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I feel honored in placing before you the latest volume of **"JIM QUEST Journal of Management and Technology,"** Vol: 19 Issue: 2 which encapsulates a diverse array of studies encompassing critical facets of business management. The journal has a strong emphasis on various business-related issues which due to their complex nature require multidisciplinary solutions. The open-minded stance towards the scope of the journal means that topics of interest to the journal include various functional areas like Marketing, Finance, HRM, International Business, Retail, Banking and Operations to name a few. On behalf of JIM QUEST Editorial Team, I would like to extend a very warm welcome to the readership of the Journal. The successful growth of the Journal owes much to the outstanding editorial staff at Jaipuria Institute of Management, Ghaziabad and to all the editorial board, reviewers and others, who have given so generously of their time and expertise. I wish to express my gratitude to the researchers for their valuable submissions. The present issue comprises of fourteen research papers across multiple disciplines in the area of Business Management. The first paper titled **"Modelling the Customer-Based Brand Equity and Its Impact on Brand Image Benefits of Coca-Cola: A Competing Model Strategy Approach"** investigates the intricate relationship between customer-based brand equity and brand image benefits, particularly focusing on Coca-Cola consumers through SEM. The second paper titled **"Evaluating the Effectiveness of e-Learning Amidst the COVID-19 Pandemic"** assesses the effectiveness of e-learning as a substitute for traditional face-to-face education during COVID-19 through quantitative analysis. This also provides valuable insights for educators and policymakers navigating the new normal in education. The third paper titled **"A Review of Drivers and Barriers to the Adoption of Electric Vehicles in India"** synthesizes existing research to develop a theoretical framework exploring the drivers and barriers to the adoption of electric vehicles in India. The fourth paper titled **"Promising Usage of Blockchain Technology"** investigates the applications of blockchain technology in library services and digital media industries. By highlighting its capacity to enhance data security and facilitate transparent transactions, the research underscores the significance of blockchain in reshaping diverse sectors and administrative processes.

The next paper titled **"Unveiling the Crucial Key Success Factors for Inbound Open Innovation Strategy and its Application in MSME IT&ITES Industry of India"**, focusing on the MSME IT&ITES sector in India, identifies key success factors for inbound open innovation strategies. The sixth paper titled **"Dairy Literacy for Dairy Farming: An Empirical Study in Morigaon District of Assam"**, examines the level of dairy literacy among farmers in the Morigaon district of Assam, shedding light on the importance of both general and technical literacy in dairy farming practices. The subsequent paper titled **"Environmental Sustainability Spending of CSR Status Companies in India - An Analysis"** investigates CSR expenditure patterns in India, particularly focusing on environmental sustainability initiatives. The eighth paper titled **"Derivatives Discern in the Ambit of Behavioural Prejudice"** explores the role of behavioural biases in shaping retail traders' usage of derivatives, offering insights into decision-making processes in financial markets. The next paper titled **"The Entrepreneurial Advantage: How Information Technology (IT) Adoption Can Help Small and Micro Enterprises Succeed",** by examining the moderating effect of IT adoption on the relationship between entrepreneurial competencies and organizational performance, offers insights into the role of technology in SMEs' success. The subsequent study titled **"Using Visual Interventions for Effective Change Management"** explores the role of visual interventions in facilitating change management processes within organizations. The next paper titled **"A Study of Performance Level of Employees During Coronavirus (Covid-19) Period"**, by investigating the impact of the COVID-19 pandemic on employee performance across various industries, offers insights into the challenges and opportunities arising from remote work arrangements.

The subsequent study titled **"Consumer Brand Engagement through Marketing 4.0: A Case of Indian Luxury Fashion Industry"** explores the intersection of consumer behaviour and marketing strategies in the luxury fashion industry and examines the adoption of Marketing 4.0 technologies to enhance brand engagement. The succeeding paper, **"A Study on Customer Engagement with Reference to Indian Telecom Industry"** focuses on the evolving dynamics of the Indian telecom sector and investigates customer engagement strategies in the face of changing consumer behaviour and technological advancements. The last study included in this issue is **"Clean-tech Startups as Drivers of Sustainable Development Goals: A Society 5.0 Perspective."** This conceptual study explores the role of clean-tech startups in advancing sustainable development goals within the framework of Society 5.0. By leveraging green technology and agility, clean-tech startups can offer innovative solutions aligned with societal needs and environmental sustainability. We expect that all the research papers included in the current issue will add substantial value to various organizations, academicians, research scholars and society at large. We are sure that you will find these articles insightful. As we look forward to the future, we remain committed to enhancing the quality and relevance of our journal. Your feedback and suggestions are invaluable to us in this endeavour, and we eagerly anticipate your contributions and engagement. Together, let us continue to push the boundaries of knowledge and innovation, advancing the frontiers of management and technology for the betterment of society.

Happy Reading!!

Prof. (Dr.) Anubha
Chief Editor

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Modelling the Customer-Based Brand Equity and Its Impact on Brand Image Benefits of Coca-Cola-a Competing Model Strategy Approach

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**G.S. David Sam Jayakumar
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Abstract

This article adopted the existing model of customer-based brand equity and brand image benefits and evaluated the causal relationship between these two among the Coca-Cola brand users. A structural model of Customer-based brand equity and its effect on brand image benefits is proposed using the Structural Equation Modelling. Four different Structural models were fitted with various indicators and one model is selected among the four based on the information criteria. From the result it is recommended that the enhancement of desirable lifestyle of the consumer's perception must look forward to increasing its reach towards consumers by giving additional priority of preference to Coca-Cola in the carbonated drinks' field. Its contribution to the society, its stability and its good workmanship needs to be significantly considered by providing and fulfilling the expectation of the consumers with their individual perceptions.

Keywords: Customer-based brand equity, brand image benefits, measurement model, structural model, Structural equation Modelling, Information criteria, Coca-Cola.

Introduction

The concept of branding is centuries old. The term ''brand'' evolved in the eighteenth century when producers' names were replaced with names and pictures of places of origin, animals, and famous people (Farquhar, 1989). This allowed for the strengthening of the association of the brand name with the product. Consumers were able to remember products as well as differentiate between competitor products. Then, in the nineteenth century, brands were used to enhance a product's perceived value using associations. Branding evolved even further in the twentieth century with new purposes and strategies. Brand image, an important building block in customer-based brand equity, is destined as ''perceptions about a brand which reflected by the brand associations apprehended in customer's memory'' (Keller, 1998). Even though the term or notion brand image has been largely defined and used in diverse ways, one common agreement of the definition is that brand image is a customer's aggregate impression of a particular brand which influence of a customer's emotional perceptions (Dobni & Zinkhan, 1990; Aaker, 1996). Image benefits are the outcome and perception of the customers based on the brand image of the particular brand I product categories I stores. According to Kevin Lane Keller brand image is the most important and dominating dimension of brand knowledge and it can be measured or evaluated ouly the benefits perceived by the customers. Though a brand may have unique associations, strength and so on, but if it fails to create a positive brand image to the customers then it will not be a successful brand in the market. Hence, Image can be studied ouly by its outcomes. Many authors exclusively studied the impact of brand image benefits on customer satisfaction and brand loyalty. Similarly, the image benefits may be a mediating aspect between brand equity and customer satisfaction, loyalty intention of the customers. Benefits means personal value and the meaning that consumers attach to the product or product attribute. Consumer think in terms of what finally a product can do for them and what it broadly represents. Consumers

generally are more interested in benefits rather than product attributes. Functional benefits are more intrinsic advantages of product. These are often linked to basic motivators such as physiological and safety needs.it involves a desire to satisfy the need or problem removal. Symbolic benefits are the more

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extrinsic advantages of product. These relate to underlying needs for social approval or personal expression and outer directed self-esteem. Experiential benefits relate to what one feel by using the product. These benefits satisfy experimental needs such as sensory pleasure, variety and cognitive stimulation. Social benefits relate to the perception of the consumer towards how the society feels about his usage. Such as the consumer feels they feel accepted among the society because of using this product. Appearances enhances are about the usage and expectations of the brand user such as the usage of the brand provides a solution to their expectations. Usage of brand creates good impression of them on other people.

1.1 Related works on Customer based brand equity

The proposals of Keller (1993) and Aaker (1991) are the most referenced brand equity conceptualizations in the marketing literature. Both authors approached the construct from the customer point of view. Thus, Keller (1993) defmed brand equity as 'the differential effect of brand knowledge on consumer response to the marketing of the brand'. He suggested evaluating the concept through two dimensions of brand knowledge, that is, brand awareness and brand image. On the other hand, Aaker (1991) defined brand equity as 'a set of brand assets and liabilities linked to a brand, its name and symbol that adds to or subtracts from the value provided by a product or service to a firm and/or to that firm's customers' and identified the following five brand equity components such as brand loyalty, perceived quality, brand associations, brand awareness and other proprietary brand assets (comprising patents, trademarks, and channel relationships). Yoo and Donthu (2001) considered that customer-based brand equity represents the assessment of cognitive and behavioral brand equity through a consumer survey, which is why the fifth dimension proposed by Aaker (1991) (i.e. other proprietary brand assets) is not relevant to consumer perception. Therefore, only brand loyalty, perceived quality, brand associations, and brand awareness should be considered as the components of customer-based brand equity. Thus, Yoo and Donthu (2001) suggested a three-dimension brand equity model, comprising brand loyalty, perceived quality and brand awareness/associations, combined into one dimension. In addition, they developed an overall brand equity scale, which estimated the construct through four items. In order to identity different brand equity dimensions, we have reviewed 60 empirical studies on brand equity. Among them, 30 examined product and service brand equity in many different contexts, while other 30 articles studied the concept within the tourism sector in general and hospitality industry in particular. We found that the scales proposed by Aaker (1991), Keller (1993) and Yoo and Donthu (200 1) are the most employed proposals in all 60 studies. However, if they focus only on those that were carried out in the hospitality context, we observe that the Aaker's (1991) scale is the most frequently applied (e.g. Hyun and Kim, 2011; Kayaman and Arasli, 2007; Kim et al., 2003; Kim and Kim, 2004, 2005). Cobb Walgren et al. (1995) used only perceptual components of Aaker's (1991) scale (i.e. awareness, brand associations and perceived quality) when examining the effect of brand equity on consumer preferences and purchase intentions among two set of brands, one from service category (hotels) and one from product category (household cleansers). On the other hand, the scale of Keller (1993) was frequently adopted when examining customer perceptions in the service sector (e.g. Rajh and Ozretic-Dosen, 2009; Wang et al., 2011), more specifically, in luxury hotels (e.g. Kimpakron and Tocquer, 2010). However, the actual impact of these dimensions on overall brand equity has been rarely analysed. Kim et al. (2008) employed this scale in their study on the impact of multidimensional customer-based brand equity on guests' perceived value and revisit intention in midscale US hotels. However,

the authors noted that the adopted scale should be refined and validated in future research. This is due to the general skepticism among academics on combining brand awareness and brand associations into one brand equity dimension, which might be the reason why brand awareness is ceasing to be considered as the antecedent of brand equity (Lee et a!., 2011). Finally, we found two other constructs that were used as brand equity components: (a) trust (e.g. Dioko and So, 2012; Hsu eta!., 2012a, 2012b; Kimpakom and Tocquer, 2010; Lassar et a!., 1995; Martin and Brown, 1990) and (b) commitment (e.g. Dioko and So, 2012; Dyson et a!., 1996; Lassar eta!., 1995; Martin and Brown, 1990; Punj and Hillyer, 2004). Martin and Brown (1990) found that among five dimensions that have been initially proposed to measure brand equity (i.e. perceived quality, perceived value, brand image, commitment, and trustworthiness), only two influenced significantly brand equity, that is, perceived value and commitment. Lassar et a!. (1995) adapted this scale and concluded that together with performance, value and social image, commitment and trustworthiness represent key dimensions of brand equity. The scale of Lassar et a!. (1995) was subsequently tested and confirmed by Dioko and So (2012) when examining destination brand equity and hotel brand equity in Macao. To conclude, the following dimensions are the most frequently employed as the main components of customer-based brand equity in the marketing literature: brand awareness, brand image, perceived quality and brand loyalty. For these, two other dimensions can be added: trust and commitment. On the other hand, the overall brand equity measure proposed by Yoo and Donthu (2001) , which evaluates the essence of the construct through four items employed by many different authors (e.g. Arnett eta!., 2003; Atilgan eta!., 2005; Chahal and BaJa, 2010; Rajh and Ozretic'-Dos'en, 2009; Wang eta!., 2011). However, this scale was rarely used in research e.g. Go'mez and Molina, 2012) (e.g. Rajh and Ozretic' Dos'en, 2009; So and King, 2010).

1.2 Related works on Brand Image benefits

A widely accepted view is that brand image represents customers' perceptions of a brand as reflected by the brand associations held in consumer memory (Herzog, 1963; Keller, 1993a, b). Keller (1993a, b) argued that these associations could originate from customers direct experience or from information obtained on a market offering or due to the impact pre existing associations with an organization had on the consumer. Brand image is, therefore, the mental picture or perception of a brand or a branded product or service and includes symbolic meanings that consumers associate with the specific attributes of a product or service (Dobni and Zinkban, 1990; Padgett and Allen, 1997; Aperia and Back, 2004). Fomell et al. (2006) studied that brand image impacts on customer perceived quality and satisfaction with the result of strong satisfaction being possible customer loyalty. According to Hsieh et.al (2004), a successful brand image enables consumers to identi:ty the needs that the brand satisfies and to differentiate the brand from its competitors. A company or its product/ services which constantly holds a favorable image by the public, would gain a better position in the market, sustainable competitive advantage, and increase market share or performance (Park, Jaworski, & Macinnis, 1986). In addition, several empirical findings have confirmed that a favourable image (i.e. brand, store/retail) will lead to loyalty (e.g. Koo, 2003; Kandarnpully & Suhartanto, 2000; Nguyen & LeBlanc, 1998), brand equity (Faircloth, Capella, & Alford, 2001; Biel, 1992; Aaker, 1991; Keller, 1993), purchase behaviour (Hsieh et al., 2004) and brand performance (Roth, 1995). Kotler (2001) defined an image as the thoughts and ideas of a person who perceives an object. Biel (1992) however defined a brand image as "a cluster of attributes and associations that consumers connect to the brand name". Brand image has been conceptualized and operationalized in several ways (Reynolds & Gutman, 1984; Faircloth et a!., 2001). It has been measured based on attributes (i.e. Koo, 2003; Kandarnpully & Suhartanto, 2000); brand benefits/ values (i.e. Hsieh et al, 2004; Roth, 1995; Bhat & Reddy, 1998); or using Malhotra's (1981) brand image scale (i.e. Faircloth eta!., 2001). Measuring image based on the above definition would help marketers to identify the strengths and weaknesses of their brand as well as consumers' perceptions toward their product or services. Keller (1993) regarded the brand image as the perception of consumer's memory that reflected by brand associations. Likewise, Keller's was proposed by Aaker (1991), whereby a brand image is referred to as "a set of associations, usually organized in some meaningful way". Keller (1993) described that this image benefits can be classified into functional, experiential and symbolic benefits, which was originally derived from the work of Park et al. (1986). Here, the functional benefits are related to the intrinsic advantages of product or services consumption and usually correspond to the product related attributes. For brand attitude, Keller (1993) referred to Wilkie's (1986) definition of brand attitudes which was "consumers' overall evaluations of a brand". Overall, the image generates value in terms of helping the customer to process information, differentiating the brand, generating reasons to buy, give positive feelings, and providing a basis for extensions (Aaker, 1991) more than this the consumer also receives certain benefits as being a user of the brand. Creating and maintaining the image of the brand is an important part of a firm's marketing program (Roth, 1995) and branding strategy (Keller, 1993; Aaker, 1991). Therefore, it is very important to understand the development of image formation and its consequences such as satisfaction and loyalty. The in-depth review of the literature related to this subject leads the authors to propose that the soft drink brand images could be captured by consumers Cognitive/beliefs on brand image-based benefits. This indicates that the distinct benefits (e.g. functional, social, symbolic, experiential, appearance enhances) overall would generally form or from the evolution of brand image.

1.3 Research Problem

Customer-based brand equity is a pillar or an asset to an organization whereas brand image benefits are the outcome of the brand image of the brand or organization. Research studies confirm that the customer-based brand equity of an organization will not affect the image benefits of the product. This study made an attempt to study the impact of customer-based brand equity on the brand image benefits. For this, the authors identified and address the following issues. They are 1. What are the dimensions of customer-based brand equity? 2. How it impacts the brand image? 3. What are the different brand image benefits? These issues need to systematically study and make the authors to conduct a scientific inquiry or investigation to study the customer-based brand equity and its impact on brand image benefits of Coca-Cola.

Section-2: Research Methodology

2.1 Objectives of the research

I. To understand the conceptual background of customer-based brand equity models and brand image benefits.
2. To propose a measurement and structural model of Customer-based brand equity and its effect on brand image benefits.

2.2 Hypotheses (II)

Proposed multi-dimensional research models with hypothesis

Figure 1- Hypothesis of competing model - I

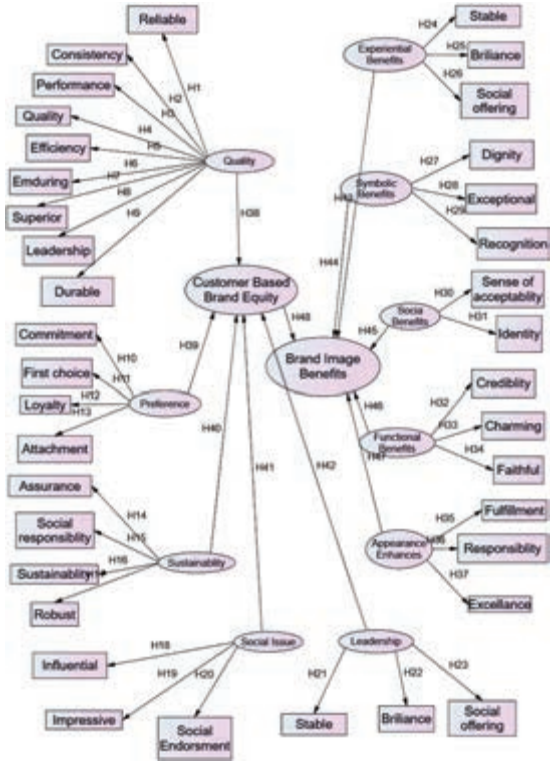


Figure 2 -Hypothesis of Competing - 2

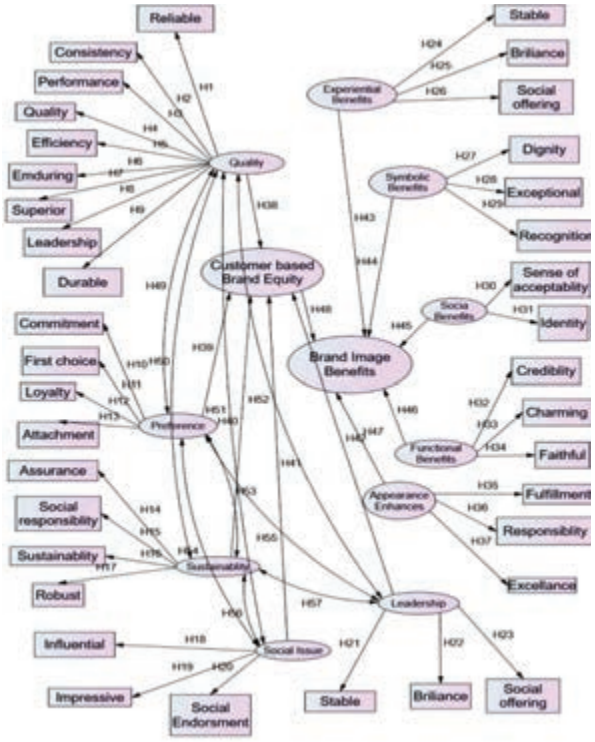


Figure 3 Hypothesis of competing model - 3

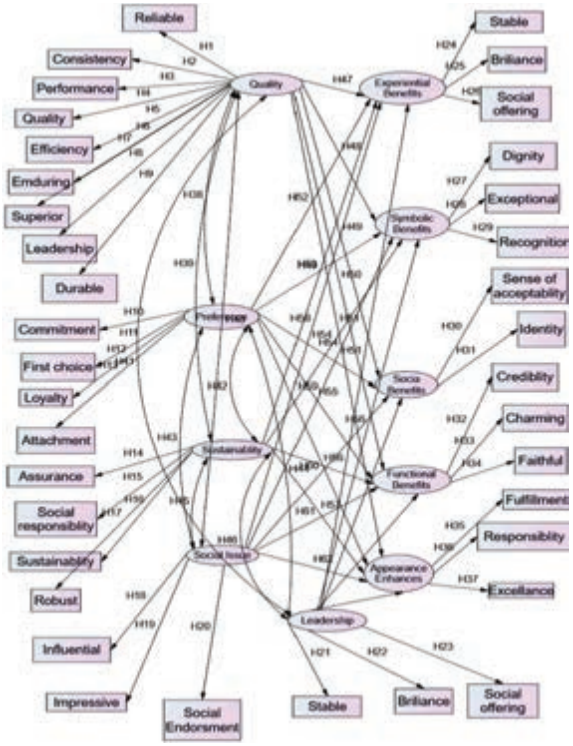
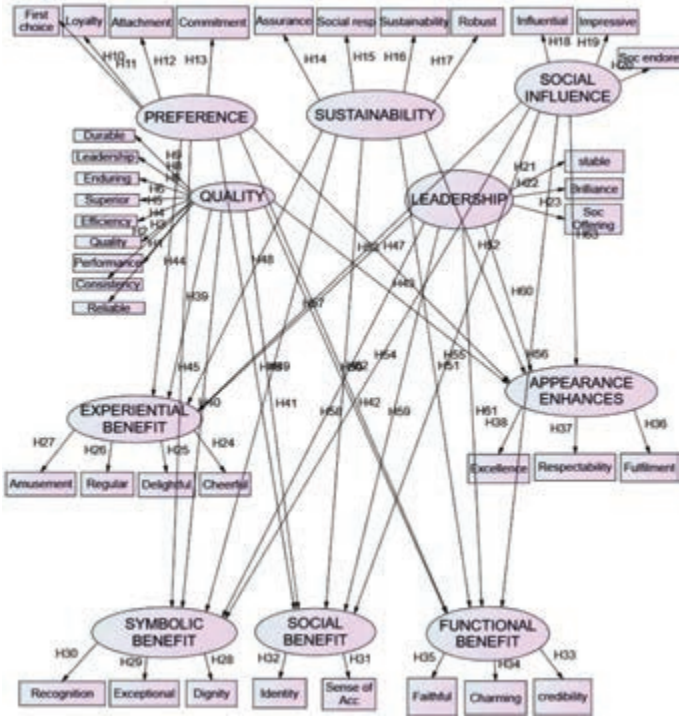


Figure 4- Hypothesis of competing model - 4



2.3 Industry and Brand selection

In India, there is a rapid economic growth occurred in the past two decades this is due to the enhancement and frequent development in the most dominated industry namely IT, Investment banking, Telecommunications and FMCG (Beverages) is contributed a major portion to the GDP of the country. Among the above-said industry, the Beverages (soft drinks) are the most controversial and notorious which creates a health hazard for the past decades. On the other hand, these hazards won't affect the growth of the industry and conversely the market share is growing and it reaches the peak when it compares with other industries. Coca-Cola is one of the most dominant players in this industry which is having a larger market share of 53.4% in Indian market. This situation is a paradox and needs to investigate further. Hence the authors made an attempt to study the customer-based brand equity and its impact on brand image benefits of one of the leading marker players.

