on stock market return when studied through GARCH (1,1) model (Siourounis, 2002). GARCH model was found as most suitable model to characterize the data in Hong Kong, which passes on all criteria and appears relatively consistent with the asymmetry existed in that data (Henry, 1998). (Liu & Morley, 2009) again studied the Hong Kong stock market from 2002-2007 by

GARCH models and found it better than historical models. The study of US stock market volatility (conditional variance), by taking daily data of S&P 500 from January 01-01-1996 to January 29-01-2010 is done by using GARCH (1, 1) model and its advance models. Although the leverage effect was presented there, even then the symmetric GARCH model proved better to forecast conditional volatility in US market in comparison to asymmetric GARCH models (P Srinivasan, 2011).

1.1 Global Stock market and Volatility

Some studies that are conducted to compare the different asymmetric models report that EGARCH model is best to estimate the volatility in different markets. The prediction of volatility is done through asymmetric models in different countries (Gokcan, 2000) and (Miron & Tudor, 2010). When GARCH family models were applied on daily data of CMA index of Egypt and TASE-100 index of Israel to model the volatility in these markets, the EGARCH coefficient with expected sign was found significant showing asymmetric impact of news on volatility (Floros & Economics, 2008). The study of Ahmed and Aal showed that EGARCH model was the best to model the asymmetric volatility in stock market of Egypt from 1998 to 2009 (AbdElaal & Economics, 2011). But when the volatility of Khartoum, Cairo and Alexandria Stock markets was examined by using daily closing prices, GARCH-M model was found best to describe the conditional variance in both markets and leverage effect was

found existed there (Abdalla, Winker, & Finance, 2012). A study volatility in India and China by using GARCH (1,1) model resulted that volatility in China is highly persisted than India. When the Impact of Eurozone debt crisis is studied on stock market of China, Hong Kong, Japan, and India the existence of clustering, leverage impact and persistence of volatility are proved by this work through EGARCH model used from 2005-2011.The features of clustering, existence of asymmetry and leverage impact are noted in stock returns of Japan, China, Hong Kong, and India (Singhania & Anchalia, 2013). When EGARCH and GJR-GARCH are applied on Nasdaq-100 index from 2000-2019, it is found that volatility shocks are quite persistent and index has leverage effect also exhibits clustering (Aliyev, 2019). In the same line, the asymmetries and persistent in volatility were observed for daily returns of Pakistan stock exchange between 2006 and 2020 (Umar, Mirza, Rizvi, & Furqan, 2023).

1.2 Indian Stock Market and Volatility

The same efforts are made by researchers in India also to study the nature of existed volatility in Indian stock market. Some studies are as follows:

When the time-varying volatility is modelled by taking the sample from NSE to check the impact of financial crises of 2008, the irregular and persistent volatility was found by both GARCH models (symmetric and asymmetric) that has been increased

after this financial crisis (Tripathy & Gil-Alana Luis, 2015). A study showed the existence of time varying volatility in S&P Nifty for the time period from 2001-2010, in which the current volatility was found highly impacted by past volatility. Investors are able to forecast their returns under different market situations, by identifying the persistence of conditional volatility (Mehta & Sharma, 2011). When different models from simple GARCH (1,1) to advance versions of this model were used on daily data of SENSEX returns from 1996 to 2010, the symmetric GARCH model was found superior to measure the volatility (P. Srinivasan & Ibrahim, 2010). To find out the features of volatility in India, Srivastava used the data of SENSEX and NIFTY and reported that the leverage and ARCH effects were existed that can be measured by using GARCH models accurately (Srivastava, 2008). Again GARCH model is found superior to accurately measure and capture the features of volatility in S&P BSE 500 Index (2007-2016) with the features of volatility clustering and leverage impact existed in India (Susruth, 2017). When volatility is estimated by using data of S&P CNX500 index of NSE for 10 years (2003-2012) through GARCH, E-GARCH and TGARCH models, the results showed that the current volatility is highly impacted by past volatility in comparison to past shocks and news. Also, there exists a leverage impact in S&P CNX500 because the volatility is higher in case of negative shock rather than positive shock. It is also found the volatility shocks took long time to
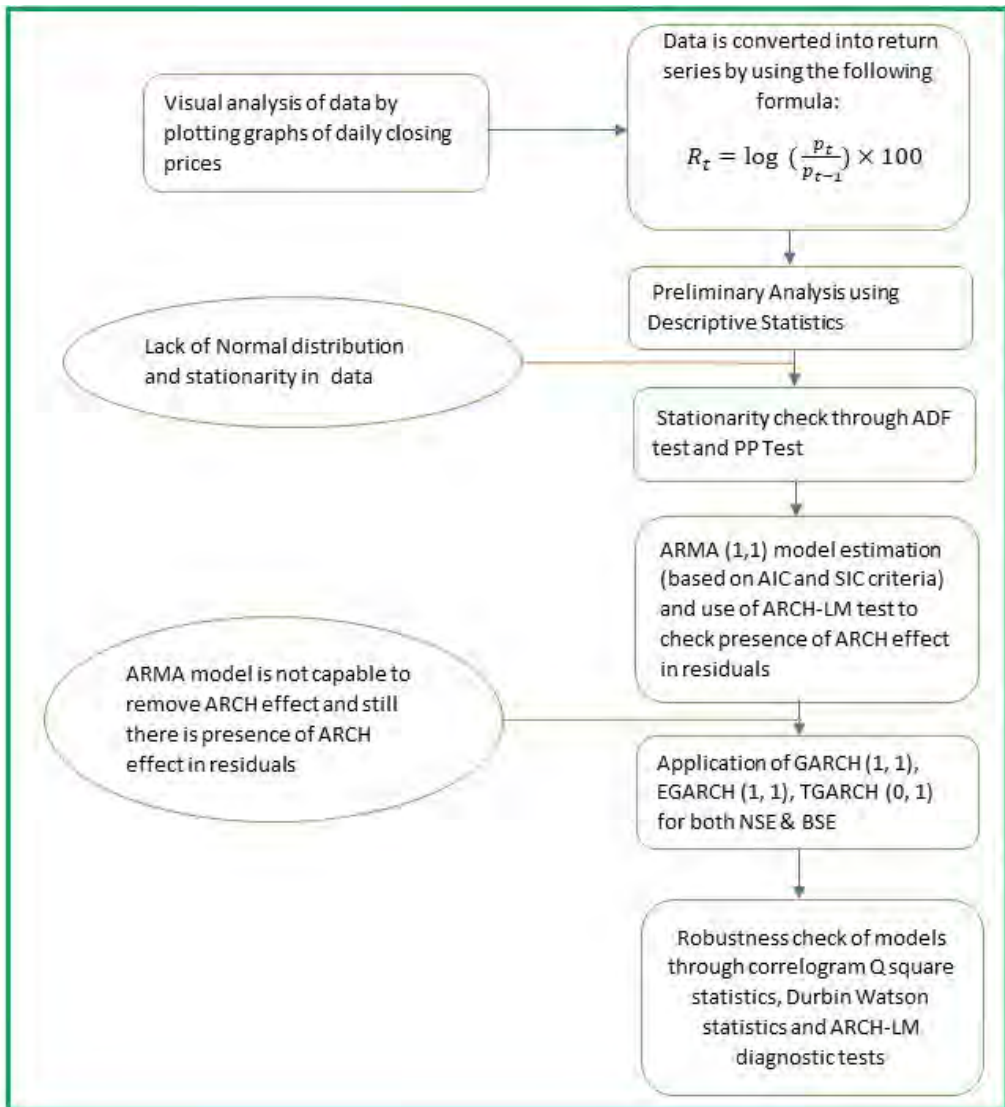
Figure 1: The step by step methodology

disperse and more prominent (Gupta, Jindal, & Gupta, 2014). The existence of volatility clustering (heteroscedasticity) is revealed in Indian market by using GARCH model. The stock returns and volatility in BSE Sensex was found positively correlated (Malepati, Challa, & Kolusu, 2019).

The leverage effects were found present in the study of S&P CNX Nifty Index (2003-2012). As per results, GARCH model measure the symmetric volatility while T-GARCH model measures the asymmetric volatility efficiently (Banumathy & Azhagaiah, 2015). P-GARCH model is found superior

model to estimate the volatility in Indian market when analysis is done on closing prices of Sensex and Nifty (2011-2017) (Dixit & Agrawal, 2020).

The research Gap and Objectives

The literature on concerned topic shows that mostly studies are conducted on small sample size and there is no study on Indian stock market after Covid Era. Stock market volatility is a very dynamic issue which requires a comprehensive and regress research on large sample data to get complete understanding about nature, persistence and patterns of volatility in Indian stock market. So, the present study aims to understand the volatility in two major stock markets of India (NSE and BSE) through the application of GARCH family models and to check the presence of leverage impact of shocks in Indian stock market.

1.   RESEARCH METHODOLOGY

1.1.   Data and Sample Size

NSE is the third largest stock exchange on the basis of number of trades and one of the largest stock exchange in world on the basis of market capitalization (As per data maintained by World Federation of Exchange for the year 2022). The total market capitalization of NSE is US$ 3.27 trillion in Jan. 2023 (www.nseindia. com). NSE's flagship index, NIFTY50 is considered as a barometer of Indian market around the world. BSE is the oldest stock market of Asia with total market capitalization of₹ 2,62,37,776 Cr. (www.bseindia.com 6th April,2023) and its benchmark index is SENSEX. So, data from NIFTY-50 and SENSEX for the period 2010-2022 are collected from

official websites www.nseindia.com and www.besindia.com respectively for this study. These two indices are used by researchers in their study as a representative of whole Indian stock market (Malepati et al., 2019) (Dixit, Agrawal, & Agarwal, 2022) (Karmakar, 2005). The daily closing prices of both indices except legal holidays and days for which no transactions are performed are taken. A total number of 2979 daily observation are included in the sample as per Table 1.

1.2.   Volatility Measurement Technique

The   features of auto regression and volatility clustering of a time series data makes it possible to predict its future values (Karmakar, 2005). The traditional model used to analyses the time series data does not provide desired results due to non-constant variance. Autoregressive Conditional Heteroskedasticity (ARCH) model was given by Engle (1982) for modeling time varying conditional variance for the first time. To model the volatility through ARCH requires many parameters and assumes constant variance also. This ARCH model can be applied on stationary data by following equation:

$$\sigma^2 t = \alpha_0 + \alpha_1 \ e^2 t\text{-}1 + \ldots\ldots + \alpha_n \ e^2 t\text{-}n \ \text{(i)}$$

Here $\sigma^2 t$ is conditional variance that depends on squared value of error terms and $\alpha_1 \ up \ to$ are unknown coefficients of ARCH process.

The Symmetric GARCH Model:

The problem of large parameters and constant variance was solved in 1986

when Bollerslev and Taylor developed a GARCH (Generalized Autoregressive Conditional Heteroskedasticity) model where variance depends on its lagged value and on squared residuals. GARCH models considered to be the chief methodologies that are useful to model the stock market volatility (Abbas Rizvi, Naqvi, Bordes, & Mirza, 2014). This method to model the volatility of stocks is most suitable when data is large (Engle, 1982) (T. Bollerslev, 1986) (Leung, Daouk, & Chen, 2000).

In present work, GARCH (1,1) model is applied to study the pattern of volatility in NSE and BSE markets as this model sufficiently measure the volatility clustering in data (Brooks & Burke, 2003). It is described by following equations:

Mean Equation: $r_t = \mu + \varepsilon_t$ (ii)

Variance Equation:

$$\sigma_t^2 = \alpha + \alpha_1\, \varepsilon_{t-1}^2 + \beta\, \sigma_{t-1}^2 \ \text{(iii)}$$

Where

α is constant *where* >0 *and* $\alpha_1 \geq 0$ *and* $\beta_1 \geq 0$,

$r_t = $ *return of the asset at time t*

$\mu= $ *average return*

$e_t = $ *residual returns* at time t

$\alpha_1\, \varepsilon_{t-1}^2 = $ARCH term (Information about previous volatility as measured by previous period squared residuals from mean equation)

$\beta\, \sigma_{t-1}^2 = $ GARCH term (Long term memory of volatility as lagged values of conditional variance

The reported measures the extent of today's shock impacts the volatility of next period (Campbell, Lo, MacKinlay, & Whitelaw, 1998). The volatility is assumed to be highly persistent if $\alpha_1 + \beta$ is close to one (Caiado, 2004). The rate of dying out of any shock in the volatility is (1-. If the sum of and is equal to one or more than one then, it indicates about existence of effect of any shock permanently. It may be possible due to non-stationarity of the series. If the total of ARCH and GARCH term is equal to one, it is termed as unit root. The total must be less than one. This condition is imposed in applying GARCH model that all coefficients should be positive. It is known as non-negativity constraints of GARCH model.

The basic GARCH model is able to account for volatility clustering and leptokurtosis conditions of time series. It is not able to consider the leverage impact in data. To overcome this drawback, advance versions are developed as T-GARCH and E-GARCH models.

Threshold GARCH (TGARCH) Model:

Glosten, Jagannathan and Runkle (1993) and Zakoian (1994) developed and used the TGARCH model to measure leverage impact of financial assets. This model is also known as GJR model after the names of its authors. The GJR model is sufficient to capture the volatility clustering and leverage impact in data (Bekaert, Engstrom, & Ermolov, 2015). The TGARCH (1,1) model can be specified as follows:

$$\sigma^2 t = \omega + \alpha_1 \, e_{t-1}^2 + \gamma d_{t-1} e_{t-1}^2 + \beta_1 \sigma_{t-1} \text{ (iv)}$$

Where d_{t-1} represents dummy variable

γ is Parameter of asymmetry.

According to this model, the impact of good news (ε_{t-1} **0**) and bad news (ε_{t-1} **0**) are different on conditional variance. The impact of good news is and bad news . If γ is significant and positive in the fitted model, then it indicates about greater effect of bad news on $\sigma^2 t$.

The Exponential GARCH (E-GARCH) Model:

The asymmetric impact of shock to conditional variance is captured along ensuring the positive variance always by EGARCH Model that is proposed by (Nelson, 1991). In this model, the conditional variance is transformed into natural logarithmic form by following equation:

$$Ln(\sigma^2 t) = \omega + \beta 1 Ln(\sigma_{t-1}^2)$$

$$+\alpha 1 \left\{ \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| - \sqrt{\frac{2}{\pi}} \right\} - \gamma \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \quad \text{(v)}$$

Where γ is the coefficient of asymmetric term. When γ is positive, indicates about symmetric impact but when γ is negative, it indicates about asymmetric impact of news (Nelson, 1991) (T. J. C. R. p. Bollerslev, 2008).

1. Results And Interpretation

1.1. Descriptive Statistics

The daily closing prices movements for both the markets are displayed in Figure 2. It is evident from the plot that data is non-stationary. Figure 3 of the daily returns of both indices depict the changes in volatility over time and volatility clustering. Then both return series are filtered through descriptive statistics (Table 2). The mean value is 0.040103 and 0.040196 for both indices that is near to zero and the risk indicators (standard deviation) for the markets is 1.101646 and 1.099098. It indicates that NSE is slightly riskier than BSE market. The Skewness and kurtosis values are considered as extreme values when higher than one and three respectively (Rohatgi & Saleh, 2015).The return series are
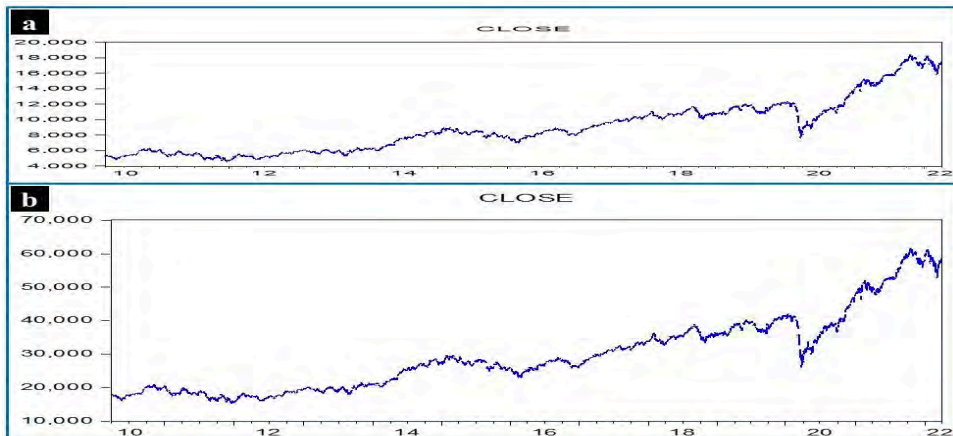
Figure 2 (Closing prices of NIFTY-50 and SENSEX)
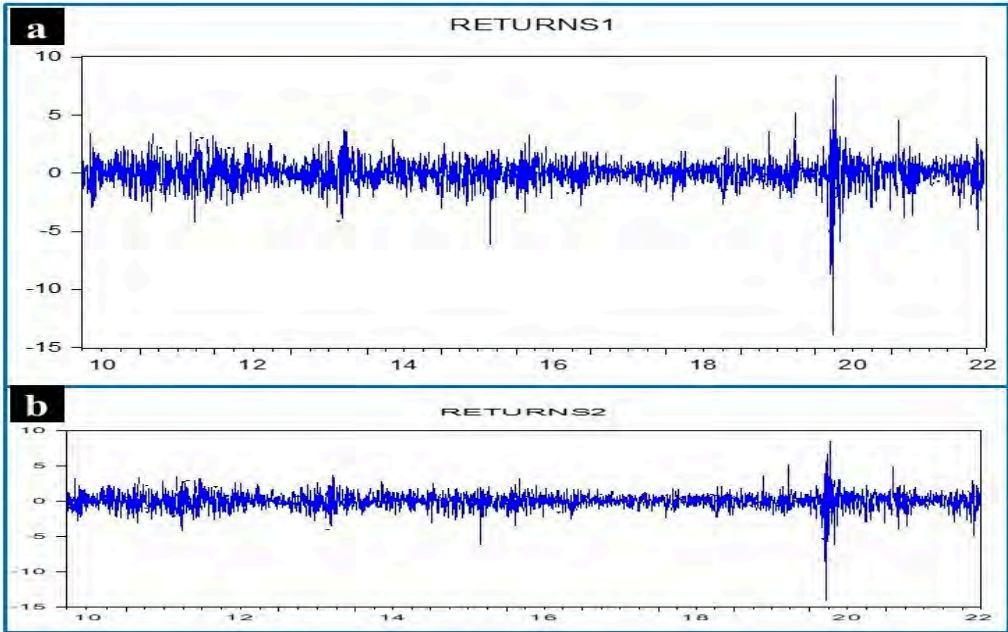
Figure 3. (Return series of NIFTY-50 and SENSEX

negatively skewed, demonstrating that the series is non-symmetric and there is higher chances of large negative returns than positive returns in both markets. Further, the Kurtosis value shows that data are having thick tails and higher peaks (Levendis, 2018). It is leptokurtic distribution in comparison to the normal distribution (Emenike, 2010) (Ezzat, 2012). It is also established by Jarque–Bera statistics that data is not normally distributed (Jarque & Bera, 1987). It becomes clear from descriptive statistics that further examination is required through appropriate econometric model.

1.2. Stationarity Test

To check the stationarity of data, the ADF (Augmented Dickey and Fuller) test and PP test (Phillips- perron Test) are used. The results of both tests reject the null hypothesis of data having unit roots because the t-statistics value is less than 0.05 as shown in Table 3.

1.3. ARMA Modeling

To analyse this data properly, an appropriate econometric model ARMA (Box-Jenkins Methodology) is applied. ARCH-LM test is performed to test the heteroscedasticity in residuals of both

Table 1. Name of Indices, Data Sources and Time period of the study

Name of Stock market	Indices	Data Sources	Time period of study
NSE	NIFTY-50	www.nseindia.com	01-04-2010 to 31-03-2022
BSE	SENSEX	www.bseindia.com	01-04-2010 to 31-03-2022

return series (Joshi, 2010). Table 3 exhibits the results of ARCH-LM test. When the data shows the features of volatility clustering, the ARMA model that assumes conditional variance as constant is not able to capture the nonlinear characteristics of data (Zivot, 2009). Due to presence of volatility clustering, stationarity at level and ARCH effects in residuals, ARCH/ GARCH models are assumed to be suitable model to study the volatility patterns (Predescu & Stancu, 2011) (Gujarati & Porter, 2009).

1.4. GARCH (1,1) model estimation

After confirming volatility clustering in data through graphs, stationarity by adopting ADF and PP test, presence of heteroscedasticity through ARCH-LM test, this study focuses to model the volatility through GARCH model. The results of GARCH model are given in Table 4. All coefficients i.e. constant, ARCH and GARCH term of variance

equation for the GARCH (1,1) model were found significant and exhibited the anticipated sign. The ARCH term value explains the current news impact on market volatility (Campbell et al., 1998), while the GARCH term depicts the impact of historical volatility and volatility persistence. The coefficient of ARCH term (0.087898) was lesser than GARCH term (0.893447) for NSE that shows that current market volatility in NIFTY-50 is highly impacted by past information in comparison to current news (Mehta & Sharma, 2011). The present volatility in NSE market is mainly due to past shocks and the impact of current news is very little on this volatility. The total of coefficients of ARCH and GARCH terms is very close to unity (0.981345) that indicates the long memory and highly persisted shocks to the conditional variance (Karmakar, 2007) (Franses & Van Dijk, 1996; Kumar & Singh, 2008).

Table 2. Descriptive Statistics (Period: April 2010 to March 2022)

Descriptive Statistics	NIFTY-50	SENSEX
Mean	0.040103	0.040196
Median	0.062627	0.065209
Maximum	8.400291	8.594739
Minimum	-13.90375	-14.10174
Std. Dev	1.101646	1.099098
Skewness	-0.966082	-0.977415
Kurtosis	16.93083	17.99006
Jarque-Bera statistics (Probability)	24543.85 (0.00) *	28355.93 (0.00) *
Total observations	2978	2978

Source: Authors' Calculation

In the same way ARCH term value for SENSEX (0.085659) was less than GARCH term (0.896276), displaying the same result as NIFTY50 that market volatility in BSE is largely dependent on past information than current news. When volatility is high, it indicates the higher chances of earning profits as well as inefficiency of the market (Mittal, 2012). Even then it will be mean reverting as it is close to unity. That indicates the feature of volatility clustering in NSE market.

1.5. The Asymmetric Model Estimation (TGARCH and EGARCH)

The symmetric GARCH model (GARCH 1,1) failed to explain the difference in impacts of news on volatility (Nelson, 1991), (Schwert, 1990) and . It is the assumption of this model that both types of news (good and bad) are having same impact on volatility. To know this leverage impact of news, TGARCH and EGARCH models are used.

When TGARCH (1,1) model is estimated, the ARCH coefficient was found negative, that is contrary to its non-negativity constraint (Irfan, Irfan, & Awais, 2010). So, TGARCH (0,1) model is estimated for NIFTY50 and SENSEX. For NIFTY50, the TGARCH coefficient (0.155072) was positive and significant that shows that news has asymmetric impact on market volatility. For BSE market also, the TGARCH coefficient (0.152305) was positive and significant, indicating asymmetric impact of good and bad news on BSE market volatility.

In the same way EGARCH coefficient (--0.11535) for NIFTY50 is negative that shows that bad news has more impact on market volatility in comparison to good news of same magnitude (Chen & Ghysels, 2011). The same results were provided by SENSEX EGARCH coefficient (-0.11666) that market volatility is more impacted by bad news than good news having same magnitude. Both markets show the presence of asymmetric volatility (Aliyev, 2019).

1.6. Robustness check of models

The Q-squared (12) test and ARCH-LM test are performed to test the fitness and suitability of GARCH models. The result of these test proves the absence of ARCH effect after estimating the

Table 3. Unit Root tests and ARCH-LM test:

Test	NIFTY-50	SENSEX
ADF test at Level	-0.54.08142 (0.000) *	-0.54.23322 (0.000) *
PP test at Level	-54.08765 (0.000) *	-54.23356 (0.000) *
ARCH-LM F-stats.	97.63112 (0.000) *	97.91909 (0.000) *

Note: * ($p<0.05$)

Source: Authors' Calculation

GARCH models because the probability value is more than 0.05 indicating insignificant Q-squared and ARCH-LM statistics. The Durbin Watson stats also proved the fitness of all models. The results of all diagnostic tests proved the fitness of estimated model.

Table 4. Model Estimation results for NIFTY 50 and SENSEX

Coefficient	NIFTY-50			SENSEX		
	GARCH (1,1)	TGARCH (0,1)	EGARCH (1,1)	GARCH (1,1)	TGARCH (0,1)	EGARCH (1,1)
Mean Equation Constant	0.07108*	0.036784	0.031296*	0.073001*	0.039116*	0.033025*
AR	-0.06127	-0.13778	0.063823	-0.062622	-0.14253	0.035728
MA	0.120802	0.209905	0.007291	0.121985	0.21242	0.033854
Variance Equation Constant	0.022578*	0.030189*	-0.1003	0.021486	0.0295*	-0.10033*
ARCH (α)	0.087107*		0.127238*	0.085023*		0.126299*
GARCH (β)	0.894403*	0.893439*	0.972236*	0.897061*	0.894881*	0.971903*
TGARCH		0.155072*			0.152305*	
EGARCH			-0.11535*			-0.11666*
R-squared	-0.00339	-0.00441	-0.00386	-0.003766	-0.00446	-0.00406
Adjusted R-squared	-0.00407	-0.00509	-0.00453	-0.004441	-0.00513	-0.00474
Log Likelihood	-4107.75	-4052.39	-4045.48	-4082.631	-4026.68	-4020.24
Durbin-Watson stat	2.101255	2.12912	2.125025	2.106068	2.129946	2.127453
Akaike info criterion	2.76369	2.726498	2.722523	2.746813	2.709225	2.705569
Schwarz criterion	2.775781	2.738588	2.736628	2.758903	2.721315	2.719674
ROBUSTNESS TESTS						
(12) stat (Probability)	14.104 (0.294)	12.351 (0.418)	11.691 (0.471)	14.049 (0.298)	12.545 (0.403)	13.37 (0.343)
ARCH-LM F-statistic (Probability)	2.153706 (0.1423)	2.653443 (0.1034)	1.717945 (0.1901)	2.155157 (0.1422)	2.708692 (0.0999)	2.041433 (0.1532)

Note: * ($p<0.05$)

Source: Authors' Calculation

2. CONCLUSION

In this work, efforts are made to study the nature of volatility in Indian stock market. For that data for two representative indices, NIFTY-50 and SENSEX is collected for the period of 12 years. The analysis of descriptive statistics shows the characteristics of negatively skewed, highly kurtosis with fatter tails and non-normal distribution of return series. The mean and median values are near to zero suggesting mean returning and volatility clustering nature for both markets. Box-Jenkins Methodology is adopted to further analyse the return series but incapable to handle the ARCH impact from financial data. GARCH (1,1) model is successfully implemented to extract meaningful information that there exists volatility persistence in Indian stock market. GARCH (1, 1) model is capable to efficiently measure the market volatility and it is consistent to the finding of Madhusudan (2005), Karmakar (2007) and (Gokcan, 2000) study but GARCH (1, 1) model is not capable to measure the leverage impacts of news (Karmakar, 2005, 2007). Based on the past study, it can be said that GARCH (1, 1) model explains the volatility with symmetric information and the asymmetric GARCH models are appropriate in case of asymmetric information (Banumathy & Azhagaiah, 2015) (Okičić, 2015). The findings of this study show the presence of long memory and highly persisted shocks to the conditional variance in NSE and BSE markets. Both markets are highly correlated and following the same trend (Dixit et al., 2022). It is also clear from the results that volatility in Indian market react differently to good and bad news of same magnitude (Banumathy & Azhagaiah, 2015), (Srivastava, 2008). The robustness of model is verified through different diagnostic tests i.e. Durbin Watson stat, the Q-squared stat and the ARCH-LM test that prove the fitness of the model. It is observed that coefficients are same for both market showing a high degree of correlation between these two markets. The planning of investment strategies for one market will be suitable to other market too. In this type of market environment, portfolio investment may be used to hedge the risk.

3. FUTURE IMPLICATIONS OF THE STUDY

The present work is helpful for investors in their investment decisions by providing insight about volatility in Indian stock markets. They would be aware about increasing risk associated with increasing volatility in present era of global integration and financial liberalization. The policy makers and market analysers are able to predict the market movements as the sum of ARCH and GARCH is less than one, representing mean returning trends of both markets. The finding shows that both markets (NSE and BSE) are correlated markets. So, through investment in non-correlated markets, investors can get benefit of portfolio diversification by reducing risk and increasing returns.

4. SCOPE FOR FURTHER RESEARCH

Present study has made a great contribution in analysing stock market volatility but it is not free from limitations that lead to further research. In this work, symmetric as well as asymmetric models are adopted to study the volatility patterns in Indian market. To get a wider aspect of volatility, some advance models like NARDL model on sectoral indices to may be adopted to go deeper into markets.

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Comparison of Performance of Selected Open-Ended Equity and Debt Mutual Fund Schemes

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Abstract:

Purpose: The numerous organisations that provide a range of funds are making it difficult for retail investors to choose an investment that is acceptable to them. During the pandemic, global market systems were disturbed, notably hurting market returns.

Design: Evaluate the open-ended schemes' performance concerning equity and debt in mutual funds. The sample contains 10 schemes chosen from ten of the BSE 30 corporate schemes from January 2018 to December 2022. The performance of selected funds is examined to determine various statistical tools such as the daily average return, standard deviation, beta, and risk-adjusted value (Treynor and Jensen ratios). A benchmark index has also been created for analysis.

Findings: The results of the performance evaluation showed that equity schemes had a comparatively better return with moderate risk compared to debt schemes, but at the same time, the risk would be lower in debt schemes compared to equity. This study will help investors to identify good schemes and asset management firms should enhance the performance of their equity schemes to attract investors who are eager to pick the market's portfolio structure. It is critical to identify and investigate the reasons for changes in time and market structure.

Keywords: Mutual funds, risk analysis, Jenson alpha, beta, market return, NAV.

1. **Introduction**

Mutual funds in India have successfully channelled household savings into the stock market. Since the introduction of unit trusts in India in 1964, the mobilisation of funds by mutual funds has increased. After the privatisation of mutual fund companies, fund mobilisation made tremendous progress. The invention and expansion of different mutual fund products in the Indian capital market are one of the most catalytic devices in creating significant investment growth in the capital market (Suchita Shukla, 2015). With a focus on increasing domestic savings and improving investment deployment through markets, the necessity for and scope for mutual fund activities have grown dramatically (Sathya Swaroop Debasish, 2009). Although overall development in the mutual fund industry in India is thriving, average assets under management stood at 40.76 trillion Indian rupees, and at the same time, only two per cent of the population is participating in mutual fund investments.

Small investors use their savings to invest in mutual funds. The investing public is afraid of volatility in the returns of mutual funds due to market fluctuation, and people also don't understand the behaviour of market returns. To help small investors realise capital gains and decent recurrent returns, the mutual fund sector will provide these services. The majority of mutual fund providers established asset management companies to create solid portfolios, maintain them, and offer investors a choice of alluring schemes. When investors know about market predictions, it helps them make good earnings. To protect investors' interests and stop market fraud, SEBI oversees and regulates the well-established mutual fund institution sector. Over the last decade, the mutual fund sector has developed to become one of the investors' favourite long-term investment vehicles. During the pandemic, global market systems were disturbed, notably hurting market returns. There is a need to analyse the behaviour of mutual fund returns in India from 2018 to 2022, which is why the present study, "Comparison of Performance of Selected Open-Ended Equity and Debt Mutual Fund Schemes".

2. **Literature Review**

The reviews were from journals, articles, websites, and books. The present "behavioural finance" research in this field is relatively scattered. A review of the literature indicates a research study was done on the subject of performance mutual fund returns.

Ajay Shah and Susan Thomas (1994), researchers examined the performance of eleven mutual fund schemes. Since the schemes' inception in April 1994, the weekly returns have been calculated. Jensen and Sharpe's measurements were utilised to assess the schemes' greater performance. The risk of these schemes was quite high, and the money may have been under-diversified. Jayadev (1995) had seriously examined mutual funds' desperate practices in the assessment of investments. Empirical studies on the

link between NAV repurchase price and market price, as well as the reasons for closed-end fund discounts, have yet to be conducted in the Indian context. Kaura and Jayadev (1995) used the Sharpe, Treynor, and Jenson metrics to assess the success of five growth-oriented plans in 1993–94. 'Mastergain-91,' 'Can Bonus,' and 'Ind Sagar' outperformed the market in terms of systematic risk but not overall risk. Kale and Uma (1995), indicated that, on average, the strategies achieved their goals. According to the data, growth schemes produced an average CAGR of 47 per cent; tax planning schemes produced an average CAGR of 30 per cent; balanced schemes produced a CAGR of 28 per cent; and income schemes produced an 18 per cent CAGR.

Madhusudan V. and Jambodeka (1996), According to the survey, income plans and open-ended schemes are preferred over growth plans and closed-ended schemes. Murthi, Choi, and Desai (1997), there are 731 mutual funds in seven categories: aggressive growth, asset allocation, equity-income, growth-income, balanced, and income funds. According to the findings, managers in aggressive growth, asset allocation, income, and equity-income funds have a lower efficiency score. Only eleven of the 33 categories had a positive connection.

Sharad Panwar and R. Madhumathi (2005), indicated that, in terms of mean percentage returns, the study indicated that public-sector-sponsored funds do not differ much from private-sector-sponsored funds. However, there is a considerable difference in standard deviation, variance, and coefficient of variation (COV) between public- and private-sector-sponsored mutual funds. D. N. Rao (2006), Monthly compounded mean return, risk per unit return, and Sharpe ratio were shown to be significant. In terms of the specified factors, the financial performance of the 21 open-ended equity growth plans and the 21 open-ended equity dividend plans was compared. The investigation revealed that growth plans produced larger returns than dividend plans but at a higher risk. Sathya Swaroop Debasish (2009), evaluates the performance of chosen schemes of mutual funds based on risk-return relationship models and measurements. From April 1996 to March 2009, a total of 23 schemes provided by six private-sector mutual funds and three public-sector mutual funds were investigated. When tested against risk-return relationship models, Franklin Templeton and UTI mutual funds perform well, whereas Birla Sun Life, HDFC, and LIC mutual funds score poorly.

2.1 Research Gap:

Numerous studies on mutual fund performance have been conducted around the world. Several researchers had analysed mutual funds, taking into consideration diverse plans. They carried out the performance study by considering several sectors as well as the NAV of the schemes. However, as time and market structure change, it is always necessary to identify and analyse the circumstances in which the changes happened. It is possible to conclude that

there is a research gap for selected open-ended schemes of BSE-30-listed asset management companies. As a result, the current study tries to close the gap by utilising the most recent available data.

3. Objectives of the Study

1. To evaluate and compare the performance of mutual fund equity and debt schemes.

2. To compare the risk assessments of debt and equity growth schemes to the benchmark index.

4. Research Methodology

The information was gathered only from secondary sources. To examine mutual fund scheme performance, researchers identified 10 open-ended equity and debt growth schemes among the top ten BSE 30 companies that were publicly traded. The information was obtained from the AMFI website, books, and periodicals. For secondary data collection, the period from January 2018 to December 2022 was chosen as five years of net asset value. For this analysis, the following mutual fund asset management firms were considered: SBI, HDFC, ICICI Prudential, Nippon, Axis, DSP Blackrock, Kotak, Tata, Aditya Birla Sun Life, and L&T.

5. Scope of the Study

The current analysis, which examines the performance of mutual fund returns, only covers growth-oriented open-ended stock and debt schemes. The insights acquired from this research will be immensely useful in understanding how mutual fund businesses will work in the current market climate, the rapidly altering nature of mutual funds, and the rising mutual fund industry in India.

6. Data Analysis

The NAV returns of chosen stocks daily of open-ended equity and debt funds were obtained from the AMFI website, and the return was calculated using Excel to implement the various ratios and statistical methods.

6.1 Return:

The portfolio's return is calculated using monthly adjusted Net Asset Value (NAV) data from several schemes.

Where,

$$Rp = \frac{NAVt - NAV\ t - 1}{NAVt - 1} * 100$$

RP = Portfolio return

NAV t = The current NAV

NAV t-1 = NAV from the previous day

The average return analyses of the growth plans and benchmark are shown in Tables 1 and 2, which are supported by Figures 1 and 2.

6.2 Risk Analysis of Performance

6.2.1 Standard Deviation:

The risk associated with mutual fund schemes and the market index was calculated using the standard deviation (σ). It is a strategy for calculating the difference between the actual and expected returns of mutual fund schemes over a certain amount of time. A greater standard deviation suggests that the schemes are more volatile and risky.

$$\sigma p = \sqrt{\frac{1}{n-1}\Sigma(Rpt - Rp)^2}$$

6.2.2 Beta

Beta (referred to as systematic risk, gauges how volatile an investment's returns are with the market return.

$$\beta = \frac{r\rho . \sigma m . \sigma\rho}{\sigma^2 m}$$

Where,

σm = Standard deviation of portfolio

$\sigma\rho$ = Standard deviation of the market

$r\rho$ = return of the portfolio

6.2.3 Treynor Performance Index

To evaluate an investment portfolio's risk-adjusted performance. The index's primary purpose was to determine a return over each unit of uncertainty for a portfolio employing beta as a risk metric.

$$Ti = \frac{Rp - Rf}{\beta p}$$

Where,

Ti - Treynor Performance Index

Rp – a rate of return that is risk-free

Rf – the portfolio's return

βp – the portfolio's beta

6.2.4 Jensen Performance Index

The alpha coefficient is the excess return on a portfolio over the necessary return, or expected return, for the risk level indicated by its beta. As a result, unlike beta, which is based on volatility, alpha is determined by the underlying values of the portfolio's firms.

$$= Rp - [Rf + \beta p (Rm - Rf$$

Where,

Rp = Return of portfolio

Rf = Return on Risk-Free Investment

βp = Systematic Risk Assessment

Rm = The market's average return.

Table 1: Average Daily Returns on Equity Growth Schemes

S. No.	Mutual Fund Schemes	2018	2019	2020	2021	2022	Overall
1	SBI Equity Savings	0.03	0.86	1.14	1.07	0.14	0.66
2	HDFC Equity Savings	0.15	0.60	0.91	1.39	0.47	0.71
3	ICICI Prudential Dividend Yield	-1.18	0.17	1.53	3.44	0.85	0.96
4	Nippon India Focused Equity	-1.27	0.80	1.93	2.72	0.48	0.94
5	Axis Equity Saver	0.55	0.89	0.88	0.36	0.30	0.60
6	DSP Equity Opportunities	-0.84	1.31	1.69	2.27	0.42	0.98
7	Kotak Emerging Equity Scheme	-1.11	1.29	2.00	3.07	0.51	1.16

8	Tata Equity Savings	0.09	0.67	0.80	0.87	0.25	0.54
9	Aditya Birla Sun Life Focused Equity	-0.47	1.24	1.68	2.06	0.23	0.97
10	L &T Focused Equity	0.06	0.54	1.00	1.29	0.27	0.61
11	BSE 30	0.50	0.79	0.84	0.37	-0.41	0.43
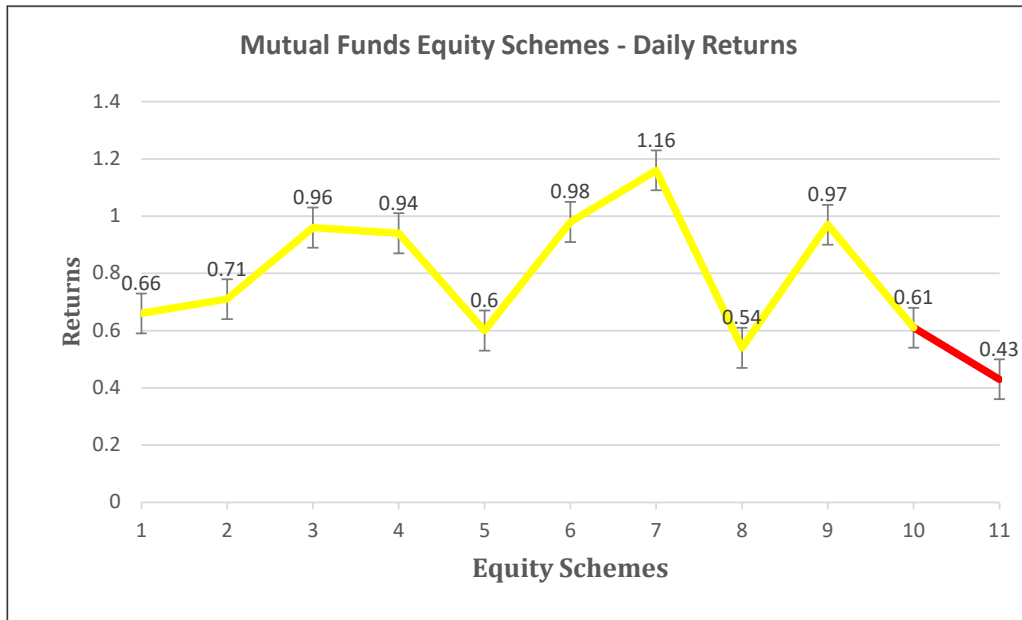
Figure 1: Average Daily Returns on Equity Growth Schemes

It could be observed Table 1, reveals the daily returns of the selected growth-oriented equity schemes and the bench market value. In all the years among the ten schemes, the Kotak Emerging Equity Scheme secured the highest market returns, followed by the DSP Equity Opportunities; Aditya Birla Sun Life Focused Equity earned close to the Kotak Emerging Equity; and the remaining equity schemes were reporting above the benchmark returns that indicate overall equity schemes had secured good market returns; however, during the COVID pandemic, which is in the years 2020 and 2021, the market showed good returns compared to the benchmark. It concludes that all growth-oriented equity schemes were good investors who had earned the best long-term returns. By taking into account the whole study period for open-ended debt schemes, it is evident that every scheme had positive daily average returns. SBI bonds had achieved the greatest return, followed by Nippon India Banking and PSU debt and Axis Banking and PSU debt, all of which had positive daily average returns. All other schemes, except the DSP bond (0.41),

Table 2: Average Daily Returns on Debt Growth Schemes

S. No	Mutual Fund Schemes	2018	2019	2020	2021	2022	Overall
1	SBI Dynamic Bond	0.50	1.10	0.85	0.23	0.44	0.63
2	HDFC Banking and PSU	0.48	0.83	0.81	0.29	0.28	0.54
3	ICICI Prudential Banking and PSU	0.47	0.81	0.72	0.32	0.38	0.55
4	Nippon India Banking & PSU	0.55	0.89	0.88	0.36	0.30	0.60
5	Axis Banking & PSU Debt	0.64	0.87	0.75	0.32	0.33	0.59
6	DSP Bond	0.32	0.31	0.80	0.30	0.29	0.41
7	Kotak Banking and PSU	0.54	0.88	0.81	0.31	0.31	0.57
8	Tata Short-Term Bond	0.07	0.81	0.82	0.30	0.31	0.46
9	Aditya Birla Sun Life Banking & PSU	0.55	0.81	0.84	0.30	0.30	0.56
10	L & T Banking and PSU Debt	0.55	0.82	0.82	0.30	0.15	0.53
11	BSE 30	0.50	0.79	0.84	0.37	-0.41	0.43
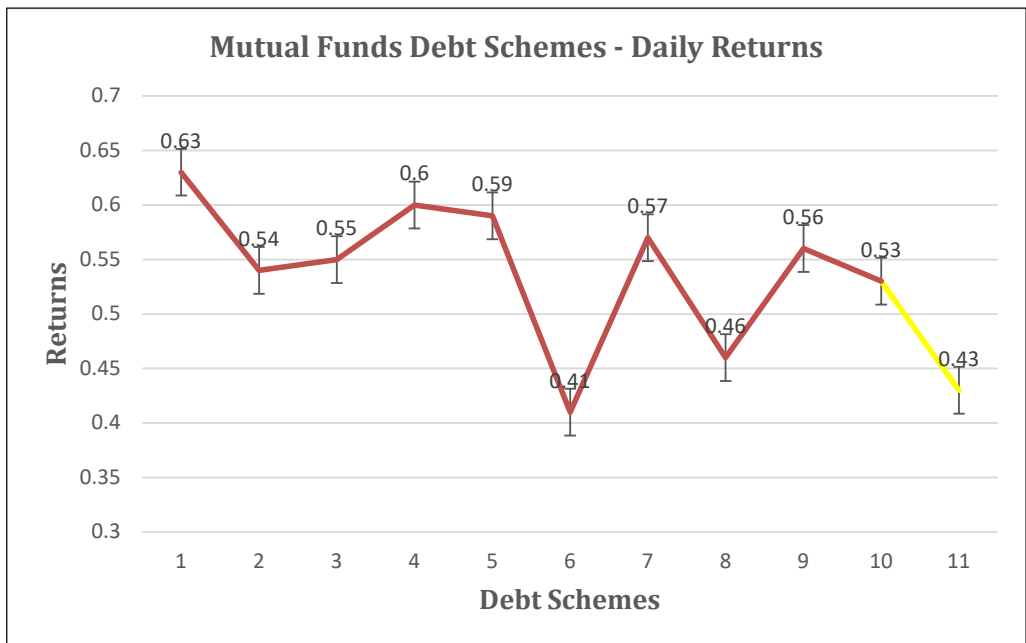
Figure 2: Average Daily Returns on Debt Growth Schemes

recorded returns that were higher than the benchmark. It shows that, except for DSP bonds, all debt schemes delivered superior returns over the research period. Due to market swings, the DSP bond schemes were providing a minimal return; however, the tendency has been mild since 2018. It concludes that the selected mutual debt scheme was able to achieve good returns that were positive, large, and comparable to the benchmark.

Table 3: Risk Analysis of the Returns of Equity Growth Schemes

S. No	Mutual Fund Schemes	SD	Beta	Treynor Index	Jenson Alpha Index
1	SBI Equity Savings	2.13	0.6744	0.0041	0.0010
2	HDFC Equity Savings	1.99	0.4352	0.0069	0.0017
3	ICICI Prudential Dividend Yield	4.87	0.9653	0.0058	0.0002
4	Nippon India Focused Equity	5.39	1.1952	0.0045	-0.0010
5	Axis Equity Saver	0.54	0.1917	0.0100	0.0016
6	DSP Equity Opportunities	4.77	1.1968	0.0048	-0.0011
7	Kotak Emerging Equity Scheme	5.12	1.1093	0.0068	-0.0008
8	Tata Equity Savings	1.59	0.4055	0.0033	0.0008
9	Aditya Birla Sun Life Focused Equity	4.51	1.1148	0.0050	-0.0006
10	L & T Focused Equity	2.34	0.5132	0.0040	-0.0011

According to Table 3, risk assessment includes diversification of the factors of risk. Investment decisions are made with the help of market prediction techniques and past-year market performance, of which the standard deviation is one of the tools to measure the risk pattern, which indicates the high volatility of returns. Among the ten open-ended equity growth-oriented schemes, the one with the lowest risk value was Axis Equity Saver, followed by Tata Equity Savings and HDFC Equity Savings, which had a value of less than 2, and the remaining schemes had a higher risk value, of which Nippon India Focused Equity had a high value of 5.39. It concludes that out of ten, five had the minimum fluctuation, and the remaining had high volatility in market returns. Furthermore, the beta value assesses how sensitive a stock's price is to fluctuations in the general market. When the benchmark index BSE 30 is compared to the returns of a specific scheme, a pattern emerges that demonstrates the equity plan's sensitivity to market risk. This allows the investor to choose between the riskier stock that is highly associated with the market and the less volatile one. Table 3 shows that four schemes had more than one beta value, such as DSP Equity Opportunities 1.1968, Nippon India Focused Equity 1.1952, Nippon India Focused Equity 1.1917, and Aditya Birla Sun Life Focused Equity 1.1148, which indicates the high volatility of the schemes and, hence, a riskier investment as compared to the other schemes.
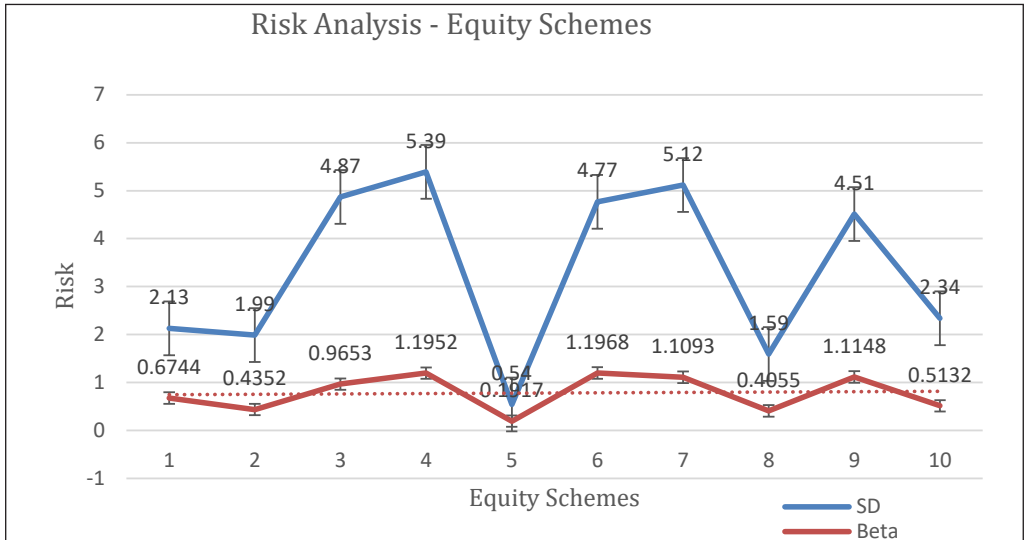
Figure 3 (a) Risk Analysis of the Returns of Equity Growth Schemes – Standard Deviation and Beta
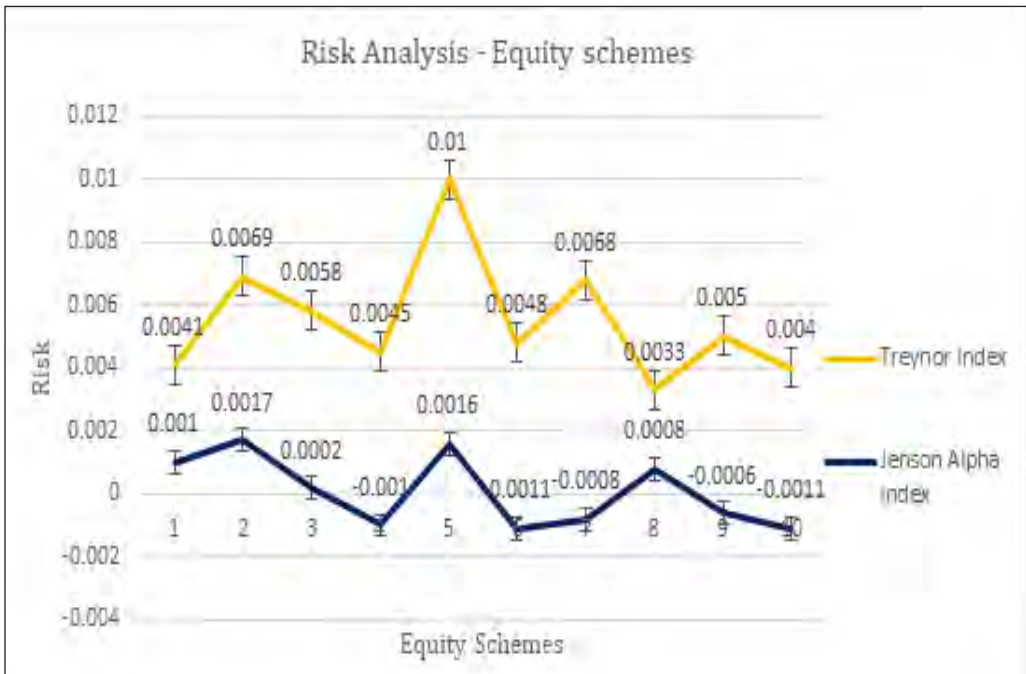
Figure 3 (b): Risk Analysis of the Returns of Equity Growth Schemes – Treynor and Jensons Alpha Index

Figure 3 b deals with the Treynor Index and Jenson alpha index values. In the case of the Treynor Index value, which measures how much return on investment a mutual fund earns for the amount of risk the investment assumes, all the schemes reported a value less than 0.01; that means Axis Equity Saver funds had the best performance on a risk-adjusted basis as compared to other open-ended equity schemes. However, the insight it offers may not always predict future performance. As a result, as investors, we should remember that the Treynor ratio should not be the only factor we examine when making investment decisions.

As the value observed from Table 3 indicates, the investment selection would be made based on the positive Jenson alpha value, and the portfolio would be earnings excess returns. Among the ten schemes, five had positive values, and the remaining were negative. Out of five positive schemes, the HDFC equity had the highest value as an investor would have earned reasonable returns, and in the case of negative Jenson Alpha value, the DSP Equity Opportunities and L & T Focused Equity had secured the minimum value, meaning the investor would have met the minimum returns. Considering the level of risk, they were incurring, the investment might not have yielded a sufficient return.