2.4 Pilot Study

A draft questionnaire was prepared to evaluate the brand equity and its impact on the customer-based brand image benefits of Coca-Cola users. The questionnaire consists of three different set of questions: Personal and demographics of Coco cola Users (6), Customer based brand equity (25), brand image benefits (15). The conceptual questions are given at Likert scale of one to five and the questionnaire was issued to Coca-Cola users randomly to collect primary information from the respondents. The draft questiounaire was structured and retained for final data collection.

2.5 Sampling

Coca-Cola users are considered as a target sample for this research study and a Sample survey was conducted for collecting the brand equity and image benefits data from the Coca Cola users based on Purposive sampling method.

2.6 Determination of sample size

Inorder to determine the lower limit of the sample size, the following formula was used

$$n = ((zxS)!\ e)^2$$

Where, n is the required sample size, Z is the standard normal variate (1.96) at 95% confidence level, 'e' is the allowable sampling error at 5% level and S is the standard deviation (0.989) of raw Customer based brand equity score computed from the pilot study respectively. Then, substitute the above values in the formula, we got the lower liruit of the required sample size to conduct the sample survey for this research study is 1520.

2.7 Instrumentation and Data Collection

A well-structured questionnaire was finalized and issued to the Coca-Cola users. The questionnaire was classified into four different parts. Part I comprised of 6 personal and demographic questions, Part 2 elucidates 4 brand related statements, Part 3 comprised of 25 Customer-based brand equity items under 5 dimensions such as Quality (9), Preference (4), Sustainability (4), Social Influence(4) and Leadership(3). Siruilarly, Part 4 consist of 15 Brand image benefits such as experiential benefits (3), symbolic benefits (4), social benefits (2), functional benefits (3) and Appearance enhances (3) under 5 dimensions were raised to evaluate the impact of customer-based brand equity of Coco cola brand on its brand image benefits. These structured items were scaled and anchored at 5 points Likert scale and the items were raised both in regional as well as in formal languages as per the evidence we got it from the pilot study.

Section-3: Analysis and Discussion

3.1 Data analysis

After the data collection process, the authors utilized statistical softwares namely IBM SPSS 24, IBM SPSS AMOS 24 and SYSTAT 13 for the data analysis. In first stage the univariate and multivariate normality of the conceptual items such as customer-based brand equities (25) and brand image benefits (15) was checked. Shapiro-Wilk and Andersen - Darling test statistic are used to check univariate normality. Similarly, Mardia's multivariate skewness and kurtosis, Henze - Zirkler test is utilized to verify the multivariate normality of the conceptual items. Inthe second stage, the reliability of the Likert scaled conceptual items are also checked by using Cronbach's Alpha and Tukey's Test of non-additivity. Hotellings T- Square test. In third stage, Structural equation models were fitted to measure the impact of brand equity variables of brand image benefits by using competing model strategy. Four different Structural models were fitted with indicators and constructs under different assumptions and the fourth model is selected as the best model based on the information criteria.

Table 1 - Test of univariate normality for items of Image benefits and Brand equity

Concept	Dimensions	Items	Test Statistic	
			SW *	AD *
Brand Image Benefits	Experiential Benefit	Cheerful	0.719	164.564
		Delightful	0.76	130.521
		Regular	0.769	130.797
	Symbolic Benefit	Amusement	0.717	164.011
		Dignity	0.863	68.987
		Exceptional	0.865	71.152
		Recognition	0.786	127.488
	Social Benefit	Sense of acceptability	0.557	271.949
		Identity	0.752	151.155
	Functional Benefit	Credibility	0.614	264.188
		Charming	0.739	144.604
		Faithful	0.647	221.304
	Appearance enhances	Fulfilment	0.848	87.425
		Respectability	0.795	117.081
		Excellence	0.74	153.197
Customer based Brand Equity	Quality	Reliable	0.862	83.06
		Consistency	0.858	74.035
		Performance	0.755	150.517
		Quality	0.816	98.615
		Efficiency	0.779	129.133
		Superior	0.864	83.855
		Enduring	0.823	103.928
		Leadership	0.859	76.505
		Durable	0.851	77.617
	Preference	First choice	0.797	116.674
		Loyalty	0.849	84.24
		Attachment	0.826	101.555
		Commitment	0.816	117.164
	Sustainability	Assurance	0.774	138.883
		Social Responsibility	0.852	82.441
		Sustainability	0.782	132.239
		Robust	0.785	130.974
	Social influence	Influential	0.786	122.377
		Impressive	0.791	130.995
		Social Endorsement	0.766	144.882
	Leadership	Stable	0.791	121.337
		Brilliance	0.736	162.054
		Social offering	0.72	173.816

*p-value <0.01 n = 1520; SW – Shapiro –Wilk Statistic AD - Anderson – Darling Statistic

Table 2- Test of multivariate normality for items oflmage benefits and Brand equity

Multivariate test	n=1520	
	Coefficient	Statistic
Mardia's Skewness *	259.492	65,874.402
Mardia's Kurtosis *	1,684.962	58.323
Henze Zirkler *	-	5.329

*p-value <0.01

Table 3- Results of Cronbach's alpha, Reliability, Hoteling's T-square test and equivalence of items

Concept	Dimensions	No. of Items	Cronbach's Alpha	Hotelling's T-Squared	F-Value
Customer based Brand Equity	Quality	9	0.766	959.63	119.4
	Preference	4	0.734	72.20	24.03
	Sustainability	4	0.751	35.82	11.92
	Social Influence	3	0.742	5.61	2.80
	Leadership	3	0.830	35.81	17.89
	Overall	23	0.878	2635.56	186.6
Brand Image Benefits	Experiential Benefit	4	0.808	34.43	11.46
	Symbolic Benefit	3	0.687	177.69	88.79
	Social Benefit	2	0.709	1870.91	1870.
	Functional Benefit	3	0.659	1952.59	975.6
	Appearance enhances	3	0.856	458.02	228.8
	Overall	15	0.706	1520.24	68.15
	Total	38	0.758	1765.578	1932.45

Table 4 – Fit Indices and Model selection

Competing Models	RMR	GFI	AIC	BIC	CAIC	Rank
1	0.388	0.587	75117.015	75575.091	75661.091	4
2	0.203	0.677	70067.148	70578.489	70674.489	2
3	0.293	0.676	70849.437	71430.021	71539.021	3
4	0.197	0.971	70021.209	70183.152	70398.527	1

RMR-Root mean Residual; RMSEA-Root mean square error of Approximation, GFI-Goodness of fit Index; AGFI-Adjusted Goodness of fit Index, AIC-Akaike Information criterion; BIC-Bayesian Information criterion, CAIC-Consistent Akaike Information criterion

Figure S-Path diagram of best fitted competing model-4

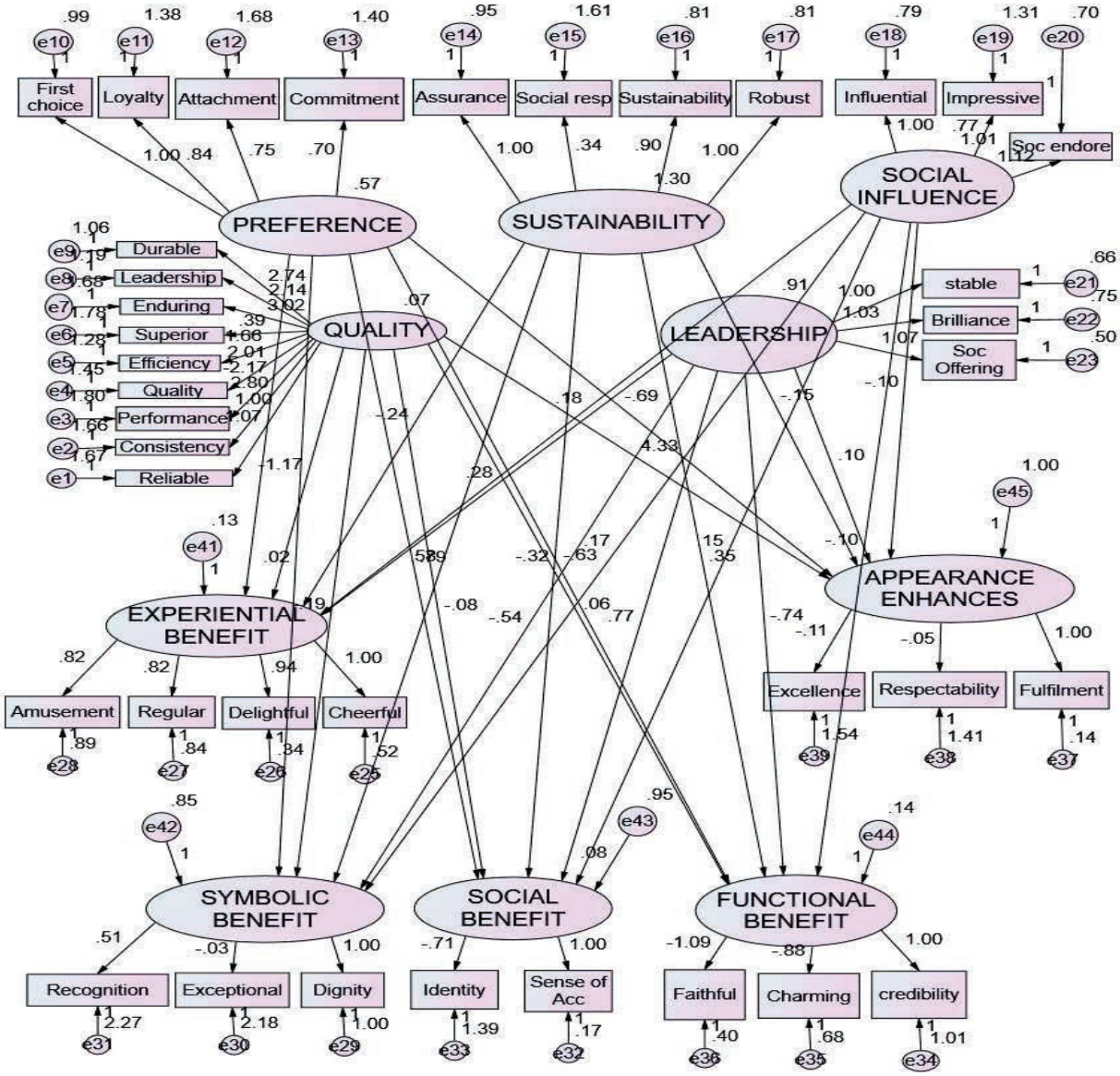


Table 5 -Results of best fitted Competing model-4

Constructs	Path	Indicators	Estimate	Standard Error	Critical ratio	p-Value
Quality	←	Reliable	1.000	-	-	-
	←	Consistency	2.797	.418	6.684	0.000
	←	Performance	-2.168	.338	-6.406	0.000
	←	Quality	2.005	.311	6.439	0.000
	←	Efficiency	1.659	.264	6.281	0.000
	←	Superior	.394	.155	2.544	.011
	←	Enduring	3.017	.448	6.733	0.000
	←	Leadership	2.138	.324	6.604	0.000
	←	Durable	2.739	.402	6.808	0.000
Preference	←	First choice	1.000	-	-	-
	←	Loyalty	.842	.056	15.047	0.000
	←	Attachment	.751	.058	13.036	0.000
	←	Commitment	.697	.053	13.183	0.000
Sustainability	←	Assurance	1.000	-	-	-
	←	Social	.344	.033	10.545	0.000
	←	Responsibility Sustainability	.901	.034	26.739	0.000
	←	Robust	.999	.036	27.547	0.000
Social Influence	←	Influential	1.000	-	-	-
	←	Impressive	.769	.042	18.402	0.000
	←	Social	1.122	.056	20.157	0.000
Leadership	←	Endorsement Stable	1.000	-	-	-
	←	Brilliance	1.029	.036	28.513	0.000
	←	Social offering	1.071	.034	31.202	0.000
Experience Benefit	←	Cheerful	1.000	-	-	-
	←	Delightful	.939	.024	38.459	0.000
	←	Regular	.823	.029	28.444	0.000
	←	Amusement	.822	.030	27.829	0.000
Symbolic Benefit	←	Dignity	1.000	-	-	-
	←	Exceptional	-.032	.036	-.894	.371
	←	Recognition	.513	.040	12.988	0.000
Social Benefit	←	Sense of	1.000	-	-	-
	←	acceptability Identity	-.711	.032	-22.097	0.000
Functional Benefit	←	Credibility	1.000	-	-	-
	←	Charming	-.875	.033	-26.852	0.000

	←	Faithful	-1.089	.035	-31.297	0.000
Appearance Enhancement	←	Fulfilment	1.000	-	-	-
	←	Respectability	-.046	.019	-2.411	.016
	←	Excellence	-.109	.020	-5.434	0.000
Quality	←	Experience	-1.173	.188	-6.252	0.000
	←	Benefit Symbolic Benefit	-.195	.152	-1.284	.199
	←	Social Benefit	-.083	.075	-1.103	.270
	←	Functional	.059	.082	.722	.470
	←	Benefit Appearance	4.331	.624	6.940	0.000
Preference	←	Enhancement Experience	1.075	.053	20.379	0.000
	←	Benefit Symbolic Benefit	.020	.053	.383	.702
	←	Social Benefit	.793	.038	20.722	0.000
	←	Functional	-.626	.039	-15.948	0.000
	←	Benefit Appearance	-.686	.056	-12.227	0.000
Sustainability	←	Enhancement Experience	-.238	.021	-11.276	0.000
	←	Benefit Symbolic Benefit	.577	.037	15.632	0.000
	←	Social Benefit	-.325	.018	-17.703	0.000
	←	Functional	.351	.022	15.969	0.000
	←	Benefit Appearance	-.145	.032	-4.465	0.000
Social Influence	←	Enhancement Experience	.183	.024	7.600	0.000
	←	Benefit Symbolic Benefit	.172	.040	4.307	0.000
	←	Social Benefit	.155	.020	7.770	0.000
	←	Functional	-.097	.022	-4.453	0.000
	←	Benefit Appearance	-.099	.038	-2.618	.009
Leadership	←	Enhancement Experience	.275	.025	11.090	0.000
	←	Benefit Symbolic Benefit	-.539	.042	-12.941	0.000
	←	Social Benefit	.766	.026	29.503	0.000
	←	Functional	-.739	.033	-22.642	0.000
	←	Benefit Appearance Enhancement	.101	.038	2.656	.008

GFI - 0.971; AGFI - 0.961; RMSEA – 0.045; RMR-0.197

Section 4 - Discussion and Recommendations

4.1 Discussion

Table 1 visualizes the results of five dimensions of Brand image benefits and five other dimensions of customer-based brand equity. Shapiro wilk test and Andersen darling test was employed to check the uni-variate normality. The result shows that all the variables consider for the study departs from following the normal distribution. Therefore, the authors frame an assumption that the variable follows the normal distribution for advanced statistical analysis. Similarly Table 2 presents the results of Mardia's Skewness, Mardia's Kurtosis and Henze - Zirkler tests for testing multivariate normality. The results confirms that the variables depart from multivariate normality and for further scientific analysis the authors assumes that the variables follow a multivariate normal distribution. Table 3 visualises the scale reliability output with the values of Cronbach's alpha. It is revealed that all the dimensions of Customer based brand equity and brand image benefits have good reliable scores. The results of hoteling's T-square test also shown. It is used to check the equality of the conceptual items under the dimensions of customer-based brand equity and brand image benefits. The result exhibits that the meaning of the conceptual items are statistically different at 5% and 1% level. This explains that the items are entirely different from one another and convey the correct meaning to the customers. Table 4 shows the fit indices and Model selection criteria for the 4 fitted competing models highlighted in the hypothesis section. The results confirms, for the fitted competing model -4, the RMR is minimum, GFI is maximum and the values of AIC, BIC CAlC are also achieved minimum. This shows, the fitted competing model-4 is the best when compared it with the remaining fitted models. Table S visualizes the results of best fitted competing model-4 of the Customer based brand equity and its impact of Brand image benefits of Coca-Cola. It is inferred that the performance of Coca-Cola has to secure its better quality. The other four major dimensions namely preference, sustainability, social influence and leadership under brand equity contributed positively by the consumers. Regarding its image benefits, exceptional attitude and the perception about this soft drink needs to be

upgraded. Coca-Cola's charming and faithful attitude needs to be focus exclusively on what actually the consumers expecting. Its good impression (-2.411) and its effectiveness (-5.434) on others also needs an improvement. Dignity, Exceptional and Recognition were also get affected when comparing with its Quality. Therefore, Coca-Cola's usage which brings its dignity, its increased perception and its better fit in societal background never design its quality. Regarding, social benefit variables such as sense of acceptability and identity has negative approach towards the impact of Brand equity. Sense of acceptance has to be appreciated in order to fulfil what actually comprises the Quality. Its Identity also needs an improvement. This will uplift the quality of Coca-Cola. The societal influence has to be furthered in order to attain its sustainability. Further, social influence causes Functional benefit and Appearance enhancement. Both these factors appeared as not influenced by societal approach. Yet, Coca-Cola's functionality needs to get involved in social featured basis and accordingly fulfilment, Respectability and Excellence also to be improved in order to attain social influence. Moreover, the GFI (0.961}, AGFI (0.971) are close to 1 and RMSEA (0.045) is close to 0 respectively. This reveals that the proposed model of evaluating the impact of customer-based brand equity is on brand image benefits is valid and reliable.

4.2 Recommendations to the brand managers

The Reliability of the consumers toward Coca-Cola has to get improved strongly by individuals' desirable lifestyle and its loyalty to the consumers by implementing its announced and improved strategies. The quality consistency of Coca-Cola gets affected except consumer's better perception. Coco cola operating requirements (KORE) promotes the highest standards in product safety and quality. This enables them to face the problems in integrated quality management program. If it concentrates on the fields in which it has to be improved, then surely Coca-Cola will attain its integrated quality management. Regarding the performance of Coca-Cola towards the consumer point of view, it gets affected by ineffective

usage and disputed impression. In order to enhance its performance, Coca-Cola needs to rely more on the priority given by the consumers, their loyalty and commitment toward the Coca Cola. If it is affected by its incredibility as of consumers perceive, that it never executes and fulfil what it promises. Therefore, awareness of Coca-Cola's policies and newly implemented strategy has to be vitally reached to the end users through a powerful medium. Consumers ignore Coca-Cola's eco-friendly aspects such as its "green" status, USGBC's standard for Leadership in Energy and Environmental Design (LEEDS) and so on. This leads them to have a negative perception towards Coca-Cola. Consumers feel that the chemical contents in Coca-Cola ruin health, and it no longer be a sustainable brand and this has a negatively influences. Therefore, Coca-Cola's sustainability and its influence on consumer's perception needs to prove it is truly a healthy drink to consume and to testify its health benefits. The good impression which Coca-Cola creates to a person on other needs to be enhanced by fulfilling its promises, providing solutions to the consumer's expectations, its stability, good workmanship and its contribution towards the Society. By making the consumers to know and to provide awareness towards its corporate social responsibility (CSR), the community voices, then Coca-Cola might be able to compensate and enhance its stability, good workmanship and its contribution towards the society.

4.3 Recommendations from the fitted model

The consistent quality and its acceptable standard of Coca-Cola need to be improved while comparing it with the performance of Coca-Cola. Its performance needs to concentrate more on its standard by implementing unique features than the other carbonated drinks. The enhancement of desirable life style of the consumer's perception toward Coca-Cola is negatively influenced, therefore it has to look forward to increasing its reach towards consumers by giving additional priority of preference to Coca-Cola in the carbonated drinks'

field. If Coca-Cola dominate unique feature towards consumer's preference than other carbonated drinks, then surely it may enhance their perception about their desired lifestyle. Coca-Cola needs to improve the way that its loyal consumer's perceived by others with increasing its benefits. It needs to improve the aspect of consumer's taste and preference, for everyone has varied taste and their preference also differed. Therefore, with its standard quality Coca-Cola has to provide and improve its preference universally. Likewise, the individual's preference needs to achieve through its loyalty toward its customers and fulfilling its promises by revealing its credibility with firmness. Coca-Cola's sustainability needs to get improved in the areas such as consumer's individual preference, perception and their trust on Coca-Cola. The social influence of Coca-Cola has to be improved with its dependency of usage, achieving the needs of the consumers effectively and with its promotions. It's contribution to the society, its stability and its good workmanship needs to be significantly considered by providing and fulfilling the expectation of the consumers with their individual perceptions.

Conclusion

This article evaluates the causal effect between the customer-based brand equity and brand image benefits; hence, it is causal in nature. It draws attention to the brand managers of Coca Cola about the Customer based brand equity and its impact on the outcome and perception of the customers based on the brand image benefits. Coco cola's operating requirements promotes the highest standards in product safety and quality. But Consumer's purchasing decision highly depends on its stable and healthy features. Therefore, Coca-Cola have to strive hard to testifY that it has no unhealthy hazards which ruins people's stable and healthy conditions. Currently, the reputation of the carbonated drinks including Coca-Cola gets involved in bad impression among the people especially in regards with the health issues. Therefore, with much simplicity, truthfulness and credibility Coco cola needs to prove that it

is no longer adding any chemical ingredients which results in ruining the health conditions and its intention is not to deceive the people even its own users for their selfish motives. The performance of Coca-Cola needs to get improvement by implementing unique aspects than the other soft drinks. Brand managers cautiously concentrate to establish a smooth pathway to their loyal customers by fulfilling all their expectations.

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Evaluating the Effectiveness of e-Learning Amidst the COVID-19 Pandemic

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Abstract

While the COVID-19 epidemic, to prevent the spread of the virus, physical meetings were minimized, which had significant implications for the effectiveness of higher education's learning process. Traditional face-to-face training sessions were substituted with different e-learning techniques, as virtual meetings became the new norm. This shift to online delivery of lessons was particularly significant in developing economies as a response to the pandemic. The acceptance and satisfaction of both students and instructors in this virtual learning environment were deemed crucial to the success of e-learning management systems. e-learning served as a valuable tool for students to supplement their traditional classroom education through access to instructional materials. To assess the efficacy of e-learning during an outbreak, a quantitative and descriptive study was conducted with an electronic research technique. The research data was gathered from 261 learners by Google Docs questionnaires, employing simple random sampling. The findings of the data analysis indicated that e-learning was advantageous in terms of user-friendliness, flexibility, availability, and accessibility. However, it was also found to have certain limitations, including network issues, a deficiency of reciprocal communication, and possible health risks when compared with traditional offline lectures.

Keywords: COVID-19, education, e-Learning, LMS, online learning, students

Introduction

As reported by (Huang et al., 2020), a novel coronavirus, COVID-19, was found in the latter months of 2019 at the seafood market in Wuhan. The WHO Director-General publicized the COVID-19 pandemic in the month of March 2020 (Jebril, 2020) after a review of the fatal virus's swift propagation and extent within the globe, and the declaration of societal separation with the goal of the global epidemic. A pandemic is defined as "an epidemic of a disease which extends over an extensive geographical region and impacts a significant percentage of the people" by Merriam-Webster Online Dictionary (2020). People's usage of ICT in their everyday lives has grown in the past few decades. It is due to the need for ICT to transform educational facilities continues to rise in tandem with technical advancements and learning in the 21st century. Online learning is defined by Fry (2001) as the utilization of the World Wide Web along with appropriate technologies to create educational materials, offer teaching, and run a course of study. As stated by Hrastinski (2008), both kinds of online learning, asynchronous and synchronous, is often contrasted; however, for online learning to be efficient teachers and institutions should fully understand its advantages and limitations. The learning management system can assist learners in following course directions, posting homework and retrieving scores, engaging interactions amongst instructors and learners, passive interaction among learners, interactions among students and learning resources, exchanging knowledge, and taking digital assessments and tests. LMS systems are classified into two categories: open-source as well as commercial. Moodle, Sakai, ATutor, Claroline, and other open-source platforms are only a few examples. Meanwhile, commercial LMSs like Blackboard, SuccessFactors, SumTotal, and more are available. An LMS is a software program which manages educational materials, training sessions, and development and learning programs by documenting, tracking, reporting, automating, and delivering them. The phenomenal rise of ICT represents one of its most crucial drivers. Several colleges and universities can now readily implement cutting-edge ICT-based services like streamed high-resolution films, videoconferencing, and simulated lecture halls. LMSs are employed at most institutions all around the globe alongside regular classes. In the past, this use was limited and rudimentary, equivalent to the use of an assistance tool,

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however, it has since evolved and embraced a wide variety of demands to be a component of a framework. A learner, for instance, may go over lessons, take off examinations, gain feedback, complete assignments, and connect with peers. In actuality, a wide range of variables contribute to an expanded spread of eLearning ideas. LMSs, as defined by Coates et al. (2005), are "acquiring knowledge, course administration, managing content gateways, and teaching systems for management.". Davis et al. (2009) employed the LMS for the very first time in the latter part of the 1990s.

Literature Review

Since technological advances have progressed, distance learning is becoming more accessible (McBrien et al., 2009). "The majority of theologies (virtual learning, open education, online education, electronic education, mixed and m-learning) share in common the capacity to utilize a gadget linked to a system, providing an opportunity for acquiring from any location, at any time, regardless of tempo and by any means" (Cojocariu et al., 2014). Online education may be defined as a means for improving the education process by making it extra focused on students, imaginative, and adaptive. "The process of educational experience in either asynchronous or synchronous situations using numerous gadgets (e.g., cell cellular phone, desktops, etc.) with net connectivity" is how online learning is described. In such circumstances, learners can learn and engage with instructors as well as other classmates from anyplace (independently)" (Singh & Thurman, 2019). Within a synchronous educational atmosphere, learners take lectures in person, instructors and students communicate in actual time, and quick feedback is feasible; nevertheless, asynchronous learning environments are poorly organized. In a setting like this, educational material is not offered in the manner of actual lectures or classes; rather, it is accessible via multiple educational platforms and forums. Quick feedback and rapid reaction are unachievable in such a context (Currie-Mueller & Littlefield, 2018). Using synchronous learning provides a plethora of options for engaging in society (McBrien et al., 2009). The only choice is to convert from in-person to distance learning courses. Universities, for instance, could not turn all of their college curricula into a web-based tool in just one day. Distance, scaling, personalized learning and instruction are among the most significant challenges for teaching via the internet. Organizational interventions will only assist us fight this epidemic (Liguori & Winkler, 2020). Useful education via the internet involves learning and teaching via the internet, in addition to the dissemination of multiple research works, rules, designs, concepts, and morality, as well as the assessment of compare levels on excellence online educational layout, and instructional methods (Hodges et al., 2020; Bozkurt & Sharma, 2020), because it has demonstrated that efficient education via the internet is the outcome of conscious planning and designing of lessons in the implementation of a structured educational setting (Branch & Dousay, 2015). In addition, there is a need for an immediate shift to online educational mode; thus, Google's offerings like Google mail, forms, calendars, drive, hangouts, jam board and illustrations, classroom and open board software can be highly beneficial in these kinds of challenging circumstances. Such tools have the potential to be a suitable alternative to classroom instruction (Basilaia et al., 2020).

Research Methodology

The present research employed both descriptive and quantitative methodology, with a web-based questionnaire as the primary data collection tool. The information was gathered via a survey using questionnaires and simple sampling at random. The participants consisted of approximately 3000 undergraduate and postgraduate scholars from an institution in the northern province of the Republic of India. The sample was drawn from students who actively engaged in e-learning and was selected using a convenience sampling technique due to its time efficiency and cost-effectiveness. To gather data, an online questionnaire was created using the Google Docs tool, divided into two sections mirroring the paper-based version. This method was chosen as students were not present on campus due to the COVID-19 pandemic, and it ensured anonymity. The survey included twenty-one questions overall and was circulated to 600 participants through the student welfare department and appropriate course WhatsApp channels. Respondents were given a couple of days to complete the survey, resulting in 261 usable responses. Anonymity was maintained by not capturing respondents' emails and IP addresses during data collection. The information was obtained using a web-based application found at https://forms.gle/kSpvUt3XuQRXUWEX7. The questionnaire covered demographic information and questions about students' perceptions of online learning. The collected data were evaluated using descriptive analysis. Prior to the main study, pilot testing was conducted, and based on the results and expert opinions, the questionnaire was finalized. The information that was gathered from the intended survey was examined using a quantitative approach.

Findings

Below are the findings derived from the quantitative data analysis conducted in the present study.

Demographic details of respondents'

Descriptive statistics were employed to examine the demographics of the respondents as shown in Table 1. Among the 261 participants, 117 were men (44.8 percent) and 144 were women (55.2 percent), with the majority registered in undergraduate programs (231 ug's, 88.2 percent), while 31 respondents were enrolled in postgraduate programs (11.8 percent). Regarding age distribution, the largest proportion of participants (54.60 percent) fell between the ages of 19 and 21. There were 72 participants (27.50 percent) between the ages of 16 and 18, and 47 respondents (17.90 percent) were above 21

years of age. In terms of accessing e-university, a significant number of respondents used smartphones (171, 65.3 percent) and laptops (87, 33.2 percent). A very small percentage utilized personal computers and other devices (0.40 percent and 1.10 percent, respectively). Regarding internet connectivity, the majority of respondents (169, 64.80 percent) relied on mobile hotspot connections. A smaller percentage used Fiber and broadband connections (6.50 percent and 7 percent, respectively), while 41 respondents (16 percent) have been using campus Wi-Fi, and merely 5.70 percent utilized LAN. On the duration of e-univ use, 85 respondents (32.40 percent) reported using it for 1-2 hours daily, 79 participants (30 percent) used it for 2-3 hours, 56 respondents (21.40 percent) used it for more than 3 hours, and 42 participants (16 percent) used it for less than one hour per day.

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A Review of Drivers and Barriers to the Adoption of Electric Vehicles in India

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Abstract

This paper attempts to develop a theoretical framework with the help of a comprehensive review of studies related to attributes of consumer adoption of electric vehicles by extracting the drivers and barriers thereto, which may have positive and negative effects on the consumers' decision to adopt the new technology over conventional one. Research papers from different search engines have been explored with multiple keywords and finally, ninety-six research studies have been considered that substantiate perceptions of consumers as well as a theoretical framework for the adoption of electric vehicles. Thus, the paper examines the previous research conducted on the theme, synthesizes them, tries to highlight the gap between the earlier research with respect to the perceptions of consumers about adoption of electric vehicles and proposes a conceptual framework describing the effect of drivers and barriers to adoption of electric vehicles on the utility of electric vehicles. That may have practical implications for the strategists to have better understanding of consumers' behaviour towards electric vehicles in India where the adoption of electric vehicles is still in its infancy.

Keywords: Electric Vehicles, theoretical framework, drivers, barriers, utilities, and India.

1. Introduction

The rapid progress of the global economy and technology through advancement of human development, it has also caused enormous harm to the world's natural ecosystem. It is obvious that with the increase in the population of any nation, the demand for vehicles also tends to increase. As per Chan, C. C. (2002), In the next 50 years, the world's population will increase from 6 billion to 10 billion, and the number of automobiles will increase from 700 million to 2.5 billion. As the demand for vehicles is increasing day by day in developing countries with an expansion of urbanization and per capita income. This will further intensify the level of local air pollution, carbon emissions, and congestion (Woodcock, J et al.,2009; Rao, Z. et al.,2013. The globe has already shown how crucial renewable energy is as an essential step to help alleviate the effects of global warming. To address this problem, the only way is to switch to the electric vehicle (EV) mode. Switching from conventional transportation to a much cleaner alternative provides the benefits of not the only a cleaner environment but also gives freedom from noise pollution. The obvious question that emerges from here is - what are Electric Vehicles (EVs)? In the broader sense, electric vehicle (EV) could be defined as a vehicle on a road that involves 'electric propulsion '. An electric vehicle includes a fuel-cell electric vehicles (FCEVs), hybrid electric vehicles (HEVs) and battery electric vehicles (BEVs). Some recent developments in electric vehicles are PHEVs. Electric vehicles includes vehicles from different technologies with slight differences like Battery electric vehicles(BEVs), can be characterised by having battery grid charging system with zero emission and independent from crude oil whereas fuel-cell electric vehicle (FCEVs) can be characterized with a fuel cell operating systems mainly sourced from hydrogen with an ultra-low emissions and hybrid electric vehicles (HEVs) which depends on both sources electric battery and internal combustion system which able to provide longer driving range (refer table1).

Table 1: Types of Vehicles'

Vehicle Type	Description	Benefits
FCEV	An EV that uses fuel cell operating system and is sourced from hydrogen	Ultra-low emission, better fuel economy, higher efficiency than a conventional vehicle
HEV	An EV that uses both the source electric battery, and internal combustion system	Lower emission, better fuel economy, less expensive to run, and provide higher driving range than similar conventional vehicles
BEV	EV derive power from electrical battery packs only and charged through an electrical outlet with a plug.	zero emissions, inexpensive to run, and no use of fuel as compared to a conventional vehicle.
PHEV	EV with a internal combustion engine and more powerful electric batteries.	lower emissions, bet ter fuel economy, less expensive to run, and offers flexibility of fuel source

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1.1. Indian Scenario

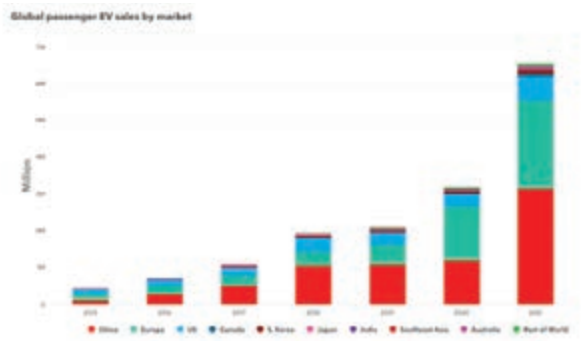
India is ranked 3rd in global greenhouse emissions after the US and China, which is a great concern because the pollution level in India is reaching an its alarming state around 87% are attributable to road transport (MOEF, 2010a). Several initiatives are being taken by the Government of India. EVs have already been started to be penetrated several cities of India in the form of battery rickshaws, electric bikes, scooters which attracted the customers. The key initiative taken by the government as National Electric Mobility Mission Plan (NEMMP) 2020 launched by Prime Minister on 9th January 2013 with an aim to enhance national energy security, mitigate adverse environmental impacts from road transport vehicles, and boost domestic manufacturing capabilities for electric vehicles (Dhar Subhash et al.,2014)

Prior to the publication of report by NEMMP, the Ministry of New and Renewable Energy (MNRE) provided a scheme of incentives to promote the sale of electric vehicles (EV) in India. The initiative, however, was only from November 11, 2010, to March 31, 2012. and its termination caused the EV market to rapidly decline. After two months after its termination, more than 20% of merchants shuttered their doors and close to 33% resumed their previous lines of work. Similar trends were seen with Mahindra Reva's sales, the sole EV vehicle manufacturer in India. Once the subsidy was terminated, sales of many produced units dropped by 40%. Recently India mooted a road map by announcing FAME II and set a target of 100% electrification of vehicle by 2025.

But this created concerns among the manufacturers to produce EV's instead of conventional vehicles because of the unavoidable barriers, especially where electricity generation from fossil fuels plays a dominant role. Although electric vehicles have potential and imperative environmental benefits it is still on an infant stage in developing country including India So, Stable policies and incentives are required if the government is to build a strong EV sector in India. There are several companies which took the opportunity an early bird by manufacturing electric vehicles in India like Hyundai, Mahindra, Tata Tigor, Atom Motors, GattiUva (Entice Impex Pvt Ltd),Ather Energy Pvt Hero electric (Hero Motocorp), Greendzine Tech, Darwyn,etc. Now considering the share of India has as compared to other countries.

The Rest of the countries includes countries like Netherland, Norway, France, Germany, United Kingdom, Canada, Italy, Sweden, Spain, Denmark, Portugal, and South Africa. This report clearly shows that India is far behind in deploying the EVs and at this rate and hence it cannot meet with the targets of NEMMP.

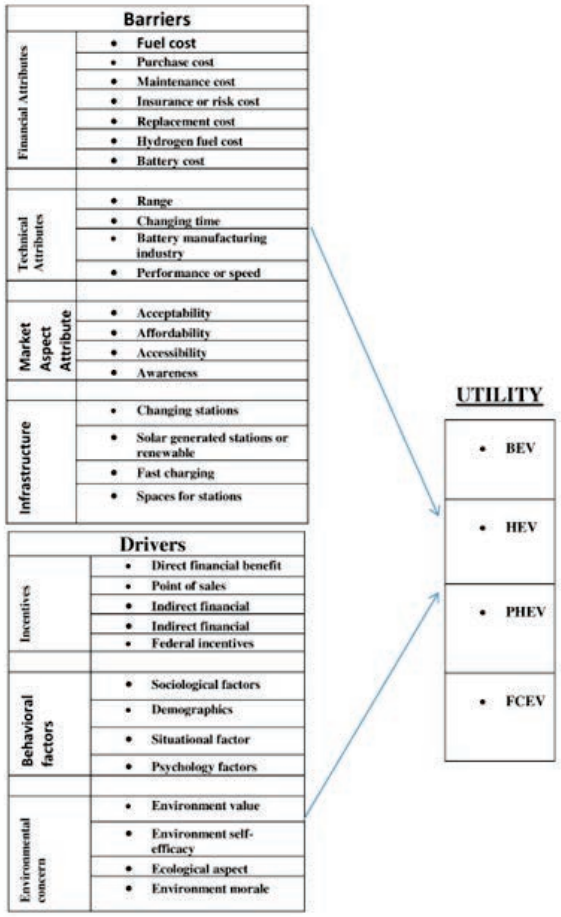
Figure 1: India's Electric Vehicle Share with Rest of the World



Source: BNEF (2022)

As per fig-1, India doesn't stand anywhere in comparison to the other westernized nations for its contribution to the Electric Vehicle market. This opens huge potential for a country like India to explore and exploit the future opportunities that the EV sector entails.

Figure 2: Conceptual Framework of Barriers and Drivers Affecting EV Utility



Source: Authors' Observations from the Review of Literature

2. Review of Literature

In this section, we suggest a conceptual framework for EV Preferences (refer Figure 2) based on which we organize our study. We first briefly introduce the context before introducing the structure. Studies on adoption of EVs' is based on many theories, models, studies, and target variables. In this paper, we divide the EV adoption based on two categories: Barriers or attributes and drivers. Through making trade-offs between attributes, customers make decisions. Attribute or barriers study concentrates on the calculation of the taste parameters which highly weigh on the decision making of consumers' adoption. Drivers' studies focus on the motivation or factors which influence the customer's emotions, attitudes, and perceptiveness for EV adoption.

The literature on EV adoption could be analysed on numerous aspects related to behaviour of consumers which affects the adoption of EVs. They have combined different theories and studied different EVs in different nations. This has made research fragmented and difficult. Therefore, this research will provide the drivers and barriers which will affect the decision of the consumers while adopting the electric vehicle.

2.1. Incentives

Prior empirical studies have divulged that consumers willing to adopt the greener technology "electric vehicles" when they get some incentives or direct financial benefits as compared to a conventional vehicle which results in reducing operational cost & increase efficiency of fuel (SangYN&Bekhet HA,2015). (Mersky, A. C.et al., 2016), investigated the impact of incentives on per capita EV's sales in Norway and gone through the method of incentivizing their citizen for instance exemption from road tolls, point of sales incentives helped in removing the scepticism for using EV's. They also mentioned other incentives of different nations UK, Sweden, France, US, Canada, for example, giving tax credit, offer purchase incentives to customers and rising gasoline prices which proved successful. In the same direction (Bjerkan, K. Y. et al.,2016) considered the role of incentives that allure customers to adopt BEV's in Norway. They provide financial incentives which bring BEVs cost at the same level as ICEV like exemption from vehicle registration tax, exemption from VAT (Currently in Norway 25%), BEV's car owner pays lowest vehicle license fee, exemption from road trolling, free parking on municipal parking's and lastly access to bus lanes.

2.2. Behavioural Factors

Many researchers suggested in their studies that consumer behaviours lead to their reactions and conversion to this reaction to actions.(Axsen, J. et al.,2012) considered sociological factor as one of the drivers for adoption of EV's by using a novel quantitative survey with 711 household representative sample in San Diego illustrated that the Pro-environment lifestyles which include practices like buying organic products, installing recycling home insulations have an insightful relationship with the demand for pro-environmental technologies like EV's. Paper by (Jensen, A. F.et al.,2014) suggested that the real-life experiences with EV's can impact individual preferences and attitude. Recent pieces of evidence in (Li, W. etal.,2017) divided the consumers' behaviour can be dependent upon three factors -(i) demographic (ii) situational (iii) psychological. Demographic factors like age, gender, income, family size significantly impact the buying behaviour of consumers. In the situational category, they included technical features like driving range, refuelling time, etc high purchasing cost which directly affects the purchasing decision. Psychological factor includes personal experience, emotions, attitudes, societal influence, and symbols. (Daziano&Bolduc, 2013) showed that highly educated people and female more likely choose EV's in Canada and neglection of behavioural changes in consumer make your attempt futile. A study in Switzerland suggested that socio-psychology cost like norms of a peer group, neighbourhood pressure also affects the decisions (Coad, A. et al.,2009).

2.3. Environmental Concerns

In the context of this study, environmental concerns can be described as a level of concern about environmental problems and a willingness to address them (Sang YN &BehketAli,2015). (Oliver D & Rosen E.,2010) (study focussed on providing the relationship between people having environmental values and environmental self-efficacy with environmental issues. The study by (CarleyS. et al.,2013) that the people sensitive towards the environment had shown more interest in adopting PEV's. This study gives insight into how the ecological aspect of usage of electric car integrates a link between value and loyalty of a customer (Koller et al., 2011). (Bauer. R et al.,2014) added the construct in his study that attitude towards environment includes having a behaviour of purchasing eco- friendly products which seems to influence customer towards greener vehicle. (Coad et al.,2009) study suggested that intrinsically motivated individual behaviour guided by "environment morale" more likely to adopt cleaner environment technologies even if the cost is high. Above studies have attempted to recognize environment concerns can affect the decision of customers to adopt greener vehicle. hence, Indian environmental concerned consumers can be targeted to adopt electric vehicle as an early adopter.

2.4. Technical Attributes

Previous researchers found that one of the impediments to making people reluctant to switch over greener technology is their attributes. Paper by Garling, A., &Thogersen, J. (2001) stated that the battery system in EVs does not provide an unlimited driving range with longer recharging time. Cheron, E., & Zins, M. (1997) exploratory research assessed the biggest fear among consumers to adopt EVs is battery failure with limited range and speed. In the study by (Karplus, V. J. et al.,2010) most concerned barriers for commercialization of PHEVs are cost,

performance, durability, and safety. A Study in Germany (Schneidereit, T.et al.,2015) talked about the preference of people is EREV's (additional battery) over BEV's as more adaptability of high range vehicles. Ozaki, R., &Sevastyanova, K. (2011) constructed some motivational factors to switch over hybrids are safety, specifications, economical, reliability, quietness, etc. Plotz,P.etal., (2014) founded that customers engaged in a technical profession are presumably like to adopt BEVs than others for the reason that of its difficult attributes. (Seixas, J.et al.,2015) suggested that EV's adoption can be successful by improvements in grid and battery swapping system feasibility. (Bauer.R et al.,2014) the study considered attitude towards technology is an important factor in the adoption of alternative vehicles.