According to Table 4, which depicts risk assessment, where the standard deviation indicates the high volatility of returns, ICICI Prudential Banking PSU Debt had the lowest risk value among the ten open-ended debt growth-oriented schemes, ahead of Axis Banking PSU Debt, Aditya Birla Sun Life Banking PSU, and HDFC Banking PSU, all of which had a value less than 0.5. The remaining schemes had higher risk values, with SBI Dynamic Bo having the highest. Although every debt scheme reported a range between 0.4 and 0.7, this simply suggests that there would be some modest variations in the volatility of market returns across each debt scheme.

Additionally, a pattern that demonstrates the debt scheme's exposure to market risk emerges when the benchmark index for BSE 30 is compared to the returns of a specific scheme. This helps the investor decide between the riskier scheme with a high connection to the market and the less volatile one. No schemes had more than one beta value, as shown in Table 4, and all debt schemes had a beta value lower than 1. Because debt securities are fixed-bearing interest instruments, this suggests that the debt schemes are less volatile than equity schemes and are thus a risk-free investment.

All of the schemes reported a Treynor Index value of less than 0.015. In terms of risk-adjusted performance, the funds beat comparable debt schemes. The SBI Dynamic Bond has the lowest index value of -0.2315 and the highest index value of 0.151, representing market returns. These values are lower than those for the schemes. As a result, investors may select debt schemes based on this value. According to Jenson Alpha, this is one of the schemes with positive values, meaning investors profit from market returns. The SBI Dynamic

Table 4: Risk Analysis of the Returns of Debt Growth Schemes

S. No	Mutual Fund Schemes	SD	Beta	Treynor Index	Jenson Alpha Index
1	SBI Dynamic Bond	0.67	0.1451	0.0151	0.0019
2	HDFC Banking and PSU	0.50	0.1873	0.0072	0.0011
3	ICICI Prudential Banking and PSU	0.44	0.1726	0.0079	0.0011
4	Nippon India Banking & PSU	0.54	0.1917	0.0100	0.0016
5	Axis Banking & PSU Debt	0.48	0.1707	0.0105	0.0015
6	DSP Bond	0.66	0.1233	-0.0001	0.0000
7	Kotak Banking and PSU	0.53	0.2000	0.0083	0.0013
8	Tata Short-Term Bond	0.65	0.1634	0.0035	0.0005
9	Aditya Birla Sun Life Banking & PSU	0.50	0.1894	0.0082	0.0005
10	L&T Banking and PSU Debt	0.60	0.1882	-0.2315	0.0003
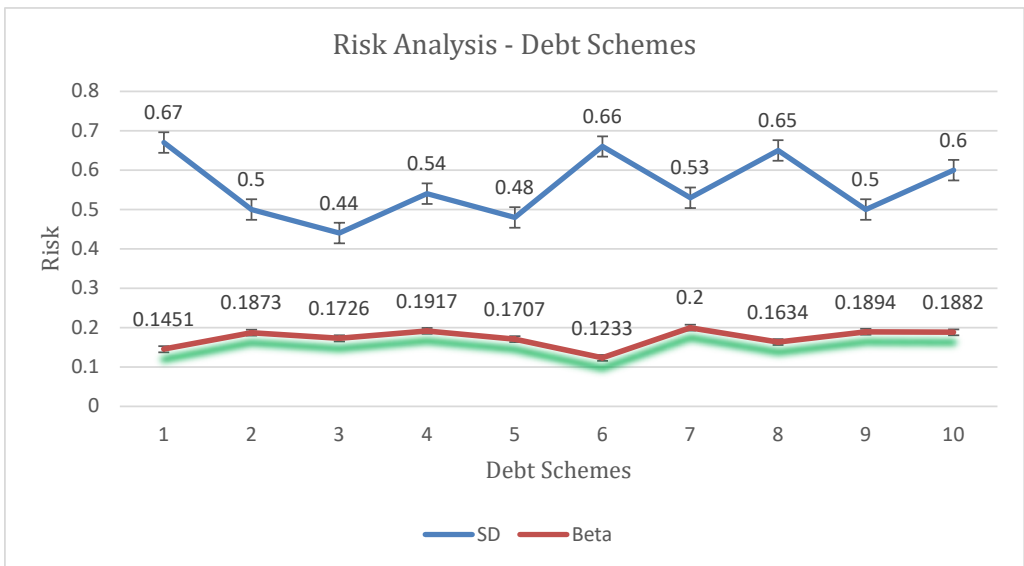
Figure 4 (a): Risk Analysis of the Returns of Debt Growth Schemes – Standard Deviation and Beta

Bond had the best value among the positive plans since an investor would have received respectable returns, but as a long-term investor, nothing would be obtained in the case of a zero Jenson Alpha value for the DSP Bond during the study period.
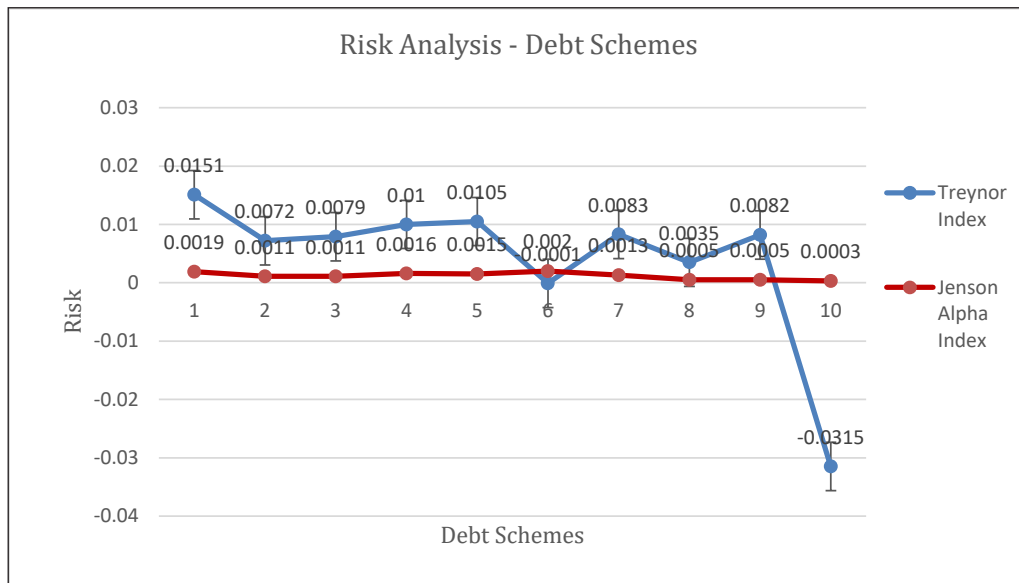
Figure 4 (b) Risk Analysis of the Returns of Debt Growth Schemes – Treynor and Jensons Alpha Index

7. **Findings of the Study**

Equity schemes of Aditya Birla Sun Life Focused and debt schemes like the SBI Dynamic Bond Fund had the highest earnings returns to investors during the study period out of the ten selected growth-oriented mutual fund schemes because the fund adopts a top-down and bottom-up approach for selecting stocks. Furthermore, it focuses on identifying companies with sound management and promising future growth prospects; similarly, the Dynamic Bond Fund has earned enormous returns because funds with excellent credit ratings have a cumulative creditworthiness of an AA as well as higher-rated investments in the market.

Axis Equity Saver, Tata Equity Savings, and HDFC Equity Savings Fund, three of the ten equity schemes, have lower

standard deviation values than the market index value of two, which indicates lower minimal volatility on the daily average return than the market index. In terms of debt funds, ICICI Prudential Banking and PSU, Axis Banking and PSU Debt, HDFC Banking and PSU, and Aditya Birla Sun Life Banking & PSU funds all had low standard deviations when compared to the market index, which indicates the low-risk associated with investing in these funds because the asset management firms carefully established the structure of the portfolio selection.

The DSP Equity Opportunities, Nippon India Focused Equity, Aditya Birla Sun Life Focused Equity, and Kotak Emerging Equity Schemes have a value of more than one out of ten equity funds, showing that these funds have portfolios

that are riskier than the typical market portfolio due to variables relating to fund management allocation. All schemes relating to debt funds with less than the value of one that is these funds are less risky in the market, and debt always returns gradually little increases happen in the market.

In an equity scheme concerning the Treynor index, a good result is achieved by one scheme like Axis Equity Saver. The debt scheme showed satisfactory results, with all the schemes having minimum value. It outperforms the risk-free yield of return on systematic risk. Jensen's alpha values were positive in all debt-oriented schemes and five out of ten equity schemes. It is agreed that all debt and positive equity schemes have good fund performance and better timing abilities in their fund managers. Jensen's alpha with a larger positive value indicates superior fund performance and the capacity of fund managers to time the market by investing in securities.

8. Conclusion

Equity schemes provided a higher return with a lower risk than debt schemes over the research period, although the risk was lower in debt schemes. Portfolio managers, according to the study, should focus more on refining their investment strategies to reduce volatility and obtain higher returns. As a result, to be desirable to investors and willing to choose the market portfolio structure, they must improve the performance of their equity schemes.

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Enhancing Customer Satisfaction in Fast Food: A Novel Approach Integrating SEM and ANN for Relationship Marketing Analysis

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Abstract

The current study presents the integrated model that explores how the relationship marketing tool constructed on the bases of trust, commitment, and communication helps achieving customer satisfaction in fast food industry. The underpinning theories of this study are relationship marketing theories, trust-commitment theory on key mediating variables and confirmation/disconfirmation theory for satisfaction. A Two Staged Structural Equation Modelling – Artificial Neural Network Approach is used to validate the findings of the research. The findings reveal that Trust has the highest impact on customer satisfaction, followed by Commitment and Communication. Both the Smart PLS and ANN analyses support this result, validating its significance. The finding highlights the importance for the fast-food industry to prioritize quality, service, and relationship marketing strategies as key factors for long-term success and sustained customer engagement.

Keywords: Trust, Commitment, Communication, Relationship marketing, Customer satisfaction, Artificial Neural Network

1. Introduction

In the 21st century companies, opt for new age technology driven businesses. However, despite of changing paradigm in the socio-political and economic strata of demography, cut-throat competition in the market and intangibilities associated with the services in the service sector, marketers still pursue the relationship marketing to gain their foothold in the market. This augurs well in the turbulent space of shifting from product to service oriented businesses (Amoako et al., 2019) to cater the needs of the customers. Indian fast-food sector also took a plunge in relationship marketing to move from customer acquisition to customer retention.

Since the coinage of the term in 1950s, relationship marketing evolved as a subject of interest in industrial marketing, service marketing and off late in online marketing as a social and economic process focusing on long-term engagement, interaction, and customer loyalty (Christopher et al., 2013; Vargo & Lusch, 2004). It is a common belief that a satisfied customer tends to become a loyal customer and eventually is retained by the organization in future business deals. Relationship marketing or customer relationship management helps in raising customer satisfaction.

Berry (1983) for the first time sin the services literature defined relationship marketing as attracting, maintaining, and enhancing customer relationships. He recommended a long-term relation between the organizations and their customers. Berry & Parasuraman

(1991) again supported this theory in their subsequent work. Relationship marketing objectively builds long-term mutually beneficial and satisfying relations with producers, distributors, suppliers, and customers in hopes to earn and retain their long-term choice preference and business (Grönroos, 1994; Kotler, 2000).

Relationship marketing is defined as a marketing device to establish, develop and maintain the relational exchange between the organization and the customer (Morgan & Hunt, 1994) which helps the organization to gain sustainable competitive advantage over its competitors (O'malley & Prothero, 2004) and is widely accepted in today's market driven economy (Gummesson, 2002). Relationship marketing emphasizes direct involvement with the customer to build long term relationships rather than relying on a lone individual transaction (Godfred Koi-Akrofi, 2013). Sheth (2017) postulated relationship marketing as a joint venture between the company and the customer focusing on winning the customer's heart than just making money out of customer. Grönroos (2000) emphasized moving from customer acquisition to customer retention by improving relationships with the customer.

Relationship marketing strongly appeals to customers and they personally want to be dealt by the organization (Bennett & Barkensjo, 2005). Payne (2000) considers relationship marketing as any other marketing tool which encompasses canvassing, advertising, events, and public relations. Jones et al., (2015)

did extensive research on relationship marketing from a consumer's point of view and found that consumers tend to participate in company's reward program; read company communications; develop personal relationships; seek preferential treatment and customized products.

Even in small retail businesses companies try to understand the customer's needs and preferences, exhibit friendly attitude towards customers and offer credit facilities and discounts to establish relationships with the customers (Khare, 2014). Some companies go to the extent of using their Corporate Social Responsibility (CSR) activities in promoting personal relation and social proximity (Montalbo, 2015). Companies use relationship marketing in building strong customer link (Taleghani et al., 2011).

In between the phenomenon of moving from customer acquisition to customer retention, much emphasis is given to customer satisfaction. Customer satisfaction plays a pivotal role in converting an acquired customer to be a retained customer in all likely scenarios. Customer satisfaction is a vital node in the journey of a business process from acquisition to retention of a customer. From the above postulates of Sheth (2017) and Grönroos (2000) it becomes evident that relationship marketing helps in achieving customer satisfaction or significantly impacting customer satisfaction from product to service, and from hotel to fast-food.

Since fast food has limited menu prepared with production line technique (Bender, 2018) in quick time, consumed immediately either inside or (mostly takeaway or home delivery) outside the premise (Yeo, 2010), limits the study in this research on SERVQUAL Model of Parasuraman et al. (1985) which purely works in service quality measurement. The SERVQUAL Model based on its five elements viz., reliability, assurance, tangibility, empathy and responsiveness could all be the antecedents of relationship marketing in a regular fine dining restaurants where guests enjoy their meal with proper service-escapes (Bitner, 1992). However, the five gaps viz., knowledge, standards, delivery, communication, and satisfaction found in the SERVQUAL Model make it more complex in fast food industry to completely rely on this model due to fast food industry's own nature. Hence, relationship marketers generally aver SERVQUAL Model in their marketing pursuit.

Similarly, DINESERV Model (Stevens et al., 1995), another tool for measuring service quality in restaurants having variables like consistent quality, personal relationship, friendly service, reasonable price and consistent communication (Vanniarajan & Meharajan, 2012) does not augur well in fast food industry for the same reasons (less point of contact and time spent).

Taking nature of fast-food industry into consideration, authors took liberty to omit most coveted service quality models like SERVQUAL Model and DINESERV Model from their study and decided to pursue relationship marketing theories only.

With increasing competition and changing consumer preferences, building, and maintaining strong relationships with customers in fast food industry has become crucial. Trust, commitment, and communication are the key constructs of relationship marketing that contribute to customer satisfaction. By fostering trust, fast food establishments can establish a sense of reliability and credibility, creating loyal customers who are more likely to return. Commitment involves demonstrating a long-term dedication to meeting customer needs and going beyond mere transactions. Effective communication allows fast food companies to understand customer preferences, resolve issues promptly, and provide personalized experiences. Recognizing the significance of these constructs, the current study aims to predict the impact of relationship marketing on customer satisfaction, highlighting its importance as a strategic approach in the fast-food industry.

2. Review of Literature

Berry, (1983) pioneered in relationship marketing theory. He highlighted the importance of keeping customers at the base of any service organization. According to him relationship marketing strategies revolve around core service marketing (need oriented, specific services), relationship customization (tailor service for individual customer), service augmentation (genuine extras to differentiate), relationship pricing (price incentive to encourage relationship) and
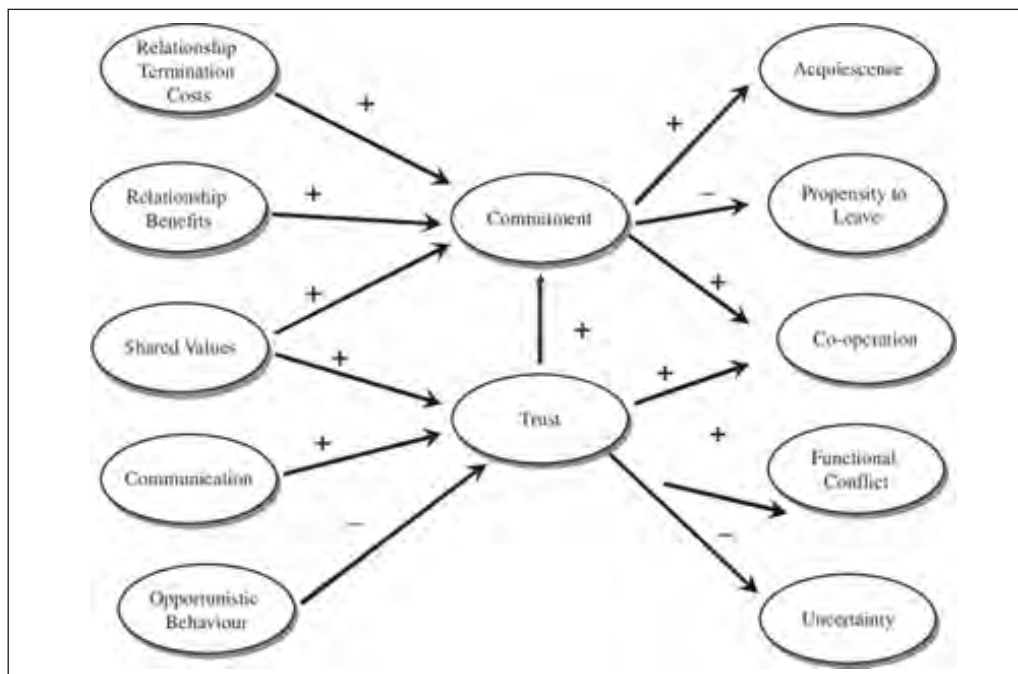
Fig.1 KMV Model of Relationship Marketing
Source: KMV Model of Relationship Marketing,(Morgan & Hunt, 1994)

internal marketing (skilled, satisfied employees to create organizational culture and give right service). He accentuated that the main objective of relationship marketing is to emphasize customer retention, while also aiming to attract new customers as a secondary goal.

For the academic purpose of the research, Morgan & Hunt (1994) Model of Relationship Marketing is taken as a base for our study wherein, trust; commitment; communication; shared value and service quality considerably form the relationship marketing.

For authors' convenience in the present study, they have omitted shared value and service quality from their scope of study and pursued trust, commitment, and communication as formative constructs of relationship marketing. Authors have also excluded outcome variables in this paper for the ease of being focused on trust, commitment, and communication linkage with customer satisfaction.

2.1 Trust-Commitment-Communication-Satisfaction Linkage

Dwyer et al., (1987) considered relationship marketing different from discrete transactions for its previous agreements, long duration, and continuing process. They argued that in a long-term relation relational parties start trusting each other and gradually increase commitment to fulfill each other's interests. Here it could be inferred that previous agreements are considered as commitment; long duration signifies trust; and continuing process is carried out through communication.

Commitment and trust together produce efficient, productive and effective outcomes (Morgan & Hunt, 1994).

Selnes (1998), in his research model proposed that communication and commitment drive satisfaction and at the same time communication and satisfaction drive trust. From the available literature it can be argued that trust and commitment are linked to relational exchanges.

Customer relationship management (CRM) when partially mediated by customer satisfaction, significantly impacts customer loyalty and builds deep trust among customers (Khan et al., 2020). Herman et al., (2020), Mang'unyi et al. (2018) and Palmer et al. (2000) have all found that relationship marketing or CRM is an important tool to achieve customer satisfaction in hospitality and tourism industry. Strong CRM practices reduce customer complaints, maximize customer satisfaction, extend relationship, and bring profit to the organization (Bukhari et al., 2019; Hyun & Perdue, 2017; Wahab & Khong, 2019).

2.1.1 Trust

Moorman et al., (1993) defined trust as relational partner's willingness to rely confidently on the other partner in the relationship. Trust is a state of mind when a person relies on the exchange partner, considering other partner to be honest and reliable (Chellappa & Sin, 2005; Hamm et al., 2016) and mediates in relational exchange (Morgan & Hunt, 1994). Trust is the buyer's belief to rely on a service provider for his own long-

term interests (Crosby et al., 1990). It is built by the relationship partners over a period of time by keeping commitments, being honest and communicating well about the actions performed by them determining their future course of action (MacMillan et al., 2005).

It is evident from the study of Viktoria Rampl et al. (2012) new production process technologies, increased attention toward product ingredients, and obesity concerns have affected general levels of trust in food. Consequently, trust is an ever more decisive factor for success in food industry buyer-seller relationships and, hence, in the retail food market. Although considerable research has investigated trust in organizations, research in the food retailing industry needs further investigation. The aim of this paper is to identify variables related to consumer trust in food retailers. Only when consumer trust in food retailers is understood can retailers effectively apply corresponding strategies to secure long-term success. Based on an established model of trust in organizations, the authors developed a questionnaire to test drivers (ability, benevolence, integrity on food retail sector, that trust in an organization is important for risks associated in relationship with the organization and thus makes customer loyal to that organization. Achrol (1991) posited that trust determines commitment in relationships. Similarly, Sharma & Patterson (1999) conceptualized trust to be a mediating variable for both communication and commitment.

Rempel et al. (1985) conceptualized trust having sub constructs like reliability,

dependability, and faith which itself establishes linkage between trust and commitment. Izogo et al. (2016) in their relationship study in retail sector found that commitment is strongly influenced by trust. This finding supports the opinion of trust working as precursor of increased commitment in relationship (Vuuren et al., 2012). Trust makes a customer satisfied with the organization and accentuate the repurchase intention of the customer which in turn helps in retaining the customer and have long term relationships with the customer (Ginting et al., 2023)

Lack of trust is detrimental to organization's anticipated results (Eastlick et al., 2006; Tarhini et al., 2015). If trust is in doubt, so is the relationship. Trust reinforces relationship between the exchanging parties (Ikram & Mustapha, 2012). By developing trust an organization can earn the pole position in the service providers' list (Doyle & Roth, 1992). Hence, our first hypothesis is framed as under:

H_1: Trust has a significant and positive impact on Customer Satisfaction

2.1.2 Commitment

Commitment is one's wish of esteemed relationship maintained by parties at exchange (Alteren & Tudoran, 2016; T. Jones et al., 2010) based on feelings of mutuality and responsibilities (Yucel et al., 2014), customers' emotive connection (Hsiao et al., 2015), affinity, loyalty, and association (Sharma & Dhar, 2016) and projected switching cost (Jones et al., 2007). It helps in continuing the relationship between the exchange

partners both implicitly and explicitly (Dwyer et al., 1987). Commitment endures relational partners to continue their exchange for infinite times for its worthiness (Moorman et al., 1992; Morgan & Hunt, 1994).

Fullerton, (2005) came up with alternative theories in which affective commitment helps in building marketing relationships whereas continuance commitment erodes marketing relationships. The affective commitment somewhat mediates trust of the customers.

Commitment manifests response to customer needs in the market and thus leads to customer satisfaction (Kohli & Jaworski, 1990). Dagger et al., (2011) marked that commitment helps in maintaining the relationship between the relational partners.

Boateng & Narteh (2016), in their study on financial institutions found that dimensions like engagement and advocacy are directly affecting customer commitment whereas, personalization and collaboration are also affecting customer commitment mediated through trust. This forms the basis of our second hypothesis.

H_2: Commitment has a significant and positive impact on Customer Satisfaction

2.1.3 Communication

Communication is a two way process of informing and listening to the customers which helps in increasing customer loyalty by seeking their opinions and identifying their needs in the relationship (Sargeant, 2001). Morgan & Hunt,

(1994) postulated three sub constructs of communication as frequency, relevance, and timeliness of the communication from the organization to its customers. He also postulated that trust is directly influenced by communication and further commitment is indirectly influenced by communication mediated through trust.

Mac Millan et al. (2005) added responsive interaction from the organization as another sublevel of communication apart from informing and listening. Due to the involvement of several people in the communication process, it becomes a complex antecedent of trust. Communication majorly helps in building trust in marketing relationship by sharing relevant and timely information (Anderson & Narus, 1990; Moorman et al., 1993). It also helps in educating the customers about the benefits offered at hand, which make them trust the organization.

Sabel, (1993) found communication as a means to mature and preserve relationships and in turn preserve trust. Since, communication makes customers understand the performance outcomes of the organization, it also leads to customer satisfaction (Selnes, 1998). Proper communication with customers helps in organizational success (Schultz & Good, 2000). Communication when integrated with the marketing mix leads to customer satisfaction directly or indirectly (Othman et al., 2020).

Communication when treated as relationship advertising through responsive interaction helps building

a sense of intimacy and belongingness to the organization (Bhattacharya & Bolton, 2000) by progressing from acquaintance to build-up to continuation (Stern, 1997). It also involves extensive listening to the customers and shorting out on feedbacks they get (Duncan & Moriarty, 1998). In fact, communication induces the feelings of trust and commitment in customers (Bennett & Barkensjo, 2005). Good communication leads to organization's profitability (Flood et al., 2000). Hence, our third hypothesis is framed as under:

H₃: Communication has a significant and positive impact on Customer Satisfaction

2.2 Customer Satisfaction

Satisfaction is the confirmation of expected performance of any product or service by the customer comparing the returns and price of purchase (Churchill & Surprenant, 1982). This theory does not distinguish between expectations from the service itself and the service providers. Customer satisfaction is the overall evaluation of the service performance of the company by the customers (Johnson & Fornell, 1991). Selnes, (1998) proposed satisfaction as a source for trust and ranked trust as a higher degree of emotion than satisfaction.

Tahir et al. (2016) have a different take on customer satisfaction and found that customer satisfaction influences CRM drivers like trust, commitment, and communication. Customer satisfaction at times is used as a catalyst to increase trust and commitment (Rather et al., 2019). To analyze the impact of trust, commitment and communication following conceptual model is poised:
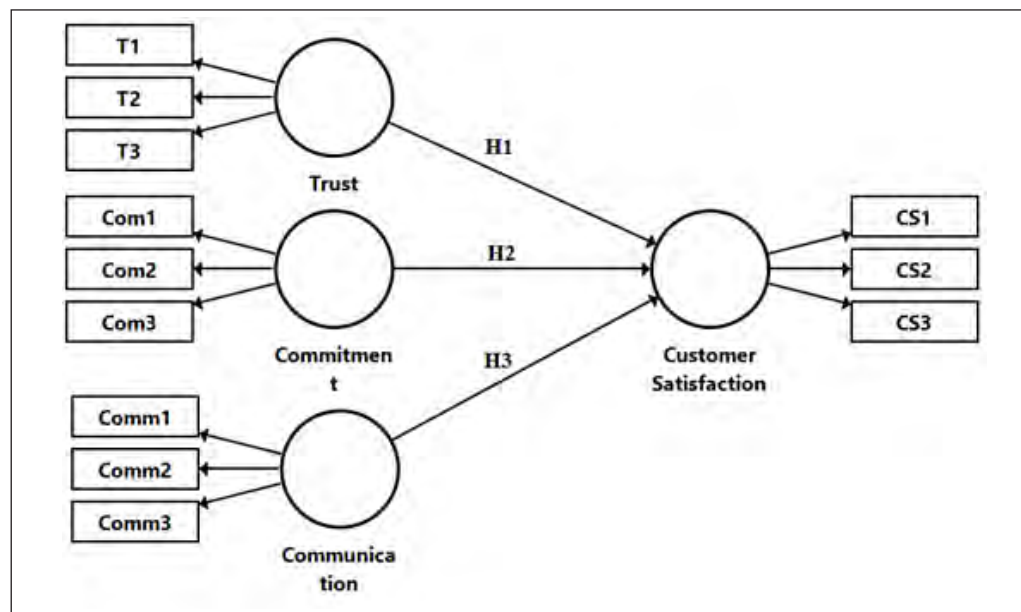
Fig 2: Conceptual Model
Source: The authors' (2023)

Methodology

To gather data from individuals who have been consuming fast food for the past 2 years, an online questionnaire was designed specifically for this purpose. The questionnaire included multiple items corresponding to different constructs which impact the respondent's satisfaction. These constructs were carefully selected and modified to ensure comprehensive coverage of the relevant aspects related to fast food consumption. The respondents were asked to provide their responses based on the given items, enabling the collection of valuable insights regarding their fast-food consumption habits and preferences.

A total of 350 responses were initially collected through the online questionnaire. However, upon thorough screening and analysis of the data, it was determined that only 238 of these data points were deemed useful and relevant for the current study. These responses have met the necessary criteria and can therefore be utilized in the analysis and interpretation of the study's findings.

Result

PLS-SEM can handle complex models with many variables and complex relationships between them, while ANN can handle non-linear relationships that may be difficult to model with traditional statistical methods. PLS-SEM-ANN can handle data with missing values. PLS-SEM can handle missing data by estimating the missing values from the other available data, while ANN can impute missing values using a variety of techniques. It can provide robust results. PLS-SEM can handle non-normal data and outliers, while ANN can provide robust results even in noisy or incomplete data. It can provide better predictive performance. ANN can improve the predictive performance of the model by learning complex patterns in the data, while PLS-SEM can provide accurate estimates of the relationships between the variables. Overall, PLS-SEM-ANN can be a useful modeling approach when dealing with complex data sets, where there may be missing data, non-linear relationships, and the need for robust results and accurate predictions.

Measurement Model

A measurement model is a statistical approach that is employed in research to explore the connections between multiple observed variables and a collection of latent constructs. The aim of a measurement model is to evaluate the degree to which a set of observed variables can adequately measure or represent a particular construct or underlying dimension of significance.

Internal consistency is demonstrated through measures such as Cronbach's alpha and Composite Reliability, which assesses the degree to which items within a scale are interrelated. High levels of reliability are important because they indicate that the measurement model variables are consistently measuring the same construct and that any observed differences are likely due to true differences in the construct being measured. The score of Cronbach Alpha and Composite Reliability is in

line with the minimum requirement of 0.7 (Cronbach, 1951; Hair et al., 2012), providing for reliability.

Secondly, the measurement model variables show evidence of convergent validity, which is the extent to which different measures of the same construct are correlated with each other. Convergent validity is demonstrated through measures such as factor loadings, which assess the degree to which items within a scale are related to the overall construct being measured. Also, a value of Average Value Extracted (>0.5) establishes Convergent Validity. High levels of convergent validity indicate that the measurement model variables are accurately measuring the construct of interest. The factor loading and AVE score as given in Table 2 and Table 3. All the factors load to their respective construct and the loading value is above 0.6. Further, the AVE score is found to be above 0.5, hence establishing Convergent Validity.

Thirdly, the measurement model variables show evidence of discriminant validity, which is the extent to which measures of different constructs are not highly correlated with each other. Discriminant validity is demonstrated through measures such as average variance extracted (AVE), which assesses the degree to which the variance within a construct is greater than the variance shared with other constructs. High levels of discriminant validity indicate that the measurement model variables are measuring distinct constructs and are not being influenced by other variables. The Fornell & Larcker, (1981)

criterion states that the square root of the average variance extracted (AVE) of each construct should be greater than the correlations between that construct and other constructs in the study. Table 4 Support the criteria, hence establishing the Discriminant Validity.

In regression analysis, multi-collinearity occurs when two or more predictor variables are highly correlated with each other. This can lead to unstable and unreliable estimates of the regression coefficients, making it difficult to interpret the relationship between the predictor variables and the outcome variable. The VIF provides a measure of the degree of multi-collinearity between each predictor variable and the other predictor variables in the model. Table 5 provides the value of VIF. All the values are less than 3, indicating that multi-collinearity is not an issue (Hair et al., 2010).

R-squared (also known as the coefficient of determination) is a statistical measure that represents the proportion of the variance in the dependent variable (y) that is explained by the independent variable(s) (x) in a regression model. The value of R-squared ranges from 0 to 1, where 0 indicates that none of the variance in the dependent variable is explained by the independent variable(s) and 1 indicates that all the variance in the dependent variable is explained by the independent variable(s). The R^2 value for present study is provided in Table 6. The value of 0.83 indicates that 83% of variance in Customer Satisfaction can be explained by the identified independent variables.

The measurement model variables demonstrate high levels of reliability, convergent validity, and discriminant validity. These positive attributes suggest that the measurement model is a valid and reliable tool for operationalizing the theoretical constructs of interest and obtaining accurate measures of these constructs.

Structural Model

After establishing a reliable measurement model, the subsequent stage involved analyzing the structural model to validate the theoretical paths and corroborate the proposed hypotheses using statistical methods. Smart PLS 3 was utilized to carry out a bootstrapping process consisting of 5000 sub-samples.

Based on the bootstrap analysis with 5000 sub-samples, Commitment, Communication, and Trust all have positive and significant effects on customer satisfaction, (t>1.96, p < 0.05) With Trust having highest effect (β=0.479) followed by Commitment (β=0.273) and Communication (β=0.267). Finding suggests that there is a strong positive relationship between the independent variable and the dependent variable. These results provide strong evidence to support the proposed hypothesis and the validity of the structural model. The outcome is listed in Table 7.

According to the results, it can be inferred that Trust (β=0.479) has the most substantial influence on Customer Satisfaction. The impact was found to be statistically significant (t>1.96; p<0.05). Moreover, Commitment (β=0.273) and Communication (β=0.276) were found

to have comparable impact on Customer satisfaction. Although Commitment slightly outperformed Communication in terms of influence, both constructs significantly contributed to Customer Satisfaction (t>1.96, p<0.05). Hence, the findings of the present study support all three formulated hypotheses.

Further, to confirm the finding of Smart PLS, authors have applied Artificial Neural Network. Using ANN to check the results of Smart PLS can provide researchers with additional insights, particularly in terms of predictive accuracy, handling missing data, and capturing non-linear relationships. It can serve as a complementary approach to validate and cross-validate the results obtained from Smart PLS, enhancing the robustness of the analysis, and contributing to a more comprehensive understanding of the underlying relationships in the data.

ANN Analysis

Using the training dataset, an ANN model (Fig. 3) was developed to predict the values of dependent variables based on the independent variables identified in the Smart PLS model. The ANN model was trained using the training dataset (90%), and its performance was evaluated using various metrics, including root mean squared error (RMSE). The model was tested using the testing dataset (10%) to assess its generalization capability. The architecture of the ANN model consisted of one layer with three neurons in each layer. The activation functions and optimization algorithm used were Hyperbolic tangent and Identity respectively.

Hidden layer activation function: Hyperbolic tangent

Output layer activation function: Identity
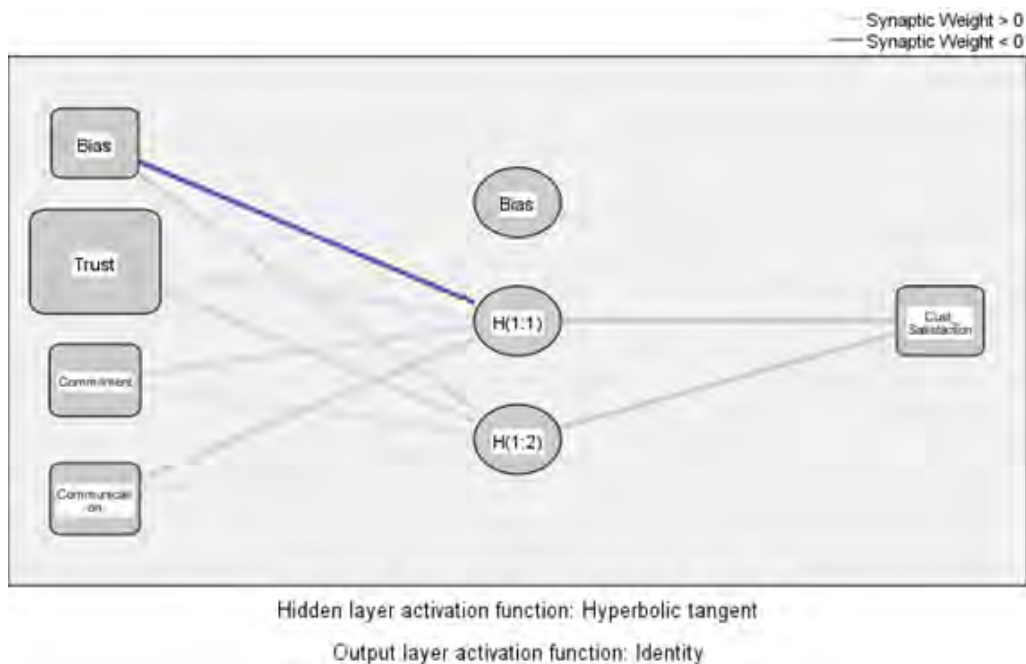
Fig 3: Artificial Neural Network (ANN) Diagram
Source: The authors' (2023)

Additionally, in Figure 4, it can be observed that the average root mean square error (RMSE) for both the training and testing samples is considerably low, with values of 0.278 and 0.268, respectively. These values fall within an acceptable range, indicating that the ANN model demonstrates minimal error.
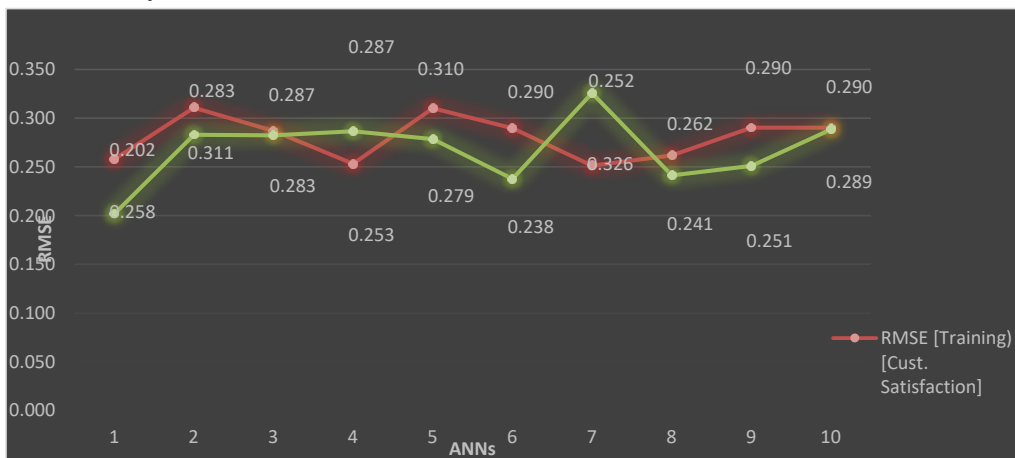
Fig. 4: Root Mean Square of Error across ANN iteration
Source: The authors' (2023)

To mitigate overfitting, a tenfold cross-validation technique was employed. Table 8 presents the root mean square error (RMSE) values for both the training and testing samples, as well as the absolute difference between them.

To assess the predictive power of each input feature, a sensitivity analysis was conducted, and the results are presented in Table 9. The normalized importance of these features was obtained by calculating their relative importance divided by the maximum importance. The findings indicate that Trust is the most dominant feature, with a normalized importance of 100%. This is followed by Commitment with a normalized importance of 57% and Communication with a normalized importance of 55%.

The ANN model's predicted values were compared to the values obtained from the Smart PLS analysis to assess the reliability and validity of the Smart PLS results. The comparison revealed a strong similarity between the predicted and observed values. This similarity was further supported by the normalized importance scores, where Trust was assigned a 100% importance, indicating its highest impact on Customer Satisfaction. Communication and Commitment followed in importance, mirroring the findings of the Smart PLS analysis. Additionally, the impact of Commitment and Communication was comparable, with Commitment having a slight advantage over Communication. Thus, the results obtained from the ANN analysis align with the findings of the Smart PLS analysis, further reinforcing their coherence.

Conclusion

The study's findings reveal that Trust has the highest impact on customer satisfaction within the fast-food industry. This finding is further supported by the importance given to Trust in both the Smart PLS and ANN analyses. For instance, in the Smart PLS analysis, Trust was found to have a significant positive relationship with customer satisfaction, with a beta coefficient of 0.479. Similarly, in the ANN analysis, Trust was identified as the most dominant feature, having a normalized importance of 100%. These results indicate that customers' trust in fast food establishments plays a crucial role in determining their overall satisfaction. Furthermore, the study also highlights the significance of Commitment and Communication, which follow Trust in terms of importance. This emphasizes the importance of establishing a committed relationship with customers and ensuring effective communication channels to enhance customer satisfaction in the fast-food industry.

Theoretical Implications

The theoretical implications of the findings are significant for the field of customer satisfaction research in the fast-food industry. The identification of Trust as the primary driver of customer satisfaction highlights the importance of establishing and maintaining trust-based relationships with customers. This finding aligns with theories such as social exchange theory, which emphasize the significance of trust in fostering positive customer experiences and loyalty.

Furthermore, the study's confirmation of the impact of Commitment and Communication on customer satisfaction provides additional theoretical insights. Commitment signifies the dedication and loyalty of fast-food establishments towards their customers, which can enhance overall satisfaction. Effective communication channels enable clear and timely information exchange, fostering better understanding and meeting customer expectations.

These findings contribute to the existing body of knowledge by affirming the relevance of these constructs in the fast-food industry specifically. The study adds empirical evidence to support theoretical frameworks and models that emphasize the importance of Trust, Commitment, and Communication in shaping customer satisfaction.

Moreover, the use of both Smart PLS and ANN in this study reinforces the robustness and validity of the findings. The integration of these two analytical approaches provides a comprehensive understanding of the relationships between variables and validates the results through different methodologies. This demonstrates the value of utilizing multiple methods to strengthen theoretical explanations and enhance the reliability of research findings.

Overall, the theoretical implications of this study shed light on the underlying mechanisms that drive customer satisfaction in the fast-food industry. These insights can guide practitioners in developing strategies and initiatives aimed at building trust, fostering commitment, and improving communication to enhance customer satisfaction and loyalty.

Managerial Implications

The managerial implications of the findings are crucial for managers and decision-makers in the fast-food industry. The insights from the study can guide them in developing effective strategies and making informed decisions to improve customer satisfaction and drive business success.

Managers should prioritize initiatives that build and maintain trust with customers. This includes ensuring product quality, providing transparent information about ingredients and sourcing, and delivering on promises made in marketing and advertising materials. By focusing on building trust, managers can foster long-term customer loyalty and positive brand perception.

Managers should invest in comprehensive training programs to equip employees with the necessary skills and knowledge to provide exceptional customer service. Employees should be trained in effective communication, conflict resolution, and problem-solving to handle customer inquiries and complaints professionally. Engaging employees through incentives, recognition, and empowerment can also contribute to positive customer interactions.

Managers should prioritize enhancing communication channels to ensure timely and accurate information delivery to customers. This includes optimizing online platforms, social media channels, and mobile apps for seamless and efficient communication.

Regularly updating customers about promotions, new offerings, and responding promptly to their queries and feedback can significantly improve customer satisfaction.

Limitation

Despite the valuable insights gained from this study, it is important to acknowledge its limitations. Firstly, the study has been conducted on a limited sample size, which could affect the generalizability of the findings. The results might be specific to the selected participants or context, and caution should be exercised when applying the findings to a broader population. Next, the study focused on fast food industry, which might limit the generalizability of the findings to other industries or sectors. Factors unique to the fast-food industry might have influenced the results. Lastly, the study relied on self-reported data from online questionnaire, which can be subject to response biases and social desirability effects.

Despite its limitations, this study serves as a catalyst for future research on customer satisfaction in the fast-food industry, uncovering several promising avenues for further investigation. Future studies can explore the inclusion of additional variables that may impact customer satisfaction, such as service quality, price perception, menu variety, and convenience. Investigating the interplay of these variables can provide a more comprehensive understanding of the drivers of customer satisfaction. Also, conducting a comparative analysis across different fast-food chains or brands can offer valuable insights into the factors that differentiate customer satisfaction levels among various establishments.

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Testing of Weak Market Efficiency in Indian Stock Market: An Empirical Study of Pharmaceutical Sector

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Abstract:

Market efficiency concept is one of the vital interest areas for economists and researchers around the world. Pharmaceutical sector has seen quite a growth in recent past, as government around the world have made healthcare a priority sector. The target of the study is to examine whether the Indian financial market, with particular reference to the pharmaceutical sector, may be considered to be following a random walk. This study is centered on past price data of two indices and eight pharmaceutical companies' stocks listed on national stock exchange for ten years. Analytical tools namely run test, unit root test and autocorrelation test have been utilized. Though results of tests are varying, we may conclude that the stock market in pharmaceutical sector lacks weak form of efficiency as the return series is neither stationary nor random.

Keywords: Efficient Market Hypothesis, Stationarity Test, Random Walk, Indian Stock Market, Pharmaceutical Sector.

1. Introduction

Investors perceive the stock market as a lucrative place for making quick returns. Most avid stock market investors depend on some logical technique for their stock selection rather than basing their decision solely on their guts. Many also take professionals' assistance to increase their chances of higher returns. Technical and fundamental analysis are two significant ways investors or stock managers use to assess a company's stock. Technical theorists base their judgment on past patterns and believe that history repeats itself. On the other hand, fundamental analysts work on the assumption of intrinsic value, which is influenced by the company's performance and other external factors. Finding the intrinsic value of a stock

and comparing it to the movement of the actual price is their path to gaining returns.

Random walk theory (Fama,1965) propagates the idea that in an efficient financial market security value movement can't be used to predict the future, and actual price and intrinsic value are the same for a stock. Thus, making technical and fundamental analysis futile for predicting future returns. Levy (1967) initiated the idea of classification of market on the basis of efficiency in two forms: weak and strong. Later this categorization was increased to three: strong, semi-string and weak form of market efficiency (Fama,1971).

Random walk model testing for stock market can be attained through different ways, such as empirical testing or technical analysis. Technical analysis id usually preferred if the period of study is short. This paper is empirical in nature.

2. Literature Review

Market efficiency has been a topic of interest for past many decades. In this section we are reviewing some of the relevant studies done beyond Indian stock market. **Bachelier and Cootner (1964)** states in their study that an inefficient market becomes a source of infinite gains for the investors. **Moore (1964)** in his paper, one the earliest, found that studying past weekly price data is futile for earning a gain in stock market. His study included thirty randomly selected stock price numbers for the years 1951 to 1958. **Sharma and Kennedy (1977)** in their work did a comparative stock behavior analysis

for three stock exchanges, i.e., Bombay stock exchange, London stock exchange and New York stock exchange. Results proved that Bombay stock exchange was at par in terms of market efficiency with other two exchanges from developed countries. **Roy (2018)** in his paper, tested the random walk theory by taking into account stock exchanges of five regions, i.e. Britain, the European Union, China, India, and Japan. For his study he tested the closing prices of stock market pointers by using parametric tests and non-parametric test. For assessing market efficiency unit root test was applied. The results showed that most of the indices were weak form inefficient. Though various tests gave differing conclusions.

In Indian context, many researchers have analyzed stock market in India for different kinds efficiency, by taking into account past data of various securities. Few relevant studies are discussed here. **Kalsie (2012)** examined the market efficiency of security prices of thirty-seven companies constituting the nifty 50 index. For this purpose, run test was applied on thirty days daily average price for seven years (2001-2007). The author determined the market as weak form efficient. **Sarkar (2019)** tested the market efficiency of top two exchanges in India (National Stock Exchange and Bombay Stock Exchange). He considered daily returns of nifty 50 and S&P Sensex for four years, i.e.,2014 to 2018. Tools used by him included run test (mean, median and zero as base) and Kolmogorov-Smirnov goodness of fit test. Both these tests indicated that the

weak market efficiency was not present. The unit root tests concluded that the return data was stationary at level, making the series modelling possible. Thus, finalizing the result market inefficiency. **Kumar and Jawa (2017)** covered twenty years (1995-2015) of price data of nifty 50 index in their paper for aiming to test market efficiency and checking the existence calendar effect anomaly. The study infers the presence of Wednesday effect and December effect through application of EGARCH estimation methodology. **Pant and Bishnoi (2001)** used daily and weekly market indices return to test random walk-through variance ratio testing. The results rejected that the market was unpredictable, thus concluding that the investors can gain if they study the past trends. **Jain and Jain (2013)** in their study's findings deduced that the BSE index is efficient. Their study covered twenty years i.e. April 1993 to march 2013, of closing price and applied various parametric and non-parametric tests. **Madhusoodanam (1998)** checked two indices(BSE Sensex index and BSE100 index) and 120 individual securities' price data from January 1987 to December 1995, for mean reverting trend. Results through variance ratio test supported a persistent movement of weekly data, thus rejecting random walk assumption for both indices and104 individual stocks.

Two studies with similar objective and related to pharmaceutical sector are reviewed here. **Kumar et al. (2020)** examines the market efficiency of the pharmaceutical sector in all three stages. For testing weak form, they applied run test by utilizing six years' closing prices of ten pharma companies. The outcomes showed that pharma sector is in weak form of efficiency. **Siddikee and begum (2015)** assessed the efficiency of Dhaka stock exchange with focus on pharmaceutical sector by taking into account security price history of thirteen listed companies. In their paper, they utilized run test, which concluded that the pharma stock prices didn't follow random walk. ADF test, Autocorrelation and Box-Ljung tests indicated the incidence of weak market efficiency.

3. Objective

The study intends to analyze market efficiency (weak form) with special focus on Indian pharmaceutical sector. With this in aim, following are the key objectives:

1. To examine market efficiency of National Stock Exchange through nifty index.

2. To assess weak market efficiency of India pharmaceutical stocks through Nifty pharma index and eight individual stocks.

The hypothesis for above objectives are as follows:

H_{01}: Return series of nifty 50 index and nifty pharma index follows a random walk.

H_{02}: Return series of listed pharmaceutical companies' stocks follow a random walk.

H_{03}: Return series of nifty 50 and nifty pharma are non-stationary.

H_{04}: Return series of listed pharmaceutical companies' stocks are non-stationary.

4. Methodology

4.1. Research design

The present work looks into the weak market efficiency in context to Indian stock exchange, focusing on the pharmaceutical sector. We have chosen two indices, Nifty 50 and Nifty Pharma Index for comprehensive market study and eight listed pharmaceutical companies' stocks for individual study. The listed companies selected are constituents of Nifty Pharma Index, which captures the performance of pharmaceutical stocks. Our aim was to study top ten constituent companies (by weightage) of Nifty Pharma Index from 1ˢᵗ January, 2013- 1ˢᵗ January 2023, but data for two companies named Alkem Laboratories Ltd. and Laurus Labs Ltd. was not available according to our study time frame. We have focused on daily compounding returns or log returns for testing the efficiency, which we have calculated through price series as follows (Kalsie and Kalra).

$$r \cong \log(1 + R_t) = \log \frac{P_t}{P_{t-1}} \quad \text{(Eq.1)}$$

The Details regarding the sample indices and stocks are given below in Table 1.

S.No.	Name of indices	Name of listed pharmaceutical companies
1.	Nifty 50 Index	Sun Pharmaceutical Industries Ltd.
2.	Nifty Pharma Index	Dr. Reddy's Laboratories Ltd.
3.		Cipla Ltd.
4.		Divi's Laboratories Ltd.
5.		Aurobindo Pharma Ltd.
6.		Lupin Ltd.
7.		Torrent Pharmaceuticals Ltd.
8.		Zydus Lifesciences Ltd.

4.2. Data collection

We have utilized secondary data for our study. We have collected the historical price data from national stock exchange website and Yahoo Finance website. Other needed information was sourced through various books and journals.

4.3. Analytical tools

A) *Run test*

Run test which is widely applied parametric measure to examine the unpredictability in series. It is one of the oldest tools for testing market efficiency. Run test observes past return data to check the succeeding returns for independence. In this test the positive returns and negative returns are denoted by 'n_1' and 'n_2' respectively and total number of runs are 'n', where total runs should be sum of n_1 and n_2. Z-value of run test tested at 5% significance level.

$$Z = \frac{r - \mu(\mathbf{r})}{\sigma_r} \quad \text{(Eq.2)}$$

Where, $\mu(r) = 2 \times n_0 x n_{1/n}$

$$\sigma_r = \sqrt{\frac{2 X n_0 X n_1 X (2 X n_0 X n_1 - n)}{n^2(n-1)}} \quad \text{(Eq.3)}$$

$\mu(r) = expected\ number\ of\ returns$

$\boldsymbol{\sigma_r} = standard\ deviation\ of\ returns$

B) *Unit root test*

Unit root test has been used quite frequently for checking market efficiency, especially as a combination with Run test. **Hassan, Shoaib and Shah (2007)** have stated that series which do not follow random walk are stationary time series. Stationary series can be easily modelled, through which future prediction about market can be made. Thus, Stationarity in a series indicate that the market is inefficient. In our study, we have used two tests for checking unit root, i.e., Philips Perron test and Augmented Dickey-fuller test at level.

C) *Autocorrelation*

Autocorrelation is a trusted statistic for checking a return series for independence. This test identifies occurrence of correlation in data series. Autocorrelation function (ACF) and correlograms (LjungBox statistic) is utilized for 1-10 lags here. If the market is efficient, null hypothesis of 'no autocorrelation' will be accepted.

Equation for finding autocorrelation coefficient (P_k) at lag k is as follows:

$$P_k = \frac{\sum_{t=1}^{n-k} (R_t - \bar{R})(R_{t+k} - \bar{R})}{\sum_{t=1}^{n} (R_t - \bar{R})^2} \quad \text{(Eq.4)}$$

Here, K denotes lags, R_t shows rate of return and n is overall number of surveys (Ramkumar et.al.). When we plot for lag k, we get correlogram.