Paper by Delang, C. O., & Cheng, W. T. (2013), studied certain technical limitations that impedes the replacement of fossil fuel vehicles includes slow charging of the battery, battery problems, operational ineffectiveness, the performance of vehicle depend upon weather conditions, vehicle capacity, and range. In other studies, by (Hensher, D. A.1982; Greene,1985; Bunch et al,.1992) suggested a limited range is one shortcoming which makes the consumer reluctance to adopt EVs. In developing country like India must work hard on research and find out the alternative solution to overcome this technical barrier.

2.5. Infrastructure Readiness

A Major impediment in the deployment of EV's in India is the lack of infrastructure readiness for battery charging and absence of business model to cater to this need (Shukla, P.R et al.,2014). Evidence have given in the paper (Ou,X. et al.,2010) one of the reason behind why china not agreed for the Kyoto protocol's lack of technological recharge related system and poor vehicle performance. proper infrastructure should be there which can be easily accessible for the public will plays a very important role so that consumers intend to switch over to EV's. (Edgbue and Long.,2012) this study emphasised on the adoption of EVs can be possible only if countries can overcome its socio-technical barriers like battery cost, battery technology and charging infrastructure. In2017, United Kingdom stopped generating electricity from coal (report by Fowler.,2018).

Though in India public transport like buses, metro, cabs are there it's not a cup of tea for every citizen and it's not always easy for long-distance travelling. So, people like to commute from their private vehicles. For this charging station is required including battery technology every km and in addition to that charging infrastructure will be installed in airports and train stations, public parking lots, parking lots of malls and supermarkets. To increase the market penetration infrastructure readiness will play a vital role in the adoption of electric vehicle in India.

2.6. Financial attribute

The Financial barrier means applying different monetary costs involved in the usage and purchase of a vehicle. The Purchase price of EVs is included by previous researchers found that price plays a very pivotal role in decision-making process of consumer especially in developing countries like India. Chandra et al., 2010 showed that people likely to substitute their vehicles with EV's if they offer the same price range and comparable offers. One of the key barriers for the adoption of new technology is a cost (Naor Michael et al.,2013). (Chan, 2002) raise the issue of promoting EV's as a low-cost vehicle. Central variables that act as a guiding factor for consumer behaviour are status, knowledge, risk preferences and financial constraints (Roger, 1995).

Coad, A.et al.,2009, described individual decisions based on monetary terms and expected payoffs as extrinsic motivation. Seixas. J et al.,2014, EVs adoption depends on consumer preferences, the major role played current and expected costs. If an efficient product introduced in the market, it will have a rebound effect of becoming cheaper than earlier (De Haan, P. et al., 2007). Research in California by Chéron, E., &Zins,M. (1997), raised the issue in the electric vehicles was higher purchase price compared to conventional vehicles. Recent study conducted by Vidhi, R., & Shrivastava, P. (2018), determined in Indian Scenario that increased demand for lithium make EV's more expensive. Paper by Musti, S.,&Kockelman, K. M. (2011), considered that fuel economy or cost is one of the top-rated attributes in preference of vehicles. Therefore, researchers believed that cost plays a principal role in persuading Indian citizen to use EVs.

2.7. Marketing Aspect

Every product and service in the market now requires a push or business model to show and create a perception of value among the people about that product. Subsequently, the electric vehicle also needs that expression. Chesbrough, H., & Rosenbloom, R. S. stated in 2002 that technology value is latent until it is marketed in some form, and how much value is realised depends on how that commercialization occurs. Developing a marketing model includes several research aspects like consumer behaviour and attitude, technology, marketing and economics (report by Chalmers,2017). Although as compared to a conventional vehicle the electric vehicles still have disadvantages. Paper by (Garling& Thogersen.,2001), stated that the public must be adequately informed, not only about the drawbacks but also about the benefits of this new technology, which is an essential challenge for advertisers and policymakers seeking must create a global demand for EVs. Therefore, in addition to controlling the EV, skilful advertising is required to be embraced and disseminated across society. Marketing campaigns are intended to improve hybrid car consumer understanding. Paper by (Edgbue and Long.,2012) showed concern through incentives like a tax credit, rebate in fuel taxes

Year	Author		Risk cost	Replacement cost	Battery cost	Fuel cost	Maintenance cost	Remarks
2010	Chandra et al., 2010	√						Consumers prefer EV's with same range as conventional
2013	Naor Michael et al.,2013	√						Electric technology is expensive
2002	Chan, 2002	√						Raised issue other low - cost vehicle availability
1995	Roger, 1995	√						One of the guiding factors for the consumer is financial constraints
1995	Roger, 1995		√					One of the decision -making factors for the consumer is risk preference
2009	Coad,A.et al.,2009		√					The Decision of consumer can be based on monetary term and expected payoffs
2014	Seixas. J et al.,2014	√	√					EV adoption depends on current and expected cost
1996	Chéron, E., & Zins, M. (1997)	√						Raised the issue of higher price of EV
2007	De Haan, P. et al., 2007			√				The Efficient product will create a rebound effect in the market
2009	Karplus, V. J et al.,2009				√			Quoted about Expensive battery
2015	Helveston, J. P et al., 2015					√		China consumer considered fuel cost as an attribute
2013	Feng, W., &Figliozzi, M. (2013)			√			√	Some consumers take decisions based on replacement cost and maintenance of vehicle parts.
2013	Dane, A. 2013		√					South Africa is in dilemma in manufacturing of battery by allowing international companies in their country or set up a local lithium -ion battery factories to favor local and regional producers

2018	Vidhi, R., &Shrivastava, P. (2018)				√			Increase demand for lithium make the EV battery more expensive
2011	Musti, S.,&Kockelman, K. M. (2011)					√		Top-rated attribute of consumer preference is the fuel cost
2013	Delang, C. O., & Cheng, W. T. (2013)			√				battery's lifespan is reduced but the battery replacement costs would add up to the total cost of the electric vehicle
2001	Delucchi, M. A., & Lipman, T. E. (2001)			√				
2000	Black, W.R. (2000)			√				
2009	Delorme, A.et al., (2009)					√		Total cost of electric vehicle will increase by battery replacement cost

Source: Authors' depiction from an existing literature review on Electric Vehicles

have a very little effect on market penetration until policymaker should not use the medium of media and social networks which can influence the people mindset. In terms of India and developing, countries policymakers should focus more on incentivizing and demonstrating projects of EVs for acceptance through inculcating the marketing strategies through 4 A's of marketing which is acceptability. affordability. accessibility, awareness.

2.7.1. Acceptability

For following the Paris agreement the government of India is making various efforts EV' s acceptable to Indian consumers, for instance, releasing the tenders to increase the charging facility in every part of country, providing the EV at zero down payment to increase thesales,60% of the Research&Development costs of developing low-cost indigenous EV's technology has been sponsored by GOI, inviting tenders for setting up manufacturing facilities for more than 10,000 EV's (Jena.R.,2019).(Ravi and Ravi,2015) stated in his study that the public's lifestyle was also an important factors in the acceptability of EV. (Nordlund,A et al., 2018) focussed his study on the measures aimed at the acceptability of EV's through developing a model based on the norm-activation model to know the attitudinal factors on the acceptance of pull measures aimed at encouraging EV adoption. This study gave importance to hazardous-related attributes like smog have a positive impact on the consumer acceptability of EV's as these strategies used in the Indian market to sell insurance policy (Liu, Y et al.,2019).

2.7.2. Affordability

As affordability is the key element for sustainable entrepreneurship which ought to be applied to the Indian market and can be used to make Indian consumers adopt any product. Indian government should inculcate this marketing strategy for EV then they would be able to increase the usage of EV's in the Indian market. (Tseng, H. K et al.,2013) The study concentrated on the analysis of how tax credit changes the consumer affordability EV. Paper by (Pillay, N. S. et al., 2019) tries to comprehend how so many important factors, including as retail pricing, charging infrastructure, reputation impact, and range anxiety, relate to the affordability of BEVs based on the average consumer's disposable income in the residential sector.. The study investigates the current and future business

implications focusing on their challenges and also structural change in production leads to a decrease in the cost would be directly making EV's affordable. (Adepetu, A.& Keshav, S. (2017) a Los Angeles case study focused on the different cases of battery cost and suggested that for promotion of EV policymaker should pay more attention to affordability rather than a range

2.7.3. Accessibility

Accessibility also plays a vital role in marketing strategy. Paper by (Kim, I et al.,2020) gives the importance of accessibility to charging stations over many other attributes like fuel cost, fuel type, maintenance cost, etc. Ehrler, V. C., Schoder, D., & Seidel, S. (2019) this paper focussed on challenges and perspectives faced by using EV's in logistic business. They showed the most problematic situation faced by drivers is the number of accessible charging points is not currently sufficiently high while en-routing for delivery this generally delays the delivery which is not acceptable by customers. (Zhang, H.et al.,2020) concentrated on the problem of accessibility coupled with the planning of charging infrastructure for EV's. (Ashkrof, P et al.,2020) indicated many factors, including limitation of the limited range, recharging length, and pace, charging methods, availability, and accessibility of charging points, may contribute to distinctive travel conduct of EV drivers compared to ICV. This uncertainty may pose challenges for policymakers and service providers.

2.7.4 Awareness

Awareness is the ability to directly know and perceive, to feel, or to be cognizant of events. Lack of awareness about the advantage is the main drawback in India which hampers the acceptance of EV's. (Zhang, Y.et al.,2014) aim to analysis consumer awareness about the EV and how it will affect the choice of consumers. (Krause, R. M et al .,2013) emphasised on the fact the persuading consumer for long term benefit by paying immediate cost was not an easy marketing task unless they should be better informed about the publicly available incentives and advantageous aspects of EV's. Paper by (Carley, S.et al.,2013) examined the main challenge with EV was to make its market presence and creating consumer demand.

3. Objective of the study

This study has the following objectives:

- To present a comprehensive overview of the drivers and impediments against the consumer in electric vehicle adoption.
- To frame a conceptual framework.
- To identify the gaps in existing literature and provide the suggestion for future.

4. Research methodology

To provide comprehensive overview of drivers and barriers of electric vehicle for this study database was created through published paper on electric vehicle and determined on electric vehicles-related determinants, issues, drivers, and attributes. This paper gathered information from a range of sources, including published empirical investigation through using a variety of keywords such as electric vehicle, EV, BEV, PHEV, FCEV, Green-vehicles, Eco-vehicles, combination of consumer adoption and E-vehicle, purchase intention and perception searched on Jstor, Inderscience, Google Scholar, and Science Direct to find pertinent papers. After that, manually searched the list of journals' abstracts. To find more research that the other researchers were unable to find, further the references from the publications also looked up to capture more sources.

5. Result

Several studies have been compiled to give the overview of factors which can affect the decision of consumers while adoption of electric vehicle. Through the exploration of literature, we categories the factors into two themes drivers and barriers to understand the applicable impact on the utility of EV. The impact of incentives is found to be the most significant driver irrespective whether it is direct or indirect benefit like reducing operational cost, exemption of road tolls, point of sales incentives, giving tax credit, offer purchase incentives, access to high occupancy lanes that have proven successful to allure the consumers in different nations duly corroborated by existing studies. Secondly, the impact of behavioural factor has been estimated to be positive and significant. The impact of sociological factors, pro-environment lifestyles, real-life experiences, demographics, situational and psychological factors are found to be positively correlated influencing consumer decision of electric vehicle adoption. technical attributes including limited driving range, less speed, lack of grid and battery swapping system that may impact the usage intentions of a consumer in a negative way. The scarcity of charging stations demonstrates the importance of charging infrastructure development in promoting EV which can positively convert the negative to positive affect for the utility of EV. The Financial barrier also plays a crucial role through attributes like purchase price, fuel cost, replacement cost, maintenance cost battery that may decline the utility of EV.

6. Conclusion

The Indian government recently has launched a scheme called FAME (Faster Adopting & Manufacturing of Hybrid and Electric Vehicles) in 2015 to promote and additionally could prove to be the backbone policies to accelerate and transform the automotive industry to manufacture greener vehicles. Unfortunately, this covers half of the journey to make India vibrant market for EV that calls for further research in Indian context as there is a paucity of studies that can throw some light

on risk or insurance cost which is considered as one of the important elements affecting the Indian consumer purchase decision of a vehicle. Secondly, due to Li-ion batteries, the cost of EVs in India is on the rise. The batteries make up about 70% of the total vehicle's cost. Thus, imported battery pack costs in India about USD 275 per kWh. So, the Indian government should be focussed on developing the ion-battery industry to lower the cost of the electric vehicles. Another obstacle for adoption, batteries are to be replaced after 5 years which further increases the total cost of ownership. EV needs charging of 6 to 8 hours that can conveniently reduce through battery swapping, spaces for charging station in India as like petrol pump, solar-generated energy or hydrogen-based energy station which can charge the vehicles swiftly otherwise it would be futile to produce electricity with fossil fuel technique which will release same emissions in the atmosphere. Lastly, the government would allow citizens to evaluate the advantage of switching to EV through roadshows, seminars, advertising, schemes available to showcase the benefits of EVs. This study has only given the overview of variables which can affect the consumer adoption through literature review of published article which can be practically tested through other methodologies which calls for future research for exploring other variables and practically examine the proof of the drivers and barriers on the utility of the EV.

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Promising Usage of Blockchain Technology

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Abstract

Blockchain, a cutting-edge technology that enables peer-to-peer transfer of digital assets with almost no middlemen, is expected to be just about as important as the Internet. Blockchain is poised to transform every sector and administrative capacity by reimagining how people interact online, communicate ideas, and manage processes. It is another technology that any business expert must understand. The library services and digital media industry is a critical switch in such transformations.

Blockchain technology has sparked significant interest among governments, businesses, and academics in recent years because of its capacity to provide a transparent, secure, and tamper-proof mechanism for linking many parties in a trustless arrangement.

The existing global financial architecture is riddled with flaws, unfair twists of events, and unexpected discrepancies. Blockchain technology has the potential to transform financial services. Blockchain technology is going to change the core parts of the financial services business by providing individuals and organizations with the same real choices in the way they create and manage wealth.

The Paper investigates Uses of Blockchain for Library Services. With distributed ledger technology, the Data security and sharing process is evaluated for flaws and further investigated to see how the flaws might be addressed better utilizing blockchain technology.

#Blockchain #SmartContract #DataSecurity #DistributedLedger #FutureLibraries #BlockchainAndLibraries #BlockchainTechnology #DigitalMedia #DigitalAsset

1. Introduction

i. Blockchain

The blockchain is a notable open-source technology (Satoshi Nakamoto 2008) that was first offered as the underlying technology for the world's first decentralized global digital currency, Bitcoin. The blockchain is an immutable and simple distributed database, a ledger that has global consent by all participants. This indicates that the information recorded in the ledger cannot be changed or tricked and can therefore be trusted if the author is trusted.

Blockchain is a cutting-edge invention, a public ledger capable of and adaptable to numerous domains in multiple enterprises. Organizations embrace blockchain as a public ledger because it provides information security and changelessness / immutability. Integrity is considered as a single term that blockchain provides. According to recent reports, blockchain technology is presently being used or is about to be used in financial services, food ventures, electric organizations, conveyances, accountancy businesses, and other industries. Blockchain not only provides security, but it also improves exchanges. As a result, the cost of the transaction will be significantly reduced. Another improvement is that the application is limited since It has not yet undergone a complete examination. As a result, the scientists' goal is to grasp and illustrate what blockchain really is. Analysts must communicate the architecture and capabilities of blockchain to industry insiders so that they may understand how blockchain can help them in their day-to-day lives. With statements from blockchain insiders, it has been shown to be persuasive in a variety of

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sectors. At some time, it is expected that blockchain, like the internet, will spread across the globe. Blockchain may trigger a better rationale sooner rather than later.

ii. Smart Contracts

Contracts are fundamental building pieces of our identity, our global economy, and, therefore, society as a whole. Contracts define mutually accepted norms, asset terms, and performance incentives in the form of rewards and punishments. You've undoubtedly engaged into a verbal or written agreement with someone at some time in your life, most likely lately.

A smart contract is a set of rules that govern how blockchain participants conduct certain transactions. These are the most basic types of decentralized automation since they do tasks automatically when a condition is satisfied. The smart contract code is kept on the blockchain, and each contract is identified by a single location, to which clients submit transactions to interact with it. The blockchain agreement protocol authorizes the proper execution of the contract. Smart contracts provide benefits such as cost savings, speed, accuracy, productivity, and clarity. Because of its security and immutability, blockchain is ideal for storing smart contracts. They speed blockchain, reducing mining postponement. A smart contract is deterministic, which means that comparable information provided to the contract will always produce the same outcome. Assuming that they are implicit in a non-deterministic fashion, the smart contracts may offer multiple states at various hubs and will fizzle the blockchain to come to an agreement. Because the contract is on the blockchain, all participants of the organization may examine the guidelines, and each of them has a cryptographically agreed message of arrangement execution. To edit any principles in the contract, an agreement must be reached throughout the group.

Smart contracts are basically impartial third-party facilitators that conduct transactions and agreements between at least two parties. They eliminate the requirement for confidence in another wise trustless system since users may employ smart contracts instead of depending on the good faith of the other side. Furthermore, they let users to avoid centralized middlemen like exchanges and banks, who would usually assist users with on-chain transactions.

Literature Review

Libraries have traditionally been important institutions in society, acting as centers for knowledge and data. To remain relevant in the modern day, libraries have had to adapt and develop since the development of digital technologies. With its potential to transform many industries, including finance and supply chain management, blockchain technology has emerged as a promising tool for increasing the features and services provided by libraries.

i. The Role of Libraries in the Digital Age:

Libraries have additional difficulties in providing access to knowledge in the age of technology. Research by Dempsey and Malpas (2009) highlights the need for libraries to transform themselves into digital information hubs, emphasizing the importance of providing online resources, digital repositories, and innovative services. Blockchain technology can contribute to this transformation by ensuring the integrity, security, and transparency of digital content, as demonstrated in projects like the Alexandria project (Kane, 2016).

ii. Blockchain Technology in Libraries:

Blockchain technology offers several potential applications in the library sector. Xu and Zhu (2018) outline various use cases, including digital rights management, preservation of cultural heritage, intellectual property protection, and authentication of information sources. Blockchain-based systems can enable decentralized lending and borrowing of digital resources, as well as facilitate peer-to-peer transactions between libraries (Li et al., 2019). Additionally, blockchain can enhance the trustworthiness and authenticity of scholarly communication by enabling verifiable peer review and ensuring the immutability of research records (Luo et al., 2021).

iii. Challenges and Limitations:

Despite its potential, the integration of blockchain technology into libraries faces several challenges. An analysis by D'Ignazio and Hawkes (2018) raises concerns about scalability, energy consumption, and the complexity of blockchain implementations. Moreover, the lack of standardized protocols and interoperability among different blockchain platforms poses hurdles for widespread adoption (Raza et al., 2019). User acceptance and privacy considerations also need to be addressed to ensure that blockchain-enabled library systems align with users' needs and expectations (Feng et al., 2020).

iv. Case Studies and Projects:

Several case studies and projects have explored the implementation of blockchain technology in libraries. The BiblioTech project in Estonia developed a blockchain-based system for managing library materials, improving accessibility and traceability (Nurmela et al., 2018). The Public Libraries 2030 initiative in Europe has also explored blockchain's potential to enhance digital literacy, privacy, and data ownership (Van der Auwera et al., 2020). These initiatives provide valuable insights into the practical applications of blockchain technology in library contexts.

How Blockchain operates

Blockchain is a novel solution to the fundamental human problem of trust. It provides a framework for ostensibly trustless trust. It enables us to trust the consequences of the framework without believing any player within it. Blockchain is a distributed database technique in which a chain is a continuously growing

list of records, or blocks, that are linked and use encryption to provide exceedingly difficult to modify ledger entries.

The objective of Blockchain technology is always to generate a distributed database network that may be used to store private data (especially ledgers, transactions, and agreements) in a manner that cannot be altered after it has been recorded in the blockchain. Since the information is validated and authorized by the network nodes, it is almost difficult for a malicious node to use it in any way. A blockchain technology is an internet-based client information system that aims to transform the way we do business.

Each block is hashed and assigned a digital signature. Distributed, immutable, decentralized, agreement verification, and the ability to maintain resource transaction complexity are characteristics of blockchain technology. In its most fundamental form, blockchain is a decentralized, publicly accessible, and decentralized ledger. It is possible to record transactions in an effective, secure, and endless manner.

- A Blockchain technology allows P2P value transactions without an agent via machine consensus. It runs on top of the Internet on a peer-to-peer network of PCs that are all running the protocol and have a duplicate copy of the transaction ledger.
- The Blockchain is a shared and open ledger of transactions that contains information on every transaction since the genesis block (first block) up to the present.
- Each block typically comprises a cryptographic hash of the preceding block, a timestamp, and trade information. The fundamental notion of technology is the block. They are small collections of transactions that have happened inside the framework. Each new block keeps a reference to the previous exchange by providing a SHA-256 hash of the previous transaction. Along these lines, it forms a "chain" of blocks, thus the name.
- By design, a blockchain is resistant to information modification. It is "an open, distributed ledger that may record transactions between two gatherings effectively and in an irrefutable and long-lasting method".
- The security is provided using strong public-key cryptography, strong cryptographic hashing, and total decentralization, as well as the maintenance of a distributed ledger.
- A blockchain is often managed as a distributed ledger by a peer-to-peer network that adheres to a protocol for inter hub communication and approving new blocks.
- Once recorded, the information in certain random blocks cannot be changed retroactively without changing every subsequent block, which requires conspiracy on the part of the organization's bigger component.
- Blocks are computationally difficult to create and need many particular processors and important timing measurements.
- Because creating a block is difficult and changing one block requires changing the previous block and then following the chain to completely convert it, blockchain technology is regarded as change safe.
- The blockchain is an amazing innovation, the brainchild of a person or group identified by the moniker Satoshi Nakamoto. The blockchain breakthrough for bitcoin makes it the principal digital currency without the requirement for a trusted authority or central server. Other apps have been influenced by the Bitcoin design.

Blockchain Internals in brief

The block is the basic building block of blockchain, created by children. As shown in Image 1, the typical design of a block is quite simple and consists of a block body and a block header. A block body is made up of an infinite number of different transactions (Data), which are added to the block by the miner.

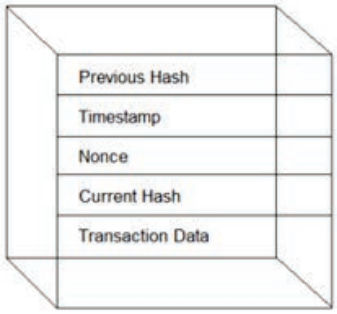

Image 1: Typical Structure of a block

The block's header might contain five main characteristics.

- Preceding Hash: The previous block's hash, used to create a "chain."
- Transaction Details: the transactions in this block's metadata
- Timestamp: the moment a block is discovered or generated
- Nonce: A random value is a nonce (number used once)
- Current Hash: The current block's hash

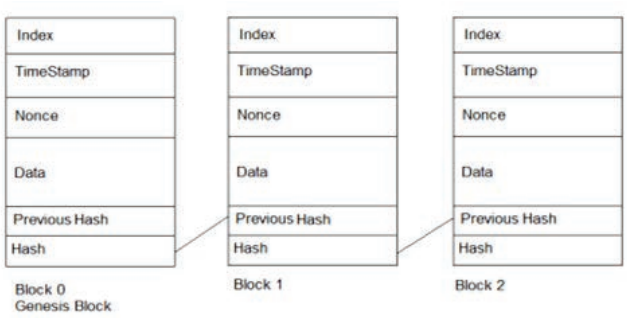

Image 2: An example of Blockchain

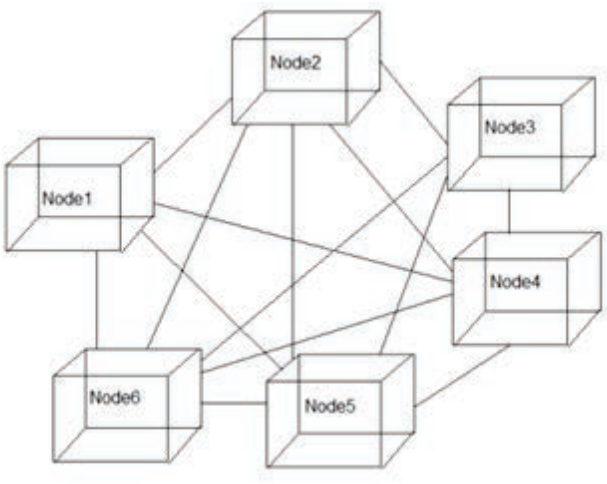

Image 3: Decentralized Blockchain network

Nobody in a decentralized blockchain network has to be aware of or trust anybody else. As a distributed ledger, every component in the network has a replica of the same information. If a component's ledger is altered or corrupted in any way, the majority of network members will reject it.

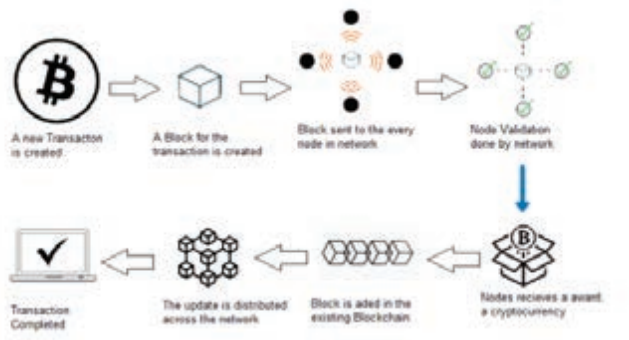

Image 4: Steps for a new blockchain transaction

The stages of activity that take place inside a network begin with the broadcasting of a transaction to the whole network, which results in the creation of a new set of transaction records. The next step is for every node to collaborate to complete a calculation for a distributed agreement on a consistent basis. This computation must contain the answer to a cryptographic conundrum (proof of work). The whole network is informed about this proof of work once a node unearths it for the first time. This guarantees that all transactions are completely open and transparent since the network has a reliable copy of the ledger. Every node in the network is responsible for performing a check on every transaction that involves the cryptographic hash of every information block in the chain that connects it to its parent and is connected to the database that is always expanding.

Use cases of Blockchain

Digital media

Businesses in Specialized Digital Media confront a number of issues, including worries about data privacy, intellectual property theft, royalties, and copyright breaches. Companies can safeguard their intellectual property, keep their data correct, target the appropriate consumers, and ensure artists earn their royalties on time by incorporating Blockchain technology into the framework of digital media.

Money Transfer

To this day, the most practical applications of Blockchain technology include payment processing and money transfer. Today, transactions may be completed quickly thanks to blockchain technology. Because of the time and money savings, most notably the removal of transaction fees paid by banks and other financial institutions, this has already caused a revolution in the banking sector that cannot be undone.

Insurance

Smart contracts may be decentralized and transparent, but they are vulnerable to security attacks that may result in millions of dollars in damages. Even audited DeFi projects may have vulnerabilities, in which case a hacker may fully empty its liquidity pools.

Governance

Governance models in the blockchain sector provide a framework in which investors have a direct influence in how a project is built and where it is headed. Community members, like shareholders in a firm, may express their views and actively participate in decision-making.

Using a smart contract, securities capitalization table administration may be simplified and middlemen in the chain of securities custody can be avoided. The smart contract may automate dividend payments, stock splits, and obligation management while lowering counterparty and operational risks.

Trade Finance

Smart contracts may promote expedited international transfers of products by enabling speedier Letters of Credit and trade payment commencement, as well as increased liquidity of financial assets.

Usage of Blockchain technology in Libraries

In addition to enhancing services based on patron needs, blockchain technology provides librarians a tremendous opportunity to build and facilitate collaboration between their clients' libraries and the users of those libraries. Library staff have the ability to discover, acquire, organize, customize, and supply information products and services to customers on demand or in anticipation of their need.

Libraries are growing increasingly interested in employing blockchain technology for several objectives, including metadata improvement, the preservation of digital first sale rights, and the promotion of peer-to-peer file sharing.

Below are notable uses of blockchain technology in libraries

Library/Student Data Sharing
It is possible to exchange any kind of information using blockchain technology. As a result, educational institutions such as universities, libraries, and schools might possibly use Blockchain to exchange customer or student data with other companies. When it comes to sending sensitive information in a safe manner, blockchain technology may provide a solution.

Prevention of Digital Asset Duplication
Libraries may use blockchain technology to handle the digital items that they now have access to. Most libraries and publishing firms are now grappling with digital asset duplication. This problem, however, might be solved if blockchain technology and digital assets are combined. This enables these resources to be identified, managed, and transferred in a distinct way. If libraries adopted blockchain technology, the ordering and payment of electronic resources may change substantially.

Data tracking and preservation
The adoption of blockchain technology has the ability to simplify the administration of trustworthy data and information, making it easier for libraries to access and utilize critical material while maintaining data confidentiality. A blockchain is a distributed ledger that is maintained safe on a network of computers known as a blockchain. It is built from "blocks" of data records. Following their accumulation in a chain, these blocks are validated and controlled by automation in accordance with general governance principles. Consequently, changing or removing any of these barriers is tough for a single person.

Borrowing books between libraries (inter-library loans) and vouchers
The use of blockchain technology may aid in the development of an interlibrary lending pilot program for institutions. People may find it easier to pay for interlibrary loan requests if libraries provide vouchers that can be used multiple times. One transaction equal one standard payment, represented by one voucher. Because of the cash transactions that occur as part of this Interlibrary Loan exchange (blockchain would make financial transactions easier), and because of the transactional nature of interlibrary loans in general, blockchain would lend itself well to ILL.

Membership and credential verification.
All possible users in participating library systems may have unrestricted access to digital material and print collections via blockchain, and risk can be managed to protect each user's privacy and identity. Because of blockchain applications, a person or organization can have complete ownership and control over both their digital and physical identities. Users who create a secure and private digital identity will have access to all the materials in those libraries, enhancing efforts to promote information literacy and digital inclusion.

Archives and other significant assets where legitimacy and authenticity are critical
During the life of an Archive data or digital asset, Blockchain technology may be used to ensure that the data is legitimate and authentic. To do so, the hash of the original records must be compared to a hash on the blockchain. If the two hashes do not match, it indicates that the records have been altered. We are currently discussing a method for configuring an individual repository to build an original document when a file is uploaded and to verify the data's integrity throughout its life by simulating migration from one format to another. Those involved in the information professions must deal with record management.

There are a few other areas that can be investigated further, such as the management of corporate intellectual property data for research and development. The blockchain can also be used to build community-based repositories for the sharing of data, information, and services.

Another use of blockchain technology is in academic records. As a result, scholars may debate material while simultaneously documenting and updating their opinions. The employment of blockchain technology has the potential to bring about substantial changes in the ways in which user privacy is preserved, people cooperate with one another, and libraries connect with both their communities and one another.

In addition to the purposes listed above, technology may be used to assist move things forward faster in educational settings and public libraries. It may be used to secure user information in libraries, maintain track of new purchases, and improve collection upkeep.

Conclusion

The future of libraries lies in their ability to embrace emerging technologies like blockchain. While challenges remain, blockchain technology offers promising opportunities to enhance the services provided by libraries, ensuring the integrity of digital content, fostering collaboration among libraries, and empowering users. By further exploring the potential applications, addressing technical and user-related challenges, and collaborating on innovative projects, libraries can position themselves as vital knowledge institutions in the digital age.

It is anticipated that blockchain will be just as important as the

internet in the future since it is a cutting-edge technology that permits the movement of digital assets from peer to peer with almost no delegates. The existing system of finance is rife with defects, uneven twists of events, and unexpected discrepancies, all of which may be remedied by using this technology. Companies can safeguard their intellectual property, maintain the accuracy of their data, reach the appropriate consumers, and guarantee that artists get their royalties on schedule when they integrate this technology into their digital media. Even though smart contracts are decentralized and transparent, they are susceptible to security attacks, which may result in losses that can run into the millions of dollars.

The implementation of trustworthy data and information might be simplified with the use of blockchain technology, which has the potential to make this possible in libraries. A distributed ledger that is kept secure on what is known as a blockchain, which is a network of computers, is called a blockchain. It is constructed from blocks that contain records of data. Because the Interlibrary Loan exchange (ILL) involves currency transactions, blockchain technology would be an ideal fit for the ILL system. Applications of blockchain technology make it possible for a person or organization to have full ownership and control over both their digital and physical identities. This benefits both parties. If users establish a digital identity that is both safe and private, they will be granted access to all of the resources included inside those libraries' applications. The construction of a safe and private digital identity by users will provide them access to all the materials in those libraries.

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Unveiling the Crucial Key Success Factors for Inbound Open Innovation Strategy and its Application in MSME IT & ITES Industry of India

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Abstract

This research find out the crucial key success factors for an inbound open innovation strategy, how they impact on firm performance, specifically in facilitating MSMEs in the IT & ITeS sector. A quantitative survey was conducted in the Indian IT & ITeS MSME industry, with 339 questionnaire were distributed, we received total 13 percent response rate. The sample includes senior management, R&D managers, experts, and MSME firm owners. Data analysis using PLS-SEM reveals significant and favourable links between firm growth and selected factors of open inbound innovation, such as R&D intensity, knowledge absorption capacity, and company objectives and motivation. However, associations with innovation approach, collaboration risk and trust issues, and leadership commitment show marginal positivity. The study acknowledges the need for sector-specific relationships and creative strategies, indicating that a simplified approach is often taken when discussing Innovation and Open Innovation. The results highlight that critical success factors can enhance firm performance when adopting an Inbound Open Innovation Strategy.

Keywords: Crucial Key Success Factors, Inbound Open Innovation strategy, MSMEs, Firm performance

1. Introduction

Open innovation is indispensable now for the new developments and competitiveness for Indian MSMEs in the IT and ITES sectors (Hungund et al., 2017). In this research we are finding the critical success factors and provide insights that can support MSMEs to overcome the barriers of growth and utilizes open innovation leverage and its potential benefits. This research is addressing a research gap in the existing literature on open innovation in the Indian context, specifically within the MSME sector where research is limited. The recommendations of this research can contribute to theoretical knowledge of open innovation and its implementation in emerging economies such as India. The paper will investigate the implementation issues faced by these businesses in adopting open innovation and identify the factors that can help overcome these challenges (Abulrub & Lee, 2012). The open innovation (OI) concept is shared by Chesbrough in 2003, this led to an evolution of research in the field, progressing from descriptive and exploratory studies to quantitative explanatory investigations. However, previous studies exploring critical success factors for open innovation did not differentiate among the Inbound, Outbound, and Coupled modes strategy of open innovation. The literature does not address specific factors for each mode of open innovation. Therefore, we are specifying key factors and their adoption for inbound mode within a specific industry for improved firm performance.

(1) What are the Key Success factors for Inbound Open Innovation?
(2) Do different specific aspects enhance the performance in Inbound Open Innovation?

Hence, we seek the crucial factors that significantly impact the Inbound mode in the Indian IT& ITeS industry. A seven-point Likert scale is used to collect the responses, where 1 indicates disagreement, and 7 indicates highest level of agreement.

2. Literature Review

2.1 Essential Key Success Factors of the Firm and Inbound Open Innovation Strategy

Inbound Open Innovation strategy involves companies actively seeking and collaborating with external partners to discover new opportunities, co-create solutions, and foster Innovation (Moretti & Biancardi, 2020). This approach differs from the

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traditional "closed" approach to innovation, where companies rely primarily on internal research and idea development resources. In contrast, open inbound innovation utilises the collective knowledge, expertise, and experiences of a broader network of stakeholders to identify and solve problems, develop new products, and drive growth (Sisodiya et al., 2013). Chesbrough and Crowther (2006) found that this approach can help reduce innovation costs and risks while enhancing the speed and effectiveness of the innovation process. Lichtenthaler and Ernst (2007) argue that open inbound innovation allows firms to address knowledge gaps, supplement internal R&D capabilities, and improve innovation performance. Laursen and Salter (2006) highlight the importance of external knowledge quality and the firm's absorptive capacity in determining the success of open inbound innovation. Similarly, Bogers et al. (2010) explains that outer world knowledge should be integrated in innovation.

2.2 Inbound Open Innovation Strategy and R&D Intensity

Literature presents differing perspectives for Inbound Strategy and R&D Intensity, with some studies suggesting a strong association and others demonstrating contrasting views. One view is that inbound open Innovation and R&D are complementary processes which can enhance innovation performance. The relationship between R&D intensity and inbound open innovation is intricate. It may rely on various elements, such as the type of innovation, the external sources of knowledge, and the firm's absorptive capacity. As a result, additional research is necessary to examine how these factors interrelate with R&D intensity and inbound mode in the IT&ITES industry.

For instance, studies have suggested that R&D intensity may positively effect on open inbound innovation only when firms possess a high absorptive capacity and can assimilate external knowledge effectively (Chesbrough & Crowther, 2006). The IT&ITES industry is distinguished by unique characteristics such as digitalisation, automation, and platform-based business models, which may affect the connection between R&D intensity and open inbound innovation in unusual ways requiring more investigation. Studies suggest that digitalisation may enhance the efficacy of open inbound innovation by facilitating knowledge exchange and collaboration (Salvadorinho J et al., 2021).

Understanding the correlation between Research intensity with inbound innovation in the IT&ITES sector has significant practical implications for businesses seeking to boost their innovation performance. Further research can offer insights into how companies can optimise their R&D investment and inbound open innovation strategies to enhance innovation results. Studies suggest that businesses can improve their innovation performance by focussing on the quality of their outside sources of information rather than quantity (Lichtenthaler, 2016).

2.3 Inbound Open Innovation Knowledge and Absorptive Capability

Absorptive capability and inbound open innovation has been verified in the innovation management, with many studies indicating a positive relationship between them (Bogers et al., 2017; Laursen & Salter, 2006; Lichtenthaler, 2016). However, the relationship is complex and may be moderated by various elements such as organisational structure, innovation strategy, and environmental turbulence (Huergo & Jaumandreu, 2004; Van de Vrande et al., 2009). Additionally, some studies have suggested a non-valuable relationship between open inbound innovation and absorptive capability, emphasising the risk of becoming too reliant on external knowledge sources (Dahlander & Gann, 2010; Jansen et al., 2006).In the absorptive capability and inbound open innovation ,despite the theoretical importance of absorptive capacity, empirical studies in this field are limited, with most focusing on the impact of inbound open innovation on innovation performance rather than the underlying mechanisms that facilitate or hinder knowledge absorption. Therefore, there is a need for more empirical studies to examine the role of absorptive capability in the context of open inbound innovation in the IT&ITES industry. Organisational culture is also important factor that may impact on absorptive capacity and its utility for the inbound open Innovation in IT&ITES firms. More research is needed to explore the role of organisational culture and its utilization for knowledge absorption in this context.

2.4 Company Objective and Motivation

Do organisational objectives and strong motivation facilitate inbound open innovation Strategy in MSMEs? Can inbound open innovation strategy in MSMEs are facilitated by organisational objectives and strong motivation? There are contrasting views on the extent of their impact on the success of open innovation activities. Some studies suggest that a clear and well-defined organisational objective can help SMEs identify and pursue strategic partnerships and collaborations more effectively, leading to successful inbound and outbound open Innovation (Ritala et al., 2021). Other studies argue that SMEs may lack the resources and capabilities to pursue open innovation actively, even when organisational objectives and motivations are aligned. They can lead to a "capability-expectation gap," where the firm's aspirations for open innovation outstrip its ability to execute it effectively (Laursen and Salter, 2006; Chesbrough et al., 2016). Furthermore, the firm's motivation can also impact results of inbound and outbound mode of open innovation. Some studies suggest that firms with a strong intrinsic motivation to innovate may be more successful in establishing collaborative relationships with external partners (Ritala et al., 2021; Ahuja and Katila, 2001). However, other studies suggest that extrinsic factors such as financial rewards may be necessary to motivate MSMEs to

engage in knowledge sharing actively (Laursen and Salter, 2006). In order for particular approach to be successful, organisations need be clear about their innovation objectives and motivated to achieve these objectives (Chesbrough, 2006).

Company objectives and motivation can impact the success of inbound open innovation in several ways. For example, organisations with clear and well-defined innovation objectives are better equipped to evaluate and prioritise external ideas and technologies, and they are more likely to effectively integrate these ideas into their existing processes and systems. In order For this approach to be successful, organisations need to be clear about their innovation objectives and be motivated to achieve these objectives. Company objectives and motivation can impact the success of open inbound innovation in several ways.

2.5 Relationship between Inbound Open Innovation and Impact on Performance

The study indicates that inbound open innovation can enhance firm performance, by bolstering absorptive capacity, innovation output, and competitiveness (Laursen and Salter, 2006; Lichtenthaler, 2011; Van de Vrande et al., 2009). Conversely, other studies contend that the relationship may vary depending on various elements, such as the type of innovation activity, industry context, and the firm's internal capabilities (Rosenbusch et al., 2011). Additionally, if not managed efficiently, inbound open innovation can have adverse impacts on firm performance, such as a loss of control over intellectual property or challenges integrating external knowledge with internal capabilities (Chesbrough, 2010; Foss and Saebi, 2017). Despite some evidence pointing towards the favourable impact of inbound mode on firm results, further empirical research is necessary to establish the causal relationship between these variables, especially in the context of the IT&ITES industry. The existing literature predominantly focuses on the high-tech and manufacturing sectors, and a knowledge gap exists. Moreover, there is a need to explore the mechanisms by which inbound open innovation influences firm performance, including its effects on innovation output and competitiveness, as well as the key drivers of these effects.

2.6 Open Innovation, IT Sector and SMEs

Digital platforms such as open-source software communities have become increasingly popular in facilitating open inbound innovation in the IT sector. These platforms provide a collaborative environment for developers and users to exchange ideas, share code, and solve problems. Lakhani and Von Hippel (2003) platforms are more effective in leveraging these modes. They need to build relationships with key contributors and understand the culture and norms of the community. Moreover, firms must balance the benefits of openness with the need to protect their intellectual property. They require careful management of legal and licensing issues and developing strategies to manage potential conflicts when working with external partners. Further research in these areas can help IT firms leverage open inbound innovation better and gain a competitive advantage in the industry. The IT sector has actively engaged in open inbound innovation, given its reliance on innovation and the fast pace of technological change. However, there are contrasting views regarding its effectiveness. While some scholars argue that the IT sector's high level of technical capabilities and well-established ecosystem of suppliers, partners, and customers make it well-suited to inbound open Innovation (Chesbrough, 2003), others contend that the commodification of knowledge in the IT sector and the need for intellectual property protection may hinder its effectiveness (Rossi et al., 2018).Online communities, for enabling effective knowledge sharing and collaboration among diverse stakeholders (Lakhani & Von Hippel, 2003).

2.7 Relationship between inbound open Innovation and Factor Approach to Innovation

Chesbrough and Crowther (2006) argue that excessive reliance on external sources of innovation may hinder a firm's ability to develop its innovative capabilities and expertise. Similarly, Ehls D. et al. (2010) propose that open inbound innovation may lead to focus on incremental rather than radical innovation. For example, Huizingh (2011) discovered that using external sources of creation does not necessarily result in a factor-based approach to innovation. Certain studies argue that inbound open innovation practices can increase collaboration risk and trust issues between organisations due to sharing sensitive information and intellectual property (IP) (Chesbrough, 2003; Laursen & Salter, 2006). Chesbrough (2003) suggests that firms engaging in open innovation should exercise caution when sharing their ideas and technologies with external partners to mitigate the risk of IP theft.

On the contrary, particularly in the IT&ITES industries, where collaboration is crucial for innovation success (Bughin et al., 2010; Lakhani & Panetta, 2007). Lakhani and Panetta (2007) argue that inbound open innovation practices can enhance collaboration and trust between IT firms and their customers, improving product development and customer satisfaction. This is because the IT&ITES industry is characterised by intense competition, rapid technological advancements, and the constant need for innovation, which can amplify collaboration risk and trust issues. Therefore, future research should investigate the factors influencing the relationship between open inbound innovation and collaboration risk and trust issues in the IT&ITES industry and explore how firms can effectively manage these factors to achieve successful open innovation outcomes.

2.8 Relationship between Inbound Open Innovation Strategy and Leadership Commitment

Inbound mode, which involves integrating external knowledge into an organisation's innovation processes, has been associated with improved firm performance (West, J., Salter, A., Vanhaverbeke, W., & Chesbrough, H. (2014). Some studies suggest leadership commitment is crucial for successful inbound open innovation initiatives. For example, Chan, W. C. et al. (2017) found that leadership support positively by organisation's absorptive capacity. Similarly, Lichtenthaler (2016) discovered that leadership support for open innovation positively correlates with the success of inbound open mode projects. Conversely, other studies have found weaker or more nuanced relationships between leadership commitment and the success of inbound open innovation. Leaders who excessively prioritise short-term results may be less inclined to invest in open innovation activities that may take longer to yield tangible benefits, leading to missed opportunities for innovation and a lack of long-term competitiveness (Piller & Walcher, 2006). Further research is needed in several areas. Some studies have found that specific organisational and managerial actions, such as effective communication and collaboration, can enhance the effectiveness of inbound open Innovation (Lin et al., 2022). However, other studies have suggested that certain factors may hinder its effectiveness, such as a lack of top management support and cultural resistance to external ideas and knowledge (Dahlander & Gann, 2010).