5. Findings and Analysis

The descriptive statistics are displayed in table 2 for two indices and eight pharmaceutical companies' securities. Daily compounded return is used in the study. Through the descriptive statistics, we can see that both the indices are negatively skewed whereas four individual securities (Sun Pharma, Cipla, Torrent Pharma and Zydus Lifesciences) show positive skewness. This indicates that for the indices higher negative returns are common whereas for positively skewed securities, higher positive returns happen more. Kurtosis value for all is positive and higher than three, which shows that the distribution is leptokurtic and higher peaked than the normal distribution. Jarque-Bera tests whether the distribution has skewness and kurtosis suitable for a normal distribution. For our distribution, probability value for all the variables is 0.000, thus concluding that daily return series is not normal.

Now, in order to test whether the return series of selected indices and listed stocks for randomness, we have used two tools, Run test and Autocorrelation and Box-Ljung test. Table 3 and 4 presents the outcomes of run test, with mean and median base respectively. With both the bases we have achieved identical results. The null proposition for the test is that the return series is random. If probability value is below

0.05, we reject the null premise. Run test results at 5% significance level, shows that both the indices reject the null hypothesis. Except Cipla, all other individual securities of pharma sector accept the null hypothesis as p-value is above 0.05

Table 5 presents autocorrelation test results for our chosen sample. For all the indices and company stocks probability value is less than 5% ($p<0.05$), thus we can say that the returns do have autocorrelation and are not random. Run test rejects H_{01}, which states that individually the index series follow a casual walk, while autocorrelation test rejects it too. For H_{02}, which pertains to random walk theory being followed by returns of listed pharmaceutical stocks, run test accepts it for all the companies except one and autocorrelation test rejects it entirely. We can notice the results for both the test in case of

indices and one company stock (Cipla) is contradictory.

To test the series for stationarity, Philips-Perron and Augmented Dickey-Fuller test is applied. Both these tests have null hypothesis as follows:

H0: Series has a Unit Root.

Through table 6, we can see that for all the return series t-statistic is above the critical value (1% (3.43) ,5% (2.86) and 10% (2.56)). Probability value is less than 0.05 in all the cases. We can discard the null hypothesis. Thus, concluding that yields of both the indices as well as eight individual stocks are stationary and do not have a unit root. With this result we can reject our H_{03} and H_{04} as return series of both the indices and listed stocks of pharmaceutical companies are stationary as they do not have a unit root.

Table 2. Descriptive Statistics

Index/ company	Mean	Median	maximum	minimum	Standard deviation	skewness	kurtosis	Jarque-Bera	
								statistics	probability
Nifty 50	0.000450	0.000672	0.084003	-0.139038	0.010874	-1.231336	20.58469	32513.88	0.000000
Nifty pharma	0.000296	0.000517	0.098650	-0.093507	0.012681	-0.154843	7.739776	2326.642	0.000000
Sun pharma	0.000384	0.000322	0.104469	-0.163202	0.019404	0.366958	8.567133	3238.559	0.000000
Dr. Reddy lab	0.000330	0.000142	0.129870	-0.157366	0.017385	-0.206823	10.66927	6058.640	0.000000
Cipla	0.000353	-0.000493	0.122550	-0.092397	0.016711	0.449757	7.177684	1875.677	0.000000
Divi's lab	0.000726	0.000802	0.149787	-0.251862	0.020016	-1.242132	24.55329	48346.43	0.000000
Aurobin-do pharma	0.000603	0.000000	0.184600	-0.210340	0.025010	-0.132186	12.06679	8450.490	0.000000
Lupin	5.44E-05	0.000130	0.126405	-0.184906	0.018763	-0.211180	10.70775	6120.157	0.000000
Torrent pharma	0.000868	2.78E-05	0.125340	-0.163767	0.018681	0.054876	8.986345	3681.927	0.000000
Zydus lifescienc-es	0.000345	-0.000298	0.180972	-0.159653	0.019935	0.578233	10.77462	6345.538	0.000000

Table 3. Run Test (Mean)

Index/ company	Test Value	Cases < Test Value	Cases >= Test Value	Total Cases	Number of Runs	Z	Asymp. Sig. (2-tailed)
Nifty 50 Index	.000449567292439	1209	1266	2475	1156	-3.293	<.001
Nifty Pharma index	.000295902114384	1220	1255	2475	1128	-4.434	<.001
Sun pharma	.000384132063608	1243	1222	2465	1261	1.112	.266
Dr. Reddy lab	.000330331757248	1252	1213	2465	1214	-.773	.439
Cipla	.000353299460130	1317	1148	2465	1298	2.846	.004
Divi's lab	.000725959456416	1225	1240	2465	1244	.425	.671
Aurobindo pharma	.000602604267198	1272	1193	2465	1239	.273	.785
lupin	.000054360044620	1222	1243	2465	1250	.668	.504
Torrent pharma	.000867778151991	1289	1176	2465	1261	1.215	.224
Zydus life-sciences	.000344755256049	1288	1177	2465	1222	-.363	.716

Table 4. Run Test (Median)

Index/ company	Test Value[a]	Cases < Test Value	Cases >= Test Value	Total Cases	Number of Runs	Z	Asymp. Sig. (2-tailed)
Nifty 50 Index	.000671937669468	1237	1238	2475	1160	-3.156	.002
Nifty Pharma Index	.000516862655259	1237	1238	2475	1132	-4.282	<.001
Sun Pharma	.000322132394367	1232	1233	2465	1263	1.189	.235

Dr. Reddy Lab	.000142498908272	1232	1233	2465	1212	-.866	.386
Cipla	-.000493065467794	1232	1233	2465	1304	2.841	.005
Divi's Lab	.000801796097547	1232	1233	2465	1244	.423	.672
Aurobindo Pharma	.000000000000000	1229	1236	2465	1231	-.100	.920
Lupin	.000130187403595	1232	1233	2465	1246	.504	.615
Torrent Pharma	.000027754353481	1232	1233	2465	1275	1.672	.095
Zydus Lifesciences	-.000297781171372	1232	1233	2465	1224	-.383	.702

Table 5. Autocorrelation Test

Index/company	Lags	1	2	3	4	5	6	7	8	9	10
Nifty 50 index	AC	-0.496	-0.01	0.017	-0.066	0.144	-0.169	0.119	-0.041	-0.025	0.08
	PAC	-0.496	-0.34	-0.236	-0.278	-0.069	-0.211	-0.1	-0.102	-0.121	-0.035
	Q-Stat	609.3	609.55	610.31	621.01	672.66	743.82	779.2	783.29	784.79	800.54
	Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nifty pharma index	AC	-0.499	0.01	-0.011	-0.001	0.022	-0.05	0.044	-0.002	-0.011	-0.008
	PAC	-0.499	-0.318	-0.242	-0.197	-0.13	-0.166	-0.116	-0.081	-0.076	-0.084
	Q-Stat	616.1	616.34	616.64	616.64	617.89	624.12	628.89	628.9	629.22	629.36
	Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sun pharma	AC	-0.499	0.015	-0.038	0.025	0.011	-0.029	0.005	0.034	-0.028	0.007
	PAC	-0.499	-0.311	-0.27	-0.207	-0.146	-0.154	-0.148	-0.083	-0.084	-0.07
	Q-Stat	613.88	614.47	618.03	619.58	619.88	621.9	621.96	624.85	626.73	626.87
	Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dr. Reddy lab	AC	-0.466	-0.042	0.018	-0.009	0.016	-0.033	0.02	0.006	-0.012	-0.023
	PAC	-0.466	-0.332	-0.235	-0.193	-0.135	-0.15	-0.122	-0.096	-0.094	-0.131
	Q-Stat	536.39	540.84	541.63	541.83	542.49	545.15	546.13	546.2	546.59	547.85
	Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Cipla	AC	-0.524	0.017	0.011	-0.011	0.011	0.018	-0.035	0.012	0.008	-0.017
	PAC	-0.524	-0.355	-0.256	-0.215	-0.17	-0.103	-0.113	-0.105	-0.082	-0.093
	Q-Stat	677.2	677.95	678.24	678.54	678.87	679.67	682.67	683	683.17	683.9
	Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Divi's lab	AC	-0.465	-0.035	0.012	-0.008	-0.022	0.002	0.04	-0.006	-0.041	0.043
	PAC	-0.465	-0.321	-0.226	-0.182	-0.184	-0.179	-0.111	-0.076	-0.116	-0.068
	Q-Stat	533.44	536.46	536.82	536.99	538.19	538.2	542.17	542.25	546.41	551.04
	Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aurobindo pharma	AC	-0.503	-0.002	0.018	-0.009	-0.001	-0.033	0.031	0.028	-0.044	0.024
	PAC	-0.503	-0.342	-0.236	-0.186	-0.154	-0.188	-0.161	-0.09	-0.111	-0.087
	Q-Stat	624.53	624.54	625.3	625.51	625.51	628.23	630.67	632.55	637.34	638.79
	Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Lupin	AC	-0.491	-0.01	0.001	0.018	-0.026	0.013	-0.002	-0.028	0.024	0.012
	PAC	-0.491	-0.332	-0.249	-0.171	-0.161	-0.129	-0.109	-0.142	-0.124	-0.091
	Q-Stat	594.82	595.08	595.09	595.92	597.6	598.03	598.04	600.04	601.45	601.81
	Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Torrent pharma	AC	-0.471	-0.031	-0.012	0.024	-0.004	-0.019	0.011	-0.014	0.025	-0.015
	PAC	-0.471	-0.324	-0.264	-0.191	-0.152	-0.153	-0.132	-0.143	-0.108	-0.109
	Q-Stat	545.93	548.25	548.62	550.02	550.05	550.91	551.18	551.64	553.18	553.77
	Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Zydus life sciences	AC	-0.478	-0.035	0.02	-0.003	0.01	-0.031	0.03	-0.025	-0.006	0.022
	PAC	-0.478	-0.342	-0.244	-0.191	-0.138	-0.152	-0.107	-0.119	-0.135	-0.111
	Q-Stat	563.51	566.61	567.64	567.66	567.89	570.22	572.51	574.03	574.14	575.35
	Prob.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 6. Unit Root Test

Index/company	ADF Test		PP Test	
	t-stats	Prob.	Adjacent t-Stat	Prob.
Nifty 50	-17.63921	0.0000	-49.59722	0.0001
Nifty pharma	-47.85560	0.0001	-47.99063	0.0001
Sun pharma	-49.29714	0.0001	-49.29614	0.0001
Dr. reddy lab	-46.45022	0.0001	-46.44631	0.0001
cipla	-51.79425	0.0001	-51.74667	0.0001
Divi's lab	-46.78676	0.0001	-46.72458	0.0001
Aurobindo pharma	-50.10776	0.0001	-50.10505	0.0001
lupin	-48.31798	0.0001	-48.32872	0.0001
Torrent pharma	-48.54725	0.0001	-48.91945	0.0001
Zydus lifesciences	-48.49390	0.0001	-48.52241	0.0001

6. **Conclusion**

The empirical findings in our paper is contrasting, depending on the different analytical tools used. Presence of random walk is rejected altogether for both the indices. Also, the return series of both, market index and pharma index are stationary which indicates towards inefficiency. This is because stationary series can be modelled, thus allowing the investors opportunity to make supernormal gains. Therefore, we can agree that both the indices are not efficient (in weak form). The finding is supported by similar studies done by Kalsie & Kalra (2015) and Sarkar(2019).

In case of individual stocks, presence of stationarity is accepted for all the companies, which is evidence of inefficient market. Run test and autocorrelation test give differing results for seven company stocks. As two tests suggests weak form inefficiency, we may conclude that daily stock returns of pharmaceutical companies can be utilized by prospective investors to know the trend. Lack of weak form of efficiency imply that security price is not reflecting all the past information. Further study in similar context can be conducted to know various causes of inefficiency in Indian pharmaceutical stock market. These may involve lots of factors such as economic, political, environmental etc., which can be explored more.

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Consumer's Adoption Intention of Electric Vehicles: A Bibliometric Analysis

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Abstract

An electric vehicle is a type of vehicle that is propelled by an electric motor fuelled by a battery. Electric vehicles are gaining popularity worldwide because of increasing environmental awareness and various benefits like less dependency on fossil fuel and they are considered an efficient and sustainable mode of transportation. This research presents a thorough overview and a bibliometric analysis of studies published related to consumer's adoption/ purchase intentions of Electric vehicles (EVs) from 1994 to 2023. The Scopus database was utilized to extract the papers as it is considered the largest database of peer-reviewed academic publications. The VOS Viewer software was used for the bibliometric analysis of networks between authors, institutions, countries, publications, journals, and keyword occurrence. The study was performed on 1 April 2023, which yielded a total of 140 documents after exclusion using the selected keywords. The findings indicate a considerable increase in EV adoption intention-related publications during the past six years. China is the world leader in this field of research, providing the maximum number of papers and involving the most prominent authors and research organizations. Whereas, Wang Z. has been the most productive author with a maximum number of publications in the area. Sustainability (Switzerland) journal stands out as the most prolific journal with the most publications. This analysis will help academicians better understand historical trends, current challenges, and prospective future research topics in the area of electric vehicle adoption/purchasing intentions.

Keywords: Electric vehicles, Adoption intention, Purchase Intention, Bibliometric analysis, VOSViewer.

1. Introduction

Pollution is affecting our environment as well as our health. The bronchitis, heart attacks, asthma, and cancer cases are rising globally. One of the reasons for the rising pollution is the harmful emissions from conventional vehicles. As per the European Union report, over 28% of the world's carbon dioxide (CO_2) emissions are attributed to the transportation sector, with road transport accounting for more than 70% of those emissions. As a result, several countries are taking necessary steps for faster adoption of electric vehicles as a mode of transport, keeping in mind the environmental benefits and reducing the dependency on fuels. Electric vehicles are gaining popularity because of environmental awareness and decreasing air quality (K V et al., 2022).

An electric vehicle is a type of vehicle that is propelled by an electric motor fuelled by a battery. Unlike standard gasoline-powered vehicles, which use combustion engines, EVs use batteries that are charged by plugging into an electrical outlet or a specialized charging station. An EV is a vehicle that is silent, simple to use and has less running and maintenance costs as compared to conventional vehicles.

When compared to cars with internal combustion engines (ICE), Electric vehicle (EVs) adoption is relatively low (Priessner et al., 2018). The reasons for its low adoption may be the charging infrastructure, its high initial price, and people may be concerned about its low driving range. Therefore, it becomes pertinent to study the adoption intention of electric vehicles as an intention to adopt a product is an essential phase of the consumer consumption process.

Adoption intention is a key predictor of actual purchasing behaviour (Chang & Wildt, 1994). Beginning with the consumer's awareness of the presence of a new product and desire to examine the product, the consumer decides whether or not to buy the new product (Febransyah, 2021). Also, the Theory of Planned Behaviour (TPB) contends that customers' buying/purchase intentions are a key determinant of future purchase behaviour. Customers are more likely to purchase when their purchasing intention is greater (Huang & Ge, 2019). Policymakers' expectations about electric vehicles' importance in decreasing emissions have recently grown significantly. Meanwhile, scholarly research on EV adoption intentions has risen considerably (Kim et al., 2014). Based on the available literature, the Adoption intention of EVs refers to an individual's proclivity to adopt and utilise electric vehicles as a means of transportation. It indicates the mentality and attitude of consumers to accept new products or technologies in the near future. Thus, adoption/purchase intention is important for evaluating the potential market demand for electric vehicles and the determinants that impact consumer decisions about EV adoption.

In light of the growth and consumer interest in electric vehicles, and despite the past research, it is still necessary to identify and analyse the major research trends to comprehend consumers'

adoption intention of electric vehicles. It is also important to know the essential studies and authors in this field and their relationship by reviewing all the research related to consumers' adoption intention for electric vehicles. A quantitative way of examining research literature is known as bibliometric analysis (Farrukh et al., 2020). The bibliometric technique provides complete information about the evolving patterns and direction of a specific topic, and it allows us to concentrate our attention on a certain area in the literature. It is based on citations, bibliographies, and other sources of data. It is used to evaluate various facets of the scholarly communication process, including the research impact, author output, journal influence, and others. Scholars can use it to (1) get a comprehensive perspective, (2) spot knowledge gaps, (3) generate original research questions, and (4) state their intended contributions to the area (Donthu et al., 2021).

The objectives of the study were:

- To explore the year-to-year progression of purchase intention of EVs.

- To identify the most productive countries, institutions, and journals in the field of EV Adoption Intention.

- To know the most prolific publications and authors.

- To identify the essential keywords and the main themes in the field.

2. Materials and Methods

It is important to discover, gather, categorize, and consolidate the existing published information on the selected topic and related issues in order to accomplish the objectives of a research utilising bibliometric techniques (Bhardwaj et al., 2020). In the present study, bibliometric analysis has been employed to determine trends and future directions in adoption intention for electric vehicles. For study findings to be accurate, thorough, and reliable, selecting the appropriate database for bibliometric analysis is essential. The Scopus database is considered the most dependable and well-known source of bibliographic information. It has comprehensive coverage of a wide range of disciplines. It contains an extensive number of academic journals, conference proceedings, and other scholarly publications, giving users a thorough understanding of the research results produced across multiple areas of study. Therefore, the researcher has selected the Scopus database for further conducting the bibliometric analysis.

One hundred forty papers data on EV adoption intention was retrieved from the Scopus database on 1 April 2023 after using the appropriate keywords and applying filters like document type, limiting the subject area relevant for the study.

Electric vehicle* OR EV OR EVs AND Purchase intention OR Adoption Intention were used as keywords to perform the analysis. These keywords were searched within the Article title, abstract, and keywords. Further, the VOS viewer software (van Eck & Waltman, 2010) has been used for creating, visualizing, establishing linkages within

the literature and analysing bibliometric networks. It is a prominent bibliometric analysis tool that has been utilized in several studies in various study domains and is available in the free domain. We have used VOS viewer to construct keyword co-occurrence networks and citation networks (Martins et al., 2022).

The following search string has been used to extract the papers from the Scopus database:

TITLE-ABS-KEY ('electric AND vehicle* OR EV OR EVs' AND 'purchase AND intention' OR 'adoption AND intention') AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "BUSI") OR LIMIT-TO (SUBJAREA , "ECON") OR LIMIT-TO (SUBJAREA , "PSYC") OR LIMIT-TO (SUBJAREA , "ARTS")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j"))

Database: Scopus

$\downarrow$

Article Title, keywords and Abstract: "Electric Vehicle OR EV*AND Purchase Intention OR Adoption Intention"

$\downarrow$

Filters Source: Journal Articles Subject Area: Social Sciences, Business, Management and Accounting, Economics, Econometrics and Finance, Psychology & Arts and Humanities Language: English Time period: 1994-2023

$\downarrow$

Bibliometric Analysis & information visualization

$\downarrow$

Data Analysis: VOS-viewer

The selected keywords were searched in Article Title, Keywords and Abstract. Only journal articles have been considered from various subject areas like Social Sciences, Business, Management and Accounting, Economics, Economics and Finance and Psychology & Arts and Humanities. These domains have been selected keeping in view the relatedness to consumers' adoption behaviour towards EVs. Journal articles in English have been considered as English is the most widely used and read language worldwide. Research papers related to EV adoption intention for the time period 1994 to 2023 have been included in the study.

3. Results & Discussion

The outcomes of the bibliometric analysis are presented in detail in this section. The main objective of the analysis is to present an overall picture of research related to electric vehicle adoption intention.

3.1 Year-Wise Publications on Adoption Intention of Electric Vehicles

The study aims to provide insight into the subject and show the advancements in research on electric vehicles and their connection to adoption/purchase intention. The primary indicator of a research field's advancement is the volume of publications (Kreiman & Maunsell, 2011). This paper examines research during the 19 years from 1994 to 2023. From 1994 to 2016, no or few researches were published. The year 2017 witnessed nine publications and

the number of publications has started rising since then. The year 2022 has the maximum number of publications as 35 research papers are published in the year. It is worth noticing that publications during 2021 and 2022 account for 45.71 % (64 out of the total number of publications 140). More authors who are continually attempting to convince consumers of the value of electric vehicles are now exploring this area. Another reason for rising academic research in this area could be the applicability of sustainable development goals globally from 2015. Electric vehicles are considered a clean energy source and thus will help in achieving the sustainable development goals. This figure amply illustrates the increased interest in this field, which highlights the importance of this research.

Figure 2. Year-wise publications from 1994 to 2023
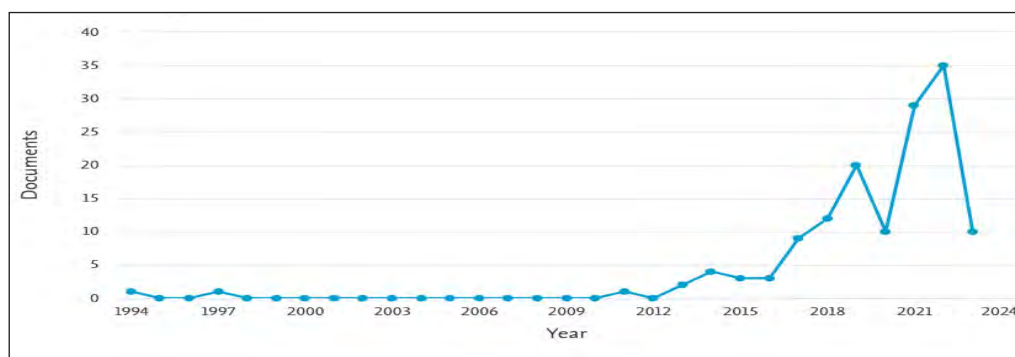
Source: Scopus database

3.2 Country-wise Publications

Contributions from 38 countries were identified in 140 publications.

China has topped the list with 44 publications in this field of research. It can be inferred that Chinese researchers have gained interest in this field of research. China alone has contributed 31.40% of the total publications. The US, being the second most productive country has contributed 16 publications, which is 11.42% out of the total 140 papers. India is the third most productive country publishing papers on electric vehicle adoption intention with 11 publications (7.85%). It may be because the awareness of electric vehicles has risen in India, motivating Indian researchers to measure EV adoption intention. Germany has published ten publications. Australia, Malaysia, and Taiwan have published seven publications each, followed by Hong Kong, South Korea, and Thailand with six publications each. They are followed by the Netherlands and the United Kingdom with five publications. Whereas Japan, Saudi Arabia, and Spain have 4 publications respectively.

Figure 3. Country-wise publications over the years 1994 to 2023
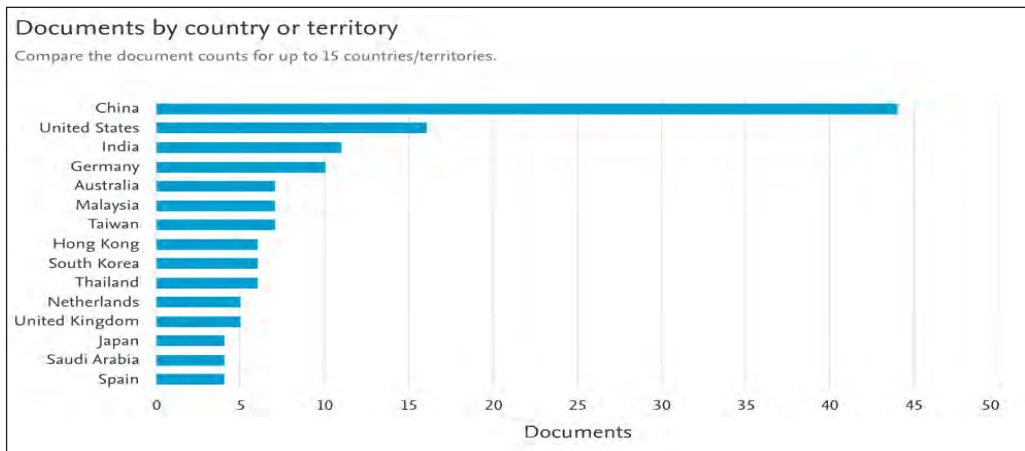
Source: Scopus database

Table 1. List of top most countries

Country	Total Publications	Total Citations	Average number of Citations Per Publication
China	44	1204	27.36
United States	16	856	53.5
Germany	10	614	61.4
Australia	7	302	43.14
Netherlands	5	247	49.4
United Kingdom	5	236	47.2
Denmark	3	211	70.33
Hong Kong	6	203	33.83
India	11	200	18.18
Taiwan	7	176	25.14
Malaysia	7	160	22.85

In terms of total citations, China (1204) is the top-ranked country, followed by the United States of America (856), Germany (614), Australia (302), Netherlands (247), United Kingdom (236) Denmark (211)), Hong Kong (203), India (200), Taiwan (176) and Malaysia (160). In terms of the average number of citations per publication, Denmark (70.33) ranks highest followed by Germany (61.4), the United States (53.5), the Netherlands (49.4), the United Kingdom (47.2), Australia (43.14), Hong Kong (33.83), China (27.36), Taiwan (25.14), Malaysia (22.85), and India (18.18). The average number of

citations per publication may be used as a criterion for valuing research and aids in determining the influence of a nation or journal (Bhardwaj et al., 2020). In terms of overall citations, China (1204) is the top-ranked country, followed by the United States of America (856), and Germany (614). Denmark is first in terms of average citation per article (70.33), followed by Germany (61.4), the United States (53.5), Taiwan (25.14), Malaysia (22.85), and India (18.18). The average citation per publication may be used as a research valuation statistic, to determine a country's or journal's average influence. Compared to the most prolific countries, papers from Denmark and Germany are the most frequently mentioned by other authors in the same field. Even though, these countries have much fewer publications compared to other top countries. Despite having the most publications, China's average number of citations per publication is a bit less. India is the third most productive country in terms of publications, yet it ranks the lowest among the 11 countries in terms of average number of citations per publication.

3.3 Institution-wise Publication on Adoption Intention of Electric Vehicles

Table 2 shows the most productive institutions in the area related to the adoption intentions of electric vehicles. School of Management and Economics, Beijing Institute of Technology has been the most productive institution with three publications and 217 citations. School of Economics and Management, Leibniz University Hannover, and School of Management, Queensland University of Technology are at the second and third positions with two publications and 186 citations each. It can be inferred that only two articles each have been published by nine institutions.

In terms of average number of citations per publication, the School of Economics and Management, Leibniz University Hannover, Germany and the School of

Table 2: Most Prominent Institutions

Organization	Total Publications	Citations	Average Number of Citations Per Publication
School of Management and Economics, Beijing Institute of Technology, China	3	217	72.33
School of Business Administration, South China University of Technology, China	3	68	22.66
School of Economics and Management, Leibniz University Hannover, Germany	2	186	93
School of Management, Queensland University of Technology, Australia	2	186	93
School of Economics & Management, Open University of China	2	158	79

University of California at Davis, Plug-In Hybrid & Electric Vehicle Research Center, United States	2	101	50.5
Collaborative Innovation Center of Electric Vehicles in Beijing, China	2	100	50
Sustainable Development Research Institute for Economy and Society of Beijing, China	2	100	50
Graduate School of Design, National Yunlin University of Science and Technology, Taiwan	2	94	47
Institute of Chinese Studies, Freie Universität, Berlin, Germany	2	82	41
Skalitzer Str. 100, Berlin, Germany	2	82	41

Source: Scopus database

Management, Queensland University of Technology, Australia are at the first position (93). Followed by the School of Economics & Management, Open University of China (79) and the School of Management and Economics, Beijing Institute of Technology, China (72.33). It can be inferred that these institutions are quite influential and various authors cite their work in the same field.

3.4 Literature Review of Top 10 Cited Publications

The scientific community believes that a document's overall quality is closely correlated with the number of citations it receives. Hence, the more citations a study receives, the better it is (Martins et al., 2022). It shows how the adoption intention of Electric vehicles has an impact on academia and other professions. The most cited publications are from 2013 to 2019. 'Intent to purchase a plug-in electric vehicle: A survey of early impressions in large US cities' by

Carley et al., (2013) published in the year 2013, is the most cited publication with 383 citations. In this paper, the authors have studied the significance of car attributes in purchase intention, and they have discovered concerns as compared to conventional vehicles that discourage customers from buying EVs. The second most cited paper 'Consumer purchase intentions for electric vehicles: Is green more important than price and range?' by Degirmenci & Breitner, (2017), found that EV's environmental performance predicts attitude and purchase intention more accurately than price value and range confidence. 'Is EV experience related to EV acceptance? Results from a German field study' by Bühler et al., (2014) is the third most cited paper which found that EV driving experience had a substantial favourable influence on an overall view of EVs and intent to suggest EVs to others but not on attitudes or purchase intentions. In the fourth most cited paper by Kim

et al., (2014), the authors had given a single integrated model of purchase intentions, which evaluated various diverse effects. In the fifth paper, Huang & Ge, (2019) in their findings suggest that policy interventions affecting attitude, cognitive status, perceived behaviour control, product perception, and monetary incentives have a substantial favourable influence on customers' intentions to purchase EVs in Beijing.

The sixth most cited Haustein & Jensen, (2018) study's main objective was to investigate the factors that influence Battery electric vehicle (BEV) adoption among Conventional Vehicle(CV) and BEV users using an expanded version of the Theory of Planned Behaviour.

In the seventh most cited paper by He et al., (2018), this article proposed a personality-perception-intention framework to investigate customers' purchase intention. The findings showed that customer perception and personality may account for 57.1% of the variance in EV purchase intention. Wang et al., (2017) applied an extended theory of planned behaviour model and a structural equation model to investigate the factors influencing Chinese residents' intentions to purchase New energy vehicles. Schmalfuß et al., (2017) conducted two studies to examine the association between direct experience and battery electric vehicles (BEV): (1) an online survey (N = 286) and (2) a 24-hour field test (N = 30). Both studies revealed several experience-based variations in how individuals assessed BEV characteristics, attitudes, and purchase intentions. Hardman et al., (2016) study is the tenth most cited paper in the list with 109 citations. In this paper, the authors have compared high-end adopters and low-end adopters and found that high-end adopters are more inclined to keep driving battery electric cars when they make subsequent purchases.

Table 3. Most Cited papers on adoption intentions of electric vehicles

Authors	Title	Citations
(Carley et al., 2013)	Intent to purchase a plug-in electric vehicle: A survey of early impressions in large US cities	383
(Degirmenci & Breitner, 2017)	Consumer purchase intentions for electric vehicles: Is green more important than price and range?	182
(Bühler et al., 2014)	Is EV experience related to EV acceptance? Results from a German field study	143
(Kim et al., 2014)	Expanding scope of hybrid choice models allowing for mixture of social influences and latent attitudes: Application to intended purchase of electric cars	139
(Huang & Ge, 2019)	Electric vehicle development in Beijing: An analysis of consumer purchase intention.	128

(Haustein & Jensen, 2018)	Factors of electric vehicle adoption: A comparison of conventional and electric car users based on an extended theory of planned behaviour.	128
(He et al., 2018)	Consumer purchase intention of electric vehicles in China: The roles of perception and personality	123
(Wang et al., 2017)	Purchasing intentions of Chinese citizens on new energy vehicles: How should one respond to current preferential policy?	117
(Schmalfuß et al., 2017)	Direct experience with battery electric vehicles (BEVs) matters when evaluating vehicle attributes, attitude and purchase intention	115
(Hardman et al., 2016)	Comparing high-end and low-end early adopters of battery electric vehicles	109

Source: Scopus Database

3.5 Prolific Authors

The author's productivity in the field of EV adoption intention is analysed in this sub-section.

The most prolific authors have been identified. The five most prolific authors accounted for 15% of the total 140 publications.

Table 4 shows the nine most productive authors based on the number of papers published by them. In terms of number of papers, Wang Z. has been the most productive author in the field with the most publications (6). Followed by Hardman S., Long R., and Li W. with the second-highest number of publications (4) each.

In terms of total citations, Krems J. F. has received the maximum number of citations (305) with three publications. Followed by Hardman S. (247), Wang Z. (227), Timmermans H. (187), and Zhang X. (158). Although Long R. and Li. W. have published four papers each, yet their work have received fewer citations among the other most productive authors.

Table 4: Most productive authors list

Authors	Documents	Total Citations
Wang Z.	6	227
Hardman S.	4	247
Long R.	4	73
Li W.	4	67
Krems J.F.	3	305
Timmermans H.	3	187
Zhang X.	3	158
Tal G.	3	138
Higueras-Castillo E.	3	108

3.6 Prolific Journals

It is essential to analyse the citations of journals. Journals with the most citations are those whose articles have been cited more. Most cited journals are often regarded as prominent and influential in their respective research areas as it shows that their publications

are extensively read and referred to by other academicians.

Table 5 shows the list of the nine most prolific journals based on the number of documents published and citations received. These nine journals have accounted for 61.4 % out of 140 publications. Out of 140 publications, 86 studies have been published in these journals. Consequently, it can be concluded that these journals have taken the sustainable transportation seriously and encouraged academics to write in this field.

Sustainability (Switzerland), with an impact factor of 3.9 has topped the list with a maximum of 29 documents but has received fewer citations (488). It is the most productive journal as it accounts for 20.7 % of the total publications in the area of adoption intentions of electric vehicles. Transportation Research Part A: Policy and Practice and Transportation Research Part D: Transport and Environment are second and third with 14 and 13 documents respectively. Transportation Research Part D: Transport and Environment came out to be the most influential journal in terms of citations with the maximum number of citations (1016) along with the third highest publications (13) and an impact factor of 7.6. Journal of Cleaner Production is the fourth most productive journal in terms of publication with 8 publications, received 670 citations, and has the highest impact factor of 11.1.

In general, it can be depicted that journals are mostly related to transportation and environmental research areas. Besides, journals from other domains like psychology, management, and social sciences also encourage similar research work in this area.

Table 5: Most Prolific Journals

Source	Documents	Citations	Impact factor 2022
Sustainability (Switzerland)	29	488	3.9
Transportation Research Part A: Policy and Practice	14	518	6.4
Transportation Research Part D: Transport and Environment	13	1016	7.6
Journal of Cleaner Production	8	670	11.1
International Journal of Sustainable Transportation	6	161	3.9
Transport Policy	5	261	6.8
Transportation Research Part F: Traffic Psychology and Behaviour	5	446	4.1
Frontiers in Psychology	3	0	3.8
Journal of Consumer Behaviour	3	43	4.3

Source: VOS viewer

3.7 Keyword Analysis

The keywords used in an article are distinctive because they reflect the terms that the authors believe to be most crucial to their arguments (Pesta et al., 2018)they can even shed light on which research topics in a field are popular (or less so. Keyword occurrence analysis helps in identifying the core themes and trending areas of a research field. The keyword of a research article may be used to represent its primary purpose as the authors try to give the most 4-6 appropriate keywords relevant to the study. Repetition of keywords depicts the importance of those keywords and helps to identify the trend or inclination of researchers during the present and past in that field. This analysis has been performed to determine the essential keywords and identify themes to comprehend better the EV's purchase/adoption intention (Barbosa et al., 2022). Table 6 shows 44 keywords (out of a total of 1004 keywords) that have occurred at least 6 times in the selected research papers of the Scopus database. The Total Link Strength shows the number of articles where two keywords co-occur. The most occurred keywords as expected are Electric vehicle, electric vehicles, and purchase intentions. It has been found that more empirical studies have been done such as surveys (19), structural equation modelling (13), empirical analysis (7), and questionnaire survey (7) are highly used keywords. Many researchers have used the Theory of Planned Behaviour to assess the adoption intention of electric vehicles. Other adoption theories, like the technology acceptance model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT), are less used by researchers. Therefore, it can be inferred that future researchers can use these to understand consumers' perceptions and purchase/adoption intentions for electric vehicles.

Table 6. Keywords that occurred at least 6 times

Keyword	Occurrences	Total Link Strength	Cluster
Electric Vehicle	87	448	2
Electric Vehicles	63	305	4
Purchase Intention	49	281	1
Sales	42	274	3
Consumption Behaviour	32	215	2
Purchasing	30	180	1
China	27	154	3
Perception	23	146	4
Technology Adoption	23	145	4
Surveys	19	133	1
Sustainability	14	95	2

Battery Electric Vehicles	13	91	2
Structural Equation Modeling	13	88	1
Theory of Planned Behaviour	13	83	1
Consumer Behaviour	12	78	2
Electric Automobiles	12	74	1
Electric Vehicles (Evs)	12	72	4
Behavioural Research	11	68	1
Marketing	11	63	2
Public Attitude	10	62	1
Sustainable Development	9	61	2
Vehicles	9	50	3
Decision Making	8	45	2
Numerical Model	8	45	1
Commerce	7	44	4
Empirical Analysis	7	44	4
Innovation	7	43	2
New Energy Vehicles	7	42	3
Psychology	7	40	3
Questionnaire Survey	7	39	1
Structural Equation Model	7	39	2
Transportation Policy	7	39	3
Attitudinal Survey	6	37	4
Car Ownership	6	37	3
Carbon Emission	6	37	2
Electric Cars	6	34	1
Environmental Concerns	6	34	4
Incentive	6	33	3
Perceived Value	6	31	4
Policy Approach	6	30	3
Theory of Planned Behaviour	6	27	1
Travel Behaviour	6	25	3
United States	6	24	3
Willingness to Pay	6	19	4

Source: VOS viewer
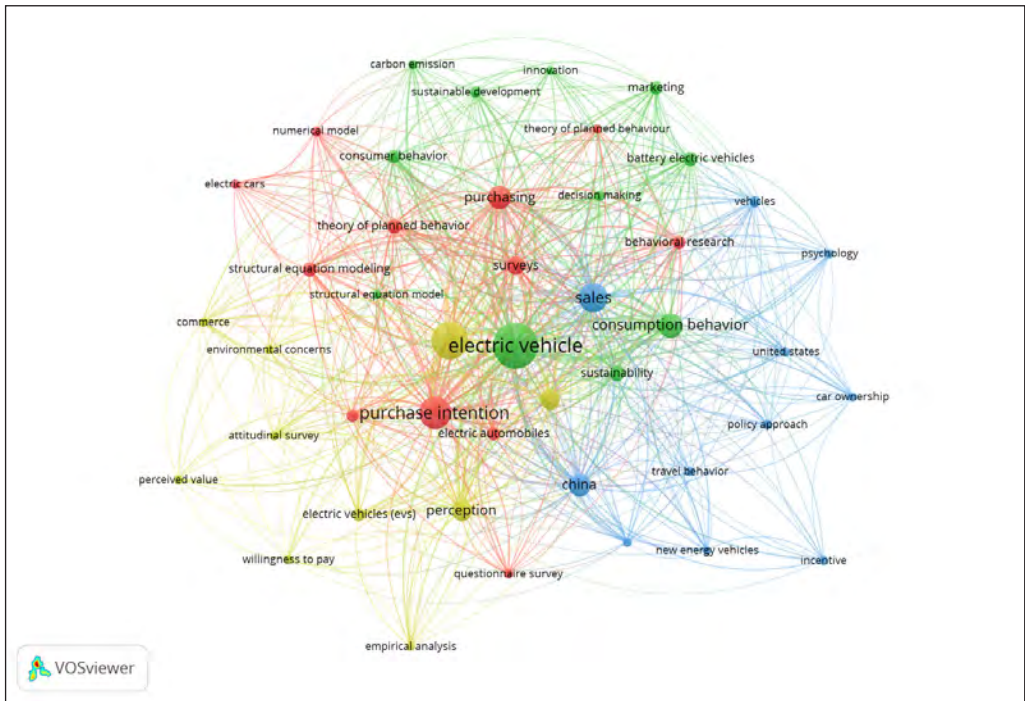
Figure 4. Keywords Network

The above network map has been performed on 44 keywords that have occurred at least six times. The wider the circle, the more important or common the item is in the network. This helps to rapidly find the things in bibliometric analysis that are the most significant or relevant. The distance between links represents the strength of the relationship between two items in a network diagram. The most related terms fall into one cluster since VOS Viewer clusters are based on minimizing distances between keywords (Waltman et al., 2010). The more articles in which both keywords were discovered, the greater the relationship between the words. Colours denote clusters of keywords that are closely connected to one another (Van Eck & Waltman, 2017). Here four clusters are formed based on the networking between them.

Cluster 1 Red has 12 items

In cluster 1, Purchase intention being the most significant node, it indicates that themes in this cluster are related to consumers' purchase intentions of consumers through quantitative techniques like questionnaire survey, structural equation modelling, surveys, etc.

Cluster 2 Green has 11 items

This cluster has keywords related to the environment like sustainability, sustainable development, and carbon emission. Also, it is inferred that the authors have worked in the area of consumer behavior, and how consumers

make decisions by considering the factors like sustainability, marketing, innovation, and carbon emission.

Cluster 3 Blue has 11 items

In Cluster 3, the authors may have studied the actual sales of electric vehicles as Sales being the largest node in this cluster. Therefore, it may be believed that to explore the actual usage of electric vehicles, the writers looked for connections between incentives, policy approach, transport policy, travel behaviour, and car ownership. Furthermore, the presence of China and the USA in this cluster demonstrates the dominance of these two countries in studying the actual purchase of electric vehicles.

Cluster 4 Yellow has 10 items

Whereas in cluster 4 with the occurrence of the keywords like perception, perceived value, and willingness to pay, it can be inferred that the authors have worked on how the consumers are perceiving EVs and they measured how willing consumers are to adopt the new EV technology.

4. Conclusion

The main aim of this research was to shed light on the adoption intention of electric vehicles by using existing literature to understand the trends and patterns in scientific research and assess the impact of the previous research on the research community.

Before exclusion, the Scopus database yielded 225 results. After the exclusion criteria, the papers were reduced to 140. This study presents the bibliometric analysis of 'adoption intention of electric vehicles ' related publications between 1994 and 2023. The total number of papers published has steadily increased after the year 2017, which may be because of the rising interest of researchers in this field. Thus, it can be concluded that the purchase/ adoption intention of electric vehicles is a promising area to be studied by future researchers to get a clear picture of how consumers perceive electric vehicles and assess their intention to purchase them in the coming years. Also, this study conducted a country-wise analysis, China remains the most influential country out of 38 countries that have worked in this field. This may be because academics in China receive financial assistance for publishing research papers. This system is uncommon in the majority of other countries, which may be a contributing factor in the significant development in the number of research publications from China (Bhat & Verma, 2022). India stands at the third place with 11 publications. Although Indian researchers are interested in the area, perhaps they do not get enough assistance. Furthermore, the adoption of electric vehicles in India is still low, which might explain why there is less study on electric vehicle adoption intention in India. Further, in the institution-wise publication analysis, the School of Management and Economics, Beijing Institute of Technology, China came out to be the most productive institution with three research papers and maximum citations. Apart from that, various other Chinese institutions were there in the top 10 institutions. Further

in the analysis of the ten most cited publications, 'Intent to purchase a plug-in electric vehicle: A survey of early impressions in large US Cities' (Carley et al., 2013) published in the year 2013, was the most cited paper. The authors compared the Electric vehicle attributes with conventional cars to analyse the reasons that discourage customers from adopting EVs. Wang Z. remained the most cited and most productive and prolific author with 6 publications and maximum citations.

In the analysis of journals, the top most 9 journals have accounted for 61.4% of the total publications. These journals have considered sustainable transport as a solution for the rising pollution level globally and encourage academics to publish in this area. Sustainability (Switzerland) is the most prominent journal in terms of citations and the number of publications. Also, keyword analysis is carried out to aid academics in understanding previous patterns, present obstacles, and potential future directions of study in the field of purchase intention of electric vehicles. More quantitative studies have been done so far in this field as keywords like empirical studies, structural equational modelling, and surveys appear more frequently in the keyword. The outcomes of this study demonstrate that research on electric vehicle adoption intention is still in its early stages. This study is beneficial in comprehending the present problems and research hotspots in this field. The researchers can further study in this field as there is so much to be discovered. The results of this analysis on EV adoption intention may be used

to illustrate how electric vehicle relates to other management related subjects.

5. Limitations and Direction for Future Scope

Despite the various advantages of this study, there are a few limitations that should be considered. The Scopus database is one of the most significant academic databases that served as the source for academic publications, therefore the authors utilized it in this research. However other significant databases like Science Direct, Web of Science, and Google Scholar were left out to condense the effort and provide a more thorough view. Researchers may take them into account for further research. Moreover, the research articles considered in this review are from peer-reviewed journal publications. Some publications may be published in conference proceedings or book series that might be useful to this review. The next major limitation of this study is that it has mainly focused on the bibliometric details of authors, journals, and countries. In the future, the researchers may conduct a systematic literature review and meta-analysis to better understand the studies. Bibliometric analysis alone may not help in building theories. Researchers can uncover gaps in literature and practise by using bibliometric analyses, which provide new research goals and directions in different research fields (Koseoglu et al., 2016). It has been observed that the penetration of Electric vehicles is less in developing countries therefore potential buyers may be surveyed to assess their purchase intentions for EVs (Bhat & Verma, 2022).

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Role of Financial Literacy in Driving Financial Inclusion and Economic Growth of Women in Odisha

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Abstract:

The study examines the relationship between financial literacy, financial inclusion, and the economic growth of rural self-help group women in Odisha. Financial literacy has emerged as a vital component in promoting financial inclusion, enabling individuals to access and utilize financial services effectively. Specifically, focusing on rural SHG women, this research investigates how financial literacy influences their economic growth by empowering them with the knowledge and skills necessary for financial decision-making. The study explores the impact of financial inclusion, facilitated by financial literacy, on the economic well-being of these women. Through a comprehensive review of existing literature and empirical analysis i.e., EFA, CFA & SEM, this research aims to shed light on the significance of financial literacy in promoting economic empowerment and sustainable development among rural SHG women. The findings of this study can contribute to policy formulation and the design of targeted interventions aimed at enhancing financial literacy and fostering economic growth in rural communities.

Keywords: Financial Literacy, Financial Inclusion, Economic Growth, SHG

1. Introduction

Financial literacy plays a crucial role in promoting financial inclusion, particularly among rural self-help group women in Odisha. By empowering these women with knowledge and skills related to managing their finances, financial literacy has the potential to positively

impact their economic growth (Adetunji & David-West, 2019). It explores the relationship between financial literacy, financial inclusion, and the subsequent effects on the economic growth of rural SHG women. It highlights the significance of equipping these women with the necessary tools and knowledge to make informed financial decisions, enhance their financial capabilities, and participate actively in economic activities. Self-help groups are a prime example of the idea of social inclusion and the power that comes from unity. These organizations have helped group members and also saved lives (Visram *et al.,* 2012). For everyone involved, establishing economic empowerment through self-help groups has been a difficult task. Participating in self-help organizations has changed how society views women (Swain and Wallentin, 2009). Members of urban self-help groups have successfully increased their income and used loan monies in appropriate ways. However, in rural areas, the typical self-help group member has difficulty finding work (Dhake and Narkhede, 2019). Understanding the implications of financial literacy on the economic empowerment of rural SHG women can contribute to the development of effective policies and initiatives aimed at fostering sustainable economic growth in these communities.

2. Literature Reviews

This study reveals the existing literature in the fields of financial literacy, financial inclusion, and economic growth of rural women as follows

Economic Growth

Women's training, marketing, and manufacturing abilities have been significantly improved by the timely provision of financial services to micro-enterprises. As a result, these women are now independent in terms of their abilities to earn money, develop their skills, obtain an education, and maintain a stable lifestyle (Arul and Packirisamy, 2015). Economic inclusion has improved the lives of those who are less fortunate and helped to reduce poverty by making vital financial resources like cash, advances, and insurance available to them (Lal, 2018). The government's financial inclusion activities in the Agra region have successfully connected people, improving the socioeconomic circumstances for women in previously underserved areas (Gangal and Singh, 2019).

Financial Inclusion

Financial inclusion has a favourable effect on a variety of factors, including job creation, per capita income, GDP, and increased competition among banks to deliver better services (Shaban *et al.,* 2020). In the context of agrarian reforms during the Andhra Pradesh crises, commercial microfinance encountered significant challenges that hindered its effective operation (Taylor, 2012). There is a link between financial inclusion and economic growth, policymakers, governments, and bankers are encouraged to advance financial inclusion (Nizam *et al.,* 2020).

Age, education, income, family structure, and accessibility to markets

are just a few of the demographic variables that have been significantly impacted by the participation of women in self-help groups. Self-help groups have significantly boosted women's economic power and access to leadership positions in society (Joshi, 2019). In order to enhance the financial inclusion of PTGs, the banking sector must expand its access to financial services. This can have a significant impact on the overall socioeconomic conditions of this marginalized population. When PTGs have the opportunity to access financial services, they are one step closer to achieving socioeconomic growth (Nandru & Rentala, 2019).

Financial Literacy

Enhancing financial literacy awareness is an urgent requirement across the nation, particularly in rural areas where literacy levels are lower and access to financial services is limited. Furthermore, the concerning state of women's financial literacy is evident through their consistently poor performance in this area (Bendre & Singh, 2017). There exists a strong relationship between micro-entrepreneurship and the empowerment of women. The act of empowering women yields tangible positive effects on both the economic and social fronts. The long-term sustainability of various groups relies heavily on the establishment of fresh economic endeavours (Chatterjee *et al.,* 2018). The Government of India can initiate substantial investments in financial literacy, thereby leading to a substantial increase in financial inclusion. Moreover, FL can enhance the effectiveness of FI initiatives in regions where access to formal financial services has already been established (Rastogi & E, 2018). Financial education has witnessed significant enhancements owing to recent developments in the financial markets, alongside demographic, economic, and legislative transformations. Among the nations evaluated, India holds the second-highest position in terms of financial literacy (Nash, 2012). While numerous households manage to navigate the complexities of investing and find satisfactory solutions, others make costly mistakes. These errors manifest in various forms, such as neglecting opportunities to refinance mortgages, maintaining inadequately diversified high-risk portfolios, and refraining from participating in volatile asset markets (Campbell, 2006). Financial literacy plays a substantial role in positively influencing individual savings. Moreover, factors such as gender, income, and educational level have a beneficial impact on one's ability to save (Jonubi & Abad, 2013).

3. Objectives of the Study

1. To measure the impact of financial inclusion on the economic growth of women in Odisha.

2. To assess the impact of financial literacy on the economic growth of women in Odisha.

4. Hypotheses

H01: financial inclusion has no significant impact on the economic growth of women in Odisha.

H02: financial literacy has no significant impact on the economic growth of women in Odisha.

5. Research Methodology

In this study, the survey method has been used for collecting primary data. The sample size is taken from 499 respondents of SHGs members in Odisha. The stratified random sampling method has been used for collecting samples from the target population. The empirical methodology used for data analysis in this survey. Statistical tools including EFA, CFA & SEM were used in this study. The variables used for the study i.e., Distance of Banks, ATMs & Post offices, Availability of SHG loans, Ease opening of bank a/c through SHG-bank linkage, Lower interest rate in SHG loans, Usage of banking services i.e., Deposit, Withdrawal, Transfer & locker facility, Financial Attitude, Financial Behaviour, Financial Awareness & Financial Education of people, saving habits, credit mobilization for income generating activities & standard of living of SHG families, etc. The Exploratory analysis has found three constructs Financial Inclusion (FI), Financial Literacy (FL) & Economic Growth (EG). Confirmatory Factor Analysis has been applied for satisfying the reliability & validity of the factors used in this study.

Table 1: Literature Support for Factors

Factors	Source
Financial Literacy (FL)	Bendre & Singh, 2017; Rastogi & Ragabiruntha, 2018; Nandru & Rentala, 2019
Financial Inclusion (FI)	Bendre & Singh, 2017 Rastogi & Ragabiruntha, 2018; Nandru & Rentala, 2019
Economic Growth (EG)	Bendre & Singh, 2017; Rastogi & Ragabiruntha, 2018; Nandru & Rentala, 2019

Table 1 indicates the literature support for the factors used in this survey such as FL, FI & EG.

Figure1: Theoretical Framework
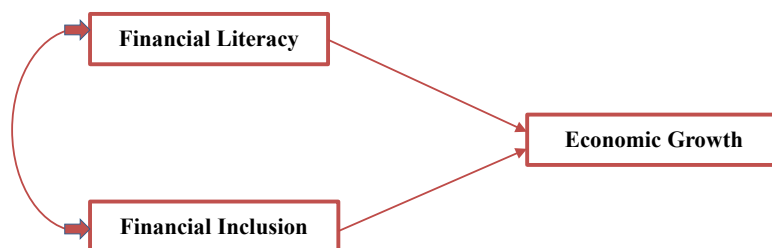
Source: Authors' Finding

Figure 1 indicates the proposed model of the Theoretical Framework used in this study.

Table 2: Sample Characteristics of SHG Members (n=499)

Measure	Items	Frequency	Percentage
Age	Below 25 years	145	29.05
	25-35 years	210	42.08
	35-45 years	92	18.44
	Above 45 years	52	10.42
Education	Matriculation	143	28.66
	Intermediate	135	27.05
	Graduation	101	20.24
	Others	120	24.05
Income (Monthly Rs)	Below 10000	305	61.12
	10000- 20000	132	26.45
	20000- 30000	50	10.02
	Above 30000	12	2.41

Source: Primary Data

Table 2 indicates the demographic details of self-help group members in this survey. Here, responses are collected from 499 SHG women in Odisha. The average monthly income of major participants is below Rs 10000 because of SHG members involved in MSE activities. The women are starting small businesses by taking loans from SHG at the initial stage.