2.9 Relationship between inbound open Innovation and Organisation and managerial actions

Li and Atuahene-Gima (2001) emphasised the significance of organisational support for experimentation and risk-taking in achieving success through inbound mode. Similarly, Laursen and Salter (2006) stressed that a supportive organizational culture encouraging knowledge sharing and collaboration to drive successful inbound open innovation strategies. Dahlander and Gann (2010) discovered that firms with a solid hierarchical decision-making structure were less successful in integrating external knowledge through open inbound innovation than firms with a more decentralised decision-making structure. Despite the existing research, there is still a need for further investigation into how organisational and managerial factors influence open inbound innovation in the IT&ITES industry, given its unique administrative and organisational practices. Therefore, more research is necessary to explore how different types of corporate and managerial factors affect open inbound innovation in the IT&ITES industry and whether these factors have varying effects on large firms versus SMEs (Chesbrough & Bogers, 2014; Laursen & Salter, 2006; Li & Atuahene-Gima, 2001). These actions may involve creating an innovative culture, providing incentives for generating new ideas, and investing in technology and infrastructure to support innovation processes (Gassmann et al., 2010). However, other scholars argue that open inbound innovation can occur despite existing organisational and managerial structures and actions and that external sources can initiate creation without internal support (Laursen & Salter, 2006).

3. Research Methodology

Introduction: This study examines the critical success factors for implementing an inbound open innovation strategy and its impact on firm performance in the IT&ITES industry, specifically on MSMEs. This study utilises partial least squares structural equation modelling (PLS-SEM) to explore how MSMEs can effectively implement inbound open innovation practices to achieve success. This section provides an overview of the research methodology employed to accomplish these objectives.

Research Design

A quantitative research design to analyse data collected through a questionnaire. The survey was administered to MSMEs operating in the IT& ITeS industry. The sample size was determined using the sample size calculator, ensuring it was sufficient for statistical analysis. The data collection period was two months, and the questionnaire was distributed online using a web-based survey tool.

Research Instrument: The primary research instrument was a survey questionnaire that comprised two sections. The first section collected demographic information about the respondents, while the second section consisted of Likert-scale questions to measure the constructs of interest. The questionnaire was pre-tested using a pilot study to ensure validity and reliability.

Sampling: Purposive sampling is used in this research to select MSMEs operating in the IT& IT industry. The selection of participants will be based on specific criteria, such as the size of the firm, the industry sector, and the level of innovation. Participants were selected to ensure a diverse representation of firms with varying levels of inbound open innovation experience and success. This sampling technique enables the researchers to obtain in-depth information from participants most relevant to the research objectives.

Data Analysis: The validity and reliability of the constructs will be assessed by testing the measurement model. In the second step, the relationships between the constructs and hypotheses were determined by testing the structural model. PLS-SEM will be used as the analytical technique.

The ethical considerations of this study are given utmost importance to protect the privacy and confidentiality of the participants. Participants were asked to provide their informed consent and informed of their right to withdraw from the study without any consequences. The data collected was stored

securely and destroyed after the study's completion to ensure that the confidentiality of the participants was maintained.

Conclusion

In summary, this research outcome will offer valuable contributions to the field of innovation management and provide valuable recommendations for MSMEs to succeed in the IT& IT industry.

4. Data Analysis and Interpretation

The participant's demographic details, who were included in study:

Table 01: Employee position in IT & ITES firms

	Position/Designation	Frequency	Per cent
	Junior	64	18.9 %
	Middle Management	126	37.2 %
	Senior Management	83	24.5 %
	Director/CEO	66	19.5 %
Educational Qualification	Graduate	138	40.7%
	Postgraduate	108	31.9%
	Professional	93	27.4%
	ITES & IT Allied Services	113	33.3
	IT Solutions/Services/Software	135	39.8
	BPO/KPO	91	26.8
Total Work Experience	Less than five years	81	23.9 %
	5 -10 years	100	29.5 %
	10 to 15 years	86	25.4 %
	More than 15 years	72	21.2 %
Firm Size	Micro Companies (Annual Turnover < 5 crores)	134	39.5 %
	Small Companies (Annual Turnover < 50 Crore)	91	26.8 %
	Medium Companies (Annual Turnover (50 to 250 Crore)	114	33.6 %
Firm Type	Proprietor	81	23.9 %
	LLP	81	23.9 %

The results reported that most of the employees selected in the study belong to middle management (37.2%), followed by senior management (24.5%), working as director or CEO (19.5%) and at the Junior level (18.9%). The results reported that most of the employees selected in the study are qualified as Graduates (40.7%), followed by Post Graduates (31.9%) and Professionals (27.4%). The results reported that most of the employees selected in the study belong to middle management (37.2%), followed by senior management (24.5%), working as director or CEO (19.5%) and at the Junior level (18.9%). The results reported that most of the employees selected in the study have experience of 5 -10 years (29.5 %), followed by 10 to 15 years (25.4 %), working Less than five years (23.9 %) and have More than 15 years (21.2 %). The results reported that most of the Micro Companies (Annual Turnover < 5 crores) (39.5 %), followed by Medium Companies (Annual Turnover (50 to 250 Crore) (33.6 %) and Small Companies (Annual Turnover < 50 Crore) (26.8 %). The results reported that most of the employees selected in the study belong to private Ltd (27.7 %), followed by Public Ltd (24.5%), LLP (23.9 %) and Proprietor (23.9 %).

Reliability and Validity Analysis

The internal consistency reliability of the questionnaire/scale is tested with the support of Cronbach's alpha. The expected Cronbach alpha value for each factor (critical success factor for innovation). The table below presents the estimated Cronbach alpha values for seven key factors, all greater than 0.7, indicating high internal consistency among the items in each element. (Approach To Innovation (Technology Aggressiveness) = 0.91, Company's Objective and Motivation = 0.874, Collaboration Risk and Trust Issues = 0.904, Knowledge Absorption Capability = 0.929, Leadership Commitment = 0.9, Organisational and Managerial action for open Innovation = 0.912, R&D Intensity = 0.919). Thus, it can be concluded that the responses received in the study are reliable.

Convergent Validity

The convergent validity of the questionnaire/scale measuring critical success factors for innovation is examined with the help of construct loadings. The selected critical success factors are assumed to be reflective. Thus, the construct loadings of each statement are expected to be greater than 0.7, the composite reliability of each factor should be greater than 0.7, and the AVE of all the factors are expected to be greater than 0.5. (Approach To innovation (Technology Aggressiveness), CR= 0.922, AVE =0.667, Company's Objective and Motivation, CR = 0.887, AVE = 0.542, Collaboration Risk and Trust Issues: CR = 0.909, AVE =0.649, Knowledge Absorption Capability: CR=0.934, AVE=0.655, Leadership Commitment, CR = 0.901, AVE=0.693, Organisational and Managerial action for open Innovation, CR=0.917, AVE = 0.675, R&D Intensity: CR = 0.923, AVE=0.743). Thus, the measurement scale measuring the critical success factors has convergent validity.

Table 02: Reliability and Validity Analysis

Item code	Construct Name	Construct Loadings	Cronbach alpha	Composite Reliability	Average Variance Extracted
AI1	Approach To Innovation (Technology Aggressiveness)	0.702	0.91	0.922	0.667
AI2		0.954			
AI3		0.762			
AI4		0.696			
AI5		0.932			
CM1	Company's Objective and Motivation	0.699	0.874	0.887	0.542
CM2		0.548			
CM3		0.783			
CM4		0.659			
CM5		0.877			
CM6		0.804			
CR1	Collaboration Risk and Trust Issues	0.867	0.904	0.909	0.649
CR2		0.822			
CR3		0.674			
CR4		0.748			
CR5		0.896			
KC1	Knowledge Absorption Capability	0.746	0.929	0.934	0.655
KC2		0.77			
KC3		0.847			
KC4		0.944			
KC5		0.834			
KC6		0.754			
KC7		0.75			
LC1	Leadership Commitment	0.865	0.9	0.901	0.693
LC2		0.813			
LC3		0.811			
LC4		0.841			
OM1	Organisational and Managerial Action for Open Innovation	0.809	0.912	0.917	0.675
OM2		0.719			
OM3		0.855			
OM4		0.789			
OM5		0.922			
RI1	R&D Intensity	0.896	0.919	0.923	0.743
RI2		0.845			
RI3		0.795			
RI4		0.908			

Discriminant Validity

The discriminant validity of the questionnaire/scale measuring critical success factors for innovation is examined with the help of the Fornell Larcker Criteria and HTMT ratio. The Fornell-Larcker criteria compare the square root of the average variance extracted for each construct to correlation coefficients between the constructs. Its correlation with the remaining construct in the measurement scale. In addition, the HTMT ratio estimates the ratio of cross-correlations of the items of different constructs and the correlation among the things of the same construct. The HTMT ratio of less than 0.8 indicates the presence of discriminant validity in the measurement scale. The table shows the results of Fornell Larcker criteria and HTMT ratio below.

The outcomes of the Fornell-Larcker criteria and HTMT ratio show discriminant validity among the questionnaire or scale used to measure the critical success factor for innovation.

Common Method Bia

In this study, the common method bias (CMB) of responses collected from the questionnaire/scale measures the critical success factor for innovation using the Harman single-factor

Table 03: Fornell Larcker Criteria for discriminant analysis

		Company's Objective and Motivation	Collaboration Risk and Trust Issues	Knowledge Absorption Capability	Leadership Commitment	Organisational and Managerial Action for Open Innovation	R&D Intensity
AI	0.817						
CM	0.701	0.736					
CR	0.612	0.46	0.806				
KC	0.718	0.696	0.682	0.809			
LC	0.735	0.714	0.655	0.784	0.833		
OM	0.556	0.516	0.792	0.675	0.601	0.821	
RI	0.683	0.558	0.516	0.587	0.595	0.464	0.862

		Company's Objective and Motivation	Collaboration Risk and Trust Issues	Knowledge Absorption Capability	Leadership Commitment	Organisational and Managerial Action for Open Innovation	R&D Intensity
AI							
CM	0.692						
CR	0.612	0.451					
KC	0.715	0.695	0.683				
LC	0.728	0.71	0.652	0.786			
OM	0.55	0.512	0.797	0.678	0.6		
RI	0.684	0.56	0.515	0.586	0.594	0.463	

method. This method estimates a single factor through exploratory factor analysis (EFA) with the limitation of a single element. The results showed that the percentage of variance explained by the single factor was 46.39%, which is less than 50 per cent, indicating that the responses collected in the study are free from CMB problems.

Hypothesis testing

In the study, another structural model indicating the relationship between the selected seven key factors (Approach to Innovation, Collaboration Risk and Trust Issues, Company's Objective & Motivation, Knowledge Absorption Capability, Leadership Commitment, Organisation and Managerial Action for Open Innovation and R&D Intensity) and the inbound open innovation strategy in the MSME companies of IT/ITES sectors in India. These key factors are assumed to be reflective and measured with the help of selected statements in the questionnaire. The SEM analysis based on the PLS algorithm is

applied to examine the impact of the critical factors on the inbound open innovation strategy in the MSME companies of IT/ITES sectors in India. The following hypothesis is concerned with the help of SEM PLS analysis using SMART-PLS software:

Hypothesis 1

"Identified factors (Approach to Innovation, Collaboration Risk and Trust Issues, Company's objective & Motivation, Knowledge Absorption Capability, Leadership Commitment, Organisation and Managerial Action for Open Innovation, R&D Intensity) significantly influence the open inbound innovation in the organisation"

The above hypothesis is examined with the help of the following sub-hypothesis:

H_{1a}: "Approach to Innovation significantly influences the open inbound innovation in the organisation."
H_{1b}: "Collaboration Risk and Trust Issues significantly influence the open inbound innovation in the organisation."
H_{1c}: "Company's objective & Motivation significantly influences the open inbound innovation in the organisation."
H_{1d}: "Knowledge Absorption Capability significantly influences the open inbound innovation in the organisation."
H_{1e}: "Leadership Commitment significantly influences the open inbound innovation in the organisation."
H_{1f}: "Organisation and Managerial Action for Open Innovation, R&D Intensity) significantly influences the open inbound innovation in the organisation."
H_{1g}: "R&D Intensity) significantly influences the open inbound innovation in the organisation."

R&D Intensity (RI) at Inbound Open Innovation

The Fig. 1 shows the structural model, and the hypothesis testing results using SEM analysis are reported in the table.

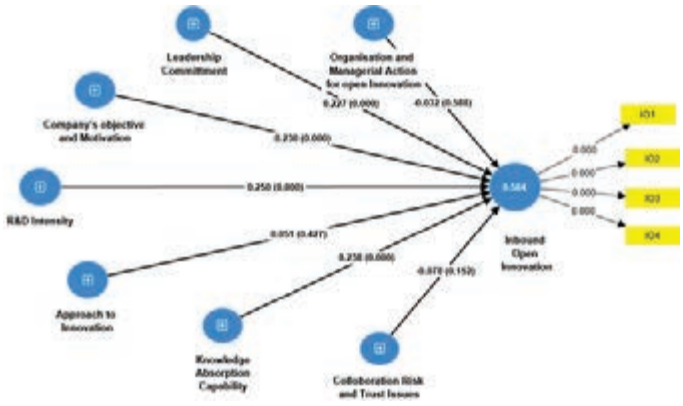


Fig. 1 Structural model: Key success factors vs Inbound open innovation

Table 4: Results of SEM PLS analysis for hypothesis testing (Inbound Open Innovation)

Hypothesis	Endogenous Construct	Exogeneous Construct	Coefficient	Standard Error	T Statistics	R square & Q Square	F Square	Remark
	Coupled Open Innovation	Approach to Innovation	0.053	0.064	0.789	R Square = 59.5 %	0.006	Not Supported
		Collaboration Risk and Trust Issues	-0.076	0.054	1.435		0.008	Not Supported
		Company's Objective & Motivation	0.229	0.06	3.843**	Q Square = 0.559	0.066	Supported
		Knowledge Absorption Capability	0.239	0.058	4.097**		0.05	Supported
		Leadership Commitment	0.227	0.054	4.195**		0.049	Supported
		Organisation and Managerial Action for Open Innovation	-0.031	0.059	0.543		0.004	Not Supported
		R&D Intensity	0.249	0.054	4.643**		0.09	Supported

Importance and Performance Analysis- Inbound open innovation Strategy

The results of hypothesis testing indicate the significant influence of a few selected factors on open inbound innovation, namely R & D intensity, Knowledge absorption capacity and company objectives and motivation. The impact of other factors is found insignificant. The study conducted a vital analysis to compare the relative effect of selected factors on open inbound innovation. The respondents' agreement level towards the selected factors influencing available innovations is also examined with the help of performance analysis. The agreement story is reviewed using a normalised mean score (out of 100). The results of the performance analysis are shown in the table as well as the figure.

Table 5: Importance and Performance Analysis for Inbound Open Innovation

	Performance	Importance
Approach to Innovation	64.732	0.053
Collaboration Risk and Trust Issues	56.604	-0.076
Company's Objective _and Motivation	71.249	0.229
Inbound Open Innovation	58.048	
Knowledge Absorption Capability	59.047	0.239
Leadership Commitment	65.852	0.227
Organisation and Managerial Action for Open Innovation	62.494	-0.031
R&D Intensity	64.353	0.249

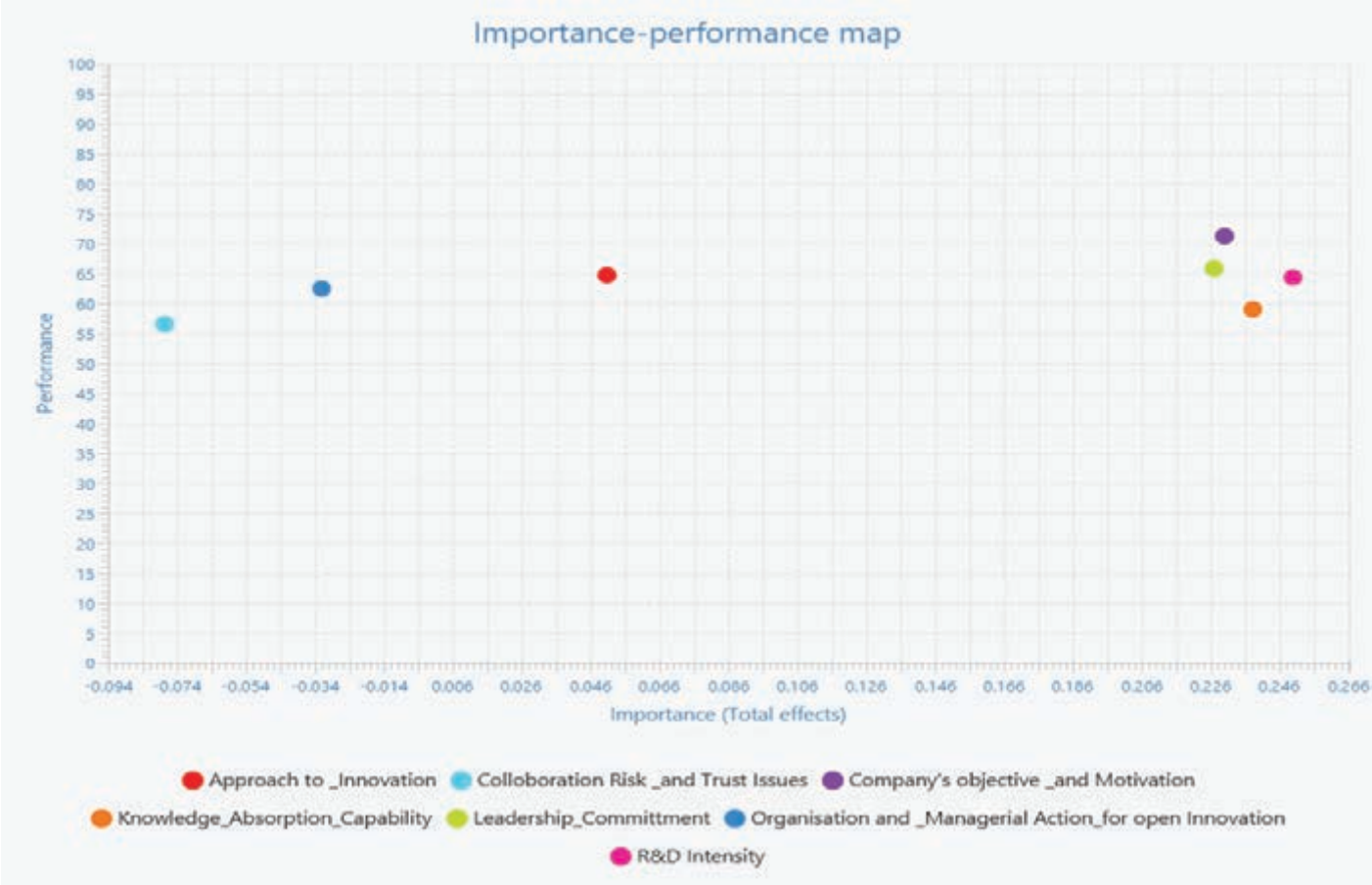
Performance analysis

The results indicate that the employees working with MSME companies in the IT/ITES sector have the highest level of agreement with the companies' objectives and motivation

(normalised mean score = 71.073). This is followed by Leadership commitment (normalised mean score = 65.792), Approach to Innovation (normalised mean score = 64.535) and R&D Intensity (normalised mean score = 64.341). The level of agreement is found to be lowest in the case of Collaboration Risk and Trust Issues (normalised mean score = 56.65).

Importance analysis

The importance analysis compares the impact of different selected factors on the dependent variable (Coupled Open Innovation). The highest impact on coupled open innovation is found for the critical success factor R & D intensity (path coefficient = 0.249). This is followed by Knowledge absorption capacity (path coefficient = 0.239) and company objectives and motivation (path coefficient = 0.229). The impact of other critical success factors is found insignificant.



Conclusion

The study improves their innovation capabilities; SMEs should concentrate on increasing their R&D intensity and knowledge absorption capacity. By doing so, they can absorb external knowledge and technologies and apply them to their business operations, which can help them stay competitive in the industry. Moreover, SMEs should align their company objectives and motivation to foster a culture of innovation and promote collaboration with external partners. However, the study also highlights that collaboration risk, trust issues, and leadership commitment can effective inbound open innovation. Therefore, SMEs should address these issues and develop strategies to build trust and improve collaboration with external partners.

Additionally, SMEs should foster a culture of leadership commitment to creating an enabling environment for innovation. The study found that R & D intensity, knowledge absorption capacity, and company objectives and motivation are significant factors that positively affect financial performance. However, the approach to innovation, collaboration risk and trust issues, and leadership commitment showed a marginally positive effect on financial performance. The study confirms that open inbound innovation can positively affect financial performance by enhancing innovation capabilities and improving collaboration with external partners. The study also provides evidence that R & D intensity, knowledge absorption capacity, company objectives and motivation are significant success factors for open inbound innovation. The study highlights the importance of aligning company objectives and motivation with innovation goals to foster a culture of innovation.

Collaboration risk, trust issues, and leadership commitment were found to have a marginally positive effect on financial performance. MSMEs should develop strategies to mitigate collaboration risk and trust issues and foster a culture of leadership commitment to creating an enabling environment for innovation. The significance of knowledge absorption capacity as a success factor is also consistent with previous research (Chesbrough, 2006; Laursen & Salter, 2006). The study shows that companies with effective knowledge absorption strategies are more likely to benefit from inbound open innovation. The study also highlights the importance of aligning company objectives and motivation with innovation goals to foster a culture of innovation. This finding is consistent with previous research that emphasises the importance of organisational culture in supporting Innovation (Wang & Huang, 2019). The study shows that MSMEs that align their company objectives and motivation with innovation goals are more likely to succeed in implementing inbound open innovation strategies. The study also provides insights into MSMEs' challenges when adopting open inbound innovation. Collaboration risk, trust issues, and leadership commitment were found to have a marginally positive effect on financial performance. According to a study by Chen et al. (2021), R & D intensity positively influences innovation capability, enhancing firm performance.

Similarly, Lai et al. (2021) found that knowledge absorption capacity positively affects innovation performance. Additionally, the study confirmed the importance of company objectives and motivation in fostering a culture of innovation, which has been highlighted in previous research (Wang & Huang, 2019). The study also revealed the challenges MSMEs might face when adopting inbound open innovation strategies. Collaboration risk, trust issues, and leadership commitment were found to have a marginally positive effect on financial performance. Earlier research also found that trust and collaboration are critical factors that influence the success of open innovation strategies (Chesbrough, 2006; Laursen & Salter, 2006).

Discussion

The study presents proves that R&D intensity, knowledge absorption capacity, company objectives and motivation are vital factors in achieving success through inbound open innovation. These findings suggest that MSMEs must develop strategies to mitigate collaboration risk and trust issues and foster a culture of leadership commitment to creating an enabling environment for innovation. The study also revealed that the approach to innovation has a marginally positive effect on financial performance. This finding suggests that MSMEs must carefully choose their innovative approach to enhance their financial performance. According to a study by Hargadon and Sutton (2000), firms must balance exploration and exploitation to achieve successful innovation outcomes. Therefore, MSMEs need to develop a balanced approach to innovation to maximise their financial performance.

Furthermore, the study confirms the importance of leadership commitment in fostering a culture of innovation. Leadership plays a critical role is critical in promoting organisational innovation (Amabile, 1998; Avolio et al., 2009). Therefore, MSMEs need to develop a strong leadership commitment to create an environment that supports innovation. The factors R & D intensity, Knowledge absorption capacity, company objectives, and motivation significantly impact firm performance; however, Approach to Innovation, Collaboration Risk Trust Issus and Leadership Commitment have a marginally positive effect on financial performance. The study has limitations regarding its sample of Indian MSME companies and its failure to control for smaller-sized firms or the types of intangible assets invested.

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Dairy Literacy for Dairy Farming: An Empirical Study in Morigaon District of Assam

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Abstract

The present study was conducted to examine the level of dairy literacy of the farmers on various parameters of dairy farming in the Morigaon district of Assam. For the study a sample of 337 dairy farmers were selected randomly from the dairy co-operatives. In this study dairy literacy of farmers is studied to obtain the level of knowledge, very high, high and average, on various parameters of General literacy and Technical literacy. The study reveals that general literacy is the primary requirement to start a dairy farm. They could identify the particular breed of cow, could construct the cowshed as per the requirement for an ideal dairy farm and also monitor general health, sanitation and milk production on daily basis. The benefits of technical literacy have strengthened farmers' knowledge on the critical issues of health, animal behaviour, fodder and feeding norms with minerals, etc., in dairy farming. So, dairy farming as a profession demands a fair amount of knowledge on different parameters and their application in practice.

Keywords: Dairy Farm, Dairy Literacy, General Literacy, Technical Literacy.

Introduction

A dairy farmer should possess a minimum level of dairy literacy for the sustenance and better management of the farm. In India, dairying, i.e. dairy farming, is recognised, from time immemorial, as a family-activity. With the passage of time a section of people started to practise it as an economic activity for livelihood (DAHD, Govt. of India, 2020). As an occupation/profession for livelihood dairy literacy is a prerequisite. Dairy Literacy is the set of skills, knowledge, ability and understanding of dairying which enables a person to make effective decisions across a range of various dairy related activities. Dairy farming in the study area is practised either as the only source of income, or principal source of income with a secondary source of income. All of these farmers consider that for successful operation of a dairy farm, some knowledge on the dairy farming is necessary.

The history of commercial dairy farming in the study area (Morigaon District of Assam) was started with the establishment of "Sitajakhala Dugdha Utpadak Samabai Samitee Ltd" in 1959 (SDUSS, 2023). The district being the neighbouring district of Kamrup (M) and located within a peripheral distance of 50 K.M. from Guwahati, the largest city of Assam, increases the prospect of dairy farming in the district, considering the market viability. Taking this in consideration, the present study is endeavoured to examine the level of farmers' dairy literacy on various parameters to be identified as very high, high and average.

Statement of the problem

Operation of dairy farms is primarily determined by dairy literacy, i.e. knowledge of farmers on various parameters such as identification of type of cows, cowshed, requirement of workers, fodder, health and sanitation, monitoring of milk production, marketing of milk, behaviour of different types of cows, breeding, upbringing of a calf, and balance feeding. Knowledge or competence in various parameters of dairy farming determines farmer's ability and confidence in the profession. Low dairy-literacy deprives them to manage the farms properly. A reasonable level of dairy literacy gives an impetus for the growth and development of dairy farming. The present study, conducted in Morigaon District of Assam, is an endeavour to examine the level of literacy of the farmers required in this profession so that it can provide a stable and sustainable source of livelihood.

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Objective of the study

To examine the level of dairy literacy of the farmers on select parameters of dairy farming.

Research Questions

1. Is dairy literacy essential for a farmer to operate the farm professionally?
2. What benefits accrue to the farm and the farmer from dairy literacy?

Research Methodology

Study Area

The present study was conducted in the Morigaon District of Assam. It is selected because dairying as a profession was started in 1959 in the district. Presently there are 31 dairy cooperatives as per the information provided by the Office of the Deputy Registrar of Co-operative societies.

Universe of the Study

There are 2132 members in 31 registered dairy co-operatives as on 01st April 2020. The Universe of the study is comprised of all these 2132 dairy farmers.

Sample Size

The Researcher has applied the formula of Taro Yamane (1967) with 95% confidence level to determine the sample size of the respondents as given below-

n= N/ [1+N ×(〖e)〗^2]
n= 2132/ [1+2132 × (0.05)(0.05)]
n= 2132/ [1+2132 × (0.0025)]
n= 2132/ (1+ 5.33)
n= 2132/ 6.33
n= 336.80

Where (n) signifies the sample size, (N) signifies the population under study and (e) signifies the margin of error.

Therefore, total sample size for the study is 337 dairy farmers who are selected randomly.

Tools of Data Collection

The data were collected with the help of schedule of questions designed to obtain information on dairy literacy of the farmers, and by conducting personal and group interview with the farmers and co-operative personnel. The data were collected from the farmers in the period of January to March, 2023.

Type of Information Collected

During the field visit, it is found that without some basic knowledge on type of cows reared, cowshed, fodder, requirement of worker, etc., it is not possible to start a dairy farm. Knowledge on these issues is termed as general literacy. It is also found that there are some technical issues in dairy farming such as behaviour of type of cows, breeding, upbringing of a calf, critical health issues, etc. Knowledge on these issues is termed as technical literacy in this study. Therefore, the level of dairy literacy is examined in terms of general literacy and technical literacy.

The following parameters for general literacy and technical literacy are considered based on the interaction with the farmers and opinion of the Chairman of the dairy co-operatives, President of Brihattar Guwahati Gopalak Sangstha and experts from Assam Agricultural University.

Parameters of General Literacy

1. Type of Cows: Identification of cows as Jersey, crossbreed Jersey, Holstein Friesian, Sahiwal, etc.
2. Cowshed: Technicalities of construction and maintenance.
3. Requirement of workers: Numbers and quality of workers required.
4. Fodder: Knowledge on green fodder and dry fodder, minerals, etc.
5. General health and Sanitation: Knowledge of fever and other illnesses like mastitis, foot and mouth diseases.
6. Monitoring of milk production: Knowledge of fluctuations of daily milk production.
7. Marketing of Milk: Knowledge on selling strategy.

Parameters of Technical Literacy

1. Behaviour of different types of cows: Knowledge on behaviour of cows in different seasons, after insemination and after giving birth.
2. Breeding: Time of insemination, knowledge of different type of serum.
3. Upbringing of a calf: Knowledge on calf behaviour, its health issues, requirement of milk feeding.
4. Critical health issues: Health issues during calving period and requirement of vaccination.
5. Balance feeding: Amount of fodder at different time period i.e. before insemination, after insemination and milch period.

Results And Discussion

General Literacy

For this study, General literacy means general/customary requirement of knowledge to maintain a dairy farm such as knowledge of type of cows, cowshed, requirement of worker, fodder, general health and sanitation, monitoring of milk production and marketing. Table No. 1 shows the percentage of farmers with the levels of literacy (Very High, High and Average) in different parameters of general literacy:

Table 1 reveals that more than 80 p.c. of the farmers are having very high knowledge on five parameters - identifying the type of cows, maintenance of cowshed, requirement of worker, fodder

requirement of cattle and marketing of milk. On enquiry, it is found that most of these farmers are practising dairy farming as the only source of livelihood and a few have other source of income as well. They are practising dairy farming for a long period and so could acquire very high level of knowledge on these parameters.

Table 1. Level of General Literacy of the Farmers

Sl. No.	Parameters of General Literacy	Level of Knowledge	Percentage of Farmers
1.	Type of Cows	Very High	81
		High	14
		Average	5
			100
2.	Cowshed	Very High	84
		High	10
		Average	6
			100
3.	Requirement of Worker	Very High	88
		High	8
		Average	4
			100
4.	Fodder	Very High	91
		High	9
		Average	-
			100
5.	General Health and Sanitation	Very High	38
		High	43
		Average	19
			100
6	Monitoring of Milk Production	Very High	38
		High	51
		Average	11
			100
7	Marketing	Very High	86
		High	14
		Average	-
			100

Source: Field Survey

Table 1 also reveals that 38 p.c. of the farmers are having very high level of knowledge on two parameters, general health and sanitation and monitoring of milk production. Some of these were employees of older farms and have gained adequate knowledge in general literacy. Percentage of farmers with high level of knowledge on General Health and Sanitation and Monitoring of Milk Production is 43 p.c. and 51 p.c. respectively. Percentage of farmers with average level of knowledge on these two parameters is 19 p.c. and 11 p.c. respectively. These farmers have stated that they have started dairy farming as main source of living bearing in mind the success story of other farmers. The enquiry also reveals that though dairy farming is the main source of income of farmers with high and average knowledge, they have other sources of income to supplement the main source of income, e.g., cultivation, business, teaching in private schools and job in private organisations. Most of these farmers, about 83 p.c. are small farmers having less than 10 milch cows.

Most of these farmers are managing the farm with the help of other members of the family. The enquiry also reveals that the average cost of maintenance per cow for these small farmers is comparatively high. They have to incur a higher average cost for labour, fodder, veterinary services and lower milk productivity. These small farmers do not feel and are not eager to have a very high level of knowledge on dairy farming.

Technical Literacy

Technical literacy in dairy farming means knowledge on the behaviour of different types of cows, breeding and life cycle, upbringing of a calf, critical health issues and balance feeding. Table 2 shows the percentage of farmers with the levels of literacy (Very High, High and Average) in different parameters of technical literacy. Contrary to the level of general literacy possessed by the farmers, it is found that most of the farmers do not possess very high level of technical literacy. Data in table 2 reveals that farmers could not have very high level of knowledge on all five parameters. Only 20 to 38 p.c. of the farmers are having very high level of knowledge on these five parameters. On enquiry, these farmers are found to be engaged in dairy farming for more than 30 years as the only source of livelihood. Others have either high or average level of knowledge on dairy farming.

Table 2. Level of Technical Literacy of the Farmers

Sl. No.	Parameters of Technical Literacy	Level of Knowledge	Percentage of Farmers
1	Behaviour of different type of Cows	Very High	20
		High	32
		Average	48
			100
2	Breeding and Life Cycle	Very High	38
		High	43
		Average	19
			100
3	Upbringing of a calf Critical Health Issues	Very High	38
		High	42
		Average	20
			100

4	Critical Health Issues	Very High	20
		High	34
		Average	46
			100
5	Balance Feeding	Very High	38
		High	33
		Average	29
			100

Source: Field Study

From Table 2, it may be inferred that it is a challenge for the farmers to gain very high level of knowledge on the given parameters of technical literacy. The reason for this, as opined by the farmers, is that their formal education could not help them in learning various intricacies of dairy farming. About 90 p.c. of the farmers are not graduates. So, the technicalities of five parameters could not be understood by most of them. The behaviour of different type of cows on various seasons is different and accordingly the fodder requirement is different for different types of cows. The health issues also vary from cow to cow and require intensive care and regular monitoring on cow dung, urine and general health of the cows.

When level of knowledge of farmers according to farm size is examined it is found that all the farmers of large size and medium size farms and 70 p.c. of the small size farms are having very high and high level of knowledge on all the parameters of general literacy (Table 3). On the other hand, 30 p.c. of the small farmers are having average level of general literacy. This shows that all the farmers are having at least the minimum knowledge of general literacy which motivates them to start this profession as a source of livelihood.

Table 3. Level of Literacy of the Farmers according to Farm size

Literacy	Level of Knowledge	Percentage of Farmers according to Farm size		
		Large Farm	Medium Farm	Small Farm
General Literacy	Very High	86	75	15
	High	14	25	55
	Average	-	-	30
Technical Literacy	Very High	52	36	8
	High	38	39	28
	Average	10	25	64

Source: Field Survey

The interaction also reveals that 90 p.c. farmers of the large size farms, 75 p.c. farmers of the medium size farms and only 36 p.c. farmers of the small size farms are having very high or high level of knowledge on all the parameters of technical literacy.

Findings

The interaction with the farmers reveals that general literacy is the primary requirement to start a dairy farm. They could identify the particular breed of cow, could construct the cowshed as per the requirement for an ideal dairy farm and also monitor general health, sanitation and milk production on daily basis. They also have gained knowledge to recruit workers fit for the farm. From the field visit it is found that male workers are engaged in feeding, milking, arrangement of fodder, distributing milk etc. Females are primarily engaged in cooking of fodder, feeding and cleaning the shed. They could also easily sell the milk and value added products without depending on the wholesalers. These farmers have also stated they could maintain better health of the cattle, which reduces serious illness and veterinary cost, results in better reproductive health and optimum milk productivity from the cows during the lactation cycle.

The benefits of technical literacy have strengthened farmers' knowledge on dairy farming. Farmers have gained additional knowledge on the critical issues of health, animal behaviour, fodder and feeding norms with minerals, upbringing of calves, etc. Different varieties of cows (Jersey, Crossbreed jersey, Holstein Friesian, Sahiwal, Sindhi etc) behave differently in different seasons and accordingly their fodder needs, health care, milking period etc. are also different. So, monitoring of animal behaviour all the time is very important to sustain professionally in dairy farming.

Advance knowledge on various parameters of technical literacy benefited the farmers in various ways. Farmers have stated that they could save expenses on veterinary services, could maintain better reproductive animal health, better milk productivity by understanding the behaviour such as illness, hunger, breeding needs, etc. of different type of cows. It is also revealed by the farmers that they could be aware of advance lactation cycle and/or early heat of the calf. It is very important that AI (Artificial Insemination) is performed on time to maintain optimum milk productivity during the lactation cycle. These farmers have also stated that the conception rate of their cows in AI services is higher and as a result of that, they are saving on repetitive insemination cost. The interaction with the farmers also reveals that most of them could evade the cases of fatality of cattle.

The interaction with the farmers also reveals that all the farmers of large size and medium size farms and 70 p.c. of the small size farms are having very high and high level of knowledge on all the parameters of general literacy. The interaction also reveals that 90 p.c. farmers of the large size farms and 75 p.c. farmers of the

medium size farms are having very high and high knowledge and 64 p.c. of the small farmers are having average level of knowledge of technical literacy.

This shows that the level of knowledge of the farmers on dairy literacy is increased with the growth of farms. However, some of the small farmers with very high and high knowledge of general literacy and technical literacy stated that they have reduced their farm size due to scarcity of family labour to manage a medium and large farm. On enquiry, their children are either studying in Schools/Colleges or working in private and Govt. organizations and some of them are engaged in Business.

Besides these, the farmers with very high level of technical literacy have stated that veterinary students, members of dairy farms from other districts visits their farms and seeks their opinion, suggestion and guidance on operation of the dairy farm. The enquiry also reveals that some of them are also invited as resource persons in workshops related to the operation of dairy farm. They have also stated that new or prospective dairy farmers consider their dairy farm management practices as a SOP (standard operating procedure) in the operation of the dairy farm. Therefore, these farmers feel their knowledge in all the parameters of technical literacy facilitate others to enter into this profession.

CONCLUSION

Dairy farming is not manufacturing organisation where machines are used to produce desired finished product from specified materials. Cows are livestock and not machines to produce milk. Sustainable and holistic development of a dairy farm requires an integrated and comprehensive knowledge on various aspects related to the livestock and its rearing for milk production. Knowledge on various parameters of dairy literacy benefits the farmers in reducing expenses, in maintaining better reproductive animal health, better milk productivity by understanding the animal behaviour. So, dairy farming as a profession demands a fair amount of knowledge on different parameters and their application in practice. Hence, there is the need of providing field level training to the farmers.

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Environmental Sustainability Spending of CSR Status Companies in India - An Analysis

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Abstract

Purpose: Ensuring environmental sustainability is one key area stated in the list of activities that are potentially included in CSR (corporate social responsibility) spending under Schedule VII of the Companies Act 2013. This study aims to analyse the environmental sustainability spending of CSR-status companies in India, with special reference to Kerala.

Design/methodology/approach: This study followed an analytical research method, which is mainly based on secondary data. The data were analysed using percentages, average, and compound annual growth rate (CAGR).

Findings: The data reveals that most companies in India contribute highly to the education and healthcare sectors. The Ministry of Corporate Affairs (MCA) data shows that Kerala is one of India's top states regarding the most registered companies, with an increased contribution towards CSR from 2015 to 2020. However, the state-wise data on CSR for the financial year 2020-21 shows that Kerala is only 13th on average and 3rd in terms of CAGR in environmental sustainability spending. Kerala's contribution to the agro-forestry sector, conservation of natural resources, and environmental sustainability were only 0.37%, 0.40%, and 1.68%, respectively. Among all companies in India, the CSR expenditure from 2014 to 2022, the average CSR spending of companies in Kerala is only Rs. 214.87 crores and ranks 11th in terms of CAGR (0.23%). Additionally, Kerala ranks 15th regarding CSR expenditure among private companies in India, with an average of Rs. 184.60 and a CAGR of 0.36%.

Originality: This paper is the first to indicate the environmental sustainability spending of CSR-status companies in India with special emphasis on Kerala.

Keywords: Corporate social responsibility, CSR spending, Environmental sustainability, CSR status companies.

Introduction

Industries are the second primary source of greenhouse gas emissions (US EPA, 2015). India's ranking of 168 in the 2020 Environmental Performance Index (EPI), which provides a sustainability data summary for all countries globally, demonstrates the severity of the environmental difficulties the nation faces. Deforestation, pollution, deterioration of the land, depletion of resources like water, minerals, sand, and rocks, loss of biodiversity, and diminished ecosystem resilience are some of India's major environmental problems (Economic Review, 2021). Environmental Sustainability is one such area specified in the Companies Act, 2013, Clause 135-Schedule VII areas of CSR in India. Furthermore, the highest-performing companies perceive sustainable practices as a competitive advantage. Companies already incorporating sustainability principles into their policies are witnessing significant commercial benefits (The CSR Journal, 2022).

Few studies have reported environmental sustainability spending by Indian companies. Tandon (2019) studied the CSR practices of selected Indian firms emphasising educational and environmental aspects. When compared to the environmental harm caused by businesses' spillovers, pollution, and sewage discharge, it was noted that spending on environmental sustainability was very negligible. Bansal et al. (2023) conducted a systematic review and meta-analysis on environmental sustainability of Indian companies prior and post to the implementation of Companies Act, 2013. Aggarwal (2017)

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examined the difference in the actual CSR spending of five types of industries among 50 companies for the accounting year 2014-15. It was concluded that industries differ significantly concerning CSR spending by companies in those industries. Based on the CSR requirement set forth by the Government of India, Ramesh & Peswani (2017) conducted an analytical research of CSR spending by the companies.

Shastri (2022) analysed and compared the CSR practices adopted by banks for CSR spending and CSR reporting patterns and also determined the most preferred and neglected CSR areas by this sector. It was confirmed that Indian private banks are the most compliant towards CSR spending and reporting. The most desired CSR areas include healthcare, education, and environmental sustainability. The most neglected CSR areas include contributions to technology incubators and slum development projects. Yadav (2019) compared CSR spending in public and private sector banking companies. The findings showed a strong positive association between the CSR spending of the banks. In terms of CSR investment, industries like education and healthcare are widespread. Patole et al. (2023) established the linkages and analysed common goals among Sustainable Development Goals (SDGs), CSR Schedule VII activities, and the critical domains of the Aspirational District Program (ADP). The study demonstrated the ability of aspirational districts to achieve SDGs by focusing on ADP's key fields by indicating the CSR spending among these districts in the years 2018-21.

The concept, evolution, policies, and examples of CSR initiatives in Indian businesses, particularly the role of SME's in CSR, were explained by Shyam & Phil (2016). The study identified a number of issues that CSR in India is now facing and offered recommendations to improve CSR programmes in the country. Verma & Kumar (2014) analysed the expenditure pattern of corporates toward CSR activities during voluntary spending. It was noted that businesses do not prioritise spending on pollution and the environment. Even while CSR initiatives are the best gauge of a company's social responsibility, their impact on fund allocations cannot always be assessed. It was determined that adding this clause was a reasonable move by the authorities to encourage CSR. Wankhade (2014) investigated the CSR expenditures of Indian firms. The survey also compared the percentage of profit after taxes that is spent on CSR and the transparency scores of both public and private sector businesses. According to the survey, Indian companies' CSR expenditures account for less than 2% of their profit after tax. Additionally, there are no differences between public and private sector enterprises in terms of openness and CSR spending.

Prasad et al. (2019) examined the relationship between CSR and energy-intensity environmental sustainability indicators. According to the findings, CSR was not yet strongly correlated with energy intensity. The effects of CSR investment on the success of the top 10 corporations during the previous ten years were examined by Dibin & Karthik (2021). It was concluded that CSR spending positively impacts the goodwill, ESG disclosure score, and enterprise value of the company. Mondal & Das (2021) enumerated the effect of CSR expenditure on economic development and its link to aggregate CSR expenditure. It was found that the sample companies' financial contribution has not increased significantly. It was found that companies with beyond prescribed CSR expenditure are expanding further in economic development than other companies. Sankar et al. (2019) explored the heterogeneity in CSR spending behaviour among Indian firms. The findings revealed that the enterprises' CSR spending activities are heterogeneous. The size of the enterprises or the type of the business, however, did not appeared to be an important contributors to this heterogeneity. Dalwadi & Japee (2023) looked at the top 10 CSR contributors in India and their contributions to environmental sustainability. The research revealed significant differences in CSR spending and environmental sustainability contributions among the top 10 firms. It was hinted that corporations should give environmental sustainability high priority in their CSR operations given the nation's existing environmental problems. The impact of required CSR spending on CSR reporting in Indian enterprises was investigated by Banerjee (2020). It was found that institutional demands for gaining legitimacy have driven corporations' CSR reporting during the past few years. The environment is not a top concern for CSR among listed firms in India, according to Verma and Kumar's (2014) observation. Environmental sustainability is third in importance behind healthcare and education and receives roughly 20% of all CSR investment (PIB, 2015).