6. Results & Discussion

Table 3: Outcome of Reliability Analysis

Cronbach's Alpha	N of Items
.948	12

Source: SPSS Output

Table 3 indicates the reliability statistics of 12 variables. The calculated Cronbach alpha value is .948 which is greater than .7 in social sciences research. It means data collected from the respondents give consistent results. The KMO value is .917, which indicates the sampling adequacy of the data set in this survey.

Table 4: Result of Rotated Component Matrix

	Component		
	FI	EG	FL
FI2	.829		
FI5	.811		
FI4	.771		
FI3	.718		
EG2		.839	
EG1		.824	
EG3		.711	
FL1			.827
FL2			.818
FL4			.618
FL3			.607

Source: SPSS Output

Table 4 indicates the outcome of the rotated component matrix from EFA.

This study has found three factors i.e., Financial Inclusion (FI), Economic Growth (EG) & Financial Literacy (FL). It found that FI has 5 variables, EG 3 variables & FL 4 variables from exploratory factor analysis.

Figure 2: Final Order Confirmatory Factor Analysis
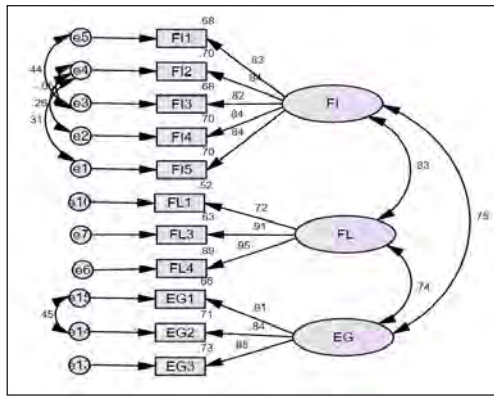
Source: Amos Output

Figure 2 indicates the graphical presentation of the final-order Confirmatory Factor Analysis. The study demonstrates the satisfaction of absolute fit measures, including CMIN/DF- 3.754 (Marsh & Hocevar, 1985), GFI- 0.955 (Joreskog & Sorbom, 1984), AGFI- 0.917, and RMSEA- 0.074 (Browne & Cudeck, 1992). Additionally, incremental fit measures are met, with values exceeding 0.95 for NFI- 0.972 (Bentler & Bonett, 1980), TLI- 0.969 (Bentler & Bonett, 1980), and CFI- 0.980 (McDonald & Marsh, 1990). The satisfaction of parsimony fit measures is also observed, as the PNFI value is above 0.60 (0.637). The CFA model is Fit in this study.

Table 5: Output of Convergent Validity & Discriminant Validity

Con-structs	CR	AVE	MSV	ASV
FI	0.9185	0.6929	0.6889	0.6257
FL	0.8984	0.7491	0.6889	0.6182
GE	0.8757	0.7014	0.5625	0.555

Source: Authors' Findings

Note: FI-Financial Inclusion, FL-Financial Literacy, EG- Economic Growth

Table 5 indicates the results of the convergent validity and discriminant validity. The Composite Reliability (CR) values for the constructs of Financial Inclusion (FI), Financial Literacy (FL), and Economic Growth (EG) are reported as 0.9185, 0.8984, and 0.8757, respectively which exceeds the threshold value of 0.7, indicating good fit measures for convergent validity. The Average Variance Extracted (AVE) values for FI, FL, and EG are reported as 0.6929, 0.7491, and 0.7014, respectively which are greater than the threshold value of 0.5, also indicating good fit measures for convergent validity. Additionally, the third condition of convergent validity is satisfied, as the CR values for all constructs (FI, FL, and EG) are higher than their respective AVE values, which is satisfactory.

It also found that AVE > MSV & AVE > ASV, satisfy the conditions for discriminant validity.

Figure 3: Structural Equation Model
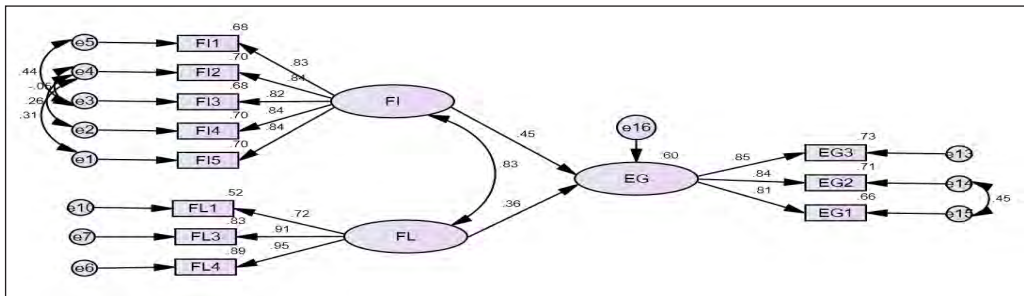
Source: Amos Output

Figure 3 indicates the graphical presentation of the Structural Equation Model. The model assesses the impact of the independent variables 'Financial Inclusion' on the supply side & 'Financial Literacy' on the demand side, indicating .45 & .36 respectively impact on the dependent variable 'Economic Growth'. Additionally, the study examines FI & FL highly correlated both demand & supply & overall 60% impact on the Economic Growth of the people of Odisha

Table 6: Summary of Structural Equation Model

Hypothesis				Estimate	S.E.	C.R.	P	Result
H_{01}	EG	<---	FI	.439	.078	5.592	***	Rejected
H_{02}	EG	<---	FL	.288	.063	4.606	***	Rejected
R^2	.60							

Source: Amos Output

Table 6 indicates the summary of the Structural Equation Model. Here, both the null hypotheses, H01 and H02, are rejected, indicating that there is a significant impact of financial inclusion on the economic growth of women as well as financial literacy have a significant impact on the economic growth of women in Odisha. The value of R^2 is reported as 0.60, indicating an overall impact of 60% from both exogenous variables, Financial Inclusion (supply side) and Financial Literacy (demand side), on the endogenous variable of Economic Growth.

7. Conclusion

The study highlights the critical role of financial literacy in driving financial inclusion and its subsequent impact on the economic growth of rural self-help group women in Odisha. Through the acquisition of financial knowledge and skills, these women are empowered to make informed financial decisions, access financial services, and actively

participate in economic activities. By promoting financial inclusion, financial literacy equips rural SHG women with the tools to manage their finances effectively, enhance their entrepreneurial abilities, and improve their overall economic well-being. The findings of this research indicate that financial literacy plays a significant role in enabling rural SHG women to break free from the constraints of financial exclusion. As they gain access to formal financial services and products, these women can expand their businesses, invest in income-generating activities, and improve their savings and investment practices. This, in turn, contributes to their economic growth, poverty reduction, and overall development. The factors of financial inclusion have 45% impact on the economic growth of Odisha, as well as the factors of financial literacy i.e., Financial Attitude, Financial Awareness & Financial Education of people, have 36% impact on the economic development of rural people. In this study, it concluded that demand & supply factors such as financial literacy & financial inclusion jointly 60% reflecting the economic progress of women in Odisha. Overall, by recognizing the interplay between financial literacy, financial inclusion, and economic growth, stakeholders can work together to empower rural SHG women, unlock their potential, and pave the way for inclusive and sustainable development.

Appendix 1: Selection of Constructs

Codes	Variables	Construct
FL1	Financial Attitude of People	Financial Literacy
FL2	Financial Behaviour of people	
FL3	Financial Awareness of people	(Bendre & Singh, 2017; Rastogi & Ragabiruntha, 2018; Nandru & Rentala, 2019)
FL4	Financial Education of People	
F1	Distance of Banks, ATMs & Post office	
F2	Availability of SHG loans	
F3	Ease opening of bank a/c through SHG-bank linkage	Financial Inclusion
F4	Lower interest rate in SHG loans	(Nandru & Rentala, 2019)
F5	Usage of banking services i.e., Deposit, Withdrawal, Transfer & locker facility, etc.	
EG1	Standard of living improved for SHG families	Economic Growth (Nandru & Rentala, 2019; Bendre & Singh, 2017)
EG2	Investing SHG credits for revenue-generating activities	
EG3	Saving habits increase through SHGs	

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Does the Weavers' Cooperative Society Yield Higher Income to the Handloom Weavers? Evidence from Odisha

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Abstract

The study aims to analyse whether the Weavers' Cooperative Society (WCS) fetches higher income for the weavers as compared to the other two systems of production-marketing such as independent weavers and working under a Master Weaver (MW)/Middleman (MM). It also seeks to examine the social and demographic factors that influence the handloom weavers to join a cooperative society in Odisha. Primary data collected from 435 handloom weaving households shows that the master weaver system of production-marketing is dominant in the study area. The results of one-way ANOVA revealed that the independent weavers earn the highest income, whereas the weavers working under MW/MM receive the lowest. Though the WCS, in comparison to the master weaver system, yields higher income to the weavers, fewer workers are employed under the cooperative society for various reasons. The results of binary logistic regression analysis tell us that the skill and marital status of the weaver are the significant factors affecting the handloom weavers to work under a WCS. Government policies should aim to strengthen cooperative societies with adequate training facilities to enhance the skill of the handloom weavers.

Keywords: Weavers Cooperative Society, Handloom Weavers, Production-Marketing System, Income Variation

1. Introduction

International Cooperative Alliance (1995) defines the cooperative organization as "an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned and democratically controlled enterprise." Cooperatives provide a distinctive mechanism for attaining several economic goals in a growing competitive economy worldwide, irrespective of the size, type, purpose, and geographical location. These goals aim to achieve an economy of scale and size, improve bargaining power, product differentiation, access and broaden marketing opportunities, improve service and product quality, provide financial securities, and increase the income of its members (RBCDS, 1995). A cooperative becomes a desired and socially favourable form of the institution due to its role in preventing exploitation, decreasing inequalities, enhancing social status, gender equality, and assisting in framing an equitable society with a consistent focus on protecting the environment and helping the development process sustainably (Taimni, 1997). Cooperatives have a pertinent role in economic development because they are attributed to being participatory, democratic, versatile, and community-based (Gertler, 2001). In order to be successful and effective, cooperatives, on the one hand, must intensify feasibility and enhance their ability to serve their members and remain an economically plausible, inventive,

and vehement social organization on the other (Dogarawa, 2010).

Cooperative mode of production and marketing is generally found in agriculture and in some informal community-based household occupations such as handloom weaving. Handloom weaving in India and particularly in Odisha has been a family occupation for ages and has been sustained by the transfer of skill from one generation to another. After agriculture, the handloom industry is termed the highest provider of employment to the rural and semi-urban masses in the informal sector of the economy. As per the report of the fourth National Handloom Census of India 2019-20, the handloom industry in Odisha employs 1.18 lakh workers working in 47,625 looms and spread over 63,223 weaver households in the state. It also assumes immense importance in terms of output and export apart from employment generation. As far as the production-marketing system is concerned, the handloom weavers in Odisha are organized into three major systems such as working independently, working under an MW/MM, and being employed under the WCS.

The independent weavers invest their own capital for the procurement of raw materials from the open market, carry out the production work with the help of mostly family labour, and market their finished products. As this system involves dynamics of raw material price and market uncertainties, the weavers receive higher returns in terms of income from weaving work. Working

under an MW/MM is similar to that of putting out system, which is a typical capitalist mode of production. In this system, the MW/MM provides raw materials and the required design to be woven and collects the finished products at a pre-determined wage or price of the products. Generally, the weavers in this system do the weaving work with their own fixed capital, viz., loom, work shed, and other accessories. As the weavers do not bear any risks of marketing, their wage/income is significantly lower than the independent weavers. The MW/MM in this system enjoys a major share of profits as they act as organizers of production-marketing. The WCS mode of production is also similar to working under an MW/MM in the sense that the weavers depend on the WCS for raw materials and marketing. However, the wages under this system are higher than the MW/MM system as the cooperative societies are mostly not-profit government organizations formed to serve the interest of the weavers. Along with this, the WCS also provides bonuses, incentives, and other benefits of government welfare measures to member weavers. According to Meher (1995), among these three systems of production, a cooperative form of production is found to be the least exploitative for the weavers. The wages are lower, and the incidence of poverty is high among the weavers working under master weavers (Dev et al., 2008).

The 4th National Handloom Census 2019-20 reports that most of the handloom workers in Odisha (69%) are independent, followed by those working under MW/MM (21%) and WCS (10%) (see Figure 1). The report also points out that 99 per cent of the weaver households earn below Rs.10000 per month from handloom-related activities. Though most of the workers are working independently, they earn a very low income which makes it difficult for their survival. This gives rise to the following research questions: Why are very few workers working under the WCS system? Does the WCS fetch higher income to the weavers? What influences the handloom weavers to work under a WCS? Given this background and the research questions, the objectives of the present study are

i. To analyse the income differentiation among the weavers working under different production-marketing systems to see whether the WCS is beneficial to the weavers in terms of income.

ii. To investigate the socio-demographic factors that affect the handloom weavers to work under a WCS.

2. Literature Review

Cooperatives are especially perceived as the major tools for fair employment creation and for providing income through resource mobilization (Somavia, 2002). In Nigeria, cooperatives provide services for local needs, livelihood and generate a community sense based on social cohesion. Cooperative societies congregate people to accumulate their own resources together to meet individual requirements that could

not be settled by individuals with finite economic dimensions (Hussain, 2014). Cooperatives generate social protection at various levels to make more capital formation and reduced underemployment. It is also justified that when proper effectiveness is emphasized, it will promote cooperatives through the market and sustainable economic conditions (Ezakie, 2014). Cooperative societies play a significant role in facilitating Small and Medium Enterprises (SMEs) in the Osun State of Nigeria. It is encouraging to note that cooperative societies help in advancing micro credits to its members to invest in the area of developing and expanding enterprises and hence should be encouraged to enhance individual prosperity in the Osun State (Adekunle et al., 2021).

The cooperative institutions are highly effective in discharging the benefits of government welfare schemes in West Bengal, India. For the efficient outreach of the welfare schemes, education and distance from the cooperative institution are found to be the significant variables. Cooperative societies have more responsibility for the welfare of weaving members (Bhowmik, 2021). The erratic merger of cooperatives, control deployed by master weavers, and native power groups have made dormant to the handloom cooperative societies in India. The politicization of cooperatives, corruption, and mismanagement, along with maximum control of the government's flow of credit to cooperatives and excessive bureaucratization of the cooperative

structure, has destroyed the working capacity of handloom cooperatives. It is found that within the cooperative society, market-motivated production system, the readiness of the weavers to accept new techniques and designs into the production process has worked out (Dharmaraju P., 2006).

Dev et al. (2008) revealed that the growth performance of cooperatives in Andhra Pradesh determines the growth of other institutions like master weavers, middlemen, and independent weavers. The number of idle members and idle looms in cooperatives has increased over time due to poor performance and management problems of the apex society, i.e., APCO. Politicization, lack of autonomy in functioning, lack of infrastructure facilities, mismanagement of funds, weavers alienation in decision making, financial and management problem and lack of skill development programs, hostile input and output market conditions, non-availability of inputs like yarn and dyes and their rising cost are the major factors responsible for the poor performance of these institutions.

The handloom Weavers' Cooperative Societies in Tamil Nadu are facing acute problems like input related weavers related and marketing related which are obstructing the smooth functioning of the WCS (Kumudha & Rizwana, 2013). According to Divya, Gopika, and Krishna (2020), handloom weavers are not satisfied with what benefits they receive from weaving cooperative society. The weaving community did not receive proper income from their

occupation, and also the government provided meager welfare programs through the cooperative society. Most of the government textile policies are not reaching the marginal weavers in Tamil Nadu. High production costs, lack of advanced technology utilization, huge competition from power loom, and poor awareness of the weavers are the major reasons for the handloom cooperative mechanism getting stagnated (Olive et al., 2021).

There is a practical impact of cooperative societies on the social lifestyle of the handloom weavers in Western Orissa. The member weavers of the cooperative societies, as compared to non-members, are better off in terms of participation in a cultural organization, education of their children with a higher amount spent on education, and expecting a government job for their children. This may be because of less awareness among the non-member weavers and frustration towards the occupation among the member weavers (Mishra, 1994). Meher (1997) opined that cooperative societies, in addition to increasing production and mobilizing underutilized resources, also have been expected to increase social justice and equality of opportunities to reinforce social solidarity. But in the case of weavers' cooperatives in Orissa, it is perceived that the governmental agencies associated with the co-operativization have become more targets oriented than looking into the actual management aspect. The co-operativization has perpetuated and sharpened the trend of socioeconomic inequality among rural people instead of reducing it. Under the present social and economic setup, in the absence of proper monitoring, increasing the co-operativization measures will lead to the eruption of unintended consequences like the enrichment of the rich and powerful at the cost of the poor and weak.

Mohanty and Acharya (2003), analysing the Sambalpuri Bastralaya Handloom Cooperative Society LTD situated in the Bargarh district of Odisha, mentioned that the society is facing financial problems due to huge debt-servicing costs, delays in the release of the dues on Market Development Assistance (MDA), cloth dues, interest subsidy, etc. The marketing problems of society include the high price of handloom fabrics because of high labour costs and the rise in the cost of raw materials. Society is also facing stiff competition due to imitation by the power loom and mill sector, where printed cloth of the same designs is available at a very lower price. Society is suffering from managerial problems like overstaffing due to political influence, absence of sound control and financial management system, frequent misappropriation of funds, shortage of stock, etc.

The above literature worldwide discusses the advantages of cooperative society, reasons for the failure of cooperative societies, and the prevailing difficulties experienced by the WCS in India. There is sparse literature examining the pattern of income generation among the handloom weavers working under different production-marketing systems. Such studies in India and particularly in

Odisha, are rare. Also, studies related to factors affecting the weavers to join a cooperative society are scarce. Therefore, in this context, the present study is an attempt to fill up the above research gap.

3. Data and Methodology

Data used in this study is primary in nature and has been collected through field surveys. Odisha state is purposively selected for the study, and within the Odisha state, district, blocks, and villages are chosen using the multistage sampling method where the criteria of selection is the highest concentration of weavers. Within the villages, the sample respondents were identified through a random sampling technique. Yamane's (1976) simplified formula was used to determine the minimum sample size, and hence 435 active handloom weaving households were surveyed across the villages and blocks. A proportional sampling technique was employed to select the households in each village and block based on their population size. A pre-tested structured interview schedule was administered to the weaver respondents. It contained questions on socioeconomic and demographic variables along with information on their production-marketing system and awareness and outreach of government welfare schemes. The head of the household or main worker was chosen for the detailed interview to collect the required information. The field study was conducted in the months of September, October, and November 2021. Raw data was processed in Ms-Excel, and SPSS software was used to carry out the econometric analysis. A one-way ANOVA was employed to analyse the income variation among the weaver groups, and a binary logistic regression was used to investigate the socio-demographic factors affecting the handloom weavers to work under a WCS.

The binary logistic regression measures the relationship between a binary response variable and one or more explanatory variables. It uses explanatory variables to predict the probability that the response variable takes on a given value. Therefore to analyse the determinants of whether a weaver is working under the WSC or not, a logistic regression equation of the following form is used.

$Y = \log[p/(1-p)] = \alpha + \beta_1 (X_1) + \beta_2 (X_2) + \beta_3 (X_3) + \beta_4 (X_4) + \beta_5 (X_5) + \beta_6 (X_6)$

where,

Y = binary response variable, which takes the value 1 if the respondent is a member of WCS, 0 otherwise

p = response probability to be modeled

α = intercept

$\beta_1, \beta_2, ….\beta_6$ = regression coefficients

X_1 = age in years

X_2 = experience in years

X_3 = skill, it is a dichotomous variable which takes the value 1 if the weaver is skilled, 0 otherwise

X_4 = marital status, it is a dichotomous variable which takes the value 1 if the weaver is married, 0 otherwise

X_5 = education, it is a categorical variable of level six

X_6 = social category, it is a categorical variable of level three

4. Results and Discussion

The primary study collected from 435 handloom weaving households in Odisha shows that the majority of the handloom weavers are working under an MW/MM, followed by working independently and employed under WCS (Figure 2). The least number of weavers working under cooperative societies can be accentuated to the unsuccessfulness of the WCS in fulfilling its intended goals. It is also observed from the field that most of the primary cooperative societies are not functioning well due to irregularity in supplying raw materials to the workers with delayed payment of wages. On the other hand, the master weavers or middlemen are very active in the study area to attract the weavers by providing advance payment and regular work throughout the year. Little more than a quarter of the weavers are independent due to having a strong capital base and information regarding marketing uncertainties. However, there is a significant variation in the income of the handloom weavers in these three systems of production and marketing. The mean variation in the income of the weavers working under different production-marketing systems is investigated through one-way ANOVA. Here, we hypothesize that there is no significant difference in the monthly income of the weavers working across the production-marketing systems. The results of the one-way ANOVA test are summarized in Table 1, which indicates that the monthly income of the handloom

weavers in these three systems of production differs significantly ($F_{2, 432}$= 109.935, $p<$ .001). The handloom weavers working independently have the highest mean income, followed by weavers working under WCS and MW/MM.

As Levene's statistics was significant, equal variance was not assumed. In order to check for individual differences between the systems of production, post hoc comparisons were performed using Dunnett's T3. The test results suggest that the average monthly income of the weavers working independently ($M=$ 16913.33, $SD=$ 4358.91) is significantly different from the weavers working under MW/MM ($M=$ 10766.20, $SD=$ 3297.63). Similarly, the independent weavers' mean level of income differed significantly from the monthly income of the weavers employed under WCS ($M=$ 13630.35, $SD=$ 5988.68). The mean variances in income were significant at 0.05 level. However, there was no significant difference between the monthly income of the handloom weavers working under MW/MM and WCS.

It is perceived from the above results that independent weavers earn higher incomes than those working under the other two systems. In the independent system, no intermediaries are involved in the production-marketing, and hence the weavers receive higher profit which also involves their remuneration for capital investment and higher risk bearing associated with market uncertainties. However, being an independent weaver requires financial resources, which most

of them still need to possess, and hence they depend on the other two systems of production-marketing. Among these two, the weavers employed under WCS earn a comparatively higher income than those under MW/MM though the variation in income is statistically insignificant. Still, it is observed from Figure 2 that most of the weavers are working under MW/MM with the lowest wage and income.

From the field study, it is revealed that though the MW/MM provide lower wages, the weavers get regular work and payment, and hence they prefer to work under an MW/MM. On the other hand, the WCS in the study area is mostly dormant with the uncertainty of work and wages, which prevents the weavers from joining a WCS though it procures them higher wage income. At the same time, it is also perceived that the awareness and outreach of government welfare schemes are higher among the weavers who are members of a WCS. However, the study tries to explore if there are any other socio-demographic factors that influence the handloom weavers to work under a WCS. To test this, a binomial logistic regression is employed where the dependent variable is whether a weaver is working under WCS or not. A set of independent socio-demographic variables is taken to analyse their effect on the dependent variable. The independent variables are age, experience, education, skill, marital status, and social category. It is hypothesized that as the age and experience of the weaver increase, the intention to work under WCS will increase to get higher wages and other welfare benefits. The WCS maintains a minimum quality of its products which can be produced by skilled weavers, and hence it is hypothesized that weavers with higher education and skill tend to work under WCS. In the study area, a person is referred to be skilled in handloom weaving if he/she knows the tie-dye (ikat) work which is intrinsic to handloom fabrics. With the workers getting married, their occupational responsibility will increase, and hence they may become more conscious about their wages and income. A better understanding of the benefits of working under a WCS might enable them to join a WCS. Handloom weaving is a caste occupation in the study area, and hence it is necessary to check if the social status of the weavers also influences them to work under a WCS. The results of the logistic regression analysis are presented in Table 2.

It shows that the regression model was statistically significant with a Chi-square value of 26.304, $p< .05$. The model explained 15.5 per cent (Nagelkerke R^2) of the variation in whether a handloom weaver is working under WCS or not. Though the R^2 value is less, we can accept it as the data source is primary in nature. The model correctly classified 93.6 per cent of the cases with an H-L test statistic of 0.884 (>0.05). From the regression results, it is noted that skill and marital status appeared to be significant in affecting the weavers to work under a WCS. A skilled weaver has 0.187 times more likeliness to be employed under a WCS.

Similarly, when a weaver is married, his/her likeliness to work under a WCS increases by 3.882 times. All other social and demographic factors did not emerge to be significant, as seen from the table. It is inferred from this result that the weavers need to acquire skills in tie-dye work to work under the WCS system of production-marketing, as the WCS are known for producing quality products that are export-oriented. The married weavers might be more aware of the benefits of working under a WCS as the government welfare schemes are mostly implemented through the primary cooperative societies, and hence they prefer to join a WCS.

5. Conclusion and Policy Suggestions

This study was carried out to examine whether the WCS is benefitting the handloom weavers financially and to identify the potential factors that affect the weavers to work under a WCS. Primary data collected from 435 active handloom weaving households in the Bargarh district of Odisha shows that MW/MM is the dominant form of production-marketing system, followed by being independent weavers and working under WCS. Checking the income variation in these three production-marketing systems reveals that there is a significant difference in income earned by the handloom weavers in different systems of production and marketing. Independent weavers earn the highest income, followed by weavers working under WCS and MW/MM. From among these two later systems of production-marketing, WCS is procuring higher income for the weavers. However, the least number of weavers are employed under this system, which broadly points to the unsuccessfulness of the cooperative societies in the study area. From the field survey, it was apprehended that most of the WCS are sick due to mismanagement, corruption, and politicization by the authority, and hence they have failed to look after the interest of the handloom weavers. The study also aimed to analyse the socio-demographic factors that influence the handloom weavers to work under a WCS unfolds that skill and marital status of the weavers are significant in affecting the weavers to join a WCS. The other factors, such as age, experience, education, and social category of the weavers, did not emerge to be significant.

This altogether exhibits that it is more of working conditions and activeness of the primary weavers' cooperative societies, which attract the handloom weavers to work under it rather than other socio-demographic factors. Therefore, it is high time to renovate these WCS with constant government intervention and support. Stringent measures should be taken to look into the operation and management activities within the WCS. Weavers' friendly and honest staff should be placed in the WCS to serve the need and purpose of the handloom weavers. Strict action should be taken against corrupt officials in delivering the rights and benefits of the weaver beneficiaries. Apart from this, as the regression results indicated skill and marital status of the weavers affecting them to join a WCS, a deliberate course

of action should be undertaken to train the weavers in tie-dye (ikat) and weaving work. Constant awareness about government assistance for the handloom weavers and the benefits of working under a WCS should be created to bring these poor and marginalized weavers into the cooperative fold. Persistent support from the government in terms of increased budgetary allocation will improve the economic and social status of the handloom weavers and will provide them with a better livelihood.

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Figure 1: Distribution of handloom weavers in different production-marketing systems in Odisha
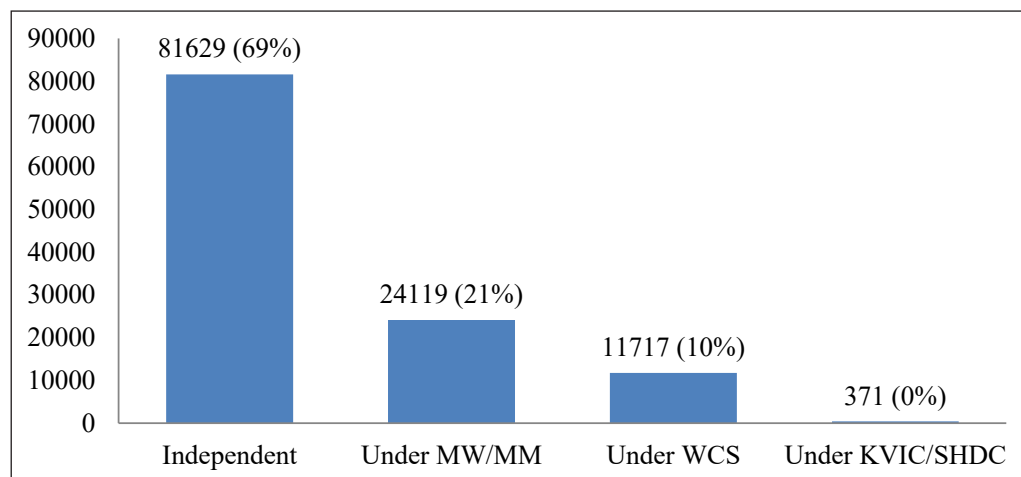
Source: 4th National Handloom Census, 2019-20

Figure 2: Distribution of handloom weavers in different production-marketing systems in the study area
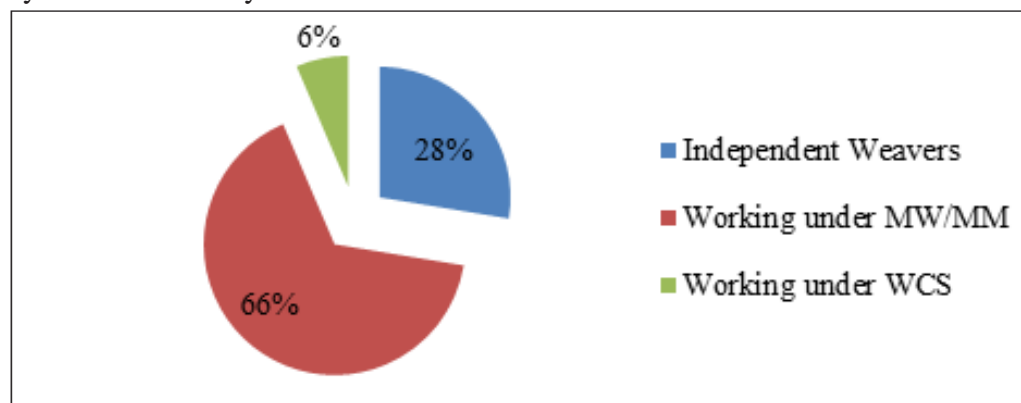
Source: Primary Survey, 2021

Table 1: Results of one-way ANOVA analysis

| Systems of Production | Mean | Std. Deviation | Test of Homogeneity of Variances | | ANOVA | |
			Levene's Statistics	Sig.	F	Sig.
Independent	16913.33	4358.91	8.739	.000	109.935	.000

Under MW/MM	10766.20	3297.63				
Under WCS	13630.35	5988.68				
Group Differences						
Systems of Production	Mean Difference		Sig.	95% Confidence Interval (LL-UL)		
Independent-Under MW/MM	6147.13		.000	5079.76		7214.49
Independent-Under WCS	3282.97		.029	276.58		6289.36

Source: Authors' own calculation from primary data, 2021

Table 2: Odds ratio calculated from logistic regression analysis

Predictors	Odds Ratio
Age (in years)	0.979
Experience (in years)	1.046
Skill (skilled vs. unskilled)	0.187*
Marital Status (married vs. non-married)	3.882**
Education (no education)	0.000
Education (primary)	0.441
Education (upper primary)	0.681
Education (secondary)	0.192
Education (higher secondary)	0.496
Social Category (SC)	0.000
Social Category (ST)	2.563
χ^2 (11)	26.304 ($p < .05$)
Nagelkerke R^2	0.155

Source: Authors' own calculation from primary data, 2021

Note: *significant at 5% level (p < .05), **significant at 10% level (p < .10)

What Influence the Business Success of Micro Small & Medium Enterprises: Analysis from Rural and Urban Assam

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Abstract:

This study strives to know if the factors influencing business success are uniform across all the three categories of MSMEs; identical for male and female entrepreneurs and universal in rural and urban areas. Based on 320 registered MSMEs from two districts of Assam, the study uses two criterions for defining a small business as successful: minimum five years survival as on 31st March 2018 and revenue greater than cost. The study recognises 16 factors that influence the success which are grouped into three categories: MSME characteristics; entrepreneur characterises and business characteristics. The findings identifies two sets of factors influencing the success, first, the vital factors (VFs) which are quintessential for performance and success and the critical factors (CFs) which are desired for the survival of an enterprise. These are found to be considerably different across the different sized MSMEs; male and female entrepreneurs and differ in rural and urban area.

Keywords: Business Success, Business Performance, Entrepreneurs, MSMEs, Vital Factors, Critical Factors.

Introduction

In a developing economy like India, MSMEs have been well identified as engines of economic growth. MSMEs ensure the socialistic principles of income equality, rural industrialization, employment, self-employment or entrepreneurship, poverty alleviation and regional development (Barik and Tripathy, 2022). They act as ancillary units to the larger enterprises, facilitate forward and backward integration for sustainable development and are the "miniature versions" of large

enterprises, apart from contributing in the national income. Considering the huge potentialities of MSMEs the Government of India have been profusely endorsing the MSME sector. Amidst the Covid19 pandemic special economic packages were even announced to relieve the MSME entrepreneurs. The relative flexibility of the MSMEs over larger enterprises be it in terms of size holding, low capital and skill requirement, easy entry and exit or hierarchical structure have attracted many individuals towards it. Consequently, the numbers of MSMEs are increasing but many cannot sustain and survive the business world and eventually goes out of business. This leads to a situation of enterprise churn. It becomes imperative to know how and why some MSMEs are successful while others fade away. This requires knowing what influences business success and recommending those influences to the entrepreneurs, policy framers and other stakeholders. With this backdrop the present study is an attempt to know the factors influencing business success for MSMEs in a developing economy. The study further envisages knowing if the factors influencing business success are uniform across all the three categories of MSMEs; uniform for both male and female entrepreneurs and uniform in rural and urban area.

The available literatures and management theories explaining the dynamics of how large enterprises achieve success cannot be applied to the MSMEs as they both have very different characteristics. The existing literatures largely focus on the factors of business failure and very few pays attention to the success factors of an enterprise. Majority of the success studies centers on the MSMEs or SMEs (Small and Medium Enterprises) of America and other developed economies. Moreover, the same set of success factors may vary across countries and continents depending upon the economic status. The success factors also differ depending upon the size, age, management profile and the industry sector of the MSMEs. There is absolute dearth of literatures dealing on the success factors of MSMEs in developing regions like India and Assam. Literatures explaining the business failures although provide some helpful insights yet they rarely divulge the process and mechanism by which different factors influence the success of an enterprise. Of the wide range of factors affecting the operations and development of the enterprise it becomes difficult for the entrepreneur to identify the vital factors for the success of the business. This study is first of its kinds in undertaking an investigation on the factors influencing business success for the region of Assam and India. The study intends to suggest the vital factors (VFs) which are quintessential for business performance and success and the critical factors (CFs) which are desired for the survival of an enterprise.

Literature Review & Theoretical Framework

Success and failure are the two sides of the same coin. Success is the primary stimulus for continuing a business. But business success has no universally

accepted definition, no universally accepted scale of measurement and nor what influences business success. Studies hold that if the success factors are employed to a flourishing business, it should amplify the enterprise's performance and success. Literatures explain business success from the standpoint of financial or quantitative factors like sales/turnover, profitability, Return on Investment (ROI). While some other studies defines successful enterprises as surviving a longer period. Studies have identified abundant factors that influence the business success, like:

a. General business environment of internal (internal to the enterprise) and external (governmental, political, etc.) environmental factors.

b. Managerial skills and an efficient management team.

c. Qualitative or non-financial measures (business experience and knowledge; quality products/ services; development of new products).

d. Characteristics of the enterprise (location; size; simplicity in operations; produce a limited variety of goods; sell to lesser consumers and have lesser suppliers; decentralized hierarchical organizational structure; faster and simpler processes).

e. Technical know-how.

f. Way of doing business

g. ICT (Information and Communication Technologies) and Internet.

h. Family support and prior work experience.

i. Cordial customer relation/service.

j. Entrepreneur's personal traits (starting age; confidence; innovation; education; etc.).

k. Efficient sales and marketing strategy/team.

l. Risk-taking quotient.

From the literatures, the present study identifies 16 factors grouped under three broad categories that are deemed to influence the business success of any MSME. The rational for segregating these factors into three broad categories is that, all of the factors represent unique and different aspect of the enterprise, entrepreneur and the business set-up. These cannot be compared under one big umbrella. As such the factors are:

a. MSME Characteristics- It includes three factors of enterprise's location, size and origin (proprietorship, sole-proprietorship, etc.).

b. Entrepreneur Characteristics- It encompasses seven personality traits of the entrepreneur like starting age, educational qualification, risk-taking quotient, confidence level, family support, duration of apprenticeship and innovation and management skills.

c. Business Characteristics- It comprises of six common business characteristics like quality of product/ service, customer relation, ICT and internet, external environment, availability of resources and way of doing business.

Methodology & Research Question

Based on the developing region of Assam, the study selects two districts

viz., Kamrup-Metropolitan and Kamrup-Rural for primary data. The study is qualitative in nature. Incorporating urban and rural area respectively would reflect a better composition and comparative analysis. The study assumes two inter-related criterion for defining small-business as successful. First, an enterprise needs a minimum survival of five years as on 31st March, 2018. Secondly, quantitative measure (financial) of revenue greater than cost (AR>AC) or increase in entrepreneur's net annual income from the enterprise.

Data Collection

MSMEs registered with the District Industries Centre (DIC) forms the primary data sources. Secondary data are also consulted. Yamane's formula fixes the sample size (N) as 320 enterprises comprising of both male and female owned registered MSMEs. The study focuses on 12 common entrepreneurial activities of the region in general and certain gender specific activities in particular. The 12 activities are according to A Standard Industrial Commodity Classification (ASICC) 2000 and National Industrial Classification (NIC) 2008 for the MSMEs. Primary data was collected by canvassing a schedule during 2018-2019. The study assumes the connotation for small businesses or MSMEs as defined by the MSMED (Micro, Small and Medium Enterprise Development) Act 2006-2007, Government of India.

Sampling Design

From the 12 activities based on our success criterions, 320 MSMEs are randomly chosen from the study areas. Of these 320 MSMEs, 220 are from Kamrup-Metropolitan as it contains more enterprises satisfying our criterions while 100 from Kamrup-Rural. Now by applying purposive sampling of entrepreneur's gender we have further segregated the 220 Kamrup-Metropolitan enterprises as 106 female and 114 as male whereas 46 male and 54 female from Kamrup-Rural. Furthermore, the 114 male-owned MSMEs of Kamrup-Metropolitan are divided as 75 micro, 35 small and 4 medium units based on our success criterions and presence of the entrepreneurial activities while 106 female-owned enterprises as 94 micro and 12 small units. In Kamrup-Rural the 54 female-owned MSMEs consisted of 46 micro and 8 small enterprises as against 46 male units divided as 25 micro, 20 small and 1 medium unit. Medium-sized female-owned MSMEs fulfilling our criterions cease to exist. Compiling the individual frequencies we get an equal representation of 160 male and female entrepreneurs each.

Statistical Tools

The study is based on 5-point Likert scale. The Likert scale was assigned weights (Extremely Important +2; Important +1; Normal 0; Less Important -1; Not Important at all -2) and the score (SC) was calculated [F*W, F=factor & W=assigned weights] for each factor that influences the business success. The score (SC) hence derived was used to compute the Co-efficient (SC/N). Based on the highest Co-efficient value, ranks are allotted to the factors. The ranks

are further used to identify and denote the VFs and the CFs. VFs comprises of the factors that are ranked first position while CFs are the factors ranked second and onwards. Descriptive statistics were also used.

Research Question

For the purpose of the study the following research questions have been formulated:

Q_1: Are the factors influencing the business success tends to be same for all the three categories of enterprises viz., micro, small and medium enterprises?

Q_2: Does male and female entrepreneurs have the same set of factors influencing their business success?

Q_3: Are both the study areas inclined towards the same factors influencing the business success?

Results & Discussion

Table 1 depicts the 12 MSME entrepreneurial activities in the study areas. Of the 320 enterprises majority (75 percent) are micro followed by small (23.4 percent) and medium (1.6 percent).

Table 1: MSME Entrepreneurial Activities

(Figures in Number)

Activities	Kamrup-Rural			Kamrup-Metropolitan			Total MSMEs
	Micro	Small	Medium	Micro	Small	Medium	
Food Processing	7 (2.2)	5 (1.6)	1 (0.3)	11 (3.4)	7 (2.2)	0	31 (9.7)
Traditional Jewellery	6 (1.9)	3 (0.9)	0	18 (5.6)	5 (1.6)	0	32 (10)
Printing	2 (0.6)	1 (0.3)	0	6 (1.9)	5 (1.6)	0	14 (4.4)
Hotel & Catering	1 (0.3)	1 (0.3)	0	2 (0.6)	2 (0.6)	0	6 (1.9)
Furniture & Fabrication	12 (3.8)	4 (1.3)	0	33 (10.3)	6 (1.9)	0	55 (17.2)
Transport & Logistic	2 (0.6)	1 (0.3)	0	3 (0.9)	5 (1.6)	0	11 (3.4)
Plastic Based	3 (0.9)	2 (0.6)	0	11 (3.4)	4 (1.3)	2 (0.6)	22 (6.9)
Civil Engineering	3 (0.9)	1 (0.3)	0	8 (2.5)	2 (0.6)	1 (0.3)	15 (4.7)
Tailoring & Weaving	13 (4.1)	5 (1.6)	0	26 (8.1)	5 (1.6)	0	49 (15.3)
Consultancy Services	0	1 (0.3)	0	3 (0.9)	4 (1.3)	0	8 (2.5)

Miscellaneous Manufactured Items	10 (3.1)	4 (1.3)	0	20 (6.3)	2 (0.6)	1 (0.3)	37 (11.6)
Beauty & Wellness salons	12 (3.8)	0	0	28 (8.8)	0	0	40 (12.5)
Total MSMEs	71 (22.2)	28 (8.8)	1 (0.3)	169 (52.8)	47 (14.7)	4 (1.3)	320 (100.0)

Source: Primary Data

Note: Figures in Parenthesis denotes Percentage

Furniture & fabrication has the highest entrepreneurs (17.2percent) whereas consultancy has the least (2.5percent). Higher number of micro enterprises (75percent) clearly states that the micro entrepreneurs of our survey have constraints to resources for which they do not prefer small and medium sized enterprises. The higher skill based activities (consultancy, civil engineering, transport & logistic) have relatively lesser entrepreneurs. This indicates that the respondents are inclined towards less skill and more labour-intensive activities.

Research Question (Q_1)

For the 240 micro enterprises location, entrepreneur's stating age and quality holds the first ranks (Table 2). Location where the enterprise is located and if it is readily accessible, draws customers to it. Quality of the product/service is vital for attracting consumers. Maintaining a persistent quality will draw new customers and retain the existing repeat customers. Of the entrepreneur characteristics, entrepreneur's age tops the list indicating that for achieving success entrepreneur's age at which he/she started the enterprise is the most crucial among all other characteristics of the entrepreneur. Starting early will provide the benefit to the entrepreneur to be long associated with the enterprise and understand the complexities of business.

Table 2: Ranks of Factors Influencing Business Success for Micro Enterprises

Factors	Extremely Important	Important	Normal	Less Important	Not Important at all	Score (SC)	Co-efficient	Rank
MSME Characteristics								
Size of the MSME	92	80	31	23	14	213	0.67	2
Location of the MSME	110	80	26	13	11	265	0.83	1

Origin of the MSME	11	23	36	60	110	-235	-0.73	3
Entrepreneur Characteristics								
Entrepreneur's Age	110	80	26	13	11	265	0.83	1
Entrepreneur's Education	23	30	47	60	80	-144	-0.45	6
Family Support	70	60	50	37	23	117	0.37	5
Risk-taking Quotient	80	77	47	25	11	190	0.59	3
Innovation & Management Skills	100	76	50	8	6	256	0.80	2
Duration of Apprenticeship	77	61	44	34	24	133	0.42	4
Confidence of Entrepreneur	21	31	41	56	91	-165	-0.52	7
Business Characteristics								
Way of Doing Business	80	77	47	25	11	190	0.59	4
Availability of Resources	93	81	31	23	12	220	0.69	3
Customer Relation	100	80	40	12	8	252	0.79	2
Quality	120	100	20	0	0	340	1.06	1
ICT & Internet	24	34	41	60	81	-140	-0.44	6
External Environment	77	61	44	34	24	133	0.42	5

Source: Primary Data

Therefore, for micro enterprises location, age and quality forms the vital factors (VFs) which are quintessential for business performance and success while the remaining factors forms the critical factors (CFs) which are desired for the survival of an enterprise.

For the 75 small enterprises, innovation and management skills, availability of resources and enterprise's location are the vital factors and the remaining factors like size, education, quality, etc., are the critical factors (Table 3). Innovating products/service, pricing, selling, marketing and advertising all involves innovation coupled with the management skills of the entrepreneur. Availability of resources at right prices like capital (working, fixed), raw materials, skilled labour, etc., also significantly influence the production process and the business success.

Table 3: Ranks of Factors Influencing Business Success for Small Enterprises

Factors	Extremely Important	Important	Normal	Less Important	Not Important at all	Score (SC)	Co-efficient	Rank
MSME Characteristics								
Size of the MSME	5	8	10	21	31	-65	-0.20	3
Location of the MSME	33	20	15	7	0	79	0.25	1
Origin of the MSME	23	11	20	18	3	33	0.10	2
Entrepreneur Characteristics								
Entrepreneur's Age	23	19	16	10	7	41	0.13	3
Entrepreneur's Education	21	13	17	15	9	22	0.07	4
Family Support	17	13	18	15	12	8	0.03	5
Risk-taking Quotient	30	21	11	8	5	63	0.20	2
Innovation & Management Skills	38	23	6	5	3	88	0.28	1
Duration of Apprenticeship	18	11	9	23	14	-4	-0.01	6
Confidence of Entrepreneur	13	8	6	23	25	-39	-0.12	7
Business Characteristics								
Way of Doing Business	30	21	11	8	5	63	0.20	3
Availability of Resources	38	23	6	5	3	88	0.28	1
Customer Relation	22	19	15	11	8	36	0.11	4
Quality	33	20	15	7	0	79	0.25	2
ICT & Internet	25	16	8	16	10	30	0.09	6
External Environment	23	11	20	18	3	33	0.10	5

Source: Primary Data

For the 5 medium enterprises, enterprise's size, entrepreneur's risk-taking quotient and the way an entrepreneur carries his business seems to influence most (Table 4). Whether, an enterprise is smaller or bigger in size will impact its business capacities like production, spending, loan mortgage, etc., affecting the overall

success. Risk-taking quotient has been long identified in literature by Hawley's of earning "profits" by the entrepreneurs. Way of doing business connotes how the entrepreneur performs and undertakes his business which involves taking stringent business decisions. As such these are the vital factors while the rest are critical factors for business survival and success.

Table 4: Ranks of Factors Influencing Business Success for Medium Enterprises

Factors	Extremely Important	Import-ant	Nor-mal	Less Import-ant	Not Im-portant at all	Score (SC)	Co-effi-cient	Rank
MSME Characteristics								
Size of the MSME	3	2	0	0	0	8	0.03	1
Location of the MSME	1	1	0	1	2	-2	-0.01	3
Origin of the MSME	2	1	2	0	0	5	0.02	2
Entrepreneur Characteristics								
Entrepre-neur's Age	0	1		2	2	-5	-0.02	6
Entrepre-neur's Educa-tion	2	2		1	0	5	0.02	2
Family Sup-port	0	0		2	3	-8	-0.03	7
Risk-taking Quotient	3	2	0	0	0	8	0.03	1
Innovation & Management Skills	2	1		1	1	2	0.01	3
Duration of Apprentice-ship	1	1		1	2	-2	-0.01	4.5
Confidence of Entrepreneur	0	2		1	2	-3	-0.01	4.5
Business Characteristics								
Way of Doing Business	3	2		0	0	8	0.03	1
Availability of Resources	1	1		1	2	-2	-0.01	5
Customer Relation	2	2	0	1	0	5	0.02	2
Quality	2	1		1	1	2	0.01	3.5
ICT & Inter-net	0	1		2	2	-5	-0.02	6
External En-vironment	2	1		1	1	2	0.01	3.5

Source: Primary Data

The findings of table 2, 3 and 4 suggest that the factors influencing business success for the micro, small and medium sized enterprises are different. Being different in size would obviously differ their characteristics and business functioning. The VFs and CFs are also substantially different. Thus, for the research question Q_1 we can state that the factors influencing the business success tends to be different for all the three categories of enterprises.

Research Question (Q_2)

The 160 male entrepreneurs unequivocally responded that size of their enterprise, their starting age and the quality of their product/service influences the most for achieving business success (Table 5). These three factors constitute the VFs for the male entrepreneurs while the remaining ones are CFs. Other factors like location, innovation, external environment, etc., matters but not compared to the VFs.

Table 5: Ranks of Factors Influencing Business Success for Male Entrepreneurs

Factors	Extremely Important	Import- ant	Normal	Less Im- portant	Not Important at all	Score (SC)	Co-effi- cient	Rank
MSME Characteristics								
Size of the MSME	62	35	26	21	16	106	0.33	1
Location of the MSME	24	60	28	37	11	49	0.15	2
Origin of the MSME	31	26	60	29	14	31	0.10	3
Entrepreneur Characteristics								
Entrepre- neur's Age	76	41	34	9	0	184	0.58	1
Entre- preneur's Education	31	26	60	29	14	31	0.10	7
Family Support	62	35	26	21	16	106	0.33	4
Risk-taking Quotient	50	37	47	14	12	99	0.31	5
Innovation & Manage- ment Skills	68	48	34	10	0	174	0.54	2
Duration of Apprentice- ship	61	45	34	15	5	142	0.44	3
Confidence of Entrepre- neur	23	50	57	19	11	55	0.17	6
Business Characteristics								
Way of Doing Busi- ness	81	41	32	6	0	197	0.62	2

Availability of Resources	61	45	34	15	5	142	0.44	5
Customer Relation	68	48	34	10	0	174	0.54	4
Quality	77	61	22	0		215	0.67	1
ICT & Internet	28	31	70	17	14	42	0.13	6
External Environment	76	41	34	9	0	184	0.58	3

Source: Primary Data

For the 160 female MSME entrepreneurs, location where their enterprise is situated, their family support and customer relation occupies the pivotal place in influencing the business success (Table 6). A prominent business location easily draws customers rather than a remotely located inaccessible one. Moreover, for the females the support they receive from their families in their decision to start or continue a business is extremely crucial. It is needless to say that the societal norms have demarcated the career options for the females. For females, diving into entrepreneurship is not much preferred in traditional orthodox Indian societies and in the rural belts. As such the traditional Indian society visualises women as a caretaker of the family latent with the household drudgeries rather than the bread earner. Entrepreneurship is highly stereotyped as a masculine endeavour and even certain entrepreneurial activities are also stereotyped as masculine ventures. In our survey, beauty and wellness had been strictly opted by females while furniture & fabrication, logistics, civil engineering and consultancy by only males. For the female entrepreneurs striking a right balance between her personal and professional life becomes a momentous task. Sometimes females are also seen to withdraw themselves from active entrepreneurial activates owing to a disequilibrium in the balance. Furthermore, marriage is another significant component in the Indian society and more so for the females. The outlook of the family towards entrepreneurship post marriage and child birth influences the decision to start an enterprise or continue entrepreneurship. Being a female itself involves managing the household drudgeries and other errands and if it is combined with entrepreneurial activities it turns out to be all the more arduous. A good customer relation on the other hand is imperative for the growth of a business. According to the females, other factors can be adjusted or groomed but lack of customers will eventually kill the business. Attracting new customers and retaining the old ones should be the prime agenda of any business. Customers also act as a means of free advertisement in the form of word-a-mouth. Females of our survey mentioned that during their early business days when they could not afford exuberant advertisements,

word-a-mouth was their only medium of advertising. As such for the females, location, family support and customer relation inhabits the VFs and the rest factors are CFs for business success.

Table 6: Ranks of Factors Influencing Business Success for Female Entrepreneurs

Factors	Extremely Important	Important	Normal	Less Important	Not Important at all	Score (SC)	Co-effi-cient	Rank
MSME Characteristics								
Size of the MSME	23	66	24	41	6	59	0.18	2
Location of the MSME	70	48	21	16	5	162	0.51	1
Origin of the MSME	33	20	55	31	21	13	0.04	3
Entrepreneur Characteristics								
Entrepreneur's Age	70	48	21	16	5	162	0.51	3
Entrepreneur's Education	33	20	55	31	21	13	0.04	7
Family Support	80	38	30	10	2	184	0.58	1
Risk-taking Quotient	70	38	45	7	0	171	0.53	2
Innovation & Management Skills	60	32	45	16	7	122	0.38	5
Duration of Apprentice-ship	54	51	40	12	3	141	0.44	4
Confidence of Entrepreneur	21	41	70	15	13	42	0.13	6
Business Characteristics								
Way of Doing Business	61	45	34	15	5	142	0.44	4
Availability of Resources	70	48	21	16	5	162	0.51	3
Customer Relation	77	61	22	0	0	215	0.67	1
Quality	68	48	34	10	0	174	0.54	2
ICT & Inter-net	50	37	47	14	12	99	0.31	6
External En-vironment	62	35	26	21	16	106	0.33	5

Source: Primary Data

Hence, for the research question Q_2 we can testify from the results of table 5 and 6 that the factors influencing the business success of male and female MSME entrepreneurs are extensively different.

Research Question (Q_3)

In Kamrup-Metropolitan enterprise's size, entrepreneur's risk-taking quotient and external environment occupies the first ranks signifying that they exert supreme influence on the business success (Table 7). These three factors form the VFs and the remaining ones are CFs. External environment comprises the tax structure, ease of doing business and a general healthy environment for business. Businesses cannot flourish in situations of excessive taxation and licensing, communal riots, strikes, lockdowns, corruption of government officials, recession or bad economic conditions.

Table 7: Ranks of Factors Influencing Business Success in Kamrup-Metropolitan

Factors	Extremely Important	Import-ant	Nor-mal	Less Im-portant	Not Im-portant at all	Score (SC)	Co-effi-cient	Rank
MSME Characteristics								
Size of the MSME	71	50	45	31	23	115	0.36	1
Location of the MSME	67	46	23	50	34	62	0.19	2
Origin of the MSME	31	23	51	47	71	-104	-0.33	3
Entrepreneur Characteristics								
Entrepreneur's Age	87	50	37	16	30	148	0.46	2
Entrepreneur's Education	41	49	70	25	35	36	0.11	7
Family Sup-port	41	70	49	35	25	67	0.21	4
Risk-taking Quotient	87	50	37	30	16	162	0.51	1
Innovation & Management Skills	70	41	49	35	25	96	0.30	3
Duration of Apprentice-ship	67	40	31	39	43	49	0.15	6
Confidence of Entrepreneur	41	70	49	25	35	57	0.18	5
Business Characteristics								
Way of Doing Business	44	68	49	35	25	71	0.22	5
Availability of Resources	77	55	30	30	28	123	0.38	4
Customer Relation	87	50	37	16	30	148	0.46	2
Quality	80	50	37	37	16	141	0.44	3
ICT & Internet	61	40	26	30	43	46	0.14	6
External Envi-ronment	87	50	37	30	16	162	0.51	1

Source: Primary Data

On the other hand, in Kamrup-Rural entrepreneurs have ranked location, entrepreneur's innovation and management skills and availability of resources as the utmost influencer on business success (Table 8). Entrepreneurs were of the opinion that being located in the rural area, they can understand the worth of locating in a prominent business place. Nearly 60percent of rural entrepreneurs wanted to shift their business to nearby urban and prominent commercial locations, but the rent of such establishments in thriving locations does not allow them to shift. Being remotely located also hampers the accessibility to resources. It further increases the labour cost to the entrepreneurs and transportation costs. The VFs for Rural entrepreneurs happens to be location, innovation and management skills and availability of resources.

Table 8: Ranks of Factors Influencing Business Success in Kamrup-Rural

Factors	Extremely Important	Important	Normal	Less Important	Not Important at all	Score (SC)	Co-efficient	Rank
MSME Characteristics								
Size of the MSME	40	30	10	8	12	78	0.24	2
Location of the MSME	50	27	10	8	5	109	0.34	1
Origin of the MSME	7	11	18	26	38	-77	-0.24	3
Entrepreneur Characteristics								
Entrepreneur's Age	41	31	10	11	7	88	0.28	4
Entrepreneur's Education	48	23	13	11	5	98	0.31	3
Family Support	35	23	12	14	16	47	0.15	6
Risk-taking Quotient	50	27	10	8	5	109	0.34	2
Innovation & Management Skills	52	30	10	5	3	123	0.38	1
Duration of Apprenticeship	40	30	10	8	12	78	0.24	5
Confidence of Entrepreneur	16	20	11	23	30	-31	-0.10	7

Business Characteristics							
Way of Doing Business	48	23	13	11	5	98	0.31	3
Availability of Resources	50	28	14	5	3	117	0.37	1
Customer Relation	41	31	10	11	7	88	0.28	4
Quality	50	27	10	8	5	109	0.34	2
ICT & Internet	35	23	12	14	16	47	0.15	6
External Environment	40	30	10	8	12	78	0.24	5

Source: Primary Data

For the research question Q_3 we can clearly state that both our study areas viz., Kamrup-Metropolitan and Kamrup-Rural have different non-identical factors influencing the business success.

Conclusion & Implication

The study envisaged to know the factors affecting business success for MSMEs in the developing region of Assam. It further attempted knowing if the factors influencing business success are identical across all the three categories of MSMEs; universal for both male and female MSME entrepreneurs and uniform in rural and urban area. With a qualitative orientation, the study is based on 320 registered MSMEs. The findings of the study recognises two sets of factors influencing the business success, first, vital factors (VFs) that are quintessential for business performance and success and the critical factors (CFs) which are desired for the survival and success of an enterprise. These VFs and CFs tends to be different for all the three categories of enterprises, different for male and female entrepreneurs and even different in both of our study areas. For the micro enterprises the VFs are location, entrepreneur's starting age and quality while for small enterprises it is entrepreneur's innovation and management skills, availability of resources and enterprise's location and for medium it is enterprise's size, entrepreneur's risk-taking quotient and the way of doing business by an entrepreneur. Contrarily, for male entrepreneurs VFs is the size of their enterprise, their starting age and the quality of their product/service whereas for females it is location, their family support and customer relation. Kamrup-Metropolitan entrepreneurs opted enterprise size, entrepreneur's risk-taking quotient and external environment as their VFs as against the Kamrup-Rural entrepreneurs who preferred location, entrepreneur's innovation and management skills and

availability of resources. Based on our findings for policy implications we can suggest that since the factors influencing business success happens to be different so the support measures should also be customized and need based. All the three categories of enterprises should be treated differently as they are very different from one another. Moreover, thrust should be focused on micro enterprises as majority of individuals opting entrepreneurship ventures in micro enterprises due to dearth of resources. Small and medium entrepreneurs are comparatively affluent. For the availability of resources like cheap credit mainly as working capital the government can enable hassle-free soft loans at reasonable prices. Furthermore, mitigating the issue of locational disadvantage, dedicated industrial spaces like industrial estates is the need of the hour and most importantly in rural belts for a holistic and socialistic development. The rent of such industrial estates should be less compared to private owned business establishments to aid the micro and petty entrepreneurs. While promoting entrepreneurship it should be borne in mind that entrepreneurship should be viewed as a career option and not as a last resort. It should be started early in life especially by those individuals who do not hail from entrepreneurial family backgrounds. Understanding the business world, the cut throat competition, establishing as a brand and garnering customers, demand investment of time. So entrepreneurship should be started early in life. Family support is crucial for any entrepreneur and it becomes more vital for a female entrepreneur. Family support affects the decision to start or continue a business. Working as an employee and working as an employer is a vast metamorphosis. The policies promoting female entrepreneurship should also look into bursting the orthodox myths related to working women and most importantly with female entrepreneurship.

Thus, to conclude we can sum up that micro, small and medium enterprises are made successful by the collective influence of a wide range of factors that can be branded as vital factors (VFs) and critical factors (CFs). But these VFs and CFs considerably differs across the different sized enterprises, male and female entrepreneurs and even differs in rural and urban area.

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An Empirical study of Unified Payment Interface (UPI) in Indian Digital Payment System

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Abstract:

"Faceless, Paperless, Cashless"

A significant shift in support of digital has been seen in the financial services industry. Numerous opportunities in the area of digital financial services have arisen as a result of this change. The purpose of this paper is to provide a broad picture of the contactless payment environment, drawing insights gained and addressing challenges and possibilities for the Indian mobile payments ecosystem in order to propel this vibrant and valued sector. The primary aim of this paper is to examine the future possibilities of the Unified Payment Interface and evaluate a comparative analysis between Public and Private sector banks performance in UPI. UPI's turnaround can be linked to a variety of revolutionary headwinds, including the presence of a robust infrastructure, switching expectations of customers, foresighted government actions, and technological breakthroughs. The future may see a realignment of ecosystem participants' roles and a consolidation of market players for better Financial Literacy.

Keywords: UPI, Financial Literacy, Digital Transition, Public and Private sector Banks.

Introduction

The banking system reflects the country's financial health. The banking industry is essential to the functioning of any civilised economy. It is one of the fundamental financial pillars of the banking system, which is crucial to the effective functioning of an Indian

economy. For a country's economic growth to be productive, its financial needs for fair trade, business, and agriculture must be met with greater enthusiasm and accountability. Therefore, the prosperity of a country and the growth of banking are strongly connected. In a modern economy, banks should be seen as economic stimulators rather than money dealers. They play an important role in mobilisation of deposit and loan distribution to various economic sectors.

Banks have played an important role in India's economic progress since the country's sovereignty. In India, the banking industry dominates, more than half of all financial assets. Indian banks have been currently experiencing an exciting period of quick transformation as an outcome of financial sector reforms that are being executed in phases.

The existing operational strategy should be considered as an opportunity to reshape Indian banking services into a sound, solid, and vibrant system capable of carrying out its responsibilities smoothly and economically without putting the government at risk. Following the economic reforms of the Indian market, the government proposed a number of policy initiatives to make the banking system more economically sustainable and productive, based on the recommendations of the Narasimhan Committee.

The banking sector in India is currently undergoing significant structural reforms, as well as an increase in the use of information and communication technology (ICT). It has significant impact on the banking sector. It enabled rapid and safe fund transfers between financial transactions by transitioning from paper to digital mode. Furthermore, technology empower the development of a wide range of E-payment platforms, colloquially known as digital payment services, the most prominent of which is UPI (Unified Payments Interface).

Review of Literature

Raharja, Sutarjo, Muhyi and Herawaty (2020) jointly made a study on Digital Payment as an Enabler for Business Opportunities: A Go-Pay Case Study. The authors propose to exemplify how cashless platforms enable market opportunities by employing a descriptive approach method and data analytical procedures from published studies. The findings show that Go-Pay encourages economic opportunities by fulfilling its mission as a digital payment solution. Furthermore, it allows consumers and merchants to tap into a large market and gain access to a variety of products and services.

Chawala, Singhal and Bajaj (2019) jointly made a study on *A Study on Awareness and Adopting of Unified Payments Interface (UPI) for Digital Payments*. The authors tried to establish folk's level of awareness of the Unified Payment Interface and the variables that impact their preference of digital payment option. This study was carried out to determine the deployment of UPI in the funds transfer framework.

Kolte and Humbe (2019) jointly made a study on Study of UPI/BHIM Payment System in India. Authors study the

positive impact of UPI and BHIM app on digital payment system. It was discovered that there is a slight bump in the gender divide for basic knowledge of smart phones, and students are extremely passionate regarding real-time payments and their settlement in savings accounts.

Boke and Harkare (2018) jointly made a study on Review on Unified Payment Interface Advancement towards Digitalization and Challenges Faced. Authors analysed about the challenges faced by the customers in Digitalization era. They found that UPI is not complex to understand and yet is not used which is complimenting the variable such as digital illiteracy in India. If Indian people adopt the cashless service than transparency will increase and it will help to ease the process. Thus cashless process will help in reduce the Black money.

Gupta and Bansal (2018) jointly made a study on UPI- Redefining Digital Payments- A Critical Review. The world's most advanced, original, and financially inclusive payment service, according to authors, is unquestionably UPI. The interface, which is governed by the RBI, operates by carrying out a mobile platform-based quick transfer of money between two bank accounts.

Buckley and Mas (2015) jointly made a study on The Coming of Age of Digital Payments as a Field of Expertise. Authors explains the essential contrasts between a banking perspective and a payments mind-set, as well as the historical backdrop in which both areas evolved. It starts a conversation on whether it's appropriate to think of the digital payments area as an emerging profession separate from banking, and if so, what the essential elements of its identity may be, and how a sense of a profession might arise. Finally, it examines the major vision, knowledge, and human capacity limitations that are currently slowing the speed of progress in the digital payments field.

Objectives of the study

1. To examine UPI's place in the digital payment ecosystem.

2. To analyse the Internationalization aspect of UPI

3. Comparative analysis between Public and Private sector banks performance in UPI

Research Hypothesis

H01: Total volume of UPI transactions of public banks equal that of the private banks.

H02: For the top ten remitter and beneficiary banks, there is no significant difference in business decline prior to and after the onset of Covid-19.

H03: For the top ten remitter and beneficiary banks, there is no significant difference in Technical decline prior to and after the onset of Covid-19.

H04: For the top ten remitter and beneficiary banks, there is no significant difference in Debit reversal success rate prior to and after the onset of Covid-19.

H05: For the top ten remitter and beneficiary banks, there is no significant difference in Deemed Approved rate prior to and after the onset of Covid-19.

Research Methodology

This paper utilizes an exploratory research strategy to gather the necessary information from secondary sources such as published research works, RBI reports, NPCI website, and so on. Total of Ten Public and Private sector banks has been taken for data collection as per top Market Capitalization among BSE 100. Based on the secondary data gathered, T-Test- Levene's Test for Equality of Variances has been used for comparative analysis between Public and Private sector banks performance in UPI.

Research Gap

Research has revealed that the revolutionary impacts of using UPI in daily life are related to authenticity, awareness, nostalgia, and consumer satisfaction. Therefore, these elements might be connected. Nevertheless, there aren't many academic studies that have compared the performance of public and private sector banks on UPI-based digital platforms.

Globalization facet of UPI

E-commerce business has accelerated in India post Covid-19 pandemic. In 2021, around 180–190 million shoppers bought products via online platform. As per a study conducted by the management consulting firm Bain & Company, India's e-retail market is projected to reach $50 billion in 2022. This makes India the world's third-largest online shopper base after US and China. Moreover, Block chain technology and Bitcoin are yet to deliver on their promise of becoming the next big thing in global e-commerce. This had made it important for the Indian policy makers to take UPI to the global stage and facilitate payments across countries in various currencies in real time.

Strategy followed to expand UPI footprint in Europe:

- To make the payments hassle-free, NPCI International Payments Limited (NIPL) has entered into an agreement with PPRO Financial (UK based fintech firm). As per this memorandum of understanding (MoU), both companies will collaborate to expand UPI into foreign markets with focus on India and Europe.
- In January 2022, Transact365 (UK based fintech start-up) has helped UPI system with a platform for enabling real time currency conversion facility. This will help global merchants to seamlessly carry out business in India without having to source local partners. Faster payment in real time in local currency is the key focus for Transact365 platform.
- Last month (October 2022), NIPL (NPCI International Payments Limited) has entered into an agreement with Word line (French company dealing with multinational payment services) to enable UPI system in Belgium, Netherlands, Luxembourg and Switzerland.
- Indian diplomats are in discussion with their counterparts in France to enable UPI usage across French business houses.

Strategy followed in Asia and Commonwealth countries:

- Government of India is forging partnerships with countries such as UAE, Malaysia, Singapore, Nepal and Bhutan to expand the network of India's digital payment system.
- Nepal became the first country outside India to adopt UPI payment system. Bhutan has installed UPI-based QR codes at many outlets. Cross-border payment system using UPI became operational in Singapore in July 2022.
- India has agreed to share UPI technology with the Commonwealth countries in a bid to go global. India's efforts have been praised by the Commonwealth Secretary General Ms. Patricia Scotland.

Meanwhile, the NPCI along with support from the RBI are trying their best to popularise the adoption of UPI. NPCI has given a mandate to all banks, third party application providers and payment service providers to enable international acceptance via UPI by September 30, 2022.

Challenges:

Following are some of the major challenges being faced by India's UPI system as it strives to go global.

- UPI implementation has come to a standstill due to geopolitical concerns in few countries. Countries such as Canada are hesitant to accept UPI due to push back from North American local tech companies. Ministry of External Affairs (MEA) is striving hard to enter into negotiations with the government and central banks of such countries in a bid to go global.
- Brazil has recently implemented PIX payment system. This instant payment system has gained popularity in many Latin American countries. It relies on a centralized repository of user database as compared to the decentralized model that UPI uses.

Instant payment system in the United States is at a nascent stage as compared to the UPI system. The prevalent mode of payment in the US is cards – credit and debit cards. The popularity of card ecosystem to some extent is responsible for hampering the growth and development of instant payment systems in the US. The government is in discussion to popularise payment system for the benefit of the end consumers – in order to save high transaction fees being charged by the credit and debit card companies.

Data Analysis & Results

A study was conducted to compare the performance of UPI transactions with public sector banks and private sector banks. In our opinion, there is no discernible difference in their performance levels. The total volume of UPI transactions by the respective banks as of March 2022 was chosen as the performance criterion. Ten public and private banks were chosen from the top market capitalization in the BSE 100.

In this problem, we want to assess whether the performance of the banks in the two sectors is comparable. The null hypothesis in this case would be that there is no difference in the performance of public and private sector banks in UPI transactions.

H01: Total volume of UPI transactions of public banks equals that of the private banks.

	Name of the Bank	Total Volume	Total Volume	Name of the Bank	
	Table 1: Total UPI Volume Transactions as on March 2022 (in millions)				
Public Sector Banks	State Bank Of India	1533187	439591	HDFC Bank Ltd	Private Sector Banks
	Bank of Baroda	379776	275879	ICICI Bank	
	Union Bank of India	159226	254012	Axis Bank Ltd	
	Punjab National Bank	302754	219200	Kotak Mahindra Bank	
	Canara Bank	234103	75655	Federal Bank	
	Bank of India	175519	27887	Yes Bank Ltd	
	Indian Bank	133612	40957	IDBI Bank Limited	
	Central Bank Of India	101216	41727	IndusInd Bank	
	Indian Overseas Bank	59554	6357	RBL Bank	
	Bank of Maharashtra	44390	27997	IDFC FIRST Bank	

Source: RBI & NPCI website

Table 2: T-Test- Levene's Test for Equality of Variances (using Statistical Package for Social Science)

The outcomes of the T-Test: Levene's Test for Equality of Variances and the t-test for Equality of Means from SPSS are summarized in the two tables above. The table contains two sets of analysis, one with homogeneity of variance in the two categories and the other with uneven variances. The t-test result

shows t statistic of 1.165 with 10.966 degree of freedom. The corresponding two-tailed p-value is 0.269, which is greater than 0.05. As a result, at a 5% level of significance, we can accept the null hypothesis, which means that the volume of UPI transactions of public and private sector banks are not significantly different from each other, i.e., both sectors' UPI volume transactions performed similarly.

Table 3: Top 10 UPI Remitter Banks						
List of Public & Private Banks	Business Decline %		Technical Decline %		Debit Reversal Success %	
	Mar'20	Mar'22	Mar'20	Mar'22	Mar'20	Mar'22
Airtel Payments Bank	6.57	12.26	1.54	1.37	48.84	72.44
Bank of India	7.93	5.05	0.8	0.5	38.88	68.83
Bank of Maharashtra	8.89	5.15	0.74	0.75	37.87	75.53
Canara Bank	11.61	7.73	2.62	1.57	27.45	61.67
Central Bank Of India	8.87	6.67	0.39	2.26	47.5	66.8
Citibank	3.84	6.12	1.75	0.29	26.76	86.47
Federal Bank	6.04	5.69	1.42	0.1	47.27	97.47
IDBI Bank Limited	7.07	4.4	0.3	0.98	47.29	77.56
Indian Overseas Bank	12.04	5.68	1.34	1.21	46.72	76.53
IndusInd Bank	7.62	8.27	2.4	1.41	24.87	78.85

Source: RBI & NPCI website

*Remitter Banks: The account holder's bank is the one sending the money.

*Business Decline (BD %): Transactions decline due to a client entering an inaccurate passcode, using the erroneous beneficiary account, or for other monetary reasons such as exceeding the per transaction limit, surpassing the allowed number of payments per day, outpacing the daily amount cap, and so on.

*Technical Decline (TD %): Transactions are declining owing to technological factors such as software outages and connectivity problems on the bank's or NPCI's end.

*Debit Reversal Success %: It means the reversal process was successful, and the money were successfully restored to the account holder's account. It indicates that the reversal request was processed and that the debit transaction was effectively cancelled. This ensures that the account holder's money is restored and that they are not held liable for the debit.

Table 4: Descriptive Statistics						
	Business Decline		Technical Decline		Debit Reversal Success	
	Mar'20	Mar'22	Mar'20	Mar'22	Mar'20	Mar'22
Mean	8.048	6.702	1.33	1.044	39.345	76.215
Standard Deviation	2.474	2.291	0.790	0.656	9.711	10.194
Coefficient of Variation	30.741	34.189	59.368	62.805	24.682	13.375

Table 5: 5% Level of Significance for a Paired T-Test			
	Two-Tailed (*p-value*)	t-value (Tabulated value)	Significant/ Insignificant
Business Decline	0.22296665	0.05	Insignificant
Technical Decline	0.38982628	0.05	Insignificant
Debit Reversal Success	0.00000015	0.05	Significant

The paired t-test was used to test the hypothesis, and the degree of freedom (d.f.) was found to be (n-1) = (10-1) = 9. After entering the data into the Statistical Package for the Social Sciences (SPSS), we obtained the calculated value shown in the table above.

Since, only in case of Debit Reversal Success % the calculated value is smaller than the tabulated value at 5% level of significance, it is significant and the null hypothesis is rejected. In rest two cases i.e. Business Decline % & Technical Decline % the calculated value is greater than the tabulated value at 5% level of significance, it is Insignificant and the null hypothesis is accepted.

The study concludes that the impact of Covid-19 has adversely effected Remitter Banks in terms of Debit Reversal Success%.

Table 6: Top 10 UPI Beneficiary Banks						
List of Public & Private Banks	Business Decline %		Technical Decline %		Deemed Approved %	
	Mar'20	Mar'22	Mar'20	Mar'22	Mar'20	Mar'22
Airtel Payments Bank	0.96	0.48	0.3	0.79	0.02	0.2
Bank of India	1.09	0.32	0.72	0.18	0.43	0.14
Bank of Maharashtra	0.62	0.28	0.8	0.43	0.38	0.19
Canara Bank	1.01	0.69	0.29	0.73	1.59	0.52
Central Bank Of India	1.53	0.64	0.29	0.58	0.3	0.9
Federal Bank	0.54	0.24	0.09	0.02	0.11	0
IDBI Bank Limited	3.3	0.53	0.05	0.08	0.14	0.11

Indian Overseas Bank	0.9	0.37	0.14	0.62	4.79	0.26
Karnataka Bank	1.74	0.92	0.14	0.38	0.05	0.29
Karur Vysya Bank	1.81	0.44	0.37	0.3	0.46	0.18

Source: RBI & NPCI website

*Beneficiary Banks: The bank from which the account holder is receiving funds.

*Deemed Approved %: The Deemed Approved percentage refers to the percentage of cases where credit authorizations are not received online from the beneficiary banks for the credit. If the beneficiary account is not credited online, the beneficiary bank will carry out the payment individually in adherence to the current RBI guidelines.

Table 7: Descriptive Statistics						
	Business Decline		Technical Decline		Deemed Approved %	
	Mar'20	Mar'22	Mar'20	Mar'22	Mar'20	Mar'22
Mean	1.35	0.491	0.319	0.411	0.827	0.279
Standard Deviation	0.811	0.211	0.255	0.268	1.464	0.257
Coefficient of Variation	60.104	43.016	79.969	65.241	177.066	92.072

Table 8: 5% Level of Significance for a Paired T-Test			
	Two-Tailed (*p-value*)	t-value (Tabulated value)	Significant/ Insignificant
Business Decline	0.00454633	0.05	Significant
Technical Decline	0.44204717	0.05	Insignificant
Deemed Approved	0.25897965	0.05	Insignificant

Since, only in case of Business Decline % the calculated value is smaller than the tabulated value at 5% level of significance, it is significant and the null hypothesis is rejected. In rest two cases i.e. Technical Decline % & Deemed Approved % the calculated value is greater than the tabulated value at 5% level of significance, it is Insignificant and the null hypothesis is accepted.

The study conclude that the impact of Covid-19 has been affected to the Beneficiary Banks with respect to Business Decline %.

Conclusion

With UPI, the NPCI has built a strong payment infrastructure that enables cashless and hassle-free financial transaction. It is simple to learn and use, due to the numerous payment

applications and simple procedures for registering and starting transactions. It is a system that integrates multiple banking services, seamless fund tracking, and merchant payments into a standard android browser (of any participating bank). UPI is an electronic payment gateway that enables money to be transferred between two bank accounts mostly through mobile phone. Consumers could use UPI to make payments directly from their bank accounts to a variety of retailers, both online and offline, without entering credit/debit card numbers, IFSC codes, or net banking/wallet passcodes. It aims to improve flawless integration & customer satisfaction by standardizing and offering a single interface for all NPCI systems. The goal of the UPI is to make funds transfer as simple and quick as conceivable. The prevalent use of android/IOS phones, the affordability of an online credible authenticity, global banking availability & the inclusion of fingerprint in phones would actively promote the utilization of electronic payment systems in India, resulting in a cashless society.

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A Parental perspective on School Children's Dietary habits, Nutrition and Health outcomes

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Abstract

The World Obesity Federation predicts that by 2030, 6.2% of adolescents aged 10-19 will be obese, and 10.81% of children aged 5-9 will also be obese. In India, it is estimated that over 27 million children will be obese. It is important for children to have a balanced diet and exercise regularly to maintain a healthy weight and proper development. The quality of nutrients that children consume can significantly impact their health, growth, and functions. This study provides insights into the eating habits and preferences of school-aged children, the prevalence of junk food consumption, and parental concerns. Junk food is appealing to children because of its taste, affordability, and convenience, and its negative impact on health is not always understood. To promote holistic development, physical activity is essential for children's physical, social, and mental well-being. Nutrition advice can also facilitate the adoption of healthy eating habits in the long term.

Keywords: Child Junk food, Consumption pattern, Childhood Obesity, Diabetes Prevention.

Introduction

An annual health survey conducted under the stewardship of the Ministry of Health and Family Welfare, Government of India, "**National Family Health Survey (NFHS) 2019-21**", is the most comprehensive survey to date on the health and nutrition indicators of India's men, women, and children. This survey demonstrates India has seen no

significant improvement in health and nutritional status among its population. The latest data shows that obesity is on the rise in the majority of states and union territories. The problem appeared more concerning in children. Obesity among children under the age of five has increased, with 33 states and union territories reporting an increase in the number of overweight youngsters. The proportion of overweight children grew from 2.1 % in NFHS-4 to 3.4 percent in NFHS-5.

Good health is vital for children because they are more vulnerable at risk to illness and health complications. When children are safe from disease, they can grow into healthy adults, and in this way, contribute to the development of dynamic and productive societies.

The relationship between nutrition, health, and learning is undeniably strong. Nutrition is one of the three major factors that impact a child's development, other factors are genes and environment. Children need adequate nutrients to stay healthy and strong which influences directly their growth & immunity.

The most important benefits of early childhood nutrition are; first, it helps in building immunity against various infectious diseases; second, ensures proper development of the brain and other vital organs; and third, improves a child's activity levels and cognitive functioning. Therefore, proper nutrition for children is important as it sets the stage for them towards living a healthy and balanced life for the rest of their lives.

Healthy eating is essential for your child's good health, growth and development. Healthy eating in childhood means they will have less chance of developing chronic diseases like obesity, type 2 diabetes, hypertension, and heart disease.

Childhood obesity is one of the most important public health challenges the world is facing today. The problem is global and is slowly acquiring epidemic proportions. In India too, the prevalence of overweight, as well as obesity among children and adolescents, has shown an increasing trend in society. It is because the majority of today's children are living in an obesogenic environment [7].

Children often crave processed fast food, sweets, and chocolate, which are loaded with sugar and unhealthy fats. Not only can these types of food cause weight and health problems, but they can also make children feel sluggish and unmotivated. Their inclination to fast foods and sugar-sweetened beverages and preference for screen games over outdoor games are leading to energy imbalance and increasing obesity which, once acquired, persists during adulthood and the rest of their life.

In junk food, the fat used for flavouring and seasoning accumulates in the children's bodies and may lead to low energy levels. Low energy levels fallouts to a lack of physical activity, resulting in childhood obesity and an increased risk of non-communicable diseases like diabetes, hypertension, and heart disease. Sweet beverages contain high amounts of sugar. The high sugar content may increase the risk of malfunction of

insulin secretion and may result in type 2 diabetes during childhood or at a later age (Vangal Krishnaswamy Sashindran and Dudeja Puja, 2019).

Therefore, childhood is the critical time to detect overweight/obesity and start preventive action towards the menace of non-communicable diseases.

According to World Obesity Federation, by 2030 prevalence of childhood obesity among the 5–9-year age group will be approximately 10.81%, and the prevalence of obesity among teenagers in the age group of 10-19 years will be 6.2%. India is expected to have over 27 million children with obesity.

Childhood obesity is a matter of serious concern because children who are overweight or obese grow up to be overweight or obese adults. Besides, it is associated with a wide range of health complications and an increased risk of premature onset of illnesses, including diabetes and heart disease. Childhood diabetes is reaching alarming proportions and is currently one of the most important public health problems.

Childhood obesity is also a strong predictor of adult obesity, which can have serious health and economic consequences.

Encouraging children to eat fruit, vegetables, and other whole foods will provide essential vitamins, minerals, fibres, and proteins, which are all crucial for overall growth and development.

To stay healthy and maintain a healthy weight, children need to be physically active and eat the right amount of nutrients to balance the energy they use.

Scope and significance of the Study

The study has been carried out on the awareness of child nutrition habits, health outcomes, and good health practices among school-going children.

The study covers a survey with a structured questionnaire for the parents of school-going children in Delhi. The survey will help in understanding the preference for junk and fast food over home-cooked food among school-going children.

As the prevalence of preference for fast food and junk food increase among children leads to an increase in the chances of obesity among children. Childhood obesity increases the risk of early type 2 diabetes, blood pressure, hypertension, etc.

The study also tries to understand parental perspective on their school-going children and also generate awareness for a balanced diet and the importance of physical activities that are very simple to perform and can easily be fitted into a daily routine.

Objectives of the study

Objectives of the study are:

1. To understand the eating habits and preferences of school-going children in Delhi.

2. To check the consumption of a balanced diet (cereals, fruits, vegetables, pulses, milk and milk products, and meat, fish, and eggs) by school-going children.

3. To assess the consumption of packaged and non-packaged food

and beverages on a daily, weekly, or monthly basis.

4. To examine the engagement of physical indoor and outdoor activity of school-going children.

Literature Review

A balanced diet, junk food, and non-communicable diseases

As per the 'Dietary Guidelines for Indians, 2011' of the National Institute of Nutrition (NIN), "The balanced diet delivers all nutrients in required amounts and proper proportions. It should consist of around 50-60 percent of the total calories from carbohydrates; about 10-15 percent from proteins; and 20-30 percent from both visible and invisible fat. In addition, it should have other non-nutrients such as dietary fibre and antioxidants that bestow positive health benefits. Micronutrients such as vitamins and minerals are necessary for physiological and biochemical processes to acquire, assimilate and utilize food to maintain health and activity. Dietary fibre helps in delaying the absorption of carbohydrates and fats and increases the satiety value. The guidelines depict the importance of foods through a 'Food Pyramid' (see Figure 1: The NIN food pyramid). A balanced diet is recommended through a blend of four basic food groups such as cereals, millets, and pulses; vegetables and fruits; oils, fats, and nuts; and milk and animal foods.

Notably, food items such as burgers, pizza, fries, chocolates, ice cream, jam, etc are not considered the right choice to meet nutrient needs and must be eaten sparingly".

Figure 1: The NIN food pyramid
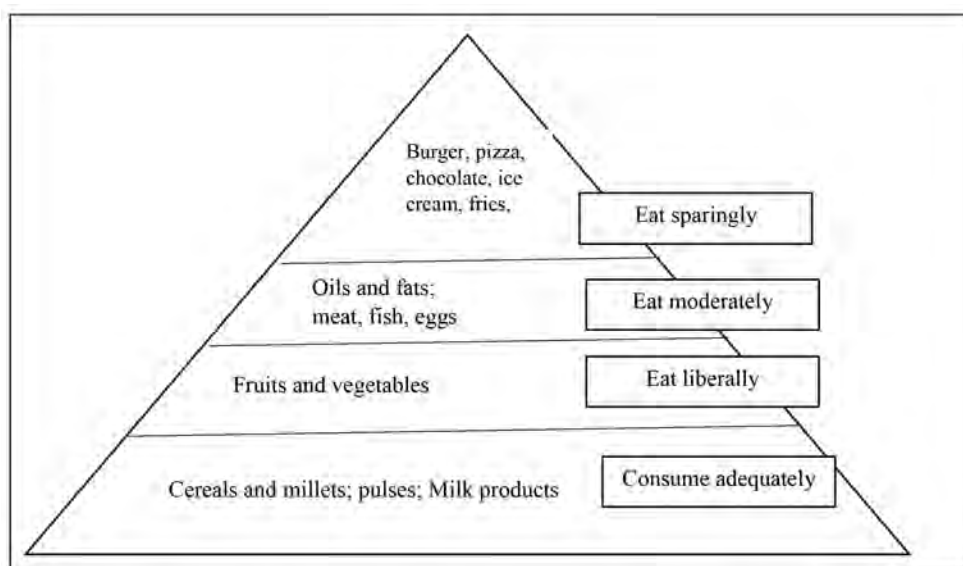
Source: Dietary Guidelines for Indians, 2011, National Institute of Nutrition (NIN)

According to National Health Planning, Government of India "children are more inclined towards junk food but it is very important to motivate your kids in teenage to eat nutrition-rich foods. Many children have poor eating habits, which can lead to various long-term health complications, such as obesity, heart disease, type 2 diabetes, and, hypertension. As a parent, there is a need to make frequent changes in children's food menu to avoid the boredom of eating the same food every day. In addition to the consumption of a nutritious well-balanced diet, appropriate lifestyle practices and involvement in outdoor activities such as games/sports should be encouraged among children. Regular physical exercises will help in increasing strength and stamina and are necessary for good health and well-being".

According to guidelines for Parents, the Indian Academy of Paediatrics, "Poor nutrition can result from a lack of food or wrong food choices. Overeating is also a part of poor nutrition and is equally harmful in long run. Healthy nutrition in early life will empower us to have a healthy and disease-free future, which will improve the overall outcome of growth and intelligence of our future population. Children should avoid junk foods, ultra-processed foods, nutritionally inappropriate foods, carbonated/caffeinated drinks, and sugar-sweetened beverages (JUNCS) because these are high in salt, saturated fat, and sugar, but low in fibre and nutrients. The risk of childhood obesity and type-2 diabetes increases when children regularly consume JUNCS".

Childhood obesity

According to a report published by Narayana Health (2019), "Childhood obesity is now an epidemic in India. India has the second-highest number of obese children (14.4 million) in the world, which is next to China. The prevalence of overweight and obesity in children is 15%. In private schools the incidence of childhood obesity has shot up to 35-40%, indicating a worrying upward trend. Obesity is defined as an abnormal and/or excessive accumulation of fat that can impair health. Body mass index (BMI), calculated by a person's weight in kilograms divided by the square of his/her height in meters (kg/m2), is the most commonly used measure of overweight and obesity in adults and children over 5 years of age".

The WHO, UNICEF, and Non-Communicable Diseases Risk Factor Collaboration (NCD-RisC) data, World Obesity Federation (WOF) published the first global atlas on childhood obesity in 2019, "provided that the latest estimates of infant, childhood, and adolescent obesity in 191 countries. It also evaluates the prevalence of obesity in children by 2030 and the probability of achieving the WHO target of "no increase in obesity prevalence by 2025". Constructed on the contemporary number of 158 million children (5-19yrs) living with obesity worldwide, this report estimates that by 2030 this number could rise to 254 million. (Table 1)".

Table 1. Indian data from the childhood obesity atlas

Latest: % Infants overweight	2.4	
	Boys	Girls
2016: % children aged 5-9 with obesity	3.7	2.6
2016: % children aged 10-19 with obesity	1.8	1.1
2010: % adolescents with insufficient physical activity	69.6	71.6
Projections for 2030		
	Percentage	Number
Predicted 2030: children aged 5-9 with obesity	10.8	12,692,004
Predicted 2030: children aged 10-19 with obesity	6.2	14,789,136
Predicted 2030: number of children aged 5-19 with obesity	27,481,141	

Source: The childhood Atlas, 2019

Table 2: Variables identified from the literature review

Authors	Study	Research Issues	Variables/ Themes for the questionnaire
Centre for Science and Environment (2017)	Burden of packaged food on schoolchildren based on the case survey 'know your diet'	Understand the eating habits and preferences of Indian schoolchildren in the age group 9–17 years.	Age of children, snacking preferences, frequency of eating packed food.
Indian Academy of Paediatrics (IAP) (2021-22)	Guidelines For Parents "Healthy Eating and Junk Food"	Generating awareness for healthy eating and avoiding junk food.	Consumption of dairy products, folic acid, and foods are given to a child as good nutrition
The paediatric and adolescent nutrition society (nutrition chapter) of the Indian academy of paediatrics (2019)	Indian Academy of Paediatrics Guidelines on the Fast and Junk Foods, Sugar-Sweetened Beverages, Fruit Juices, and Energy Drinks	Drafting a guideline for children and adolescents because of the increase in consumption of junk food and sweet beverages.	Regularity in consumption of packed food and beverages by school-going children, restrictions for packed food on children, and concerns of parents

Kaur Khushpreet, Patney Sunita, Mathur Dr. R.G. (2019)	The pattern of Junk Food Consumption and its Relationship with Body Mass Index, to Develop and Evaluate the Effectiveness of Information Booklet on 'Harmful Effects of Junk Food' among Adolescents	Generating awareness for harmful effects of junk food among adolescents.	Physical activity duration, how the school can help students.

Research Methodology

Research Design: The study followed an empirical approach that involves systematically collecting and recording statements of school-going children's parents about their eating habits. This study adopted an exploratory study and descriptive research design. It was a cross-sectional study based on a quantitative and qualitative research approach to assess the factors associated with bad nutrition leading to obesity and diabetes in children.

Questionnaire Design: The questionnaire consists of different sections of questions related to the variables under study and these variables are mapped to the objectives so that we obtain what we are trying to find out from the respondents. The research objectives and the variables/themes for the study emerged from the research gaps identified from the literature review, past research surveys, and focused group discussions with a sample of respondent parents.

The factors/ items are used in the weighted importance scale (Likert Type Scale, from very much=5 to not likely=1) marked by the parents of school-going children for each questionnaire as per their perceived importance.

Sources of Data: The researcher collected data by getting questionnaires filled up from chosen parents of school-going children in the Delhi region. This helped to do the quantitative analysis. The face-to-face interaction and interview note to ascertain the reasons for the response helped us to get deeper qualitative insight from parents' perspectives on their children's eating habits and inclination toward junk food.

The researcher has referred to various Journals, Magazines, Reports & websites related to the importance of a balanced diet for the early age of childhood, the causes of childhood obesity, and health-related complications due to childhood obesity.

Sample Design: For the population under study, a representative sample of at least 100 parents of school-going was chosen from different regions of Delhi. The study period is from July 2022 to October 2022. Around 70 filled responses were found acceptable. The parents were approached and depending

upon their availability and they were requested to respond. The study selected localities, one block/per area where schools exist on random bases parents were selected and studied as a whole. All selected study areas included all the parents of children between 3+ years to 14 years old wherever they lived.

Analysis and Discussion

A pilot study consisting of 10 parents was done. This helped to clarify the factors in the questionnaire for the main study. The descriptive method of result analysis was used. The excel spreadsheet was used to derive the tables and the bar graphs for analysis and interpretation.

The method of averages was used to understand the relative importance of the factors. The weighted average marks were then calculated based on a percentage of responses in different categories of importance multiplied by their respective weights and the total gave their relative average out of a maximum of 5 to find out important factors influencing prescription behaviour.

In this study, it has been observed mothers (Graph 1) are the main respondent for the children's eating behaviour.

It has been observed during the study, there is a fondness for salty snacks and sweets among children but parents have made sure that sure one or more fruit/s should be added to their daily snacking routine which is depicted in graph 2.

Many parents are not allowing their children to drink packed juices but it has been observed fresh juice and

Graph 1: Respondents
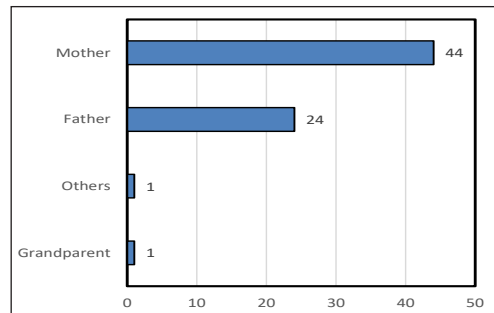
Source: Researcher's survey

Graph 2: Snacking preferences
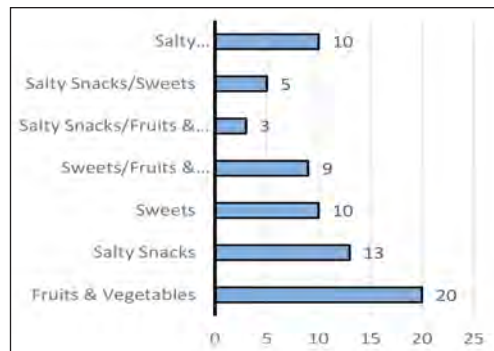
Source: Researcher's survey

Graph 3: Frequency of packed and fresh juice intake

Source: Researcher's survey

packed juices are very much penchant among children. In the market, there are various types of juices are available like regular and cold press juice. According to parents, there is adulteration in fresh juice available in the market and this is the reason they prefer packed juice if their child insists much on the juice.

Folic acid plays a very important part in children's growth and during the study, it has been observed parents are very watchful for the different sources of folic acid like citrus fruits, dal, egg, legumes, etc., but green leafy vegetable is most common folic acid source using by parents.

Graph 4: Sources for folic acid

Source: Researcher's survey

Graph 5: Duration of Physical Activity
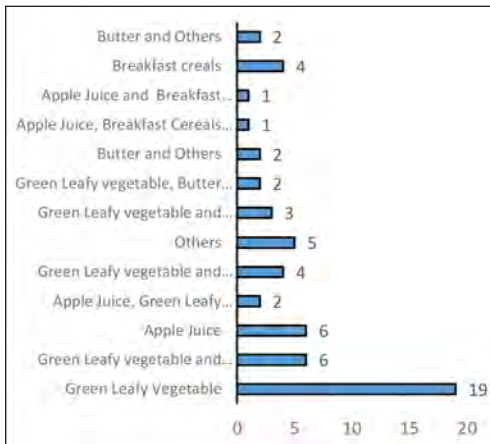
Source: Researcher's survey

It has been observed many parents have enrolled their children in sports where they have trailed their favourite sport but many parents are not in favour of joining sports because their child does not have much time to pursue sports activity as their children are either in higher secondary school or have joined coaching classes for studies.

It has been observed during the study parents are very observant of their children's eating habits. According to parents' junk food is the most easily available food these days in the market. Despite of putting restrictions by parents it is still very collective in the

Graph 6: Restrictions putting on children
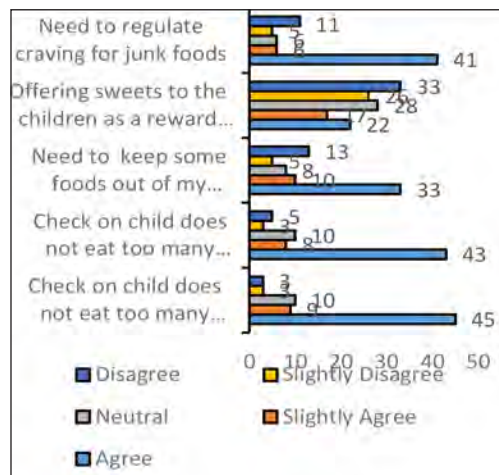
children and eating junk food is the first preference of children.

These days junk food plays a very important role in modifying the behaviour of the kids and parents are giving junk food or sweets as a reward to children for their good behaviour. In a way, they are encouraging junk food without their knowing it.

Graph 7: Monitoring eating junk food behaviour

	Never	Rarely	Sometimes	Mostly	Always
Tracking of the sweets	2	8	21	23	16
Tracking of the snack food	3	6	21	23	17
Tracking track of the high-fat foods	7	9	14	23	17
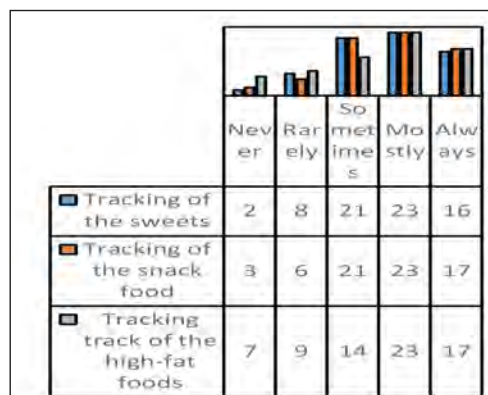
Table 3: Parents' Opinions on wellness policy in school

Rank	Need for school wellness policy	Average
1	Implementing a school wellness policy helps improve the health of the students	4.5
2	Teachers and coaches are better educated if a school wellness policy is implemented	4.4
3	Implementing a school wellness policy helps improve academic performance	4.3
4	School food service staff need to learn new cooking methods if a school wellness policy is implemented	4.3
5	School wellness policies help to increase students' attendance	4.2
6	School wellness policies reduce the amount of money made from vending machines	3.9

Source: Researcher's survey

As claimed by parents' school plays, a very important role in children in development and there should be a wellness policy in schools where they teach children the importance of a healthy diet and physical activities.

Parents ponder that, chefs in the school canteen should be trained to cook healthy meals for the children and teachers should discourage them from eating junk food instead of suggesting putting limits on junk food.

Parents think about generating awareness for physical activity/ exercise. Parents and school teachers should educate children about good food and the need for daily physical activities. Physical activity should be done at least 10 minutes daily.

Parents surf the internet for checking new ways of cooking vegetables without losing the nutritional value of a food. So that their children will love homemade food than craving market food.

In the opinions of parents, there is a need for generating awareness for having a healthy diet during childhood can help reduce the risk of developing chronic diseases, such as obesity, type 2 diabetes, and heart disease. It will also help them concentrate & learn better and proper nutrition plays a role in promoting better sleep-in kids.

Research Findings

Objectives	Outcomes
To understand the eating habits and preferences of school-going children in Delhi.	This has been noticed parents are trying to give healthy and balanced meals to their children but the prevalence of junk food in the market is deeply enrooted, and they are failed to eliminate junk food from their children's daily routines.
To check the consumption of a balanced diet (cereals, fruits, vegetables, pulses, milk and milk products, and meat, fish, and eggs) by school-going children.	Parents are very watchful towards the diet of their children. Parents have cultivated a habit in their children of eating one or two fruit/s daily. Parents also consider eating vegetables (cooked or raw) as a good part of nutrition.
To assess the consumption of packaged and non-packaged food and beverages on a daily, weekly, or monthly basis.	This has been recognised in the study, consumption of packed juice is more than fresh juice among school-going children. The reasons commonly given by parents are 1) Easily available, 2) Parents think that they are not giving packed juice to their children regular basis. So, children can have one or two packed juices in a week or month, and 3) Most of the parents feel fresh juice available in the market is found to compromise quality like adding more water to juice or fruits are rotten.
To examine the engagement of physical indoor and outdoor activity of school-going children.	Most of the parents have enrolled their kids in a sports activity. There their child can do good physical activity and learn some discipline for their future. Few parents feel whatever physical activity their kid has done in school is good enough. After school hours their children should study for college admissions. So, they don't have time to pursue any physical activity as they are engaging in after-school studies like studying in private tuition and self-studies.

Source: Researcher's survey

Limitation of the Study

1) The study was conducted in Delhi perhaps a wider sample base could have been taken so that the results could have been more generalized. The sample size could have been larger.

2) The research was restricted to parents of school-going children.

3) Not all respondents have responded. So, the study cannot give 100 percent accurate results.

4) Some of the parents were reluctant to communicate so the response could be a bit biased.

Conclusion

From the above discussion, it is found that parents are equally responsible for the unhealthy food habits of their children, though they express concerns about children's eating habits. Parents give sweets or favourite food to their children as a reward for good behaviour.

The reason for popularity of junk food is extremely to most children because of its taste, comparatively lower price, and convenience (doesn't require any cooking or preparation). Since children typically do not understand how this kind of food negatively impacts their health, it can be quite addictive.

From the extensive literature review, it has been perceived some factors make fast food very similar to packaged food. Fast food, such as pizzas, burgers, fries, wraps, etc., is typically ultra-processed or made from ultra-processed packaged ingredients and is aggressively marketed.

Children spend a significant amount of time in school. Schools can therefore act as important avenues where they can develop good eating habits. Teachers should counsel children about right and good nutrition. Nutrition counselling is one of the most effective tools for changing food habits and aware the adolescence regarding the harmful effects of Junk Foods and Beverages. Nutrition counselling can play an important part in promoting long-term healthy eating habits. Nutrition counselling aims to raise children's knowledge of the hazards associated with their eating habits, teach them how to eat a well-balanced diet that includes a range of foods, and teach them how to make wise food choices on their own.

According to WHO, "Children aged between 5 to 17 years should do at least 60 minutes of moderate to vigorous-intensity physical activity daily".

Physical activity includes play, games, sports, recreation, physical education, or planned exercise, in the context of family, school, and community activities.

Physical education is equally important to children's scholastic education. Keeping children physically active, being in the normal weight range, and lowering body fat can help children prevent some of the diseases that are prevalent on a wide scale. Maintaining good physical fitness can help children avoid heart disease and diabetes later on.

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CSR in PSUs- Reckoning Compliance and Expenditure of Transportation and Logistics Companies

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Abstract

The companies are expected to discharge their social obligations to benefit society and environment. The transportation and logistics companies work to curb the time and place barriers and for that utilizes the resources from society itself. This study deals with compliance and expenditure of transportation and logistics PSUs in context of CSR along with determining the impact of various CSR parameters on aggregate CSR expenditure. The data of four companies have been studied from 2014-15 to 2020-21 and explained through percentages and descriptive statistics and analyzed through sample t-test, one-way ANOVA and panel regression analysis. The companies across the sector differ in their compliance and expenditure significantly, however do not differ in their approach over the years and the aggregate CSR expenditure gets significantly determined by its various parameters. There is a need of specified guidelines on CSR expenditure to ensure the inclusive growth and efficient contribution towards social activities.

Keywords: Corporate Social Responsibility, Transportation and Logistics Companies

Introduction

Corporate social responsibility has been an evolving concept and changing its form with the dynamic environment. It has been becoming significant from a recent past drastically due to its need and nature of the activities involved. Companies are keen to accept this concept of social responsibility as it yields them the benefit which are not being provided by sticking to profit motive only. When public sector undertakings in India came into the purview, since then it has been continuously operating towards the upliftment of an economy and the country. Though there are many industries that function within the horizon of PSUs, transport and logistics industry holds a special importance as it utilizes the infrastructure intensively and has been loaded with lot of social and environmental aspects in terms of market accessibility, employment, congestion, quality of life, pollution, resource depletion etc.

For building a better future, the Indian government has brought in to affect new CSR guidelines through Section 135 of Companies Act, 2013 along with Schedule VII which underlines some broad areas where CSR funds of the companies can be deployed to discharge their social obligations towards various sections of the society. However, the continuous amendments have been made in the section concerning CSR.

This study focuses on the level of compliance and expenditure of the transportation and logistics sector along with determining the impact of CSR parameters on its aggregate expenditure in context of CSR in accordance with Section 135 of the Companies Act, 2013 and Schedule VII lies within it.

Review of Literature

The business must be profitable, abide by the law, be ethical and be the one who take initiatives to live up to the expectations of the society. The management should incorporate morality instead of immoral acts to ensure the social responsibility in the business (Caroll, 1991). In order to ascertain integration of equitable social development into good business practices, a business must contribute towards CSR beyond philanthropy (Arora and Puranik, 2004). There are diversified forms of media for social and environmental disclosure, but annual reports and standalone reports of environmental and social disclosure are widely used and accepted due to its credibility. It has been evolved during course of time and integrated into single sustainability reporting that comprises of social, environmental, health, safety and community issues. The need to increase confidence in data reliability, boosting reporting transparency, interest of investors in social disclosures and government pressures has been contemplated as the major driving forces for developing reporting standards (Jenkins and Yakovleva, 2006). Though, not all activities of CSR are functional. It can only be considered functional if moral commitments are used as a factor of production and conversation with public in this regards helps in creating awareness that will result in creating mutual benefit with stakeholders (Will and Heilscher, 2014). While, stakeholders do not pay equal attention to all dimensions and

consider it as economic responsibility primarily followed by legal, ethical and philanthropy at last (Fadun, 2014). However, it is believed that corporate social responsibility assists in boosting an image of an organization. The industries adopting CSR get immense support of the public as they seem such industries as their source of upliftment (Jaysawal and Saha, 2015; Kadlubek, 2015). All the companies making any kind of disclosure is a result of legitimacy and a drive to contribute more towards CSR lies in the essence of gaining competitive advantage (Hossain, Hecimovic and Lema, 2015). CSR in India is a progressing thought and keeps evolving over the time but gets affected by the number of challenges like transparency issues, non-participation of community and not being on a same page in context of CSR implementation (Jha and Singh, 2016). The mandatory provisions of CSR marked a great change in the companies that the expenditure on it has been increased twice than incurred earlier (Verma and Kumar, 2014; Rami, Shah and Bhatt, 2019). In spite of implementation of mandatory provision of CSR, many companies fail to contribute till the minimum limit of 2% (Sai, 2017; Kumar and Dhanda, 2017). Even the clear reason for such a failure in contribution has not been revealed by any company (Kumar and Dhanda, 2017). The transparent disclosure in reports indicate the good CSR performance while the poor CSR performance associates with the ambiguous disclosure in reports (Nazari, Hrazdil and Mahmoudian, 2017). The CSR disclosures in developed countries have been influenced by public

pressure while in developing countries government regulations poses such pressure to disclose about CSR (Ali et al., 2017). The criticisms over burdening of regulations without additional benefit and limited disclosures on CSR thrust areas has been witnessed but these new regulations have led to more transparent reporting and formulation of structured policies for CSR, eventually which opined to result in cordial relations between corporate and society (Ray, 2017). The accountability perspective on CSR emphasize on enticing the corporate attention towards the environmental obligations towards their natives. Also, it promotes enforceability mechanism by developing a suitable criterion for performance evaluation and a consent document in a legalized form to impose compliance (Jeremiah, 2018). The companies contributing less towards CSR in voluntary period have increased their expenditure to reach up to the level of 2% while the companies contributing more earlier reflected a declined expenditure towards CSR to stay at the level of 2%. Moreover, the inclination of expenditure has been seen towards healthcare and education (Kavitha, 2018). The amount of CSR practices differs from one sector to another, for say manufacturing concerns contribute more towards CSR as compared to service concerns (Krishnan, 2018; Kumar and Kidwai, 2018). Also, there has not been any consistency exists between sectors, projects and geographical location (Poddar, Narula and Zutshi, 2019). It is important to address environmental sustainability at a greater extent but the companies are not going beyond healthcare, education

and community development (Banerjee and Pulikkamath, 2019). In spite of contribution towards various CSR activities, detailed information has not been present adequately in reports (Kikwiye, 2019). The government is required to implement strong evaluation system for the companies so that the minimum contribution towards CSR can be ensured (Mishra and Banerjee, 2019). Since corporate social responsibility plays such a major role in ensuring the sustainability of businesses and enhancing the performance of institutions, it is vital to increase spending on it in order to ensure its effectiveness (Bani-Khaled et al., 2021). Companies are required to spend money on CSR activities as part of their ongoing operations which are seen as an additional burden by them. CSR activities, therefore, should be designed to complement the existing skills and expertise of the companies, rather than replacing them. Another way for the government to promote CSR activities is by allowing businesses to deduct their CSR expenditures in their taxes. Additionally, it is possible for Schedule VII to be expanded beyond the current exhaustive list of activities to include a broader range of activities than what is currently listed (Sharma and Aggarwal, 2022). The companies complying with CSR legislations mandatorily makes it more prone to discernibility and inspection that lead to reduced tax antagonism of firms (Raithatha and Shaw, 2022). There are a number of factors that have an impact on the conduct of the industry in which developing and implementing policy is one of the crucial factors. Thus, it is of utmost importance for policy makers to increase awareness about corporate social responsibility (CSR) among firms and its potential strategic benefits in order to enhance the economic growth and also to support social development at the same time. For the firm to adopt, the document provides a framework that explains in various ways how they can spend money on CSR activities as well as communicate these activities to their financial groups so that they can increase the impact of these activities on their performance (Shukla and Geetika, 2022).

On the basis of the review of literature carried out, certain gaps have been identified. Though a lot has been talked about CSR contribution in more or less terms, no study has taken an in-depth approach towards the CSR expenditure for the considered period of time. This study is based on the foundation of Schedule VII of Companies Act, 2013 taking all the 13 parameters into consideration incorporating all the latest amendments and measuring the impact of diverse of CSR parameters on the aggregate CSR expenditure is sort of an effort not made yet. The transport and logistics sector in Public Sector Undertakings has been an underdog which at a great extent affects the society and environment but has been given very less attention. Thus, this study deals with such a sector which is significant but less acclaimed.

Research Methodology

The study focuses on measuring and analysing the CSR compliance and expenditure along with determining the impact of diverse parameters of CSR on the aggregate CSR expenditure in line with Section 135 of the Companies Act,

2013 in the transportation and logistics PSUs. For the said purpose, the sample of four companies viz., CONCOR Ltd., CWC Ltd., DFCCI Ltd. and SCI Ltd. has been considered for which the data have been collected from their annual reports from 2014-15 to 2020-21 giving it a form of panel data.

For the said purpose, data have been collected in two sets as shown in Table 1– first set consists of disclosure checklist as per Section 135 of Companies Act 2013 in the form of "Yes" or "No".

There were 12 items in the checklist and their disclosures made by the companies during a period of seven years from 2014-15 to 2020-21. Second set consists of actual CSR expenditure under the items mentioned in right-hand side part of Table 1. For the first set of data, disclosure checklist has been converted into percentage of disclosures made out of total items applicable. The percentage calculation for Section 135 compliance has not considered the count of "NA" i.e. Not Applicable clauses.

Table 1: CSR Disclosure Parameters

Parameters for Disclosure for complying with Section 135 of Companies Act, 2013	Parameters for CSR Expenditure
Composition of CSR Committee	Eradicating Hunger, Poverty and malnutrition, promoting health care & sanitation
Contents of CSR Policy in the Report	Promoting Education & enhancing vocational skills
CSR Policy on Website of Company	Promoting gender equality, empowering women, child and senior citizens welfare & reducing inequalities
Minimum Spend of 2% of Average Profits of three preceding financial years	Ensuring Environmental sustainability
Annual Report on CSR having Details of CSR Expenditure	Protection of national heritage, art & culture
Activities in CSR Policy is in alignment with Schedule VII of Companies Act, 2013	Measures for the armed forces veterans, war widows & dependents
Reasons for Unspent Amount of Prescribed CSR	Training to promote sports at national & international level
Transfer of Unspent Amount to Specified Funds (if any)	Contribution to various Govt. funds for welfare of society & backward classes
Transfer of Unspent Amount related to ongoing project to "Unspent Corporate Social Responsibility Account" opened by the firm in any scheduled bank (if any)	Contribution towards technological incubators

Utilization of Amount of "Unspent Corporate Social Responsibility Account" within three financial years from date of transfer (if any)	Rural and Urban development
Transfer of Amount to specified fund if failed to spend within stipulated period of three financial years (if any)	Slum Area Development
Details of Impact Assessment of CSR Projects (if applicable)	Disaster Management and Relief Activities
	Others

Source: Section 135 and Schedule VII of the Companies Act, 2013

The following hypotheses have been developed for testing the CSR compliance level and to make the intra and inter-firm comparison in terms of CSR expenditure of the companies which have been tested using one sample t-test and one-way ANOVA respectively.

$H_{01:}$ *The companies do not comply with the mandatory guidelines of the Section 135 of the Companies Act, 2013.*

$H_{02:}$ *There is no significant difference between CSR expenditure pattern of each Transportation and Logistics sector PSUs over the years.*

$H_{03:}$ *There is no significant difference between CSR expenditure pattern of Transportation and Logistics sector PSUs.*

Panel Regression Model

For determining the impact of diverse variables of CSR on the aggregate CSR expenditure of the company, panel regression model has been developed to test the following hypothesis.

$H_{04:}$ *There is no significant impact of CSR variables on the aggregate CSR expenditure of Transportation and Logistics sector PSUs.*

The following regression equation has been branched out for testing the corresponding hypothesis-

$$ACSR = \alpha + \beta_1*EHPM\&HCN + \beta_2*E\&VS + \beta_3*GEWE + \beta_4*ES + \beta_5*NH + \beta_6*AFVWD + \beta_7*INS + \beta_8*GF + \beta_9*TI + \beta_{10}*RUD + \beta_{11}*SAD + \beta_{12}*DMRA + \beta_{13}*Others + e_i$$

where, α-constant, β-coefficients, CSR-Aggregate Corporate Social Responsibility Expenditure EHPM&HCN- Eradicating Hunger, Poverty and Malnutrition & Promotion of Healthcare and Sanitation; E&VS- Promoting Education and Vocational Skills; GEWE- Promoting Gender Equality and Empowering Women, child and senior citizens, welfare & reducing inequalities; ES- Promoting Environmental Sustainability; NH- Protection of National Heritage, Art and Culture; AFVWD- Measures for armed forces veterans, war widows and dependents; INS- Promotion of international and national sports; GF- Contribution to various Govt. funds for welfare of society

& backward classes; TI- Contribution to technological incubators; RUD- Rural and Urban Development; SAD- Slum Area Development; DMRA- Disaster Management and Relief Activities, e_i- error term

Results and Discussion

Table 2: CSR Disclosure Compliance (%)

Year	CONCOR Ltd.	CWC Ltd.	DFCCI Ltd.	SCI Ltd.
2014-15	85.71	85.71	85.71	14.29
2015-16	100.00	100.00	100.00	28.57
2016-17	100.00	85.71	100.00	71.43
2017-18	85.71	100.00	100.00	85.71
2018-19	85.71	100.00	85.71	85.71
2019-20	85.71	85.71	85.71	100.00
2020-21	88.89	88.89	80.00	88.89

Source: Author's Calculation on the basis of Annual Reports of the Companies

It has been found from the results that there has been a volatility in the compliance level of the companies over the years from 2014-15 to 2020-21. CONCOR Ltd. has shown 100% compliance of Section 135 in 2015-16 and 2016-17. In other years, except 2020-21, it has disclosed 85.71% items. In 2020-21 it reached to 88.89%. CWC Ltd. has shown 100% compliance in 2015-16, 2017-18 and 2018-19. In other years, except 2020-21, it has disclosed 85.71% items. In 2020-21 it reached to 88.89%. DFCCI Ltd. has shown 100% compliance in 2015-16, 2016-17 and 2017-18. In remaining years, except 2020-21, it has shown 85.71% compliance. In 2020-21 it reduced to 80% compliance. SCI Ltd. has shown least compliance as compared to other companies. In 2014-15 it showed 14.29% compliance followed by 28.57% in 2015-16. It significantly increased to 71.43% in 2016-17 and 85.71% in both 2017-18 and 2018-19. In 2019-20 compliance increased to 100% which reduced to 88.89% in 2020-21.

Table 3: Descriptive Statistics and Results of t Test for Compliance

Company	N	Mean	Std. Dev.	t	df	p Value
CONCOR Ltd.	7	90.249	6.761	-3.816	6	.009
CWC Ltd.	7	92.290	7.298	-2.795	6	.031
DFCCI Ltd.	7	91.020	8.639	-2.750	6	.033
SCI Ltd.	7	67.800	33.013	-2.581	6	.042

Source: Author's Calculation on the basis of data gathered from Annual Reports of the Companies

Table 3 shows that mean values of all companies except SCI Ltd. for all seven years stood between 90-92.5%. This shows that majority of companies are showing high level of disclosures. SCI Ltd. has the lowest level of disclosure as it is disclosing only 67.8% on an average of all disclosures mentioned in Section 135. Disclosures of all companies, except SCI Ltd., are consistent as is evident from low values of standard deviation. All the calculated values of t came to be negative as all the disclosures were less than 100. All the p values were less than 0.05, confirming the rejection of null hypothesis and it can be concluded that there is significant difference between the mandatory disclosures prescribed by Section 135 and actual disclosures made by sampled companies.

Table 4 presents the disclosure of CSR expenditure under various parameters mentioned in Table 1.

Table 4: Disclosure of CSR Expenditure

Company	Disclosures	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
CONCOR Ltd.	Total Parameters	13	13	13	13	13	13	13
	No. of Parameters Covered	8	4	5	6	8	8	9
	%	61.54	30.77	38.46	46.15	61.54	61.54	69.23
CWC Ltd.	Total Parameters	13	13	13	13	13	13	13
	No. of Parameters Covered	4	3	3	5	4	4	1
	%	30.77	23.08	23.08	38.46	30.77	30.77	7.69
DFCCI Ltd.	Total Parameters	13	13	13	13	13	13	13
	No. of Parameters Covered	2	1	2	2	2	2	0
	%	15.38	7.69	15.38	15.38	15.38	15.38	0.00
SCI Ltd.	Total Parameters	13	13	13	13	13	13	13
	No. of Parameters Covered	0	0	4	5	4	2	2
	%	0.00	0.00	30.77	38.46	30.77	15.38	15.38

Source: Compiled on the basis of data gathered from Annual Reports of the Companies

Table 4 discloses only CONCOR Ltd. has shown improvement in expenditure over the years. Expenditure of all other companies has declined in 2020-21 as compared to other years. DFCCI Ltd. expended on none of the parameters in 2020-21. In other years also, its expenditures are quite low as it has

covered 1 or 2 out of 13 parameters. CWC Ltd. reflected moderate level of expenditure till 2020-21 when it remained to only 1 parameter. It was also found that for the parameters "Slum Area Development", "Disaster Management and Relief Activities" and "Others" neither of the companies has disclosed anything in any of the years.

Table 5: Descriptive Statistics

	Mean	Std. Deviation	Minimum	Maximum
EHPM	2.28	3.41	0.00	11.63
E&VS	1.40	1.53	0.00	5.32
GEWE	0.02	0.06	0.00	0.20
ES	1.49	3.29	0.00	14.19
NH	0.03	0.11	0.00	0.56
AFVWD	0.11	0.31	0.00	1.00
INS	0.16	0.32	0.00	1.00
GF	1.11	4.78	0.00	25.00
TI	0.01	0.04	0.00	0.20
RUD	1.12	1.98	0.00	6.28
SAD	0.00	0.00	0.00	0.00
DMRA	0.00	0.01	0.00	0.04
Others	0.00	0.01	0.00	0.03

Source: Author's Calculation on the basis of data gathered from Annual Reports of the Companies

The initial summary of statistics is assessed through the central tendency using mean, minimum, maximum and standard deviation. As per table 5, the average of EHPM&HCN is 2.28 with highest standard deviation is recorded at 3.41 followed by ES, and E&VS with 1.49 and 1.40 which depict the companies are spending towards eradicating hunger, poverty and malnutrition followed by environmental sustainability and promoting education and vocational skills more in comparison with other variables of CSR expenditure.

Expenditure made by different companies for CSR activities were tested for significance of difference. (inter-firm comparison). Results of one-way ANOVA have been presented in Table 6.

Table 6: Results of ANOVA for Inter-Firm Comparison

Groups	Count	Sum	Average	Variance
CONCOR Ltd.	7	369.2308	52.74725	205.6917
CWC Ltd.	7	184.6154	26.37363	95.80163
DFCCI Ltd.	7	84.61538	12.08791	36.63004
SCI Ltd.	7	130.7692	18.68132	233.8687

ANOVA					
Source of Variation	SS	df	MS	F	P-value
Between Groups	6677.937	3	2225.979	15.5665	0.00
Within Groups	3431.953	24	142.998		

Source: Author's Calculation on the basis of data gathered from Annual Reports of the Companies

It is found from Table 6 that highest disclosure of CSR expenditure is made by CONCOR Ltd. as is evident form high mean value whereas DFCCI and SCI Ltd. are having lower disclosures of CSR expenditure. The calculated value of F is 15.56 with a p value of 0.00. Thus null hypothesis is rejected at 5% level of significance and it can be concluded that there is significant difference among the CSR expenditure disclosures made by different sampled companies.

CSR Expenditure: Intra-Firm Comparison

Expenditure made by companies for CSR activities were tested for significance of difference among different years (intra-firm comparison). Results of one-way ANOVA have been presented in Table 7.

Table 7: Results of ANOVA for Intra-Firm Comparison

Years	Count	Sum	Average	Variance
2014-15	4	107.6923	26.92308	690.3353
2015-16	4	61.53846	15.38462	197.2387
2016-17	4	107.6923	26.92308	98.61933
2017-18	4	138.4615	34.61538	177.5148
2018-19	4	138.4615	34.61538	374.7535
2019-20	4	123.0769	30.76923	473.3728
2020-21	4	92.30769	23.07692	986.1933

ANOVA					
Source of Variation	SS	df	MS	F	P-value
Between Groups	1115.807	6	185.9679	0.434211	0.84772
Within Groups	8994.083	21	428.2897		
Total	10109.89	27			

Source: Author's Calculation on the basis of data gathered from Annual Reports of the Companies

It is found from Table 7 that highest disclosure of CSR expenditure is made in the years 2017-18 and 2018-19 as is evident form high mean value whereas 2015-16 is showing lower disclosures of CSR expenditure. The calculated value of F is 0.434 with a p value of 0.85. Thus null hypothesis is accepted at 5% level of significance and it can be concluded that there is no significant difference among the CSR expenditure disclosures made by sampled companies in different years.

Econometric Analysis

In order to assess panel data of CSR parameters covering four companies with a span of 7 years, panel regression has been imposed to ensure the behaviour of unit's pragmatic transversely time. The person correlation has been used to check if the independent variables are not highly correlated to each or there is no multi-collinearity present.

Table 8: Pearson Correlation

	1	2	3	4	5	6	7	8	9	10	11	12
EHPM	1.00											
E&VS	-0.15	1.00										
GEWE	0.24	0.07	1.00									
ES	0.02	-0.13	-0.15	1.00								
NH	0.13	-0.15	-0.05	0.33	1.00							
AFVWD	0.09	-0.06	-0.09	-0.12	0.27	1.00						
INS	-0.02	-0.23	-0.08	-0.16	-0.05	0.02	1.00					
GF	-0.05	-0.20	-0.08	-0.01	0.11	0.36	-0.03	1.00				
TI	0.08	-0.13	-0.02	0.36	.936	-0.06	-0.05	0.03	1.00			
RUD	-0.37	-0.23	-0.13	-0.09	-0.08	-0.05	-0.06	-0.04	-0.08	1.00		
DMRA	0.18	0.03	.58	-0.12	-0.06	-0.06	-0.05	-0.05	-0.04	-0.09	1.00	
Others	0.32	0.05	.52	-0.20	-0.10	-0.10	-0.02	-0.09	-0.06	-0.15	0.28	1.00

Source: Author's Calculation on the basis of data gathered from Annual Reports of the Companies

Table 8 depicts the Pearson correlation coefficients for independent variables excluding slum area development as none of the sampled company has made any expenses to this indicator of CSR. All the variables found to be moderate correlated to each other. Additionally, in correlation matrix, some indicators also depicted the negative correlation or close to no correlation.

Table 9: Diagnostics Statistics

Tests	Statistics	Prob Value
Hausman Test	28.72	0.00
Breusch-Pagan test	19.69	0.07

Source: Author's Calculation on the basis of data gathered from Annual Reports of the Companies

For checking the robustness of the model, Hausman test has been used to confirm if fixed effect is best fit or random effect. The null hypothesis for Hausman test states that the random effect is consistent, however, the prob. value of Hausman test is 0.004 in table 9 which indicates the significant results. Hence, the null hypothesis of Hausman is rejected, therefore, which depicts that fixed effect is best fit for the current study. Also, Breusch Pagan Test has been used to check the heteroscedasticity in the data. The null hypothesis for Breusch Pagan Test states that the variance is consistent, and the prob. value of Breusch Pagan Test is 0.073 in table 9 which indicates the insignificant results. Hence, the null hypothesis is accepted and there is a presence of heteroscedasticity.

Table 10: Fixed Effect Regression Results

Indicators	Coefficients (β)	Std. Error	Sig. Value
EHPM	1.00	0.00	0.00
E&VS	1.00	0.00	0.00
GEWE	0.99	0.00	0.00
ES	0.99	0.00	0.00
NH	0.99	0.00	0.00
AFVWD	1.00	0.00	0.00
INS	1.00	0.00	0.00
GF	1.00	0.00	0.00
TI	0.99	0.00	0.00
RUD	0.99	0.00	0.00
DMRA	1.00	0.00	0.00
Others	1.00	0.00	0.00
R-Squared:	1.00		
F Statistics	8.42		
Sig. (F-Statistics)	0.00		

Source: Author's Calculation on the basis of data gathered from Annual Reports of the Companies

The fixed effect model in table 10 indicates the significant relationship among all the 13 CSR indicators for the study. The sig. value for each variable is below 5%, hence the null hypothesis formulate for the study is rejected. R^2 which explains the magnitude of each explanatory variables contribution in the model also shows 100% accuracy along with the F statistics prob. value which is 0.00 indicates model fitness which is justified on the ground of model being based upon Schedule VII of the Companies Act, 2013 which deems to envelope all the possible parameters under its purview. However, the parameter Slum Area Development data summed to 0 in each year of every company, therefore it didn't count in the regression output.

Conclusion

The significance of the corporate social responsibility has been grown with the changing scenario and took a front seat in recent times. When Section 135 of Companies Act, 2013 came into the picture, it has transformed the era of discharging social responsibilities and its disclosures. Though the companies adhered to the mandatory compliances of the act, in initial years, the company found it difficult to comply with it efficiently. That has been evidently shown in the performance of the sampled companies. In this line, the above tested hypothesis validated that there is a significant difference in actual compliance of the companies as compared to the required guidelines. But, eventually the companies have covered it up and paced up their expenditure

and performance. In context of which, there has been no significant difference in the CSR expenditure pattern of the companies over the years. However, they differ in their expenditure pattern when compared to each other. Also, the various CSR parameters on which contribution has been made significantly determines the extent of aggregate CSR expenditure. In all this, the ambiguity in the reasons stated for an unspent amount has been observed. Moreover, likewise the government has specified the parameters in the Schedule VII, in the same way should demonstrate the guidelines on the coverage of expenditure towards each area specified in the schedule so that inclusive expenditure pattern can be assured and every section of the society can be benefitted out of the social actions of the companies. Also, in the run of complying with minimum limit of 2%, the companies do not use their CSR funds judiciously and devote maximum of the fraction of expenditure towards one or two areas. They are required to incur expenditure in such a manner so that maximum areas specified in schedule can be addressed in order to ensure inclusive growth. Correspondingly, the consistency in the CSR performance need to be maintained in order to ensure the efficient and effective discharge of social obligations of the companies. It is substantial to deal with CSR in such a manner that its expenditure and disclosure can be assured to be discharged efficiently, benefitting every section of the society and the environment these companies are dealing with. The transparent disclosure would assist in boosting the

confidence of the public in the social actions of the companies while the efficient expenditure will result in an inclusive growth of the society. Thus, it is important to make use of the guidelines of the section 135 of the Companies Act, 2013 effectively to contribute socially in the best interest of the society and the country as a whole. The further study can be carried out for upcoming years by taking private sector and more industries into consideration. Also, the detailed comparative study can be conducted by considering pre and post implementation era.

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Analysis of Retail- Investor's Behavioural Intention to Use Mobile Trading Apps: Using UTAUT 2

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Abstract:

Purpose: In the era of fast internet mobile apps of different kinds are becoming important in daily life as they save time and money. In recent past mobile trading apps have gain importance and usefulness among the retail-investors as they can access their current stock from anywhere at any time giving them hands on advantages over who are not used to these apps. In past there are studies using UTAUT 2 to find out the factors contributing to the development of behavioural intention of an individual adopting different technology, banking apps, education apps, and other apps but we do not find the studies in which behavioural intention of retail-investors using mobile trading apps in context to India. In this research study an attempt is being made to find out the factors which contributes towards the development of behavioural Intention among retail – investors using mobile trading app using UTAUT 2. Apart from this relationship of perceived risk with behavioural intention of retail-investors to use mobile trading apps is also examined.

Keywords: Mobile Trading apps, UTAUT 2, Retail-Investors, Behavioural Intention

Introduction: In the digital era when everything is provided online to customers from food to bank accounts. Trading platforms has also evolved with the time from using dial-up connection in 1980's ,Internet based in 1990's (Ankit Kalda, Benjamin Loos, Alessandro Previtero, 2021) to app based trading in 2020's. App based trading is gaining pace with the time with improved network connectivity and due to the penetration of smart phones among masses. In present there are online trading apps like Zerodha Kite, Upstox Pro, Angle One, 5 paisa, Motilal Oswal, and etc providing trading facilities to their customers on their fingertip touch.

Ongoing through the past literature related to online trading intention of individual across the world we find studies using mainly TAM and TPB. For example, study conducted in Vietnam uses TAM to establish the relationship between customer loyalty and customer satisfaction in online trading (Nguyen et al., 2020). Likewise, study conducted using TAM and TPB together in Vietnam to predict the customer intention to use online trading (Lee, 2009). Similarly there are studies conducted using TAM and TPB to predict the customer intention to use online trading in different parts of world (Abroud et al., 2013; Liu et al., 2012; Sharif & Naghavi, 2021).

So, it becomes important to understand what are the factors which motivates an individual to opt for technology in place of doing trading in traditional ways. In past studies are conducted using TRA, TAM0, TAM1, TAM2, TAM3, UTAUT, and UTAUT2 when attempts are made to study the factors that motivates an individual to opt for technology or not. A comparative study was conducted that states that UTAUT 2 is the better technique to establish the relationship between the variable which motivates an individual to opt for a technology or not (Rondan-Cataluña et al., 2015). In past studies are conducted using UTAUT 2 in different fields. UTAUT 2 is extensively used to study the adoption of mobile banking in different part of globe. For Example, study conducted in Europe (Portugal) using UTAUT 2 and characteristics of diffusion of innovation (DOI) states that "compatibility, perceived technology security, performance expectations, innovativeness, and social influence" could have a major positive effect on mobile payment acceptance and the desire to suggest this technology (Oliveira et al., 2016). Likewise, study was conducted in Saudi Arabia using UTAUT2 and the D&M IS Success Model and states that "performance expectancy, price value, facilitating conditions, hedonic motivation, habit, system quality and service quality" posits a relationship with used behaviour of an individual in case mobile banking usage (Baabdullah et al., 2019).Similarly there are studies making use of UTAUT 2 demonstrating the factors responsible for adopting mobile banking (Gharaibeh & Mohd Arshad, 2018; Merhi et al., 2019; Singh et al., 2020).

UTAUT 2 is not only used in establishing the relationship between the variable in case of mobile banking but it is used

in different industries including use of social media in advertisement to attract and motivate individuals to purchase goods (Alalwan, 2018). UTAUT 2 is used in education industry to understand the relationship between the variables that motivates an individual to learn online (El-Masri & Tarhini, 2017; Mittal et al., 2021; Moghavvemi et al., 2017). Apart from this UTAUT 2 affectively used to study the consumer intention towards product and to predict the purchase behaviour (Kazancoglu & Aydin, 2018; S. Sharma et al., 2020; Tandon et al., 2017).

In this study we have tried to formulate a model demonstrating the factors that motivates a customer to use online trading apps using UTAUT 2. In this study relationship of customer security with behavioural intention of customer is also tested while using trading apps on mobile phone.

This study is broadly divided into Six segments namely1. Introduction, 2. Literature Review & Hypothesis, 3. Research Methodology, 4. Finding and Analysis, 5. Conclusion, 6 References & Appendix.

Literature Review:

Performance Expectancy (P.E.):- In present when India has second largest mobile phone user in world after China (K. Sharma, 2022) and when mobile apps are there for everything from food delivery (Zomato, Swiggy and etc) to House cleaning (Urban Clap) making the life of customer easy and comfortable. There are apps providing online trading services to masses. It becomes important to understand what customer expect from these online trading apps. "Performance Expectancy is defined as a degree to which individual thinks the set technology or a system will help them to attain the objective" (Viswanath Venkatesh, Michael G. Morris, 2003). P.E. refers to how much investors feel mobile stock trading will increase their transaction performance (Tai & Ku, 2013). Mobile trading apps may provide the desired services to the customers. P.E posits a significant relationship with B.I. to adopt and use M- Commerce (Chong, 2013) based on (Viswanath Venkatesh, Michael G. Morris, 2003). Similarly P.E tends to have a positive relationship with the B.I to use mobile apps (Hew et al., 2015). In present there are large number of mobile apps in market for instance there are apps like Zomato, SBI Yono, Ola, Uber making the life of customer easy and simple. Thus, if customer finds the usefulness of mobile apps, then he/she would like to use different type of mobile apps present in the market. Thus, following hypothesis can be formulated:

H1: P.E posits positive significant relationship with B.I to use mobile trading apps.

Effort Expectancy (E.E): It is defined extent to which system is easy to be used (Viswanath Venkatesh, Michael G. Morris, 2003). E.E is based on "perceived ease of use (TAM/TAM2), complexity (MPCU)(Thompson et al., 1991), and ease of use (IDT) (Gary C. Moore and Izak Benbasat, 2016)". In past researches are conducted across the globe stating the relationship between E.E and B.I to use mobile apps and

result found there depicts the positive significant relationship between E.E and B.I to use mobile apps. For Example (Hew et al., 2015; Peng et al., 2018; Tam et al., 2018). Likewise, ease to use, Complexity and perceived use can motivate the individual Intention to use mobile trading apps. Thus, following hypothesis can be formulated and tested in the study:

H2: E.E posits a positive significant relationship with the B.I to use mobile trading apps.

Social Influence (S.I.): The degree to which clients' belief that other people (such as relatives and friends) think they should utilise a certain technology (Viswanath Venkatesh, 2012). It is represented as "subjective norms in TRA, TAM2, TPB/DTPB and C-TAM-TPB, social factors in MPCU, and image in IDT" (Viswanath Venkatesh, Michael G. Morris, 2003). S.I is the direct determinant of B.I. Researches conducted in past on mobile apps usage states that S.I posits significant relationship with B.I (Sanchez et al., 2019; Wiratmadja et al., 2012; Zhou & Li, 2014). Similarly in our study also S.I can motivate the individual behavioural Intention (B.I) for using a mobile trading app. Thus, following hypothesis can be formulated:

H3: S.I. posits a positive significant positive relationship with the B.I to use mobile trading apps.

Facilitating Conditions: "Refers to consumers' perceptions of the resources and support available to perform a behaviour" (Viswanath Venkatesh,

2012). "Perceived behavioural control (TPBI DTPB, C-TAM-TPB), enabling conditions (MPCU), and compatibility (IDT)" are all ideas included by this approach (Viswanath Venkatesh, Michael G. Morris, 2003). Studies conducted across the world on mobile apps using UTAUT 2 states the direct relationship between F.C and B.I. For Example Study conduct on Malaysian University student states the positive significant relationship between F.C and B.I (Fadzil, 2018). Similarly, research study conducted on students of Midwestern University in the US on mobile apps (social networking, game, and productivity apps) depicts the positive significant relationship between F.C. and B.I of students intention to adopt mobile apps (Peng et al., 2018). Likewise study conducted on university student stating the significant relationship between F.C and B.I (Hew et al., 2015). Apart from this studies conducted on mobile banking and e-wallets states the significant relationship between F.C and B.I across the world (Baabdullah et al., 2019; Gharaibeh & Mohd Arshad, 2018; Moorthy et al., 2020). But when we research for studies establishing the relationship between F.C and B.I for trading apps there is no study present using UTAUT2. Hence following hypothesis can be formulated:

H4: F.C. posits a positive significant relationship with B.I of individual to use mobile trading apps.

Habits: The degree to which individuals have a tendency to conduct activities reflexively as a result of the knowledge that they have acquired through their

experience in making use of certain technologies (Viswanath Venkatesh, 2012). Habit is found to effect B.I in different studies conducted related to mobile app adaption across the globe (Hew et al., 2015; Kala Kamdjoug et al., 2021; Tam et al., 2018; Thusi & Maduku, 2020). Based on past literature related to adoption and usage of mobile apps, it is expected that individual will have Habitual behaviour towards using the mobile trading app. Hence following hypothesis can be formulated and tested:

H5: H.B posits a positive significant relationship with B.I of an individual to use mobile trading apps.

Hedonic Motivation: It is defined as "Fun or pleasure derived from using technology" (Brown & Venkatesh, 2005) and depicted as perceived enjoyment. H.M. tends to influence individual behavioural Intention (B.I.) according to Venkatesh (2005). There are studies depicting the relationship between Hedonic Motivation and Behavioural intention of using mobile apps and mobile banking apps for example (Alalwan et al., 2017; Baabdullah et al., 2019; Fadzil, 2018; Gharaibeh & Mohd Arshad, 2018). So, working on these relationships between H.M and B.I in for mobile apps and mobile banking apps usage and adoption following hypothesis can be formulated:

H6: H.M. posits a positive significant relationship with B.I of an individual to use mobile trading apps.

Price Value (P.V.): "Price value" is a term that refers to the cognitive trade-off that customers make between the

perceived advantages of employing an invention and its costs. It is possible that the price of the technology and how it is priced will have a substantial influence on how often it is used. For mobile trading apps, pricing value is the trade-off between download, installation, and usage costs and perceived value. Same as for mobile banking apps described (Thusi & Maduku, 2020). Past studies conducted on mobile app and mobile banking ,adoption states that there exist a significant relationship between Price Value (P.V.) and B.I to use mobile trading apps (Al-Okaily et al., 2020; Owusu Kwateng et al., 2019). Based on the past literature on mobile apps adoption among the customers following Hypothesis can be formulated:

H7: P.V. posits a positive significant relationship with B.I of an individual to use mobile trading apps.

Perceived Risk: It is often defined as a feeling of uncertainty about the potential negative repercussions of adopting a product or service (Featherman & Pavlou, 2003). P.R is defined by different eminent authors from time to time "the expectation of losses associated with purchase and acts as an inhibitor to purchase behaviour" (Peter & Ryan, 1976), and "Risk is a cost of outcomes" (Joubert & Van Belle, 2009). We define perceived risk as the extent to which one believes that the mobile trading app is secure for trading. Past researches in the field of mobile payment (Abrahão et al., 2016; Moghavvemi et al., 2021; Oliveira et al., 2016; Widyanto et al., 2021) depicts the significant relationship between P.R and B.I. Based on past

literature of mobile payment following hypothesis is formulated:

H8: P.R. posits a significant relationship with B.I of an individual to use mobile trading apps.

Behavioural Intention (B.I): According to (Viswanath Venkatesh, Michael G. Morris, 2003) B.I is the outcome of Facilitating Conditions, Social Influence, Effort Expectancy, and Performance Expectancy. Working on UTAUT Venkatesh (2012) added three more variables namely Habits, Hedonic Motivation, and Price Value. Many studies have proven the same in different context (Palau-Saumell et al., 2019; Puriwat & Tripopsakul, 2021; Tam et al., 2018; Tamilmani et al., 2018; Yawised et al., 2022). In given research article we have attempted to check the UTAUT 2 model in the context of mobile trading apps.

Figure:1 (Relationship Tested)
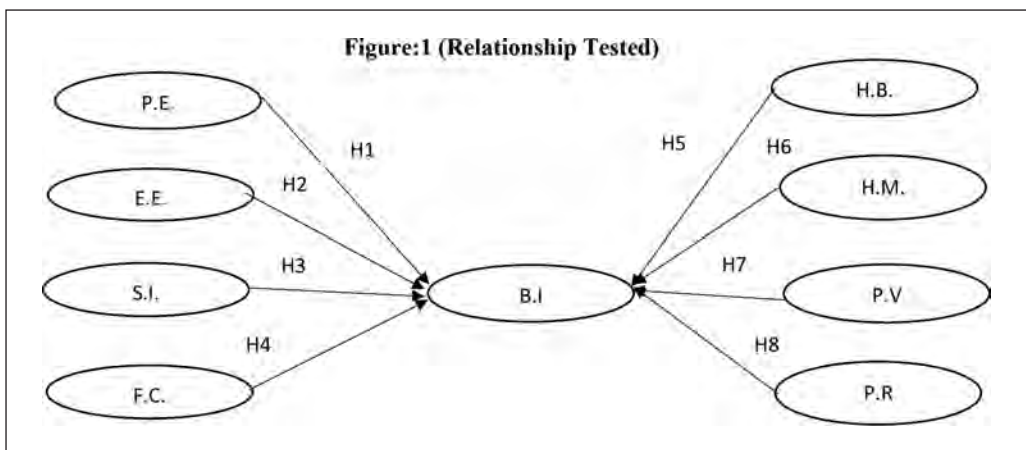
Research Methodology: In the exploratory study undertaken Questionnaire 5-point Likert scale ranging from Strongly Agree to Strongly Disagree with Neutral as mid-point is used. The Items and question taken in the study are adopted from (Khraim, 2021; Viswanath Venkatesh, Michael G. Morris, 2003) and modified as per the requirement of the study undertaken. In the research study undertaken data is collected from different states of India by sending questionnaires online and offline. In the study total 350 questionnaire are send through online and offline mode out of which only 218 are received out of which only 195 questionnaires are used in the study undertaken as remaining are incompletely or wrongly filled. In the study PLS-SEM is used to establish the relationship between the variables taken in the study.

Measurement of Scale

Cronbach's Alpha and Composite reliability are used to measure the reliability of the scale used in the research study (Munir, 2018). In this study values of Cronbach Alpha ranges

between 0.762 to 0.875 that are above the acceptable limit of 0.6 and acceptable (Claes Fornell ; David F. Larcker, 1981). Apart from Cronbach Alpha value of

Composite reliability in the research study ranges from 0.863 to 0.915 that is above the acceptable limit of 0.70 (C. Jain, 2019; Hair et al., 2019).

Table-1: "Reliability and Validity of the scale"

Construct's	"Cronbach's Alpha"	"Rho_A"	"Composite Reliability"	"Average Variance Extracted (AVE)"
B. I	.875	.881	.915	.729
E. E	.814	.818	.878	.643
F.C	.762	.789	.863	.679
H.M	.797	.796	.881	.712
Habit (H)	.858	.871	.904	.701
P. E	.829	.833	.887	.662
P. R	.849	.850	.930	.869
P. V	.796	.805	.880	.709
S. I	.838	.843	.891	.672

In PLS-SEM Rho_A is used to assesses the scale's internal consistency. For this model, Rho A values for all variables vary from 0.789 to 0.881, which is above the allowed threshold of 0.7 (Hair et al., 2019).

Result and Analysis:

In the research study undertaken UTAUT 2 model along with perceived Risk is used to determine the factors that develops behavioural intention to use mobile trading apps among the retail investors in India. In this research study relationship between the variables are established and tested.

Relationship Formation:

Figure 2 depicts the relationship between the variables taken in the study. In the study validity test is performed to check the fitness of the proposed concept.

There are two types of validity namely "convergent validity" and "discriminant validity".

Discriminant Validity: It quantifies construct diversity. Low collinearity between constructs indicates discriminant validity. "HTMT," "Cross Loading," and "Fornell-Larcker Criterion" quantify it.

HTMT: To establish if the contracts used in the research are discriminatory, consider using the HTMT value. A HTMT score of less than 0.85 indicates acceptable minimal discriminant validity. The values in Table 2 are within acceptable bounds (0.508 to 0.828) (Somjai et al., 2019) .

Fornell- Larcker Criterion: FLC was established thirty years ago to assess the construct's discriminant validity. If the

Figure-2: Path Analysis
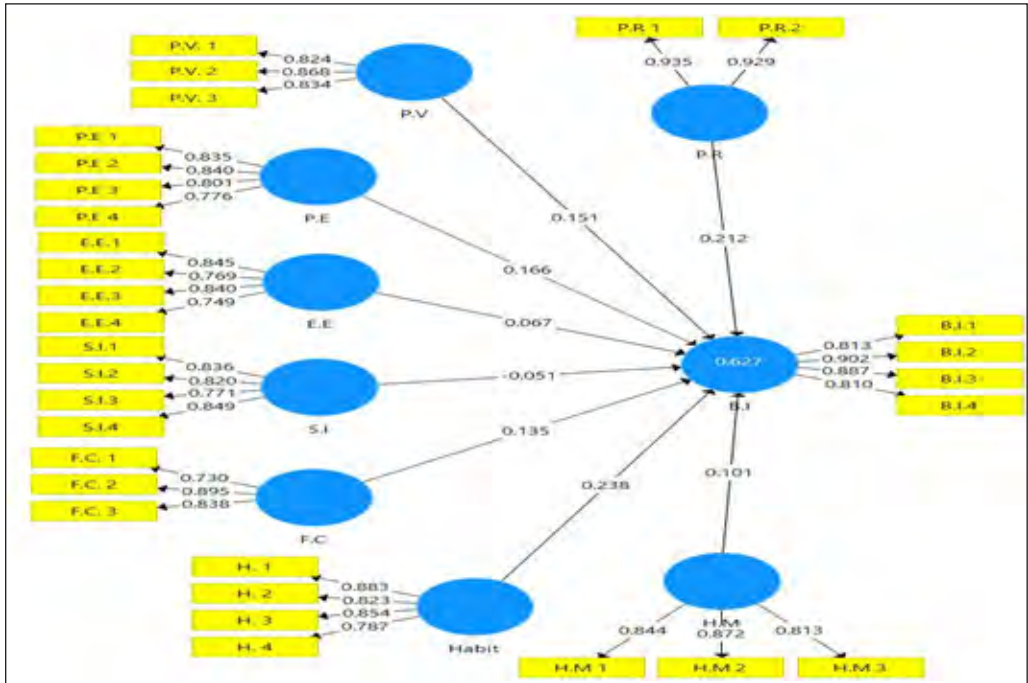
Table 2

	B. I	E. E	F.C	H.M	Habit	P. E	P. R	P. V	S. I
B. I									
E. E	.671								
F.C	.641	.695							
H.M	.735	.669	.575						
Habit (H)	.739	.562	.648	.761					
P. E	.708	.828	.639	.605	.560				
P. R	.727	.591	.427	.724	.636	.606			
P. V	.719	.608	.508	.670	.657	.642	.694		
S. I	.570	.716	.732	.522	.665	.599	.547	.554	

diagonal's starting value is higher than the other components, the model meets the "Fornell-Larcker criterion" for discriminant validity. "Table:3" shows it.

Table:3

Constructs	B. I	E. E	F.C	H.M	Habit (H)	P. E	P. R	P. V	S. I
B. I	.854								
E. E	.569	.802							
F.C	.531	.544	.824						
H.M	.615	.540	.449	.844					
Habit (H)	.655	.479	.534	.630	.837				
P. E	.604	.683	.511	.492	.478	.813			
P. R	.628	.489	.342	.596	.548	.507	.932		
P. V	.607	.490	.395	.536	.549	.520	.576	.842	
S. I	.495	.598	.581	.429	.562	.498	.464	.461	.820

Cross Loading: It refers to structures that have multiple substantial loadings (Hair Jr. et al., 2017). "Acceptable discriminant validity would typically be assumed if the number in the diagonal cell for each column is greater than any of the other numbers in the same column" (Kock, 2015).

Table:4

Constructs	B. I	E. E	F.C	Habit	H.M	P. E	P. R	P. V	S. I
B.I.1	0.813	0.430	0.376	0.418	0.501	0.501	0.507	0.486	0.361
B.I.2	0.902	0.545	0.496	0.595	0.573	0.552	0.615	0.584	0.402
B.I.3	0.887	0.495	0.476	0.589	0.543	0.494	0.518	0.526	0.431
B.I.4	0.810	0.466	0.456	0.620	0.478	0.517	0.500	0.470	0.496
E.E.1	0.499	0.845	0.444	0.438	0.459	0.601	0.342	0.418	0.432
E.E.2	0.429	0.769	0.389	0.282	0.399	0.488	0.418	0.299	0.371
E.E.3	0.442	0.840	0.472	0.370	0.412	0.579	0.427	0.420	0.531
E.E.4	0.450	0.749	0.437	0.434	0.458	0.516	0.390	0.430	0.586
F.C. 1	0.357	0.465	0.730	0.345	0.339	0.348	0.265	0.286	0.522
F.C. 2	0.500	0.498	0.895	0.541	0.412	0.497	0.282	0.327	0.456
F.C. 3	0.441	0.388	0.838	0.410	0.356	0.404	0.301	0.363	0.481
H. 1	0.554	0.404	0.495	0.883	0.535	0.391	0.453	0.431	0.478
H. 2	0.441	0.309	0.381	0.823	0.479	0.336	0.431	0.410	0.446
H. 3	0.642	0.436	0.431	0.854	0.526	0.464	0.506	0.506	0.486
H. 4	0.523	0.435	0.474	0.787	0.568	0.388	0.433	0.478	0.466

H.M 1	0.515	0.404	0.353	0.588	0.844	0.398	0.467	0.385	0.359
H.M 2	0.514	0.427	0.352	0.528	0.872	0.371	0.506	0.518	0.360
H.M 3	0.526	0.533	0.429	0.480	0.813	0.474	0.535	0.454	0.366
P.E 1	0.530	0.579	0.416	0.385	0.428	0.835	0.441	0.390	0.344
P.E 2	0.498	0.568	0.392	0.386	0.415	0.840	0.377	0.434	0.399
P.E 3	0.489	0.559	0.414	0.376	0.349	0.801	0.399	0.406	0.415
P.E 4	0.445	0.512	0.447	0.411	0.409	0.776	0.435	0.470	0.477
P.R 1	0.599	0.466	0.336	0.534	0.573	0.443	0.935	0.558	0.412
P.R.2	0.572	0.445	0.301	0.486	0.538	0.504	0.929	0.516	0.454
P.V. 1	0.440	0.401	0.313	0.418	0.402	0.417	0.421	0.824	0.349
P.V. 2	0.556	0.392	0.274	0.444	0.460	0.433	0.562	0.868	0.382
P.V. 3	0.525	0.447	0.413	0.521	0.488	0.463	0.460	0.834	0.430
S.I.1	0.369	0.449	0.459	0.506	0.322	0.383	0.342	0.281	0.836
S.I.2	0.347	0.419	0.408	0.488	0.343	0.392	0.367	0.354	0.820
S.I.3	0.433	0.537	0.488	0.421	0.364	0.406	0.390	0.425	0.771
S.I.4	0.453	0.530	0.530	0.437	0.368	0.441	0.411	0.429	0.849

The numbers in the diagonal column are smaller than any other number in the same column. Hence study's is free from problem of discriminant validity.

In addition to these three methods, VIF is used to examine any potential collinearity problems between the constructs utilised in the research.

VIF: It indicates high or multi-collinearity between independent conceptions(Hair Jr. et al., 2017) . In the planned research study VIF varies from 1.859 to 2.454, which is below 3.3 and hence suitable for factor-based PLS-SCM (Kock, 2015).

Table:5

Constructs	B. I
B. I	
E. E	2.454
F.C	1.859

H.M	2.161
Habit (H)	2.250
P. E	2.184
P. R	1.988
P. V	1.860
S. I	2.053

R2: It demonstrates how exogenous variables explains endogenous variables taken in the research study. There are three values for R2 namely "Large 0.75, moderate 0.50, and small 0.25(Hair et al., 2019). The value of BI is 0.627, which is good since it is above 0.25 hence depicts moderate level of R2.

F2: Higher (f2) values suggest that independent constructs have a greater influence. (Cohen, 1988) defines (0.02) as a little impact, 0.15 as a medium influence, and 0.35 as high. In the research study variables taken have little impact on dependent variable

ranging from 0.003 to 0.067. Table 6 given below explains the same in detail:

Table: 6

Constructs	B. I
B. I	
E. E	0.005
F.C	0.026
H.M	0.013
Habit (H)	0.067
P. E	0.034
P. R	0.060
P. V	0.033
S. I	0.003

The second step is the testing of the hypothesis that is done by performing bootstrapping procedure in PLS-SEM. Bootstrapping entails extracting a large number of sub samples from the main sample with replacement to provide bootstrap standard error, which is used to calculate estimated "T-values" for assessing structural path significance and "P-values" (Wong, 2013). Path coefficient "P-values" test hypotheses (Belkhiri et al., 2015). Figure 3 given below describes the relationship between the constructs taken in the study:

Figure 3: "Bootstrapping"
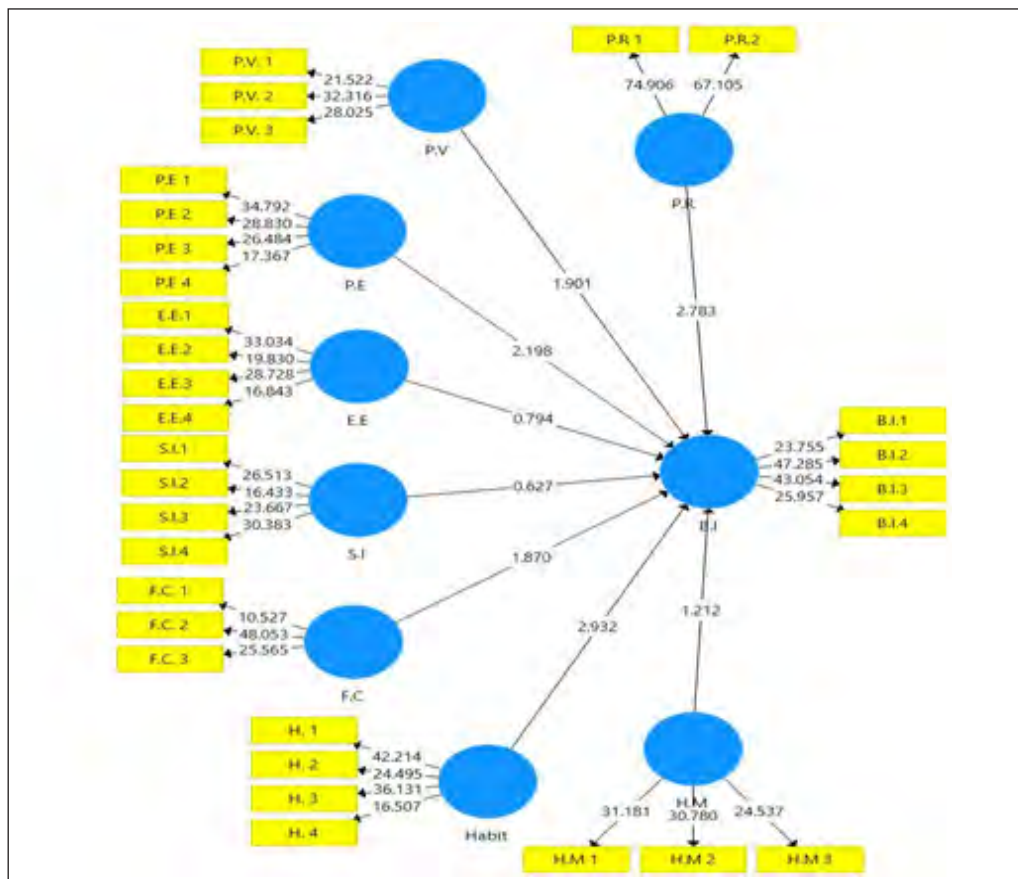
Hypotheses Testing: In the given study total of eight hypotheses based on UTAUT 2 model are proposed. These eight hypotheses are examined by running bootstrapping in smart PLS 3.0 and result are depicted as given in table 7:

Table: 7

"Hypo-theses"	Constructs	"β"	Standard Deviation (STDEV)	"T Sta-tistics (|O/ST-DEV|)	"C.I at 5%"	C.I at 95%	"P Values	Decision
H1	P.E -> B. I	.166	.076	2.189	.037	.286	**.029**	Accepted
H2	E.E -> B. I	.067	.084	.803	-.065	.210	**.422**	Not Accepted
H3	S.I -> B. I	-.051	.082	.634	-.188	.080	**.526**	Not Accepted
H4	F.C -> B. I	.135	.072	1.874	.025	.262	**.061**	Not Accepted
H5	Habit -> B. I	.238	.081	2.926	.101	.372	**.003**	Accepted
H6	H.M	.101	.084	1.204	-.040	.237	.228	Not Accepted
H7	P.V -> B. I	.151	.078	1.933	.034	.293	**.05**	Accepted
H8	P.R -> B. I	.212	.075	2.834	.079	.326	**.005**	Accepted

In this research it is found that there exists as significant positive relationship of a Performance Expectancy (P.E.), Habit (H), Price Value (P.V.) and Perceived Risk (P.R) with Behavioural Intention of retail Investors to use mobile trading apps for trading purpose as the P-values for these constructs are 0.029, 0.003, 0.05, and 0.005 respectively that below the acceptable threshold of 0.05. Making hypotheses H1, H5, H7 and H8 valid and accepted in the research study. Apart from these four hypotheses H2, H3, H4 and H6 are not accepted in the study as the P-values for those are above the threshold of 0.05. Apart from this it is found that "Effort Expectancy (E.E), Social Influence (S.I.), Facilitating Conditions (F.C), and Hedonic Motivation (H.M)" do not have a positive significant relationship with Behavioural Intention (B.I) of retail Investors to use mobile trading apps for trading purpose as the P-values for these constructs are 0.422, 0.526, 0.061 and 0.228 respectively that are above the acceptable threshold of 0.05.

Discussion: In the research study it is found that Performance Expectancy (P.E.), Habit (H), Price Value (P.V.) and Perceived Risk (P.R) have a positive significant relationship with Behavioural Intention of an individual which is well supported by previous studies conducted across the world using UTAUT 2 Model for studying the Behavioural Intention B.I of an individual (Al-Okaily et al., 2020; Chong, 2013; Hew et al., 2015; Kala Kamdjoug et al., 2021; Moghavvemi et

al., 2021; Owusu Kwateng et al., 2019; Thusi & Maduku, 2020; Widyanto et al., 2021).

Apart from this other constructs "Effort Expectancy (E.E), Social Influence (S.I.), Facilitating Conditions (F.C), and Hedonic Motivation (H.M)" of UTAUT 2 does not show a positive significant relationship with Behavioural Intention (B.I) that contradicts the previous studies (Baabdullah et al., 2019; Moorthy et al., 2020; Peng et al., 2018; Zhou & Li, 2014) this may be because in past studies are conducted using UTAUT 2 model for studying behavioural Intention of an individual for using mobile apps , mobile banking, education and other purposes, but no study was conducted in India using UTAUT 2 model for studying the behavioural Intention of retail investors for using mobile trading apps.

Conclusion: In past many studies are conducted using UTAUT 2 to determine the behavioural Intention (B.I) of an individual in Indian and across the world for the usage of mobile apps, mobile banking, education apps and other apps but no study was conducted to determine the behavioural Intention of retail investors to use mobile trading apps in India. In the study it is found that only "Performance Expectancy (P.E.), Habit (H), and Price Value (P.V.)" determines the behavioural Intention of retail investors to use mobile trading apps in India. Unlike the previous studies conducted across the world using UTAUT 2 in which Behavioural Intention of an individual is a result of "Performance Expectancy (P.E.), Habit (H), Price Value (P.V.) Effort Expectancy (E.E), Social Influence (S.I.), Facilitating Conditions (F.C), and Hedonic Motivation (H.M)" for adopting

and using different technologies, mobile apps, mobile banking, and other apps.

Apart from this in research study undertaken relationship of Perceived Risk with Behavioural intention of retail investors to use mobile trading app is also tested and establish as perceived risk is always an important factor in adopting and using technology or any mobile apps. Hence it is concluded that not all constructs of UTAUT 2 model but only three of them namely Performance Expectancy (P.E.), Habit (H), and Price Value (P.V.) contributes in the development behavioural intention of retail investors to use mobile trading apps in India. Apart from this perceived risk also plays a significant role in the development of behavioural intention of retail investors to use mobile trading apps in India.

Limitation and Future Scope of the study: In the proposed study, Demographic factors of retail investors to use mobile trading apps are discarded, that may affect the result of the study undertaken. In future researcher may conduct the study using different demographic factors of retail investors to determine the behavioural intention of them to use mobile trading apps along with constructs of UTAUT 2. Apart from this they may conduct study to find out why other constructs "{Effort Expectancy (E.E), Social Influence (S.I.), Facilitating Conditions (F.C), and Hedonic Motivation (H.M)}" of UTAUT 2 does not show a positive significant relationship with the behavioural intention of retail investors to use mobile trading apps in India.

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Overview of Telework and Work-Family Conflict: Science Mapping, Themes, and Future Research Scope through Bibliometric Analysis

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Abstract

Work-family conflict arises when a person encounters expectations that are incompatible with their family and work responsibilities, making it harder for them to fulfil both tasks. As a result of this imbalance, there is conflict between work and family life.

Objectives: The current study examines the development of research on the topics of telework and work-family conflict as well as the science mapping of already published articles between the years 1992 to 2023.

Methodology: The VOS-viewer tool and Scopus analysis are used to undertake a bibliometric analysis of the biographies of papers published in telework and work-family conflict. From the Scopus database, 281 papers were retrieved and used for analysis.

Findings: The results revealed exponential growth in current trends, leading journals, top authors, top articles and significant co-words, keywords, and so on, followed by comprehensive science mapping analysis.

Limitations and implications: The focus of the literature review is limited to the social science field. However, analysts may include additional domains in future studies. Furthermore, future researchers may also target other databases, such as the Web of Science, or combine data from Scopus and the Web of Science in their studies.

Keywords: Telework, Work-family conflict, Family-work conflict, Work-life balance, Bibliometric analysis, VOS-viewer.

1. Introduction

Researchers have long recognized the close connection between work and family life. A growing number of studies have examined potential conflicts that could arise from having incompatible commitments in these two areas of life (Allen, Golden & Shockley, 2015). However, due to constant change, instability, work intensification, work-family conflict and the need for flexibility, employees are finding it harder and harder to manage work and family life (Cha & Weeden, 2014). According to Kahn et al. (1964), work-family conflict results from an inter-role conflict; however, Renshaw (1976) proposed that it is the result of the interplay between home and workplace stressors. Workplace stress, work overload, and long hours have all been found to be significant predictors of conflict (Bakkr & Geurts, 2004; Demerouti et al., 2004).

The widespread accessibility of cutting-edge technology alters how we perceive "the office". Nowadays, as businesses battle to preserve their competitive edge, technological innovation has allowed Telework and other types of virtual work to be widely used. According to estimates from the International Telework Association and Council (2001), over 28 million Americans work remotely, and 37% of businesses already have plans for it (Harris & Ogbonna, 1999). Teleworking is becoming increasingly popular due to people's perceptions that it might assist them in combining work and family obligations (Rau & Hyland, 2002). Work-family conflict refers to role expectations that are incompatible between work and family, making it harder to fulfil one duty due to fulfilling the other (Greenhaus & Beutell, 1985). The conflict between the workplace and family spheres is a topic that receives much academic attention and has been linked to job stress and turnover intentions (Parasuraman, Greenhaus, and Granrose, 1992), and turnover intentions (Higgins and Duxbury, 1992). Given recent developments in information and communication technology, such as mobile communication devices and digital networking, which enable data access from any Internet-enabled device, telecommuting defined as work done outside of the office but connected to the place of employment via telecommunications or ICT has become more prevalent (Lautsch et al., 2009), is becoming an increasingly significant problem in the discussion Today, a lot of businesses, organizations, and individuals see telecommuting as a direct way to increase productivity and flexibility, as a tool for socioeconomic growth and job creation, as a way to gain more control over work and target a better balance between one's personal, family, and professional lives, as well as a way to gain more control over the workload (Gray, Hodson, & Gordon, 1993). Teleworking is essential for HRM professionals since it can improve both individual and corporate performance (Kugelmass, 1995). Workplace circumstances, work-life balance, performance, and employee lifestyles are all impacted differently by flexible telework arrangements. One way Telework might improve work-life

balance is by giving employees more autonomy and flexibility (Modrono & Lopez-Igual, 2021). The idea of a work-life balance was developed because people thought combining personal and professional lives might make life perfect (Irawanto et al., 2021). Lack of separation between work and home life will have a negative impact on organizational performance and productivity (Cohen & Liani, 2009). According to Irawanto et al. (2021), telecommuting can help one achieve a better work-life balance because it allows for more time spent with loved ones. The ability of any person, regardless of gender, to manage work and family is referred to as having a "work-life balance" (Hjalmsdottir & Bjarnadottir, 2021).

The work-life balance of employees who telecommuting is the primary focus of this study. Telework is used more often worldwide (Buomprisco et al., 2021). Using bibliometric analytic methodologies, this study intends to give a comprehensive picture of Teleworking and work-life balance in the current trend of remote working due to technological advancements. The findings of this study are anticipated to be helpful to decision-makers when teleworking is implemented to enhance work-life balance. Additionally, it is anticipated that this research will contribute to future studies.

The present study also offers a literature evaluation based on bibliometric analysis to discover the solution to various research questions. The following are the prominent research questions that require further analysis to observe information in this domain:

1. What are the current work-family conflict and telework research trends?

2. Who are the most important authors who have contributed to the body of literature?

3. Which articles about teleworking and work-family conflict have the most notable authors, co-authors, and citations?

4. Which are the top nations where the majority of this field's research is done?

5. What are the top affiliations in the field of research on work-family conflict and teleworking?

To answer the above research questions, various bibliometric analyses such as Bibliographic Couplings (BCs), Co-Occurrences and Co-Authorship Analysis, Co-Words Analysis, Scopus Analyzed Search Results, and Citation Analysis were conducted.

2. Methods of Research and Study Design

The current study attempts to evaluate the state of the art in studies on telework and work-family conflict. To achieve this, bibliometric analysis was done on the biography information of publications that were published in this field and indexed in the Scopus database. One of the biggest databases of articles and biographies is the Scopus database. As a result, the Scopus database is taken into account in this analysis. The search keywords, extraction process, and inclusion and exclusion criteria are discussed in the later sections.

Figure 1: Analytical methods and Outcomes of the bibliometric study
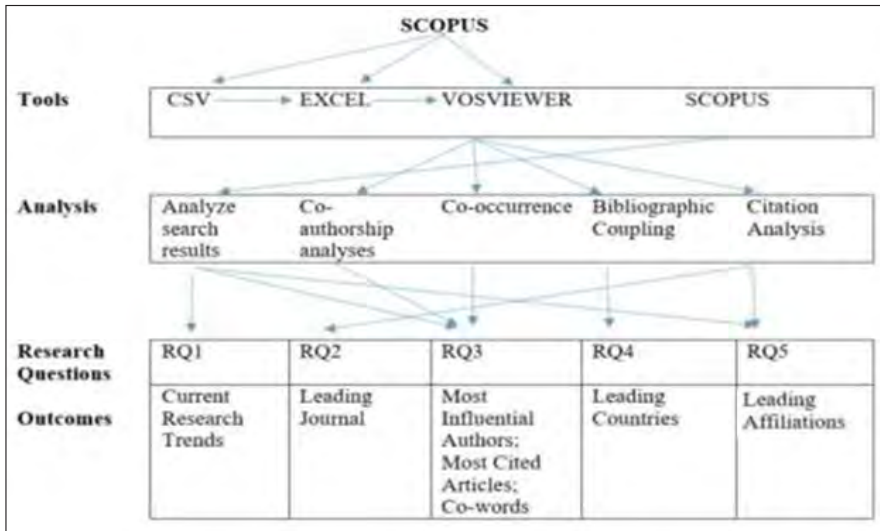
Note: Figure 1 represents the analytical methods and Outcomes of the bibliometric study. Abbreviations: BC= Bibliographic coupling; CA= Citation Analysis; CRT= Current research trends; MIA= Most influential Authors; MCA=Most cited countries; LC = Leading countries; LA= Leading affiliations

2.1 Search criteria and data extraction process

Figure -2 shows the entire search procedure from the Scopus database, including the keyword used for searching. ("Telework*" or "Telecommuting" or "Homework*" or "Remote work" or "virtual work" or "online work" or "work from home" or "Mobile working") AND ("Work-family conflict*" or " Work life conflict" or "Workplace conflict" or "work-life program" or "Work life balance") search term furnished access to literature from social science, business management and accounting, economics, computer science as well as arts and humanities disciplines from Scopus database. The extraction of data from Scopus is explained in Table 1. Before filtration, broad topic papers were 476 on the topic, and after applying the filtration, yielding 281 results.

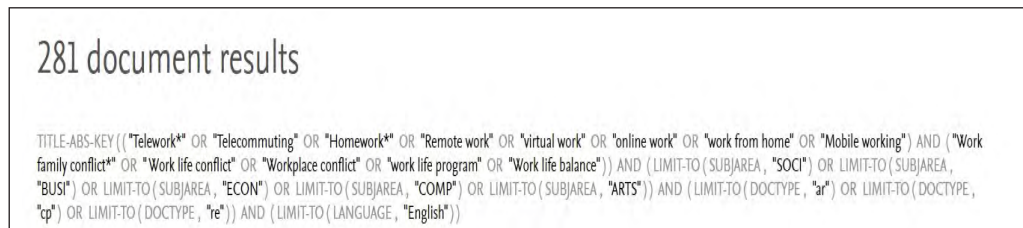**Figure 2: Screenshot of Scopus database search process**

Table 1: Bibliographic data Extraction procedure

Stage	Filtering standards	Rejected	Accepted
1.	Initial search	---	476
2.	Subject filter (Social sciences; Business, Management and Accounting; Economics, Econometrics and Finance; Computer Science; Arts and Humanities)	148	328
3.	Document type (Article, Review paper and Conference paper)	33	295
4.	Language (ENG)	14	281
5.	**Total accepted papers**	---	**281**

2.2 Development in Bibliometric Research Methodology

In recent years, bibliometric analysis has become increasingly popular among researchers (Donthu, Kumar, Pattnaik, & Lim, 2021). This popularity is attributable to the creation, accessibility, and development of bibliometrics software like Biblioshiny and VOS-viewer and research databases like Scopus and Web of Science. Second, the application of bibliometric research techniques to various discipline, including business and management research and information theory. Additionally, the bibliometric analysis has been examined in numerous areas of business research, including business strategy (Kumar et al., 2021a), commerce (Kumar et al., 2021b), finance (Durisin & Puzone, 2009), human resource management (Andersen, 2019), management studies (Ellegaard & Wallin, 2015), and marketing research (Donthu et al., 2020d; Donthu et al., 2020b),Through descriptive and network analyses, the present study provides a bibliometric outline of the research domain on Telework and work-family conflict that is currently dominant in the fields of social science. Our descriptive analysis includes the total number of publications and citations (Tsay, 2009), and keyword analysis is used to uncover growing trends and concepts within the proposed study (Hu et al., 2018). Science mapping analyses include bibliographic couplings (BCs), co-occurrences and co-authorship analysis, co-words analysis, citation analysis, and co-citation analysis. We used Scopus analysis, VOS-viewer, and Excel to focus on primary analysis in our study. VOS-viewer is used for science mapping and displaying bibliometric analysis, and CSV excel is used to extract data files.

3. Results and discussion

1.1 Current publication trends

Figure 3: Research trends of articles between 1992 and 2023
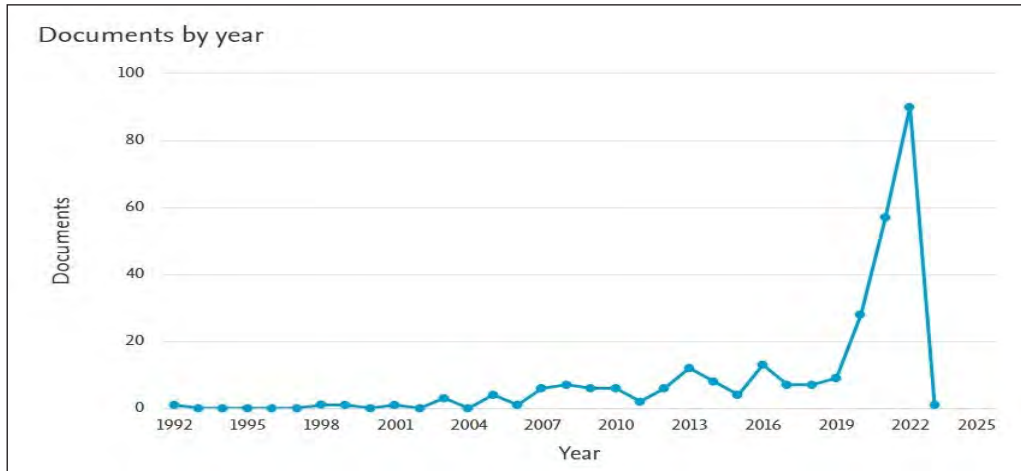

Figure 3 depicts the research trends of Scopus publications over the last 32 years. According to this Scopus analysis, the growth of published documents was firstly almost steady, then increased slowly. In 2013, the total number of publications was 12, whereas, in 2022, the total number of publications is almost eight times that is 90.

Figure 4: Distribution of documents by subject area.
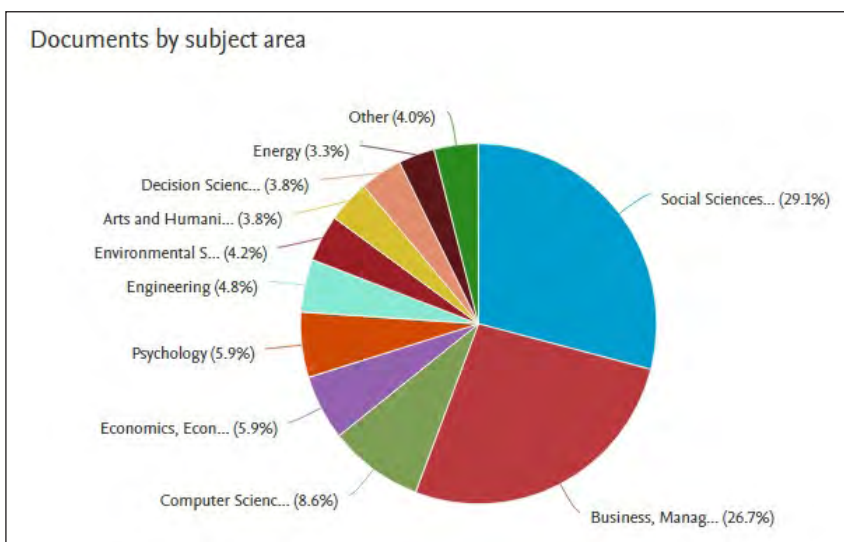
To identify the disciplines covered in this domain, all 281 research papers were extracted from the Scopus database and presented in Figure 4. The major subject area was examined by using a pie chart. "Social science" covers a maximum that is 29.1 percent (159 papers) of the total, followed by "Business management and accounting" covering 26.7 percent (146 papers) respectively. The subject considered the least in this research domain are "energy", "Decision Science", and "Arts and Humanities", which account for 3.3 percent, 3.8 percent and 3.8 percent, respectively. According to this analysis, the current research trends in this area are Social Science and Business management. So, researchers who want to pursue these streams can study Telework and work-family conflict in this area.

1.2 Leading, Significant and Impactful Source

Table 2: Top 10 leading journals in teleworking domain with total publications and total citations.

Journal	Publication	Citation
new technology, work and employment	8	809
gender, work and organization	5	615
journal of vocational behaviour	4	597
sustainability (Switzerland)	17	335
journal of organizational behaviour	3	334
International Journal of human resource management	6	208
community, work and family	6	145
work, employment and society	3	126
review of public personnel administration	4	108
personnel review	4	69

The leading journal "new technology, work and employment" which has featured eight publications (809 citations) on Telework & work–family conflict. This is followed by the Journal of gender, work and organization and the Journal of vocational behaviour, which each have 5 and 4 documents. These top 10 publications have influenced the overall research published on the topic starting from 1992. Surprisingly, only a few research papers on Telework & work–family conflict was published in the Journal of work, employment and society.

3.3 Most Creative/Prolific Authors on Telework

Figure 5: Top 10 leading authors' studies on Telecommuting and work–family conflict.
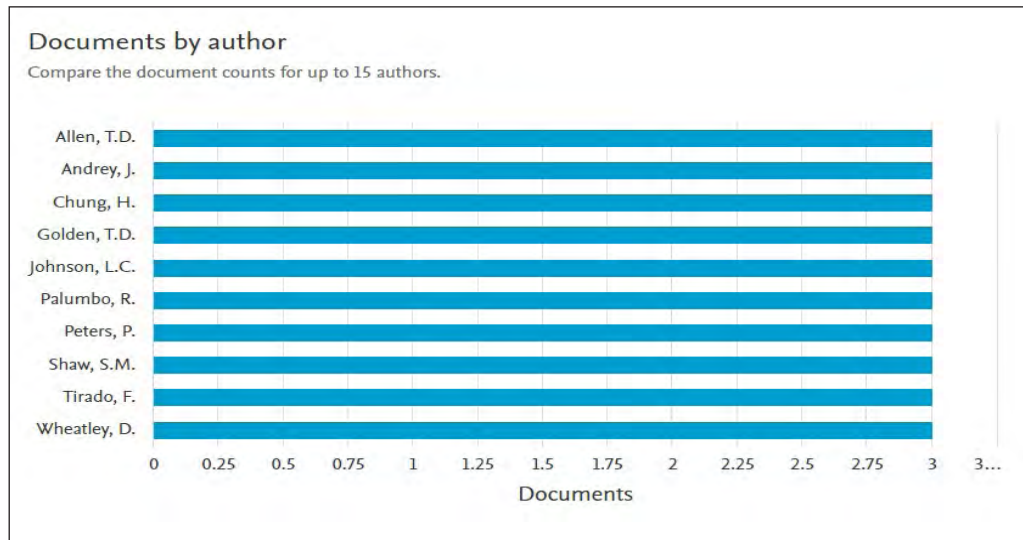
Figure 5: display the number of research articles on Telework and work–family conflict written by each researcher. Table 3 lists the most well-known authors in this field and the number of papers they have published. Only authors with three or more articles on the chosen topic were considered. Surprisingly all the top 10 authors, each having three published works.

Table 3: Co-authorship of the top nine authors in the research area.

Author	Documents	Citations	Total link strength
Andrey J.	3	267	6
Johnson L.C.	3	267	6
Shaw S.M.	3	267	6
Allen T.D.	3	264	0
Chung H.	3	134	0
Golden T.D.	3	307	0
Palumbo R.	3	118	0
Peters P.	3	172	0
Tirado F.	3	49	0
Wheatley D.	3	224	0

Co-authorship analysis explores how academics collaborate on a specific topic and is presented in table 3. Because co-authorship is a formal way for the researcher to engage intellectually (Acedo, Casanueva, & Galan, 2006; Cisneros, Ibanescu, Lobato-Calleros, & NieblaZatarain, 2018), understanding how they do so is critical. Andrey J., Johnson L.C. and Shaw S.M. have worked together on six articles.

1.4 Most Influential articles

Table 4: Top 10 leading articles along with authors based on total citation

Authors	Title	Citation
Kelliher c. (2010)	"Doing more with less? flexible working practices and the intensification of work."	445
hill e.j. (2003)	"Does it matter where you work? A comparison of how three work venues (traditional office, virtual office, and home office) influence aspects of work and personal/family life."	303
hill e.j. (1998)	"Influences of the virtual office on aspects of work and work/life balance"	277
Felstead a. (2017)	"Assessing the growth of remote working and its consequences for effort, well-being and work-life balance."	245
Shockley k.m. (2007)	"When flexibility helps: Another look at the availability of flexible work arrangements and work-family conflict."	219
Sullivan c. (2001)	"Home-based telework, gender, and the synchronization of work and family: Perspectives of teleworkers and their co-residents"	218
perrons d. (2003)	"The new economy and the work-life balance: Conceptual explorations and a case study of new media"	195
Fonner k.l. (2010)	"Why teleworkers are more satisfied with their jobs than are office-based workers: When less contact is beneficial."	184
hilbrecht m. (2008)	"'I'm home for the kids': Contradictory implications for work - Life balance of teleworking mothers."	173
golden t.d. (2006)	"The role of relationships in understanding telecommuter satisfaction"	171

Table 4 lists the top 10 most influential articles, along with their years of publication and total citations, based on citation analysis. Kelliher c.'s "Doing more with less? Flexible working practices and the intensification of work" (2010) is recognized as the most significant article credited with the highest citation, i.e., 445, followed by Hill e.j.'s "Does it matter where you work? A comparison of how three work venues (traditional office, virtual office, and home office) influence aspects of work and personal/family life" (2003) with citation 303 and "Influences of the virtual office on aspects of work and work/life balance" (1998) with 277 total citations.

3.5 Co-occurrence author keywords. (Co-words)

The term in a co-word analysis is frequently derived from "author keywords," but key terms might be derived for the study from "article titles", "abstracts", and "full texts" (Donthu, Kumar, Gremler and Pattnaik, 2020). According to co-word analysis, the keyword that appear together frequently has a thematic relationship. When relevant "words" from the publications and future study aims are included in the analysis, co-word analysis can be used to predict further study in the field.

Table 5: List of top 29 author's keyword in the Telework and work-family conflict domain

keyword	occurrences	total link strength
work-life balance	72	106
covid-19	67	113
telework	59	88
work-family conflict	28	35
telecommuting	26	48
remote work	24	37
Gender	20	38
teleworking	20	38
work-life balance	20	35
work from home	19	40
job satisfaction	18	40
well-being	11	15
pandemic	10	19
flexibility	9	13
virtual work	8	13
remote working	7	11
work-from-home	7	15

working from home	7	17
autonomy	6	12
flexible work	6	14
work–family conflict	6	10
burnout	5	8
flexible working	5	8
homeworking	5	10
human resource management	5	10
teachers	5	7
work at home	5	13
work engagement	5	7
work-life conflict	5	8

Table 5 shows the top 29 author's keywords, which represent the most frequently used words in the existing Telework and work-family conflict literature. The term "work-life balance" ranks first with 72 occurrences, followed by covid-19 and telework with 67 and 59 occurrences. It indicates that the majority of previous studies on the author's keywords, i.e., work-life balance, covid-19, Telework, and work-family conflict, have been conducted in areas of Social Science. Table 5 also presents the total link strength between keywords, indicating that work-life balance, covid-19 and telework have strong network links, implying that these three keywords have been frequently used together in research and review papers.

Figure 6: Network visualization of author's keywords trending in Teleworking and work-family conflict area
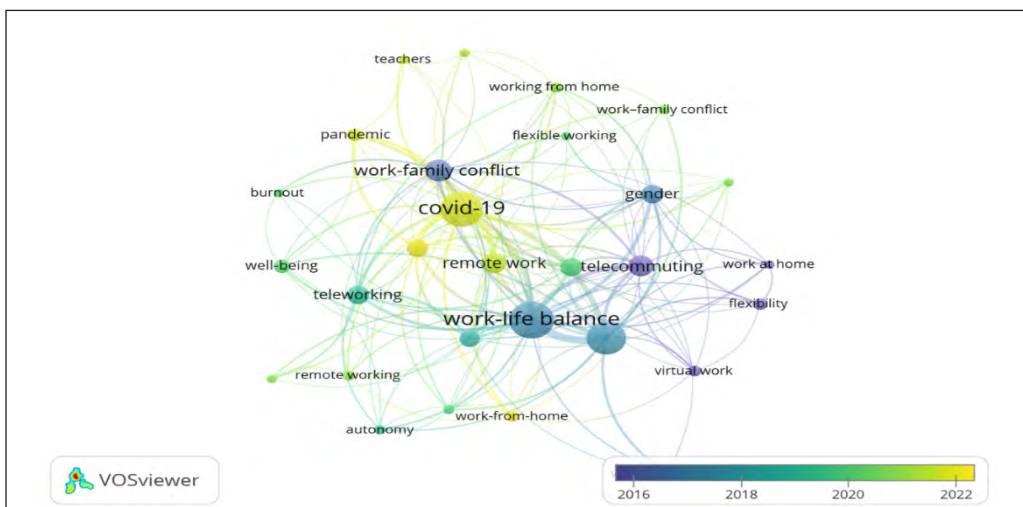
Figure 6 shows the network visualization of 29 of the author's keywords created with VOS-viewer software. This network suggests keyword trends over the course of a year. Work-life balance, covid-19, Telework, and work-family conflict are the most recent keyword used in this research domain, followed by telecommuting, remote work, work from home, gender and remote working. As a result, future researchers can use these keywords in their future studies. Most importantly, it is determined that the pandemic, covid-19, remote work, working from home and telecommuting are the most recent research topics being investigated at this time.

3.6 Bibliographic Coupling of Countries

Figure 7: Network of bibliographic coupling of countries.
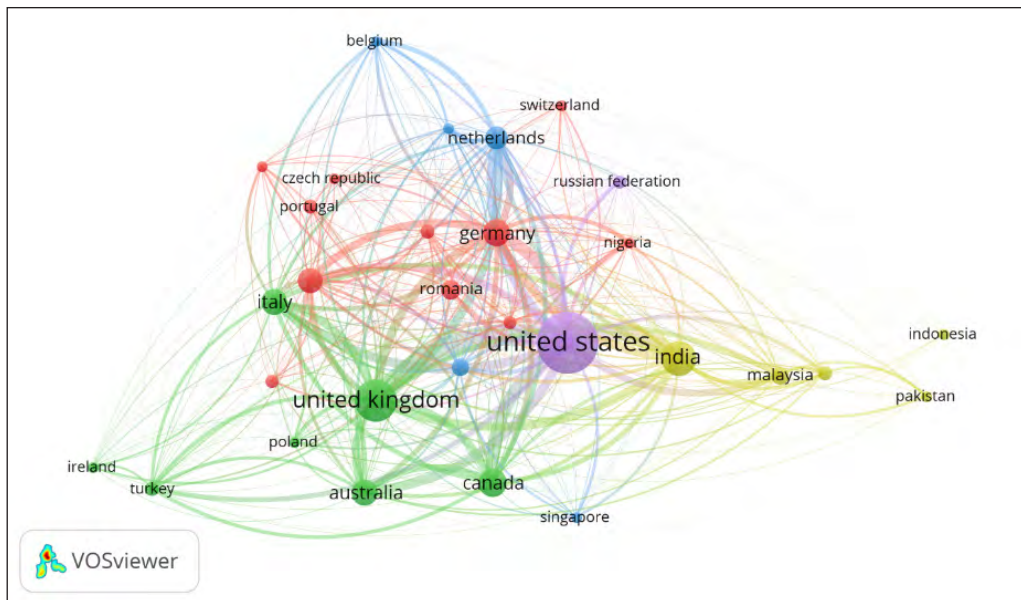

Table 6: This table lists the top 30 countries of the five bibliographic clusters.

Country	Documents	Clusters	Citations
United States	69	5	2622
United Kingdom	35	2	2072
Canada	16	2	707
Netherlands	11	3	294
Italy	14	2	282

Germany	15	1	201
Sweden	7	3	189
India	24	4	172
Australia	14	2	169
Hong Kong	4	1	163
Spain	13	1	140
France	3	1	70
Romania	8	1	52
Malaysia	7	4	39
South Africa	5	4	36
Poland	3	2	35
Indonesia	3	4	34
Portugal	5	1	34
Turkey	5	2	34
Russian Federation	4	5	27
Pakistan	3	4	22
Belgium	3	3	15
Brazil	4	1	15
Ireland	3	2	14
Switzerland	3	1	10
Singapore	3	3	9
Norway	3	3	8
Lithuania	5	1	5
Nigeria	3	1	5
Czech Republic	3	1	1

The United States publishes the greatest number of documents with 2622 citations, followed by the United Kingdom with 2072 citations. Out of the 30 countries considered in the clustering, 11 are in cluster-1, 7 are in the cluster-2, 5 are in the cluster-3, 5 are in the cluster-4, and 2 are in the cluster-5.

3.7 Leading Institutes

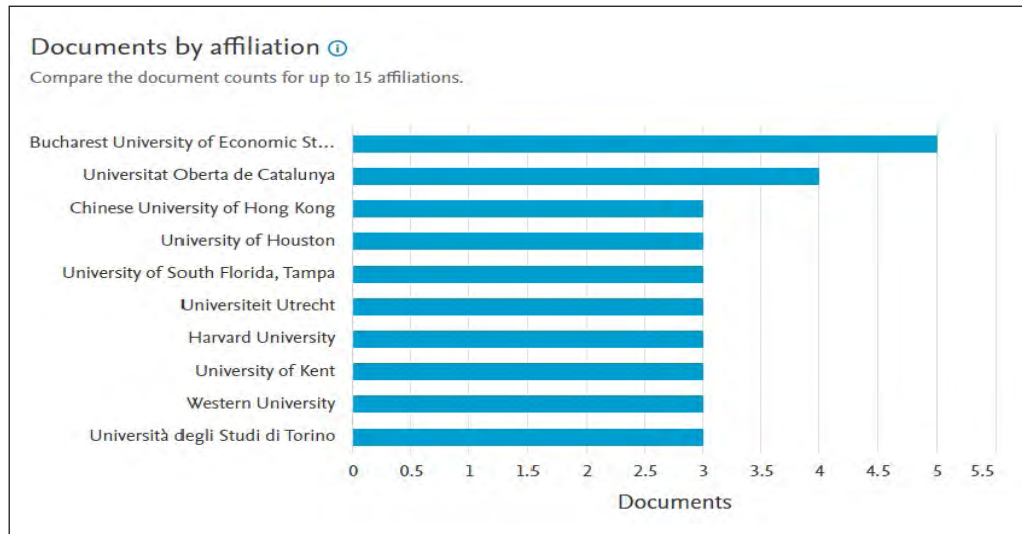Figure 8: Top 10 leading affiliations of Telework and Family-work conflict

Figure 6 shows the top ten institutional affiliations in the Telework and work-family conflict research area as determined by the Scopus database. The Bucharest University of Economic Studies has the most publications, with five, followed by Universität Oberto de Catalunya, which has four publications, and the other top 8 institutes each have the same publications, i.e., three.

4. Findings and Future Areas of Research

In this section, we summarize our findings and make recommendations for future research on Telework and work-family conflict including which area of Telework and work-family conflict require additional research. We also describe the constraints that current researcher face. The descriptive analysis rely on the current state of the research theme i.e. Telework and work-family conflict (RQ1). The greatest proportion of documents was published in the year 2022. The greater number of research on this area was published after 2016, and it is still evolving at a rapid pace. Furthermore, the vast majority of Telework and work-family conflict research is concentrated in the field of social science. The top 10 journals evaluated had a greater influence on overall research published on the topic (RQ2). According to the top 10 journals of Teleworking and Family-work conflict research, the Journal of new technology, work and employment have the highest cite score as well as the second-largest number of publications. We also discovered that the most prolific author, co-authorship, and co-occurrence author keywords contribute to Teleworking and Family-work conflict literature all

over the world (RQ3). Keyword and co-occurrence (or co-word) analysis suggest popular themes in the work-family conflict literature (RQ3). A list of the top 29 authors' keywords is also included, demonstrating that work-life balance, covid-19, and telework & work-family conflict are the most commonly addressed keywords in the Telework and the work-family conflict literature. Surprisingly, this analysis aids in the understanding of specific keywords that can be used by new researchers in future studies. Furthermore, all the top 10 authors are the most prominent authors who have written about Telework and work-family conflict in the past. Furthermore, the study by Kelliher c. (2010) is the most visible node in the network it has the most total article citations, followed by hill e.j. (2003) and a recent study with prominent citations by Felstead a. (2017). The findings of the co-authorship network reveal the current state of collaboration and the most important academics in the field of Telework and work-family conflict (RQ3). According to our findings, there is very little collaboration among authors, and most of it is confined. Andrey J., Johnson L.C., Shaw, S.M. and Allen,T.D.. all play important roles in the network. Despite having a significant number of relational connections, they serve as information brokers between groups. Our findings also show that GoldenT.D. has a higher total number of citations but no relational ties. This result could be influenced by limited cooperation within a small group. We conclude that more collaboration among researchers is required. Besides, much research

on Telework and work-family conflict focuses on the U.S.A and the UK, which have the highest number of citations and articles (RQ4). Furthermore, analyses are extracted from Scopus search results about the top ten affiliations where the majority of the studies on Telework and work-family conflict were conducted (RQ5).

5. Conclusion

The current study's findings imply that the most critical research in the field, with the highest citation rankings. According to our keyword and co-occurrence studies, researchers' focus has remained on work-life balance, Telework and Family-work conflict. To further understand the relationship between countries that concentrated on the same level of research, we utilized a bibliographic coupling analysis to divide the top 29 countries into five clusters, with a significant focus on the study of Telework and work-family conflict. We discovered that Asian countries still have relatively few researchers engaged in this level of research. According to this research, American and European nations are where most of the Telework and work-family conflict dialogues occur. This is caused by the fact that certain regions produce technical advances more quickly than most Asian nations.

This study devotes to the field in a variety of ways. First, we examine the trends in this field by reviewing yearly publications and the most popular study topics. Second, we map citations and relationships between authors and co-

authors to figure out the most influential authors and co-authors on this area. Third, we identify the most influential articles and their authors, years, and total citations to highlight the top 10 telework and work-family conflict titles and their rankings in this domain. Fourth, we map the working principles of this field using co-occurrence and co-words analyses, highlighting the most common themes to assist researchers in avoiding stagnation and moving the field forward. Fifth, a network bibliographic coupling of the top 32 countries was analyzed using a combination table that represents five clusters, total documents, and total citations, and this research thoroughly and objectively examines the literature. Finally, we present the top ten leading affiliations for further research in this area. Our study provides a clear description of Telework and Family-work conflict research as a result of the bibliometric analysis.

It has limitations, just like any other piece of research work. First, this study only looked at the bibliographies of papers published in the Scopus database. Bibliographies of older articles and other databases should be included. Second, due to VOS viewer limitations, analysis such as co-citation and other similar analyses are impossible. Third, different types of analysis techniques could be used in future studies with other statistical tools like Gephi, Biblioshiny, and so on.

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Creating Value in a VUCA World–
The Role of Financial Resources

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Abstract

The concept of VUCA was introduced or brought into forefront post 9/11, when the businesses and their respective models were questioned, their existence, their profitability was uncertain. The growth, globally in various industries was facing a slowdown, however when the financial crisis was almost getting over, the 'new normal' emerged. VUCA circumstances undermine any efforts to understand the future and to plan for response. There is a change that is witnessed in the global business climate, the companies that have been doing well now thrive in this business environment in developed countries, the volatile situation in the industries continue to pose economic challenges for the businesses and where decision regarding technology and innovation is questioned. An important understanding of operational leadership in the context of VUCA is to identify the issues embedded in it. Unlike the problems that need to be solved, the issues are the unresolved, unexpected, complex - issues and challenges that every leader faces. Size and volume are no longer the keys to business success. Cash flow rather than profit helps an organization to cope with difficult times. Transforming a rapidly changing foreign environment into a one-size-fits-all approach requires a major overhaul of the way we develop, implement and deliver business plans and objectives as evidenced by numerous companies such as Ford Motors, Capital One Bank, Philips NV, Panasonic Corp, South West, The airline, Rio Tinto, Halliburton to name a few. This paper seeks to emphasize how important it is for leaders to enjoy the promotion and use of financial resources, maintain financial viability at all costs, master the art of budgeting, maintain and improve organizational performance.

Keyword*: VUCA, Value creation, Divestiture, Financial Agility, Operational Hedging

1. INTRODUCTION

"There are known knowns, there are things we know we know. We also know there are known unknowns, that is to say we know there are some things we know we do not know. But there also unknown unknowns – the one's we do not know we don't know." *Donald Rumsfeld*, US Defence Secretary, 2001-06.

Each passing day, in any kind of print or electronic or social media, there is constantly mentioned of words like uncertainty, ambiguity and volatility in business environment. When further, Technology or Artificial Intelligence or Robots takes over lives or the human connect, nobody can fathom. It is not only in the day-to-day lives of individuals, that is affected in a good or a bad manner, but also when organizations think to strategize in the ever-evolving business environment; there is a dilemma about the future of such businesses in this kind of a volatile world. The companies diligently try to compete with each other in the VUCA context and constantly reach out to different verticals where they plan to succeed.

A typical job in the organization that was earlier like 9 am to 5 pm, maybe forgotten or may be used for newer ways of saving time, increasing productivity or gaining some kind of technological advantage. The corporate world will be getting geared up to survive, thrive in this cut throat competition with a strategic plan in mind. There will be only those who may survive this onslaught who will perform, innovate, ideate and strategize to stay one-step ahead of the rest. The HR departments in the future organizations will have to see whether the machines will overtake the human connect, whether the job of the employee is at stake in this VUCA world or whether the workplace will be a different one altogether. The human resource management in the HR department in companies will look forward to strengthening the employee resources by cost cutting and combining general administration in the HR department. HR professionals will need to learn a new language in managing the resources in the fast changing VUCA like situation and understand to strengthen leadership abilities amongst leaders in the organization.

2. OBJECTIVES

Our study has objectives pertaining to - Understanding the business context from a VUCA perspective, Understand the term VUCA; Identify and study the factors that lead to the emergence of the VUCA world, Determine the flexible HR paradigm and setting the new HR function from VUCA Context and Study a few cases of firms that successfully control VUCA.

This conceptual research design is based on updated literature from news articles, research reports on leading consulting firms and websites of several organizations.

3. REVIEW OF LITERATURE

Organizations are challenged by many demands such as global trade, strong competition, rapid technological change, new corporate alliances, changing demographic patterns, soft

organizational structures etc. (Nazir, 2017). These changes put a lot of pressure on organizations and work in HR. HR activities should play a strategic role in these organizations (Nazir, 2017). HR staff and the department must ensure that they prepare future employees to meet the needs of the international market place (Andersen, Cooper, and Zhu, 2007). The HR that once played the role of relief should now play a dominant role in a changed environment by making limited strategic decisions (Golden and Ramanujam, 1985). The world of VUCA requires that HR work be integrated into the firm's business strategy and be active in its implementation of strategic implementation (Walker, 1994). HR in the VUCA context should be a strategic partner and participate in firm decision-making in the firm (Beatty & Schneier, 1997). In addition to being a strategic partner, HR should be seen as a transformation agent that identifies the needs of the organization and works to match the strengths and capabilities of the staff to fit the organization's strategy. HR must find new ways to attract and retain talent and be able to influence business in anticipation of industry changes. (Nazir, 2017)

What is VUCA World?

VUCA is a summary of V- Volatility, U- Uncertainty, C-Complexity, A-Ambiguity. The term was used in 1987 to describe and reflect on the conditions of uncertainty drawing with the leadership theories. The term was also used in a military college in the United States to describe the state of the world after the Cold War. The term gained prominence and began to be used as a business metaphor to describe the state of the business environment after a disaster and the emergence of Industrial Revolution 4.0.Nowadays the businesses need a new term to withstand such onslaught of unexpected, unpredictable situations and also to have responsive organisations to the various needs of all their stakeholders. The changes will need to cater to the requirements of a 'new normal' wherein employees, vendors, clients will play an important role in shaping the current and future state of the companies.

Volatility-Unexpected, flexible and sudden changes that occur daily in the business environment. These consistent changes can have both positive and negative implications for a business company but often have negative impacts making it difficult for leaders to make the right decisions in the short term. For example: - property prices may go up or down in a short period of time and trend direction may suddenly decline.

Uncertainty- Uncertainty is a situation where an event is not predictable at all, or does not mean that it is completely unexpected. Example - Decisions that have an impact on future outcomes cannot rely on any single piece of information.

Complexity - Complexity can be defined as a state that combines complex components with multiple problems, the interaction between many different agents with flexible features. In fact, uncertainty is considered a significant factor in the difficulty.

Ambiguity- Uncertainty is a condition in which nothing is clear. The event is interpreted differently by different people. There is a lot of reflection in the clarity part of the event. What can leaders do to address VUCA's situation?

Leaders should be able to plan ahead for any changes that may occur in a VUCA world. Only with a strong, clear and encouraging vision, organizations can make the right decisions for the present and the future of their firms. Leaders should manage uncertainties, manage processes and plan programs that are built on future strategies. Leaders need to articulate decisions and outcomes and guide staff to deal with challenges posed by complex situations. Leaders must make their organizations and teams fast enough to respond to changes and problems quickly and with great accuracy. These are important indicators for leaders to tackle VUCA status also known as VUCA prime. To lead and navigate in a complex environment like VUCA is not only a challenge for the leaders but also requires a set of skills that are not only attune to the environment but also is applicable to different vocations of businesses. The world of VUCA demands that you be mentally, emotionally prepared and are able to deal with any situation that may arise.

4. ACHIEVING EXCELLENCE WITH FINANCIAL RESOURCES

Faced with an uncertain, volatile, complex business environment, organizations throughout the years are heading back to reorganization, downsizing, staff intervention, technological changes to name a few.

The four basics or goal of managing financial resources are extremely simple:

I. Value policy is the context in which the addition of value is a function of profitability in growth and expenditure.

II. The goal of savings is to improve only cash flow, which creates value. Financial changes to be dealt with financial engineering, redistribution, acquisition.

III. The expected treadmill goal defines a company's price movement as higher than expected, the best the company has to do to keep going.

IV. The best owner's policy is that no other business has a natural value in itself; it always has different value to different owners or potential owners — the amount based on how they treat it and what strategy they follow.

Ignoring these doctrines can lead to poor or irrelevant decisions that undermine the greatness of companies. The four financial frameworks provide a stable reference framework for management decisions such as these.

1. Capital Allocation - a winning mantra.

CEOs need to do two things well to survive and thrive in the world of VUCA:

- Start their activities more effectively;

- Raise the income generated by those activities.

Many CEOs read or write management letters and focus on job management, which is very important. However, the most successful CEOs of their peers manage the sensitive but unpredictable field of budgeting -

'The executives in many companies do not have the skills in budgeting. Their scarcity is not surprising. Most executives rise to prominence as a result of success in fields such as marketing, manufacturing, engineering, management and institutional politics at times. Once they become CEOs, they now have to make budget decisions, an important task that they may have never done well and this is not easy to do. To add to this, it is as if the final act of a talented artist should not have sung at Carnegie Hall, instead, he should have been the Chairman of the Federal Reserve. '

2. Maintain Financial Capacity - Liquidity is key

To adapt to the opportunities or threats that arise due to uncertainty & instability. It is the ability to move quickly and flexibly.

'Build your ability quickly, according to the right procedures and programs, so that when the next shock comes and a new period of uncertainty comes, if it is a long period of uncertainty then you have plans and processes that allow you to respond in that moment.'

-Ian Howells, Honda Europe

The decline in debt brought about the irreverent fact that without liquidity it is difficult for a business to succeed, even to survive. Liquidity is a major

constraint that guarantees uncertain and flexible times. In addition, when other businesses are struggling, companies with a lot of money, and a fast-moving firm have significant competitive advantages. Cash companies can take advantage of emerging opportunities in the recession. They can buy sick competitors or launch new products or expand into new markets overseas.

Industrial Survival 0f 2008 Financial Crisis

Case Studies: Following are few of the outlined cases of how do individuals, companies, firms overcome a VUCA scenario.

Case 1: Ford Motors

Liquidity is an important platform whose strategy has been adopted by Ford Motors to recover and maintain growth. Their focus on finance was an important decision - and one that could have saved the business following General Motors and Chrysler, both of whom had been cash-strapped and forced to file for bankruptcy in 2009. Autumn 2006. Ford Motor, which had been looking at a $ 18 billion loan, ended a $ 23.5 billion financial package, feels the markets are open and need to plan accordingly for future uncertainty. While the environment was deteriorating faster in 2007-08 than anyone expected, and funding helped Ford Motor with adequate funding to address the problem. Like other big American companies like General Motors and Chrysler. It also allowed Ford Motor to continue investing in new products to the end. While car sales began to grow in 2010, Ford had new

products ready for sale that helped re-sell and improve performance results faster than expected.

Companies across their sector have their downtrodden finances suffering and finding it difficult to make ends meet. Weak competitors will see their numbers drop to levels that make them attractive targets. Therefore, the main goal of any CEO or business leader is to maximize revenue - even at high cost. Companies can reconstruct their liquidity by taking the following steps:

• Raising Money - An organization like Rio Tinto, GKN, Facebook, Reliance Industries

• Debt Recovery - General Dynamics, Washington Post, Suzlon Industries

• Divestment - Barclasys, Shell, Rio Tinto. Jaiprakash Associates

And it is always best to do so before a disaster- otherwise it will look like a fire auction and bring up the sale price of the fire.

3. Reduce costs but not energy:

Research has shown that more than 80% of companies take the cost of reducing costs when it becomes difficult. Reduction of costs to some degree is the whole thing. Some of the measures include - reducing travel costs, controlling expenditure on visibility, downsizing, and reducing population, ice rental, back-up operations, equipment removal and closure.

Cut cost but not capability:

Researches have revealed that more than 80% of companies resort cost cutting when a crisis stuck. Cost cutting

to some degree is universal. Some of the measures include -reducing travel expenditure, controlling discretionary spending, destocking, and head-count reductions, hiring freezes, outsourcing back-office operations, plant relocations and closure.

The best approach to cost cutting is to focus on:

• Uncompetitive business, products or markets which are unlikely to create value (because the returns are below the cost of capital);

• Non-core activities, projects or functions which are not essential for business sustainability or highly valued by customers.

In contrast a bad approach is

• Indiscriminate – cost cutting are targeted on a category of spend rather than whether they are creating value.

• Damaging to long term capacity or competitiveness

• Damaging to the company's ability to deliver high-quality product or services.

The essence is that cost cutting must be focused on not diminishing a business's ability to create value in the medium to long term. In one respect this means not diminishing organizational agility.

Case 2: RIO TINTO

Cost cutting strategy to tide over falling commodity price

Although Rio Tinto is known as a different player, most of the profits come from the metal. It is ranked second in steel production and is ranked first in

the steel cost curve. Iron ore contributes 49% of Rio's income and more than 90% of its basic profits. Iron content and price perspective are important to determine Rio's position in the industry

Rio Tinto, which is facing a slowdown in steel prices (steel has dropped by 48% weakest since June 2009 and coal prices dropped by 25% in 2014), is focused on lowering costs. These efforts are in line with Rio's plans to significantly improve its steel production. The company expects to reduce unit costs by reaping the benefits of the average economy - using its cheap metal deposit. Rio Tinto also reduced spending and testing costs by about $ 1 billion in 2013, compared to last year. Rio Tinto made significant strides in its cost-saving efforts in 2013 (9% lower than in 2012). The company reported that $ 2.3 billion was saved in operating expenses last year. These savings reflect the development of the unit of cost of goods sold through operating assets and the improvement of operating costs for medium-term operations. Its half-year profit doubled in 2014. The company is looking to further reduce its spending costs, already earning nearly $ 3 billion in 2014, compared to operating costs in 2012.

The recent fall in oil prices, about 60 percent since June 14, has come under increasing pressure as profits fall, and it looks set to spark another wave of restructuring in the oil industry with a focus on lower costs. The whole industry is expected to cut costs by force in the current situation. The bulk of the restructuring costs will depend on staff reductions at all stages, oil testing and production, refining trade and management. BP and Shell are not the only oil companies in the world to make tough decisions about investing in developing sectors and exploring new resources. Chevron, the oil company in the US, delayed its mining budget for another next year and ConocoPhillips said it will reduce spending by 20 percent to $ 13.5bn next year.

Opportunistic Mergers and acquisitions

The sharp decline in product prices, disruptive technologies, changing consumer preferences often create opportunities for opportunistic acquisitions and consolidation to overcome uncertain and volatile times. Purchasing is both an important source of corporate growth and an important factor in a volatile economy. Acquisitions that put companies into the hands of better owners or managers or that reduce excess capacity often create huge value for the economy as a whole and for investors.

It is important to note that the acquisition effect on each profit (EPS) is not a litmus test. No link is used to indicate that the expected EPS acquisition or de-recognition is an important indication that the acquisition will create or undermine value. Deals that strengthen short-term EPS and deals that undermine short-term EPS may equally create or undermine value.

Case 3: Facebook high Price acquisition of WhatsApp's

The February 2014 announcement of Facebook's WhatsApp acquisition

program, a five-year instant messaging service with 55 employees, $ 19 billion and stock is an example — especially as WhatsApp has just completed a round of business grant that cost the company $ 1.5 billion. Shortly after Facebook announced the acquisition, its share price dropped by 5 percent due to doubts about the deal and the company's reason. It took a few days - and a concerted effort to contact investors - for investors to understand the basics of the agreement, both strategically and financially. The market finally awarded Facebook a cumulative abnormal return (CAR) of 1.1 percent. (CAR assesses the impact of the agreement by estimating the total change in market price over a seven-day period based on the date of the purchase announcement.) its mobile location at the same time. Perhaps most notably, the price paid for WhatsApp was $ 42 per mobile user — a few times less than the market price per Facebook personal user ($ 141) or social networking site, Twitter ($ 124).

Case 4: Haliburton acquisition of Baker Huges in the face plunging oil price

Crude recently declined for almost 6 years amid US overcrowding due to shale oil and slow economic growth in China, Japan and Europe. Declining oil prices look set to spark another wave of industrialization, given uncertainty over global economic recovery and green prices.

That makes high-energy companies, from manufacturers to oil testers, cheaper for consumers to live with the certainty of strike action. Over the past 18 months Big Oil has been under pressure from shareholders to keep track of the number of items that are more important than volume - to improve their return on investment rather than focusing on product growth. As a result, oil majors were in a state of disrepair. But with oil at 60 percent cheaper since June, companies are likely to change course and consolidate, with everything from mass mergers and opportunistic purchases to pressurized shale oil producers on cards.

Large companies view this refinement as a window of opportunity for resources that can improve their performance and generate corporate benefits.

Divestitures

Inaction in a rapidly changing world is not an option. The real reason for many deals is no longer valid as economic speculation is made in a different market place. Companies should consider whether that investment brings the expected value or if the capital can be better distributed elsewhere. Critical diversification is the key to raising money and investing in the company's core business.

Managers often worry that divestitures will seem like accepting failure, making their companies smaller, and lowering their stock market value. However research shows thatthe stock market always responds well to stock market announcements. Different business units also benefit. Studies have shown that interest rates for small businesses usually increase by a third within three years of completion. These findings

illustrate the benefits of continuing to apply the principle of the best owner.

Many Reasons to Quit

Companies divide goods and services to suit the ever-changing uncertain and complex business environment. Other factors change over time with changes in the economy, the flexibility of each industry but the three most closely related are the following:

• Focus on the core

Leading players re-invest their businesses in their highly profitable and fast-growing units. Some companies now have a number of non-essential assets due to the increase in new locations, nearby businesses and new locations. In order to remain competitive and adaptable, these companies need to identify people who may be able to be separated for a small fee but need additional funding and / or management time.

• Generating Money

Revenue from the sale of assets is often used to finance the acquisition or reduction of debt, especially if companies expand or the economy declines or sometimes returns direct income to shareholders by repurchasing shares or shares at the same time. Big markets are sensitive to how profitable companies handle balance sheets. Such methods are often used in slow-moving industries where investment opportunities are low except when managers start a diversification program.

• Improving Performance

The dividing company usually gets a higher profit by focusing on the core functions. Often a trading or converted business was an orphan business that received insufficient investment and attention and as a result produced poor performance. Its sale raises overall profitability by increasing managers' attention to surplus assets and better allocation of funds.

Strong evidence suggests that financial markets reward emerging companies, especially if they make huge profits, and that split companies often improve the productivity and performance of their other operations.

Increases Value: Select Right Exit Route

Deciding to dive is one decision. Deciding how to open the full amount of garbage disposal is another, often complicated, step. Increasing the value depends largely on choosing the right outlet. Companies have three basic ways of disposing of unwanted businesses or assets: direct sales to another buyer; wandering around company shareholders; and carve-out, in which a parent company sells part of the profits to the public while retaining ownership - usually a controlling profit.

Commercial Trading: Fast, easy, and low risk. It is an auction for direct money to another company or individual buyer. It generates a lot of cash for a commodity. A retailer can use it to invest in its left-out businesses, make purchases, pay off debt, or return it to shareholders and this is the only way that exists where the seller has the ability to indirectly participate in the business, that is, the new owner's relationship with the acquired business.

They are the preferred option in times of high volatility, when IPOs are cunning to use them.

Spin-off: It usually comes from re-focusing on a portfolio and getting out of the business line. They do not produce cash but usually produce a large amount of shareholders. They usually have tax advantages and high termination security.

Carve-outs: Under appropriate circumstances, companies may be able to obtain their own cake and eat it using a recording strategy to classify, at least part of the insignificant business or asset that managers believe is not to be underestimated. Carve-out usually involves the IPO of a particular segment of the cash-generating business to be reduced or re-invested. The company maintains a balance, which can be maintained for a long time or can be deducted from a second donation at a future date. They also allow the parent company to participate in the future growth of stolen property — a market potential that enjoys the status of new goods or services in sectors that are bound to increase the cycle.

Managing in the Face of Exchange Rate Volatility

The great power of the great economy and the political uncertainty of the world have the power to force a continuous depreciation of the single currency relative to other currencies. Strong and long-term changes in exchange rates create cost conflicts and revenue models leading to operational and strategic risks. In order to develop effective risk

management strategies, companies need to assess risks arising from cost sensitivity and variable revenue under various exchange rate conditions. Managing exchange rate risk (external risk) by simply assessing the financial implications of pay-outs and receivables - using sophisticated financial models, usually from the finance department - is a very limited approach. Its main benefit is to reduce the impact of short-term exchange rate fluctuations on imminent cash flows. However, in the global arena, a long-term decline in the value of the currency compared to other currencies could put future cash flows at risk.

Leading companies have deployed various fences to effectively manage the risk of bias and prevent price erosion.

• Moving production bases and marketing strategies to the final markets

• Develop acquisition and supply networks to limit financial risk

• Redirecting investment and marketing investments towards strong financial markets

• Pursuing exports through product development to enhance global attractiveness

• Increasing productivity in foreign and foreign jobs

Therefore, as a matter of fact, companies that are exposed to long-term risks should prepare themselves in advance. They can do this by: 1) Identifying and evaluating all types of risk factors, including performance and strategies, the company is experiencing due to

long-term changes in exchange rate; 2) Using effective fencing strategies to reduce risk and increase opportunities

Companies with a range of international products in international markets will not only have risk of exchange rates from an accounting angle, but risks from their competitive positions and revenue fluctuations due to the large and massive inflationary volatility. Financial protection strategies are effective in reducing small and short-term volatility. But in order to avoid the consequences of major, long-term changes in the value of the dollar, companies are strongly advised to adopt security measures. This provides flexibility for managing the dynamic supply chain and markets, thus allowing for flexible and efficient management of cost-effectiveness as the strength of a major international economy influences the global market environment.

Leaders, who want to be progressive and responsive in VUCA world, may resort to strategic decisions with respect to:

Vision

Successful leaders do not accept any changes to diminish their vision; however, they may revisit their ideation to reach the pinnacle of their objectives. In their 1996 Harvard Business Review article, "Building Your Company's Vision," Jim Collins and Jerry I. Porras wrote that a vision consists of two important elements and two sub-elements: a central idea (including basic values and context) and the future (s) -BHAG – Big Hairy Audacious Goal- 10 to 30 years from now with clear definition.

In this age of change, leaders must adhere to their core values; central purpose; and their intelligent intentions. Yes, they can modify their strategies to fit the situation, but they should always keep in mind their point of view.

The VUCA Paradigm and the Coronavirus Crisis

Social scientists have proposed the VUCA paradigm (Volatility, Uncertainty, Complexity, Ambiguity) as a helpful concept to make sense of some of the modern phenomena affecting leaders' behaviour, style, decision-making and reasoning. They believe this is necessary because 21st century factors influencing leadership aren't accounted for, or given enough weight, in previous frameworks. Like many helpful concepts, the elements can have a touch of common sense. However, I believe that in combination, it gives you a different lens to look through when appraising the performance of business leaders responding to coronavirus and more importantly, to examine the challenges you face in your work from a different perspective. I have changed the order of the concepts in the acronym because for me, it all starts with complexity.

• **Complexity**

The clearest lessons from the coronavirus crisis is that the world is increasingly interconnected and complex. The national systems for public health, management of the economy, education and transport, among others, are all so mutually dependent that a crisis in one system cannot be treated as a single issue. You only have to look

at the struggles of governments to co-ordinate the restrictions on daily life in response to the virus, and their difficulties in ending those restrictions safely, to find evidence to support this viewpoint. The situation is further compounded by the inter-relatedness of international and multi-national factors such as globalisation, the exponential rise in population number and mobility, the ubiquity and dominance of a small number of big tech companies, the hyper-speed of digital communication and the prevalence of intercontinental supply chain management for all goods, even essential ones. It all leads to complexity beyond comprehension. Even with the best medical and scientific advice available and the processing power of several super-computers, political leaders responding to the coronavirus crisis have to weigh the importance of every decision against multiple multi-dependent factors in a dynamic, real time and fast evolving crisis. It is a difficult task which requires highly developed leadership skills to get right.

- **Volatility**

Our 21st century complex world has not developed into its current state by adhering to a plan or blueprint, it is more Darwinian and volatile. Our social structures have evolved over millennia in an unplanned way through experimentation and problem solving, similar to the process of natural selection for all living things. The changes are not due to genetic mutation, they are changes in between genes of the same species, humans. This has always been true. However, the pace of social change

is accelerating in our time, mainly due to the factors listed above. Most notable of these is the almost instantaneous speed of global information sharing and the relative ease of intercontinental travel. As a result, the advances in human society can be more rapidly shared and bring benefit to many more people quickly. However, there are inevitable unintentional negative impacts of innovation and progress, sometimes leading to new phenomena and events with global consequences. The crises are simultaneous and overlapping. As one crisis recedes, the next is ready to take its place. The consequences of the measures we have taken to avoid further deaths from coronavirus are the seeds of the next crisis, an economic recession. The 21st century is a more volatile world and there is change that brings benefits to many, but the frequency of these level based threats to us all is increasing.

- **Uncertainty**

Increasingly, we don't know what to do to resolve the challenges that face us. To take our example, we know the basics of why any virus could be a threat to life but for the majority of people, we had never heard of coronavirus previously. It was a new threat. Now, we understand the cause and effect that could lead to many thousands dying and consequently, there was and is general support for the first wave of measures needed to stop the spread of the virus. However, there is uncertainty in when they should start, what measures are most effective and how these measures could be relaxed safely? This uncertainty exists at all levels; in governments, in organizations

and in families. For example, despite the virus representing the same threat to life in all countries, there is a wide disparity in how each government has chosen to deal with the crisis. Some variety in approach is due to the differences on the ground, but not all of it. In many organizations, previous business planning has been rendered obsolete by the crisis, and senior leaders of companies with similar challenges will devise very different strategies to help their company survive. For families, even decisions about whether to go to the local hospital for urgent healthcare is now uncertain, as there is an increased risk of contracting the virus whilst there. The uncertainty is created because there are no elegant solutions to these problems, obvious to all. There are only messy solutions which are contested and debated. It is also true that different stakeholder groups will lobby to influence decisions, through fair means and foul, to maximize good outcomes for their members at the expense of others. In these circumstances, finding a solution that is good enough for all is very difficult. There is no Utopian or universal solution, and uncertainty about what to do for the best is a new norm.

• **Ambiguity**

It is difficult to establish the truth of any matter if you can't distinguish between information and misinformation. The situation is often ambiguous as you may not have the full picture. Nowadays, there is more data on every subject for us to consult than ever before, and it is more open to manipulation than ever before.

This aspect of the modern world has important implications for leadership. For example, is the coronavirus a natural threat to global public health which requires increased international co-operation to find a solution? Or is it a new form of biological weapon deliberately released to do harm which must be defeated and avenged? The response of different governments and organizations will reflect the view they form of what type of problem they are dealing with. Ambiguity is not to be confused with either ambivalence or non-engagement. In the former, the leader doesn't care strongly how a crisis is responded to, and in the latter, the leader dismisses the evidence that a crisis is happening at all. It would be unwise for a modern political leader responding to the coronavirus crisis to behave in way which demonstrates an ambivalence towards the deaths of their people or in a way which acts like the crisis isn't happening at all (although, it seems like a high profile leader in South America is doing exactly this). However, even when a leader is fully engaged and seeking to create best outcomes for all, their perception of the current crisis is very likely to be beset with ambiguity: global health threat or new biological weapon; restrict personal freedoms or appeal for public support; priorities individual health outcomes or emphasize the health of the economy. Increasingly, how political leaders respond to the ambiguity of modern problems, shapes how they make sense of the crises like the coronavirus and ultimately, what they choose to do about it.

Corona Virus and its Impacts on Money Market

The economic ups and downs because of Corona virus pandemic have resulted in a turmoil that has yet to be negated. The financial crisis including money markets, oil prices, commodity prices' fluctuations, stock markets; all have been attributed to the pandemic. The Covid 19 recession has had a tremendous negative impact on the market scenario all over the world. Since not much was known as to how to curtail this Covid crisis, the damage continued for a long time. Many countries had to resort to lockdowns, many suffered losses in tourism sector, transports were restricted, food was scarce, the markets had come crashing down and many such difficulties had to be faced by people.

The banks and the financial institutions suffered setbacks. The country risk experts, academicians, financial gurus, economists were left at lurch and because of these unprecedented events, a calamity was looming large.

Stocks: The FTSE 100 and Dow Jones Industrial Average dropped more than 3% in early 2020 because of the virus outbreak.Thus, Stock market suffered.

Oil Prices: There was a collapse in oil and oil prices due to this shock. It was one of the biggest drop, the largest price shock since the market experienced since 1973.

Debt and Bonds: The situation worsened with firms getting dissolved, the debt amount increased, financial system with respect to bond market and debt collapsed. The amount of borrowing by institutions created a dip in the whole system.

The developed as well as developing nations witnessed a hit in the emerging global markets, with market returns being thoroughly compromised. In a nutshell, the coronavirus epidemic has led into a sharp decline in world economies, a long-lasting recessionary period, de motivation amongst people and lack of confidence in doing further businesses.

Is the COVID-19 crisis just "another" large-scale shock?

We think not. Its origin as a health shock, an unprecedented global pandemic, makes it fundamentally different from previous financial and economic crises, including the GFC and the Great Recession. A deadly virus attacked not only the health of individuals but also that of the entire economy, creating stress in financial markets not seen since the GFC. While both Congress and the Federal Reserve stepped in right away to apply lessons learned from the GFC, the U.S. economy has not fully recovered more than a year later. Hence, putting the origin of the shock aside, the magnitude and scope of the intervention are surely unprecedented and will affect economics and finance research for years to come.

The VUCA Paradigm and Organizational Leadership in the 21st Century

The VUCA paradigm is helpful to leaders of organizations as well as those of nation states. Although the scale is different, the complexity,

volatility, uncertainty and ambiguity of modern social structures affects the role expectations and behaviour of 21st century leaders at all levels during periods of crisis as well as periods of relative stability.

A leadership role in a 21st century organization requires the person holding it to respond to and overcome phenomena and factors which are novel to our century and evolving dynamically at a fast pace. These new challenges require new ways of thinking to assist leaders with their roles. Some of the challenges facing us all are

- Sustainability of planet, national economy and sector all under question

- Unpredictable economic conditions grossly affected by macro crises

- Multiple regulatory frameworks with extending influence

- Rising knowledge intensity of work

- Impact of a global marketplace and the rise of venture capitalism

- Emergence of artificial intelligence (AI) as a replacement for human systems

- Changes in societal structure and values

- Complex, non-transparent and divergent stakeholder expectations

- Increasing complexity for business processes and models

Some of these factors were present for previous generations but not in their current form or their intensity. Some were not challenges for previous leaders and are entirely novel for 21st century organizations. For every leader in role now, it will be possible for you to track the impact of each of these challenges over the last 5 years. In my experience of running Young Foundations, the frequency and scale of the problems we face is increasing. There are new difficulties this year which were not part of our business planning last year. The most obvious example is the coronavirus crisis. Yet, my organization has also had to deal with the impact of global warming, the impact of multiple regulatory frameworks, the impact of venture capitalism on our sector, and the rising knowledge intensity of the work among many others. As discussed previously, the challenges co-exist and are occasionally co-elements or multiple dimensions of single event or problem.

Given the scale and complexity of the issues listed above, the task for leaders in the 21st century is to choose groups of solutions which work well together and create stakeholder belief in a temporary state of group safety and security. It is temporary because the situation can change quickly and the state of safety and security will need to be rebuilt over and over in the new circumstances.

So does viewing these levels of problems through a VUCA lens help an organizational leader to respond successfully. I think the answer is yes and I will show you why I think this in relation to each of the four categories separately, and then I'll link them again as a group.

- Complexity - when faced with problems with many interconnected parts and variables and where the nature of information is too big or too specialist for you to process, a leader could respond by structuring their business such that it has experts available who can decode the information and make it more understandable. Example - Young Foundations was overwhelmed by the implications of how to respond to GDPR legislation. We hold and process a lot of personal information as part of our work. Our solution was to employ a part-time expert who researched the issue and formed a project team to work on solutions at all levels. We gave them responsibility for keeping the organisation safe in data management and gave them permission to make changes to do so.

- Volatility - when faced with problems which are unexpected, arrive quickly and will last for an unknown duration, a leader could respond by ensuring their business is running with a small amount of extra resource, inventory and talent to create preparedness for emergency responses. Example - Young Foundations requires each service to have a fully operational manager, registered with our regulator, focused on supporting the team in their work. When a manager was either not available due to an unplanned event or temporarily overwhelmed by increased workload, the service's safety was at risk. The solution was to employ full-time deputies to assist all of the time and deputize when required.

- Uncertainty - when faced with problems where you don't know what to do even though the basic problem is understood, how to fix it is not clear, a leader could respond by investing in more information collection, analysis and discussion amongst a wide group of people in their organisation and creating structures which support sharing the burden of not knowing. Example - Young Foundations looks after children with very poor mental health and we don't know what to do to help them most of the time. The families and authorities who ask us to look after their children see us as experts and expect us to know how to help their child. We use a Multi-Disciplinary Team to discuss each child fortnightly where their challenges are discussed and solutions sought. Often the start of unlocking the most difficult of problems is when someone says I don't know what to do.

- Ambiguity - when faced with problems that are completely unclear and their cause could be anyone of a number of things, a leader could decide to experiment to test out their theories as to why something is happening and what could be done to either keep it happening or bring it to a stop. Example - Young Foundations has a residential service which has never

had a referral from its host local authority, the county within which it sits. We didn't know why. We did a needs analysis and confirmed there were local children needing our services. We did a competitor analysis and confirmed our nearest direct competitor was out of county. We improved our marketing to ensure we were known to the local authority. Eventually, we got to meet the lead official with responsibility and she said we didn't have any referrals because she didn't like 'for profit' providers of social care. So we stopped trying, and carried on looking after children from other local authorities.

The VUCA lens allowed me and the rest of the organization to see problems differently and to apply solutions differently than would've been the case without it. Using the four categories together allows a leader to look at a problem and ask what type of problem is this? I have presented the examples as if the problem fits neatly into one of the categories only, normally it doesn't. Usually, there is overlap and a problem could have many aspects either immediately and throughout, or such that as you make progress the nature of the problem changes and the emphasis shifts. The latter is far more common in my experience.

A Culture of Successful Leaders

There are implications from adopting this approach for the type of leadership more likely to be successful in 21st century circumstances. The social and communicative elements of leadership will be emphasized because creating and perpetuating a belief in the temporary state of group safety and security is linked to each follower's dynamic appraisal of the leader's behaviour, style, decision making and reasoning. In addition, leadership in the 21st century has to more of a shared space where the person in charge creates organisational structures that allows leadership from below, or more accurately, leadership from more than one place. This is only possible if the organization and the leader both agree that it is in group's benefit for it to do so. Where they do, and a leader is mature and confident in role, i.e. they believe that sharing the task of leadership is not a threat to their role, the right voice will step forward, receive permission and support, and take primacy according to the requirement of the time. In this way, a culture of leaders can be developed with a system for identifying more than one voice of leadership in response to multiplicity of challenges the organisation faces.

However, the leader is also asked to integrate the different voices or contributions in to a coherent whole. It is a bricolage, something created from a diverse range of things, and the role of bricoleur in needed to decide which elements, from all of those available, would work well together, align with group values and norms and be consistent with the primary task of organisational survival. There will be tensions and inconsistencies between the different voices of leadership from within the organisation and their

proposals for inclusion. The art of leadership lies in the decision making of which elements, at which time and in which combination. So there is still a role for a senior leader, someone who takes on the task of creating the holistic response to a crisis or for finalising an organisation's strategy for business survival. However, historical or even earlier modern idealised versions of leaders may not be a good fit for this task and the challenges of the 21st century.

The body of knowledge pertaining to leadership, accumulated over centuries, remains relevant, but new knowledge is always being created at its margins which extends our understanding. In science, all of the theories explaining the world as we see it are subject to continual testing by the current generation of scientists. In this way our cumulative understanding of the universe is expanded. This is also true of the separate and less scientific study of leadership. There is an ever expanding literature in this field with a bewildering array of theoretical and practical explanations for successful and unsuccessful leadership. It would not be possible to read them all. Therefore, you have to choose and I think it is helpful to mix reading from classics in the field with some new knowledge being created at the margins. The VUCA paradigm is from the margins of new knowledge in the field of leadership and it may be helpful to you or not. There is certainly plenty of choice.

In Young Foundations, not because of our use of this concept but because of our cumulative knowledge and experience in leadership, we have created a structure which promotes thoughtfulness and transparency within a group of leaders and managers. We support each other to face and respond to our individual and collective problems, the goal is to be present in the reality of our situation, and to help each other stay there.

Prior to the coronavirus crisis, each month, everyone with the title of manager or head teacher met for two days in our office in Chester. The first day is spent reviewing performance for the previous month in a group session where everyone's data is available to all. It is an accountability meeting, a discussion meeting, a coordination meeting and a support meeting all in one. Everyone is expected to be fully engaged in all discussions. It is chaired by a director but each manager is answerable to the group for their performance. Standards of excellence are incrementally set by the group for the group. A mix of quantitative and qualitative data is reviewed and there is no hiding place from the scrutiny of all. The evening is spent at a local hotel. The group eat together and socialise together. Inevitably, the majority of the discussion is about work but there is space to get to know each other's family life and other interests. It is a work space and how you engage in the evening is part of your work in Young Foundations. The second day is space for sharing ideas and for discussion of concepts which could be helpful to all managers in their work. Usually, everyone is asked to read a paper on a chosen topic and to discuss in a seminar style led by a director. A lot of discussions return to the theme of

company culture and values with great emphasis placed on each individual manager's engagement with their work from this perspective.

The group of Young Foundations managers can be a daunting one to join. When first introduced, new managers recognise and appreciate the strength of relationships between individuals, how interested they are in each other's work and how much they know about each other's services. Maybe they have experienced this before or maybe not, but it is usually what newcomers see and comment on first. The second level of awareness comes after they have attended the meeting for two or three occasions, they become increasingly aware that they are fully accountable for the outcomes of their service. When reporting on the performance of their service, any answer which places responsibility for an outcome outside of them and what they could do to improve it will be challenged. The most common pitfall for a new manager is for them to blame their staff team for not doing what they asked them to do. Every other manager will challenge them and give advice and guidance on how they can improve performance and understanding. A third level of awareness occurs when the (now, a little more experienced) manager realises how hard it is for them to be successful when judged against all of the group's standards. Fundamentally, the most important standard is good outcomes for the people you look after or educate but the manager is also expected to lead a team of other professionals, maintain full

occupancy in their service, achieve high outcomes with their regulator, maintain safety for all, have an environment that is fit for purpose and develop their knowledge and understanding related to their task and role. Good commercial outcomes are seen as a consequence of meeting and exceeding all of the other standards. The fourth level of awareness is that they are co-responsible for setting and maintaining the high standards of all managers in the group and that they're contribution to the organisation isn't only how successful their service is but how successful all of the services are. Finally, the last level of awareness is purpose. The organisation exists to create better outcomes for the children and young people we look after, and if what we are doing is not in service of that purpose then we need to stop and start again.

VUCA and Ukraine Crisis

The developments after the Russia's invasion into Ukraine have been fluid and depressing. Not only has been a total devastation of human toll but also a downside of declining economy of the world was witnessed. The market fluctuations, and the volatility in the crisis has led to ambiguous situation of the global trends, giving rise to consequences that are difficult to fathom. In this kind of adversity with the whole of Europe besides the world was re aligning themselves to shocks in the financial sector. The instability at the macro level and the risk of escalating issues gave rise to geopolitical problems. The Ukraine crisis gave way to rising prices, slower growth in the economy,

complex financial losses and shocks in the politics.

The (re)insurance market is closely monitored with developments ready to support with direct investments and manageable resources. Post Invasion of Ukraine, there has been a lesson for all dealing with VUCA like situations that things can go out of control if war like situations are not handled with proper care. The rising costs of Energy led to inflation in the core areas. It has also added new risks.

The shock at the Supply level was seen at a different level, not seen earlier in decades. The consumer demand boomed, the manufactured goods were needed, the problem of inflation persisted, supply chain was disrupted worldwide. The factories were closed, logistics was halted, delivery times were longer, constraints in the financial markets led to uncertainty. Many suppliers had to shut shops because of unavailable resources and volatility of the situation.

The Labour market in few countries underwent a dip as the unemployment level hit the lowest. The countries like United States of America and United Kingdom's labour witnessed a wave of worker movement. The Ukraine conflict made the task more difficult of balancing the high pressures in supply and the tight manpower market.

The ever-increasing Commodity prices of energy and non- energy products went sky rocketing. The fluctuations in production market spread into less affected areas of economy where the trade-offs were challenged. Post Covid gains clearly vanished from the scene as if the Covid had not much damage, people had to suffer the losses because of the Ukraine crisis.

5. Conclusion

So here are the 10 conclusions, you might read the article and come up with 10 different ones but these are few delineated.

1. The world is more complex, volatile, uncertain and ambiguous than ever before.

2. The VUCA paradigm can be helpful to leaders, and those appraising their performance, in thinking about unique qualities of 21st century problems.

3. This is equally true of macro-level crises such as the current coronavirus crisis and of the more routine leadership task of organisational survival.

4. Leadership in the 21st century is better understood as a system operated by many people rather than as a position held by one.

5. The role of leader is changing and has within it a new requirement to share the task with others.

6. The leader must find the right mix of solutions from divergent elements, in many organisations this remains the task of a single person.

7. Structured forums for group leadership can create a culture of successful leaders.

8. The group must help each other to stay focused on the reality of the problems they face.

9. The group will have a better chance of being successful if members are strongly connected to each other and to the purpose of the organisation.

10. The leadership task is understood as the creation of a temporary state of safety and security which needs to be rebuilt over and over again.

Concluding Remark

So concluding in the words of Danish philosopher Soren Kierkegaard - 'Business can only be understood backwards, but it must be managed going forward.' New companies are emerging to pursue new opportunities, while established companies that are unable to adapt are failing. The only way to avoid this harsh Darwin pressure is to adapt to changing circumstances before the market forces choose from any company. The final message is that uncertainty and instability create both an opportunity and a risk, Organizations that want to ignore it are at risk of unexpected and destructive force, Uncertainty will grow until the organization finds itself completely out of place - to force it to initiate disaster risk management and business transformation. Another is to engage in uncertainty and hold a campaign and make it an opportunity. An organization that learns to deal with uncertainty will be the one that will prosper in the decades to come.

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Quality Performance and Capacity Improvement Model for the Service Sector Industries

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Abstract:

Service sector industries are becoming the most prominent economic contributors almost in all countries for its' increasing share in the GDP with major impact in employment generation. Service industries are advancing in developed & developing countries with high mass consumptions and owing to enrichment in standard of living with modern life styles. Industry revolutions and extensive application of Cyber Physical System in the services with indispensability of digital interventions in our daily life booming service sectors since last two decades. Exponential growth with technological transformation, robust changes in the process of communication and useful & inevitable use of apps in everyday life leverage the service sectors. Online communication and impact of covid19 in the working methods, services in both developed and developing countries created a remarkable opportunity in various dimensions in all economies. New prospects of business in service industries are producing employment, wide spreads the volume of business and created higher money velocity with GDP.

The objective of this research study is defined with outcomes are, develop a service improvement framework with applicable quality techniques, service improvement structure with parameters through a model, factors of operational efficiency measurement & improvement, and detailed control and improvement points for the service organization enhancement with service efficiency. This study results will assist to service owners, management and stakeholders to comprehend and recognize the gaps in their various services domains, required initiatives for outspreading business, profit, manage quality, generate internal efficiency, customer's delight, planning for execution, improvement benchmark and organized method for attending critical areas of business & services.

Keywords: Customer Satisfaction, Total Quality Management, First Time Right, Overall Service Efficiency (OSE), Gross Domestic production (GDP).

1. INTRODUCTION

Service sector incessantly value-adding in all aspects of people's life through the digitalization and technical & business innovations. The magnitudes and process engineering are enormous in-service industries and it is expanding with times and technology. **In definition,** Service Sector (SS) might be defined as an economic segment that performs certain tangible and intangible activities that fulfils certain needs with value creation. Companies within this industry performs actions that are useful to their customers.

Service industries covers many sectors like banking, communications, wholesale and retail trade, all professional services such as engineering, computer software development, medicine & health care, non-profit economic activity, education, all consumer services, and all government services including defence sector and administration of justice etc.
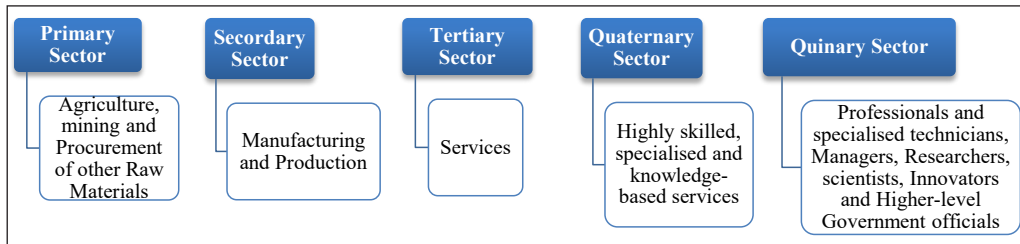
Figure 1: Various sectors with Services

There is a gap in the service industries, in terms of organized method of advancement through a model to control & monitor the growth for the management and stakeholders to comprehend the broad and essential mechanism of various initiatives in this sector. Various technical & operational features are essential to design the service criteria such as service quality, value stream, service time, processes & reengineering, service planning, customer communication, methodology with principles of good service, management and control of efficiency with performance.

2. STUDY OBJECTIVES

Service companies moving forward with various internal and external challenges, that affects the progress, and these requires to resolves with planning and prioritizing the customer's expectation for getting new business with service extensions. The purpose of design a model is to contribute the service industries for achieving more efficacy in operation, best services to customers, generate efficiency for service preparation and effectiveness in business promotion with technical advancement.

Services sectors persisting with Post covid impact and world-wise shadow of recession. So, there are various service-related problems identified in this study, which are to find a model-based development applied in service industries, what are the quality improvement tools and parameters, to comprehend the operational efficiency measurement and improvement methodologies and what will the elements of control & improvement the services, and enhancement of service volume with zero failures.

Based on the above identified problems, the research objectives are designed as, develop a service sector improvement framework with applicable quality techniques; Structure the service industry improvement structure and parameters of the model; Develop the factors of operational efficiency improvement; and Detailed control and improvement points for the service organization enhancement and service perfection.

3. STUDY METHODOLOGIES

This study process followed Descriptive Research with attempts to systematically analyze the state of operations, problems & constraints, phenomenon, analysis-based information about the present circumstances of a service organization with primary issues. It is an Exploratory Research method which are combined with the study objectives for exploring the realm that relatively not as much of is explored to analysis the possibilities to undertake that particular research study. This methodology is a retrospective -prospective studies converging the past trends in a phenomenon of the organization and forthcoming sate study with planning. Process of the data collection is reflective with documented from the current data & on progress before the interruption and next from the population study followed to govern the effect of the engrossment & connection is analysed, established with results.

Applied sampling method are, define sample size of average 15 to 16 nos. service units from industries and various levels of an organization with developed matrix or table. Sampling methods also includes the targeted sampling where the samples are selected and collected from industry / cluster as per confirmation from units & convenience to the study with it, and whenever a person or expert with the availability & appropriate types are observed, that person is asked to share the impressions for this study. Expert sampling, where experts and respondents must be known the respective areas and interested to respond for value-addition to this study.

4. LITERATURE REVIEW ON PREVIOUS MODEL AND STUDIES

Various important models of improvement are developed for casting aside the business problems into excellence by like Baldridge and Deming, Masaki Emai - TQM, EFQM (European Foundation for Quality Management), country's BE models and many research scholars. Organizational efficiency which is applicable to SS by using a number of quantitative figures such as service / production costs and service production times etc., are also

enumerated by various Gurus. These are Six Criteria of Scott Sink and Thomas Tuttle describes the organization's future on, Effectiveness, Efficiency, Quality - Internal Quality & External Quality, Timeliness: Cycle Time, Waiting Time and, completed Time, Finance and Workplace Environment. These are in respect to manufacturing, but service providers could develop these calculations as per the process and operations applicable for service industries.

Service quality is defined as 'a global judgment or attitude, relating to the overall superiority of the service' (by Parasuraman, Zeithaml and Berry, 1988). The SERVQUAL concept proposes a gap-based conceptualization of service quality, where the gap indicates the extent to which the service obtained conform to expectations.

SERVQUAL is based on a set of five magnitudes which have been consistently ranked by customers to be most important for service quality, regardless of service industry. These dimensions defined by the SERVQUAL measurement instrument are as follows: **Tangibles**: appearance of physical facilities, equipment, personnel, and communicated materials. **Reliability**: ability to perform the promised,

service dependably and accurately. **Responsiveness**: willingness to help customers and provide prompt service. **Assurance**: knowledge and courtesy of employees and their ability to convey trust and confidence. **Empathy**: the caring, individualized attention the firm provides its customers. Access of service: related to service accessibility by customers. Financial aspect: financial transactions with customers. Employee competences: individual skills, abilities and competency of employee required for service.

Customer Satisfaction (CSAT) is calculated by dividing all the positive responses by the total number of responses and multiplying by 100. A CSAT score of 80% is a good indicator of success, although it will vary as per industry. Another concept is DSAT score, it is nothing but the converse of CSAT, in DSAT the customer is judged on the scale of dissatisfaction with the service received. Net Promoter Score is a customer loyalty metric developed by Fred Reichheld, Bain & Company and Sat-Metrix. Following points are important for reducing the DSAT in service with applying the dimensions of quality.
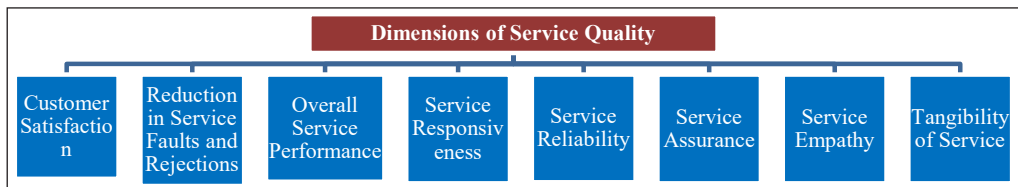

Figure 2: Various Dimensions of Service Quality

Nine Technical Service Quality Approaches for measuring and improving service quality, developed by experts. SERVQUAL, the most common method for measuring the subjective elements of service quality. Mystery Shopping: This is a prevalent technique generally applied in retail stores, hotels, and restaurants, but applies for any other services as well. Post Service Rating: In this practice, the process is applied by requesting customers to assess the service delivered to them after it has been completed. Follow-Up Survey: Through this method company or service providers ask customers to assess the service quality through an email survey or any other procedure like Google Forms etc. In-App Survey: As various apps are commonly available and by using an in-app survey method, the queries are asked while the visitor is on the website or in the app, instead of after the service or via email. Customer Effort Score (CES): This measure proposed in Harvard Business Review article; which describes aiming to 'delight' the customer – to exceed service expectations, it's more likely for a customer to punish companies for bad service than reward companies for good service. Social Media Monitoring: In the present technological progress, this method is gaining momentum with the rise in the use of social media. Through this media people could release their problems and benefits which be unlash to perceive. Documentation Analysis: Through the collection of primary data and records for service process, times etc., by various online or offline method i.e., with qualitative approach enables companies for better and corrective planning. Objective service matrixes: Service matrix plays a vital role in showing which areas company requires to improve. This statistical data provides the objective, quantitative analysis of any service.

5. STUDY AND ANALYSIS

5.1 Developed Service Sector Improvement Model with Applicable Quality Techniques

After studies in service organization and industry case studies, major concern of quality in service industry is managing the quality, which is primarily linked with the training to grow capable peoples for best performance, develop standard operating & quality procedures for consistent & fault-free services. Another significant point in service industries is service quality assurance through progressive system generation, possible application of digitalization for capacity building & improvement, develop capabilities, system reliability, enhance human competency & motivate to front-line servicers and for proficient supply channels.

This study also reflects that effective customer services ensure customer expectations with cost effective services, develop businesses and ensures efficient system building. Structure and organized system are essential for good services and it is observed that expect some service industries with global presence, most have Gaps in technical aspects & experts for improvement & innovation. Existing good business not assures the

sustainable performance. Following are the outcomes in these areas.

5.1.1: Tools and Techniques to Improve Quality in Service Process

i) Develop System & Process Quality for efficiency and effectiveness services

ii) FTR / FTA; First Time right in the process for First-time acceptance by customers

iii) Poka yoke: Mistake Proofing techniques in the service preparation for conformities

iv) Quality at all places and self-reliance at each place instantly - Assurance & Reliability

v) Planning Quality online with Digital applications in the strategy as per market with next generation business strategies

vi) Apply 7QC Tools for Analysis and Action with Lean Six-sigma techniques as per applicability

vii) Develop Online and off-line checking, Layer-wise Quality Assurance

viii) Use PDCA Cycle for step-wise overall quality and journey of improvement

ix) Total Quality Management for organization quality culture through employees and management

x) Use quality control Tools and statistical process control with various control charts.

5.1.2: Quality in Culture to Control through implementation of the Quality Tools

i) **Study** and identify the problems of quality, productivity and efficiency

ii) Establish and generate the individual **commitment** to quality through responsibility

iii) Learning on essential **Training** on Quality techniques, data validation, Digitization, monitoring and control system

iv) Develop **check points** with sheets at various levels of operations, deviations in planning & execution, put the systems and process of checking in the service stations and its' process

v) Service **Readiness** with checking in practice for getting more perfection in services

vi) **Ensure** Quality at each process: FTR and FTA through on/ off line

vii) Implement **Process Excellence** Structure in the Service Excellence.

5.2 Improvement Model for Service Performance

This model describes as a macro view, which is significant for service sector industry's improvement through quality culture with tools and techniques. This developed model is reflective and refractive of the improvement, which could be proposed to include in strategy for applying in service organizations performance enhancement. Model is

based on business planning, customer delivery time, quality and service techniques. It will also assist the industry for better arrangement, sequencing and identifying internal improvement gaps & strategizing the inventiveness on customer services.

5.2.1 Implication of this Proposed Model

i) To perceive the required improvement dimensions at a glance during planning and strategy making

ii) Identify the Priorities and Focus areas in service efficiency and effectiveness

iii) Improve Service Capacity with optimum utilization of resources

iv) Application of Techniques for Improvement and efficiency

v) Application of Service 4.0 Techniques for exponential technological transformation

vi) Areas of Control and monitoring the performance and efficiency

vii) Capacity building with competency

viii) To reach the maximum level of efficiency with business development in the market

ix) For Capability with competitive and achieve the Goals & Targets

x) Customers oriented and driven decisions

xi) Identify the required Interventions of new Techniques and process

xii) Quality of services to customers for loyalty and reliability

xiii) Completion of the services on time and in Totality

xiv) Cost effective services

xv) Total Quality in a Service Industry.

This Model covers points of business development for reaching out to as many as customers, focusing on customers' expectations as per their purchasing and consumption behaviour, quality of services, and through creating organizational strength.

5.2.2 Essentials for Implementation of Service Improvement Model

It is essential to all entrepreneurs to be competitive with advantage for business expansion. Implementation of the techniques and methods of this model depends on the understanding, initiatives and involvement in following arenas by service providers;

i) **Management:** For decision-making, initiative for improvement, employee involvement and business promotion.

ii) **Employee:** Individual commitment on the improvement, connect all activities with customers and process improvement as a process owner.

iii) **Infrastructure:** Establish good customer service processes and stations, and market-oriented investment on infrastructure for customer's services and business expansion with Techniques and Technology.

iv) **Service Efficiency:** Make the service providers and efficient

system, this model is effective for efficiency and service competency, aimed at competitive advancement over the competitors.

The implementers of this model could apply the following extents in their organization by management; how to make the better services to retain the customers with maintaining good quality, apply the service improvement check points as per the developed service efficiency model, for service quality and application of TQM in service industry, awareness on prevention of mistakes with service poka yoke, process of generating new market through forecasting and market research, service measurement, reengineering of business and processes and service performance and efficiency.

5.0.3 Service Industry Improvement Structure and Parameters of the Model
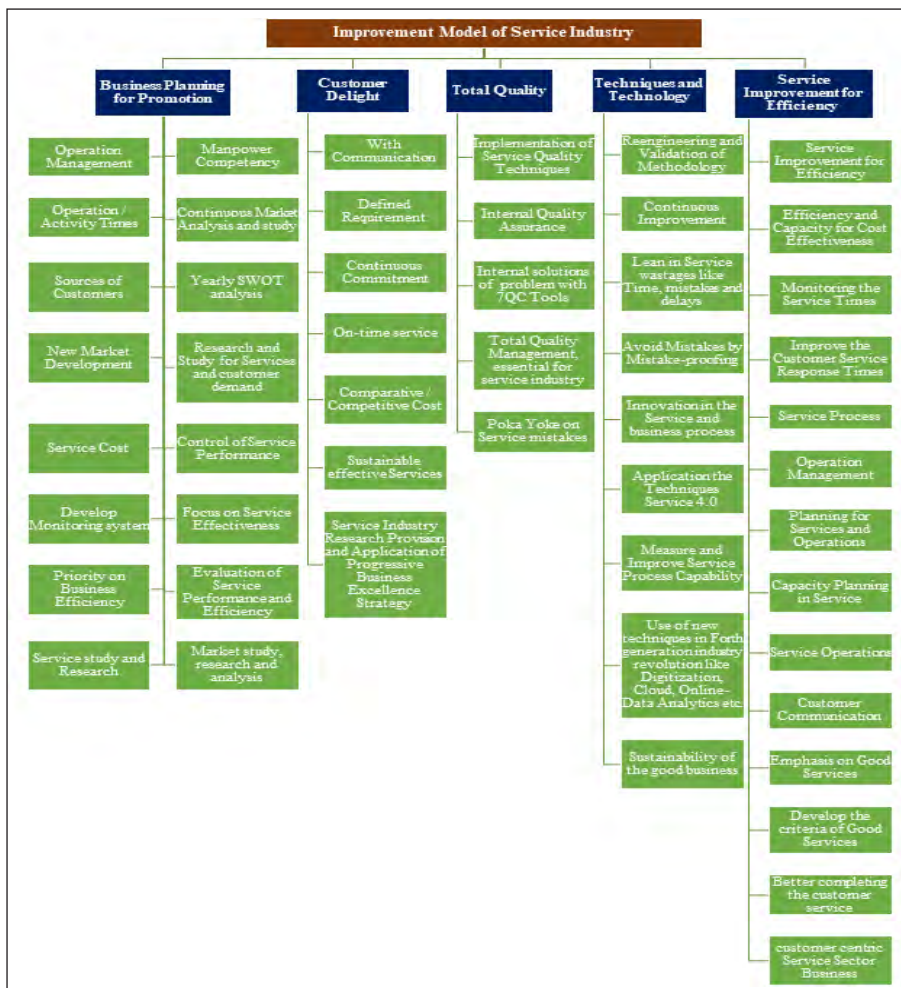
Figure 3: Service Industry Improvement Model

5.3 Process of Measurement and Calculations of Efficiency of service organization

The fundamental target in the service efficiency is optimization of utilization resources in existing system and technology. In the present evolution of Industry 4.0 & 5.0, the fourth & fifth Industrial Revolution entails the digitalization and automation. It changes the processes of service production, among service industries, that are developing on the target of effectiveness with the advancement of IT, cloud computing, Industrial Internet of Things (IIoT), data analytics, robotics, artificial intelligence, and machine learning, considering the factor of cost efficiency & market orientation.

5.3.1 Factors of Operational Efficiency improvement

i) Define the Performance *Benchmark* as per the efficient company's best practices.

ii) *Identify* and *eliminate* wastages by targeting issues like bottlenecks and poor production planning.

iii) Monitor and *manage performance* by setting up dashboards/ control points, statistical analytics and implementing them in daily team meetings.

5.3.2 Overall Service Efficiency (OSE)

It is a calculation used in the service production lines or total services with the parameters of availability, performance and quality of the services. The details of OSE measurement require to be defined to service provider and line managers.

5.3.2.1 Process of Overall Organization Efficiency Measurement

Efficiency Measurement Parameters	Weightage (1%)
Quality: FTA of Services and Zero return by the Customers	100
Optimum **Manpower utilization**	100
Cost of output (Including all Costs) = in Absolute Terms after adjusting/ considering Inflation/ money valuation of Output and Input Service Price. It could be considered as absolute/ total Value addition	As per Business Criticality and evolved Market Competition
Utilization of **Plant and Machineries**	100
Input **Utilization/ Yield Rate**	100
New Business: % of Old Business (as per the market and industry), this criterion may include in Performance Measurement.	As per Business Criticality and Market Trend

Table No. 1: Potential list of Efficiency Measurement Parameters

5.3.3 Depending Factors of the Service Capacity

i) Service Process: Types and variations in services, Combination of Technology and Techniques – Online, Offline, Digitization of the processes

ii) Execution or completion times

iii) Employee competency or efficiency

iv) Total Organizational set up

v) Value addition through analysis/ engineering of operations

vi) Management expertise, competency and effectiveness

vii) Applied Process of Improvement: Training, Improvement Planning

viii) Performance and productivity Target & Achievement

ix) Developed Control and Monitoring mechanism of total services.

5.3.4 Process of Improvement of the Capacity and Efficiency

i) Balancing of all operations, activities or section / group services

ii) Data and fact-based decision making

iii) Application of various techniques

iv) Plan for service demand / requirement, fluctuation and variations

v) Technical Strategy for Slack and Pick Time services: for cost effective and reduction in service wastages

vi) Digitally manage the sequence of services with Time, Manpower, Operations, as per the new dimension I 4.0

vii) Measure the Capacity of each section and sub-operation or sub-services

viii) Employee Improvement planning: Training, Processes, Execution, Criticality and Significance from customer's side

ix) Customer and market-oriented process and service design.

Table No. 2: Parameter Based Assessment of Services

Sr. No.	Parameters	Efficiency Level	Performance Target
1	Various Service Timings		
2	Service Quality		
3	Optimum Utilization of System/ Organization structure, Technology and other Resources		
4	Improvement Planning through Technology and Techniques		
5	Amount of Business Generation		
6	Number of Customer Attained in a certain Time and period		

7	Customer Service Improvement		
8	Service Expansion / Diversification / strategy and Business Development		
9	Planning, Sustainability and Result		
10	Business and Process Reengineering		
11	Improvement of Manpower and Process Competency		
12	Prevention of Faults		

5.4 Detailed control and improvement points for the service organization enhancement and service perfection

These are collective points of Total Service sector's required improvement inventiveness. The operational Head / CPO could review for strategy making and apply these points to control & upgrading their system, process and manpower for cost, customers turn in and commitment aiming to business success, efficiency in expansion. This check points are valuable and significant for service providers for verifying the effectiveness, efficiency and improvements. Total points consist of 12nos. Parameters with 136 sub-parameters / points to improve the Service efficiency. It could be used as an enabler for the Service Operators and managers also.

i) Key Performance Indicators (10 check points)

ii) Factors of the Service Capacity (9 check points)

iii) Capacity and Efficiency for Cost Effectiveness (9 check points)

iv) Service Time (9 check points)

v) Service Process (9 check points)

vi) Service Planning and Establish the Service structure (8 check points)

vii) Planning for Services and Operations (4 check points)

viii) Critical variables and factors for service capacity planning (8 check points)

ix) Prepare for the Services for communication (9 check points)

x) Activate the Types of Communications (5 check points)

xi) Methods of developing effective and good services Procedures (12 check points)

xii) Factors of Good Services (It consists of 10 sub-parameters and 43 check points).

Table 3: Details of the 12nos. Parameters with 136 sub-parameters / points to improve the Service Efficiency with Perfection

Sr. No	Improvement	Initiative areas of the Criterion and Sub-Parameters
1	Key Performance Indicators	Production Volume: Track the quantities that are able to produce
2		Production Downtime: Analyze and optimize the maintenance
3		Production Costs: Monitor the costs implied in the production
4		Defect Loss: Track the defects / damaged items right away
5		Rate of Return: Measure how many items are sent back
6		First Time Right: Understand the performance of your production process
7		Asset Turnover: Acknowledge the assets in relation to the revenue
8		Unit Costs: Track and optimize the unit's costs over the time
9		Return on Assets: Observe how profitable the business is relatively to its assets
10		Maintenance Costs: Evaluate the equipment costs in the long run
11	Factors of the Service Capacity	**Service Process**: Types and variations in services, Combination of Technology and Techniques – Online, Offline, Digitization of the processes
12		Execution or completion times
13		Employee competency or efficiency
14		Total Organization set up
15		Value addition and analysis of values
16		Managerial experience and competency
17		Applied Process of Improvement: Training, Improvement Planning
18		Performance and productivity Target
19		Control and Monitoring of the total service.
20	Capacity and Efficiency for Cost Effectiveness	Balancing of all Operations, activities or Section / Group Services
21		Data and fact-based decision making
22		Application of various techniques
23		Plan for Service Demand / requirement Fluctuation, Variations
24		Technical Strategy for Slack and Pick Time services: For Cost effective and Reduction in Service Wastages
25		Digitally manage the sequence of services with Time, Manpower, Operations, as per the new dimension I 4.0
26		Measure the Capacity of each section and sub-operation or sub- services
27		Employee Improvement planning: Training, Processes, Execution, Criticality and Significance from customer's end
28		Customer and market-oriented process and service design

Sr. No	Improvement	Initiative areas of the Criterion and Sub-Parameters
29	Service Time	Estimation of Services Time for internal planning
30		Customer response and agreed Service Time
31		Internal Service preparation
32		Service Execution Time in workstations and individual operations
33		Total Balancing of Supporting services
34		Total service completion time
35		Service quality, verification and correction Time
36		Any support service completion and trail period
37		Duration of accomplishment of total business, financial and commercial terms.
38	Service Process	Service planning and establish the Service structure
39		Service Readiness
40		Customer Communication
41		Prepare the Services
42		Delivery of the service
43		Customer acceptance
44		Collection of payment against bill
45		Service completion
46		Customer Feedback.
47	Service Planning and Establish the Service structure	Total activities and operations of service
48		Total Time of each activity and operations
49		Customer's Details and service requirements and specifications
50		Assigned Manpower and group
51		Internal Verifications points through developing Check-list or online digital checking
52		Process of Identifications of Mistakes and Failure
53		Techniques of Service Improvement
54		Understanding and application of Quality Standards.
55	Planning for Services and Operations	Types of services may be tangible or intangible which should be offered or provided
56		Process or method to provide these services
57		Decision as per the location of the business and what will be the facilities
58		Estimation and idea about the service requirements.

Sr. No	Improvement	Initiative areas of the Criterion and Sub-Parameters
59	Critical variables and factors for service capacity planning	Number of customers will one have to serve in certain duration
60		Total Estimation of service times with priority services etc. and calculation of actual times, duration days of the week, which times of the day
61		Total Estimation of service times with priority services etc. and calculation of actual times, duration days of the week, which times of the day or scheduling
62		Planning for Managing the services
63		Any Saturation or overload points or nos. of customers as per orders
64		What are external and influencing factors, such as occasions, seasons, weather, holidays, affect the demand for services.
65		Define internal Factors of Services which effects and affects the capacity
66		Estimations of controlled and uncontrolled factors of customer services which could impact the capacity.
67	Prepare for the Services for communication	All main and supporting processes are defined, standardized and followed
68		All Quality points and checked or verified
69		Infrastructure for service are set up, verified and certified
70		Service process completion time and single process times are defined
71		Processes are distributed in individual and in group with responsibility
72		Quality standards are made
73		Manpower are Trained in Tools, Techniques and processes
74		Supporting Functions are defined
75		Total Process Flow are understood and Value Stream are prepared.
76	Activate the Types of Communications	Marketing or promotional communication
77		Service communication
78		Communication for receiving orders
79		Service Feedback
80		Verification communication etc.

Sr. No	Improvement	Initiative areas of the Criterion and Sub-Parameters
81	Methods of developing effective and good services Procedures	It must be analyzed and verified
82		Follow the Standard operating system
83		Make the Process Flow for bird's view for overall process observation
84		Make Value Stream of the Process Flow
85		Identification of Critical Processes
86		Deployment of competent manpower in critical services
87		Time to time Validated the service process and services
88		Effort for reducing service times
89		Improve quality of services
90		Easy and understandable of the services
91		Make these/ all improvements as a culture
92		Apply the techniques to improve methods.
	FACTORS OF GOOD SERVICES	**Customers for Success**
93		Define the customer choice of Services
94		Service specifications
95		Customer Feedback
96		Corrective action.
		Communication in Services
97		Process of communications
98		Effectiveness and Reliability of the communication
99		Communication points or periods
100		Establish the communication process
101		Modern Technology and techniques of communication.
102		Quality standards on communication are made and communicated to the employees
103		Manpower are Trained in Tools, Techniques and processes of communications
		Service Times with Reduction
104		One Time completion of Services
105		Overall Performance Level
106		Overall Efficiency level.
		Service Quality
107		Define the Service Quality
108		Quality Checking
109		Customer Requirement conformance
110		Quality Cost
111		Quality Improvements.

Sr. No	Improvement	Initiative areas of the Criterion and Sub-Parameters
		Service Cost
112		Identify the cost centers
113		Direct and Indirect Cost
114		Cost Reduction process
115		Cost controlling initiatives.
		Pricing on Services
116		Define the process of measuring the service charges – process cost, Market Price, competitors and customer's requirement etc.
		Service Technology
117		IT Techniques
118		Exponential Technological Transformation for Service Preparation
119		Digital Technologies for Effective Service Communication with Interaction
		Applied Techniques for service improvement
120		It is primary involved in cost, quality and organizational excellences
121		Quality Tools
122		Lean Tools
123		TQM
124		DFSS
		Service Process Reengineering
125		Service Modernization
126		Market Trend and analysis-based process design
127		Strategic planning
128		Organization Effectiveness in service design
129		Proactive Leadership and Business penetration.
		Competent service process owners
130		Train and handholding the process owners
131		Deployment of manpower as per service knowledge and competency
132		Customer oriented services.
		Good Customer Services
133		Customer Oriented, user-cantered design (UCD) approach
134		Cost Effective
135		Quality Driven
136		Organizational Commitment to business and customer.

(The Improvement column is a single vertical spanning cell reading: **FACTORS OF GOOD SERVICES**)

Internal Improvement Team and Functional heads and process owners would check the above stated Initiative areas of the criterion and sub-parameters with the online or offline documented with the status application/ applied, internal initiative and current status.

6. CONCLUSION

Advancement in technology and techniques, and elegance of the public life with the trend of more comfort, plays as a catalyst in service sector expansion. It is comparatively easy to start, operate, to convert the functions as per customer's requirements, but necessary to develop to control mechanism to grow with skills and competency of the employees. Most of the business in service sector depends on enterprising skills and proactive thinking.

Service industries should be thoughtful on service efficiency to create a customer-centric operation & business strategy with the expectations when they interact with employees. Not fulfilling the expectancy and failing to deliver what customer specified & expected will result an erratic experience. Organizations must find out the capability gaps and go about fixing these with a sincere effort to save customers with the results of lower operating costs for the business along with more satisfied and loyal customers.

Service organizations might apply the manufacturing techniques like Six Sigma - DFSS, forecasting techniques for business development, digital marketing, service research, reengineering for process competency and measurement for service performance for efficiency.

This study and experience based developed model might be improved further as per invention & introduction of new Techniques and Technologies, to assist all service owners, management and stakeholders to comprehend and recognize the gaps in several services areas. Initiatives are indispensable for outspreading business, profit, attain quality, internal efficiency, customer's service, planning and improvement based on organized method of feedback collection.

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