According to MCA (2021b), Indian corporations have been continuously engaging in many development sectors across the nation in an effort to promote sustainable socio-economic development. Furthermore, the value of spending on CSR projects by leading listed companies in India and Kerala is rising (Statista Research Department, 2023). However, the statistics show that among the Schedule VII areas, the companies' contribution to environmental sustainability is lower than their contribution to other CSR activities, and the ongoing sustainability projects are meager (CSRBOX, n.d). Kerala spent a total of Rs. 283.78 crores in fiscal year (FY) 2020–21, jointly by 409 companies in 15 districts under ten varied sectors, according to data from the national CSR portal. Ernakulam (58.27 cr), Thrissur (40.46 cr), and Palakkad (12.68 cr) are the top three districts receiving CSR benefits. The remaining topmost districts receiving the same were Kozhikode, Thiruvananthapuram, Kottayam, Kannur, Malappuram, Kollam, and Wayanad. Health, reducing hunger, poverty, and malnutrition, safe drinking water, sanitation (108.07 cr), education, people with disabilities, livelihood (78.47 cr), and rural development (36.58 cr) are the main sectors in Kerala for

CSR activity. The Federal Bank Limited, Kerala Enviro Infrastructure Limited, and Manappuram Finance Limited, in that order, have spent the most on CSR in Kerala during the 2020–21 fiscal year (32.18 cr, 28.51 cr, and 27.66 cr, respectively). The remaining top 10 firms in terms of CSR spending in Kerala were Dr. Reddy's Laboratories Ltd, Cochin Shipyard Ltd, Kitex Childrenswear Ltd, Reliance Industries Ltd, Sobha Ltd, Muthoot Fincorp Ltd, and Cochin International Airport Ltd (The CSR Journal, 2022). Most of the previous studies and data reveals that the contribution of Indian companies toward environmental sustainability was not on their priority list. Most of the related previous studies have only analysed the CSR spending practices of few companies in India. Studies emphasising the environmental sustainability spending of all CSR companies in India and Kerala are limited. Hence, the present study aimed to analyse the environmental sustainability spending of CSR companies in India, mainly focusing on Kerala.

Objectives of the Study

1. To analyse the environmental sustainability spending of CSR companies in India.

Methodology

The study follows analytical research method. Secondary data was collected from government websites and reliable data sources such as Indiastat. Simple percentages, averages, and compound annual growth rate (CAGR) are the primary analysis tools used in this study.

Results and Discussions

As declared by the UN, India is the 5th largest FDI recipient in the world in 2020. From 2015 to 2021, according to Figure 1, the majority of foreign firms registered in India have US headquarters, followed by Singapore, the UK, Japan, and Germany. The statistics indicate a significant rise in the number of foreign companies registered in the country during 2021-22 compared to the five previous years (MCA, 2021c).

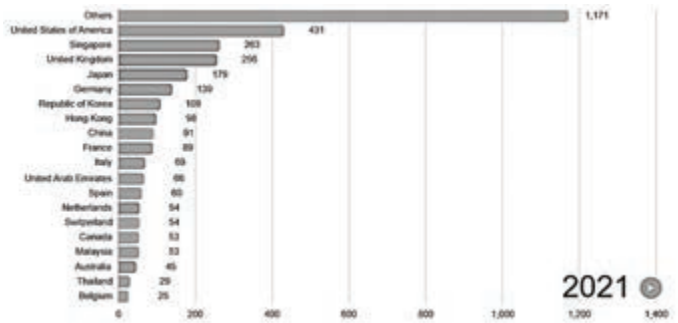

Figure 1: Country of origin of foreign companies registered in India

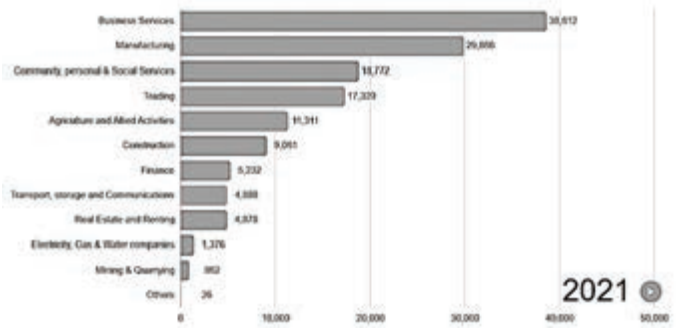

Figure 2: Top 15 development sectors by CSR spending

Health care, education, other central government funds, rural development projects, the prime minister national relief fund, environmental sustainability, livelihood enhancement projects, vocational skills, eradicating hunger and malnutrition, sanitation, Swachh Bharat Kosh, training to promote sports, special education, art and culture, and women's empowerment are among the top 15 development sectors (MCA, 2021b) (See Figure 3).

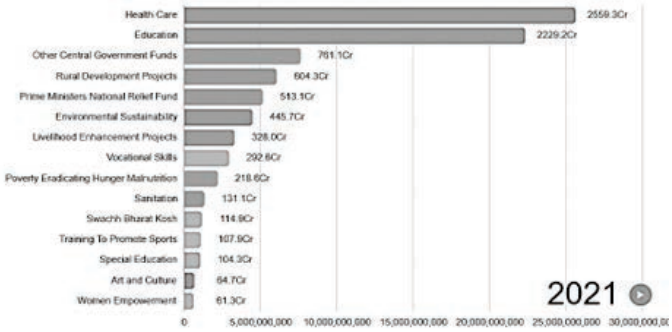

Figure 3: Registered companies in India based on economic activity

Figure 4 reveals that there was a steady rise in the number of companies registered in India since 1857, with Maharashtra being the state with the highest number of registration, followed by Uttarakhand, Delhi, Karnataka, Tamil Nadu, Telangana, Gujarat, West Bengal, Haryana, and Kerala. Significant export incentives with various tax reforms after independence were pointed out as the reason for the growth in the company registration rate in India (MCA, 2021d). As per MCA (2021d), above 6.4 lakh companies were registered in the previous five years. Initiatives of the India Government, namely: Ease of Doing Business and Make in India, have led to this remarkable growth in the registration of companies.

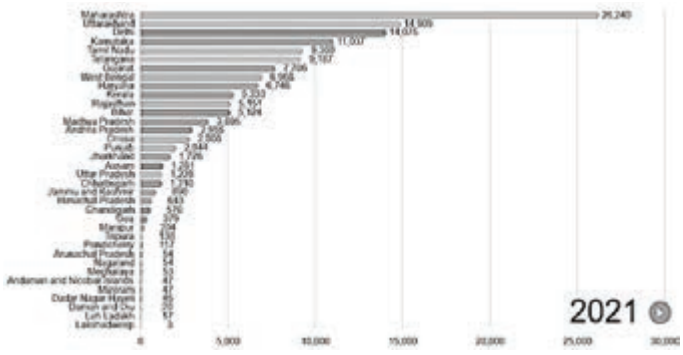

Figure 4: State-wise Trend of Registered Companies in India

Figure 5 presents the state-wise distribution of Indian companies regarding CSR Spending. The states shown in this figure jointly accounted for above 90% of the country's total CSR spending, with Maharashtra being the highest contributor, followed by Gujarat, Andhra Pradesh, Karnataka, Uttar Pradesh, and Tamil Nadu. As per MCA (2021a) data, contribution to CSR by Kerala and Telangana has increased to above 300 percent from 2015 to 2020. Moreover, significant growth of above 200 percent was also observed in Karnataka, Uttar Pradesh, and Gujarat (MCA, 2021a).

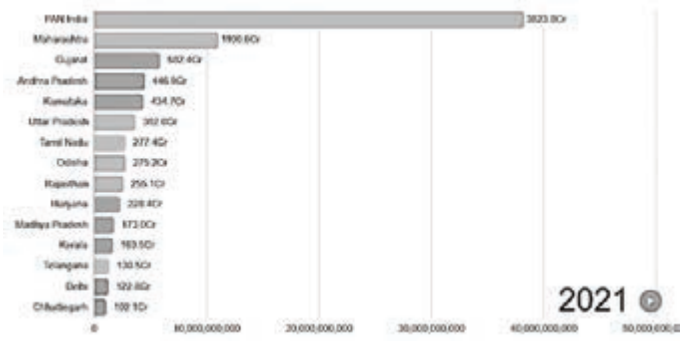

Figure 5: Topmost States in India in terms of CSR spending

Table 1: Distribution of CSR by states in India during the fiscal year 2020-21

States	Amount Spent (INR Cr.) for FY 2020-2021
PAN India	8802.29714
Maharashtra	2646.45997
Gujarat	1166.84268
Karnataka	966.62066
Delhi	839.64693
Tamil Nadu	749.03191
Uttar Pradesh	680.24399
Andhra Pradesh	588.67188
Odisha	495.72005
Rajasthan	454.07955
Haryana	398.4544
Telangana	343.38093
Kerala	**321.10016**
West Bengal	316.98048
Chhattisgarh	283.14089
Madhya Pradesh	273.87691
Jharkhand	188.35081
Nec/ Not Mentioned	176.71358
Assam	160.77637
Uttarakhand	113.10345
Himachal Pradesh	98.59172
Punjab	95.16299
Bihar	56.2941
Jammu And Kashmir	33.82156
Goa	32.5315
Sikkim	13.85207
Puducherry	10.43885
Meghalaya	8.7123
Tripura	8.19924
Chandigarh	7.20195
Dadra and Nagar Haveli	7.01928
Arunachal Pradesh	6.42009
Manipur	6.28163
Daman and Diu	3.13366
Nagaland	2.9849
Andaman and Nicobar	2.26451
Mizoram	0.49
Lakshadweep	
Grand Total	**20358.89308**

Source: CSR.Gov.in

Table 1 shows distribution of CSR by Indian states for the fiscal year 2020–21. It reveals that the CSR companies having Presence Across Nation (PAN India) (8802) are the highest contributor of CSR funds, followed by Maharashtra (2646), Gujarat (1167), Karnataka (967), Delhi (840), Tamil Nadu (749), and Uttar Pradesh (680) during this period. Kerala is only 13th regarding CSR spending in India (321).

Table 2: State-wise CSR Spending during 2014-15 to 2020-21 for Environmental Sustainability* (INR Cr.)

Sl. No.	State		2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total	Average	CAGR
1	Andaman and Nicobar	*	0.00	0.00	0.06	0.00	0.14	0.21	0.06	0.47	0.07	**0**
2	Andhra Pradesh	*	62.92	126.60	82.40	92.06	101.07	106.25	108.77	680.07	97.15	**6%**
3	Arunachal Pradesh	*	7.09	0.56	0.80	0.59	0.86	1.78	0.27	11.95	1.71	**-18%**
4	Assam	*	6.64	6.36	34.68	17.40	12.50	7.61	4.09	89.28	12.75	**10%**
5	Bihar	*	20.06	54.21	39.27	57.25	57.62	46.58	16.00	290.99	41.57	**11%**
6	Chandigarh	*	0.04	0.54	0.00	0.20	0.17	0.12	1.05	2.12	0.30	**34%**
7	Chhattisgarh	*	6.42	9.03	1.68	54.41	15.15	16.75	21.28	124.72	17.82	**16%**
8	Dadra and Nagar Haveli	*	0.31	1.21	0.34	0.14	0.29	9.88	9.18	21.35	3.05	**39%**
9	Daman and Diu	*	0.00	0.00	0.00	0.00	0.43	0.01	0.11	0.55	0.08	**0**
10	Delhi	*	7.27	14.39	16.05	63.56	134.22	123.74	38.03	397.26	56.75	**34%**
11	Goa	*	1.42	1.17	5.48	0.96	0.86	1.01	0.61	11.51	1.64	**2%**
12	Gujarat	*	11.27	19.91	22.24	58.18	60.38	60.94	106.20	339.12	48.45	**23%**
13	Haryana	*	8.30	17.52	29.56	23.54	31.20	35.31	34.54	179.97	25.71	**18%**
14	Himachal Pradesh	*	0.58	1.99	4.01	14.07	10.27	2.61	4.98	38.51	5.50	**38%**
15	Jammu and Kashmir	*	1.57	17.78	17.22	3.84	10.79	3.53	1.64	56.37	8.05	**26%**
16	Jharkhand	*	8.94	13.59	4.62	4.17	3.88	3.81	6.97	45.98	6.57	**-4%**
17	Karnataka	*	53.01	162.34	118.23	283.11	180.25	195.81	142.80	1135.55	162.22	**17%**
18	**Kerala**	*	**2.28**	**19.37**	**9.95**	**17.73**	**29.45**	**42.13**	**12.99**	**133.90**	**19.13**	**36%**
19	Lakshadweep	*	0.00	0.00	0.00	0.43	0.00	0.00	0.00	0.43	0.06	**0**
20	Madhya Pradesh	*	18.23	6.98	8.65	11.76	11.67	8.64	35.42	101.35	14.48	**-3%**
21	Maharashtra	*	47.39	93.11	204.45	145.90	171.68	205.07	163.29	1030.89	147.27	**18%**
22	Manipur	*	0.00	0.00	0.04	0.00	0.07	0.02	1.25	1.38	0.20	**0**
23	Meghalaya	*	0.52	1.10	0.97	0.42	0.34	0.29	1.38	5.02	0.72	**5%**
24	Mizoram	*	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	**0**
25	Nagaland	*	0.00	0.00	0.00	0.02	0.00	0.04	1.52	1.58	0.23	**0**
26	Odisha	*	11.58	24.92	7.68	6.87	17.87	78.02	16.54	163.48	23.35	**11%**
27	Pan India (Centralised Funds)	Clean Ganga Fund	5.47	32.82	24.37	33.96	8.11	6.63	13.36	124.72	17.82	**18%**
28	Pan India (Centralised Funds)	Swachh Bharat Kosh	113.86	325.52	184.06	272.07	95.50	53.37	159.68	1204.06	172.01	**6%**
27	Puducherry	*	0.00	0.06	0.01	0.07	0.13	1.92	1.68	3.87	0.55	**0**
28	Punjab	*	19.36	9.01	5.58	9.34	50.66	16.48	16.60	127.03	18.15	**-1%**
29	Rajasthan	*	18.48	34.13	32.56	41.42	42.83	37.49	78.92	285.83	40.83	**12%**
30	Sikkim	*	0.00	0.00	0.00	0.04	1.03	0.01	0.00	1.08	0.15	**0**
31	Tamil Nadu	*	11.83	33.83	29.73	34.28	56.86	94.34	110.00	370.87	52.98	**24%**
32	Telangana	*	6.18	38.59	7.84	21.46	12.27	15.13	21.50	122.97	17.57	**16%**
33	Tripura	*	0.54	0.00	0.25	0.12	0.32	0.00	0.07	1.30	0.19	**-14%**

Source: https://www.CSR.gov.in, *denotes 'Environment, Animal Welfare, Conservation of Resources'

Out of the total CSR spending of all Indian companies of Rupees (Rs) 20359 crores, only Rs. 1208 crores (5.93%) were disbursed for environmental sustainability activities in 2020-21 (Table 2). Regarding Kerala's contribution to environmental sustainability, only around Rs. 13 crores were expended, which is 1.08% for the FY 2020-2021 (Table 2). Furthermore, Kerala stands only in the 13th position regarding CSR spending for the FY from 2014-15 to 2020-21 for environmental sustainability. The top CSR companies contributing to environmental sustainability activities have Presence Across Nation (PAN India) with an average spending of Rs. 172 crores and CAGR of 6%, followed by Karnataka, Maharashtra, Andhra Pradesh, Delhi, Tamil Nadu, and Gujarat with an average of Rs. 162, 147, 97, 57, 53, and 48 crores and CAGR of 17%, 18%, 6%, 34%, 24%, and 23% respectively. However, the highest CAGR was indicated by Dadra and Nagar Haveli (39%), Himachal Pradesh (38%), and Kerala (36%) in terms of environmental sustainability (See Table 2).

Table 3: District-wise CSR Spending in Kerala from 2014-15 to 2020-21 for Environmental Sustainability (INR Cr.)

Sl. No	List of Districts	Type of Districts		2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total	Avg.	CAGR
1	Wayanad	Aspirational	*	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.00	0
2	Alappuzha	Other than aspirational	*	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.27	0.04	0
3	Ernakulam	Other than aspirational	*	0.65	3.63	6.74	12.56	1.73	9.35	7.25	41.91	5.99	41%
4	Idukki	Other than aspirational	*	0.00	0.00	0.00	0.06	0.00	0.03	0.00	0.09	0.01	0
5	Kannur	Other than aspirational	*	0.00	0.00	0.00	0.00	0.01	0.00	0.15	0.16	0.02	0
6	Kasaragod	Other than aspirational	*	0.00	0.00	0.00	0.00	0.00	0.00	0.40	0.40	0.06	0
7	Kollam	Other than aspirational	*	0.00	0.00	0.00	0.00	0.01	0.03	0.21	0.25	0.04	0
8	Kottayam	Other than aspirational	*	0.00	0.00	0.01	0.00	0.28	0.00	0.00	0.29	0.04	0
9	Kozhikode	Other than aspirational	*	0.00	0.00	0.01	0.00	0.00	0.04	0.00	0.05	0.01	0
10	Malappuram	Other than aspirational	*	0.00	0.12	0.00	0.00	1.95	0.00	0.04	2.11	0.30	0
11	Nec/ Not Mentioned	Other than aspirational	*	1.28	15.24	2.11	4.35	23.25	31.16	1.90	79.29	11.33	6%
12	Palakkad	Other than aspirational	*	0.05	0.02	0.19	0.14	0.71	0.00	1.65	2.76	0.39	65%
13	Pathanamthitta	Other than aspirational	*	0.00	0.10	0.00	0.00	0.08	0.01	0.00	0.19	0.03	0
14	Thiruvananthapuram	Other than aspirational	*	0.05	0.00	0.78	0.00	1.11	0.68	1.03	3.65	0.52	54%
15	Thrissur	Other than aspirational	*	0.25	0.26	0.12	0.63	0.27	0.56	0.37	2.46	0.35	6%
Total				**2.28**	**19.37**	**9.96**	**17.74**	**29.43**	**42.13**	**13.00**	**133.91**	**19.13**	**28%**

Source: https://www.CSR.gov.in, *denotes 'Environment, Animal Welfare, Conservation of Resources'

The district-wise CSR spent of Kerala from 2014-15 to 2020-21 regarding environmental sustainability shows that the spending of Rs. 79.29 crores were not mentioned as to which state/states where such costs were expended. However, in terms of district-wise spending, Ernakulam (41.91) is the largest, followed by Thiruvananthapuram (3.65), Palakkad (2.76), Thrissur (2.46), and Malappuram (2.11) (see table 3). Table 4 reveals the reason for Ernakulam being the highest in terms of CSR spending; that is, the majority of CSR-eligible companies are located in Ernakulam (125), followed by Thiruvananthapuram (36), Kozhikode (34), Thrissur (22), Kottayam (15), Palakkad (13), and Alleppey (12). Additionally, in case of the highest average spending for the environment, animal welfare and conservation of resources are Nec/Not Mentioned (11), followed by Ernakulam district (6). However, in terms of CAGR, Palakkad (65%), followed by Thiruvananthapuram (54%), and Ernakulam (41%) were the highest contributors (See Table 3).

Table 4: District-wise Distribution of CSR Eligible Companies in Kerala as on 31.03.2023

District / Headquartered / Registered office	Number of companies
Thiruvananthapuram	36
Kollam	4
Alleppey	12
Pathanamthitta	4
Kottayam	15
Idukki	1
Ernakulam	125
Thrissur	22
Palakkad	13
Malappuram	1
Kozhikode	34
Wayanad	0
Kannur	2
Kasaragod	0
Total	**269**

Source: Registrar of Companies, Ernakulam

Table 5: State-wise CSR Expenditure on Environment Protection in India - Part II (2014-2015 to 2020-2021) (Rs. in Crore)

States/UTs	Agro Forestry Sector									Conservation of Natural Resources Sector								
	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total	Percentage	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total	Percentage
Andaman & Nicobar Islands	-	-	-	-	-	-	-	0	0.00	-	-	0.06	-	0.04	-	-	0.1	0.01
Andhra Pradesh	0.1	-	0.6	5	0.1	0.2	0.1	6.01	1.79	0.4	9.2	0.99	0.63	2.52	2.5	1.1	17.3	2.03
Arunachal Pradesh	-	-	-	-	-	-	-	0	0.00	7	-	0.1	0.03	-	0.9	0.1	8.1	0.95
Assam	-	-	0	-	-	-	-	0.01	0.00	0.2	0.1	31.6	0.25	-	0	0.1	32.2	3.77

Bihar	16	51	37	52	54	46	-	255	75.95	0.9	0.5	-	-	-	0.2	-	1.59	0.19
Chandigarh	-	-	-	-	-	-	0.9	0.94	0.28	-	-	-	-	-	-	-	0	0.00
Chhattisgarh	-	0.2	-	-	-	0	-	0.22	0.07	0.7	-	-	0.08	-	1.4	-	2.14	0.25
Dadra & Nagar Haveli	-	-	-	-	-	-	-	0	0.00	-	-	-	-	-	-	-	0	0.00
Daman & Diu	-	-	-	-	-	-	0	0.03	0.01	-	-	-	-	-	-	-	0	0.00
Delhi	-	0	0.1	0.2	0.1	0	0	0.46	0.14	0.7	2.5	0.19	9.32	112	99	1.2	225	26.36
Goa	0.1	0.3	-	0	-	-	-	0.43	0.13	-	-	0.01	0.05	-	-	-	0.06	0.01
Gujarat	0.1	0.4	0.5	0.1	0.3	0.4	10	11.7	3.50	0.5	0.9	1.12	2.79	4.45	3	4	16.7	1.96
Haryana	-	0	0.3	0.1	-	-	-	0.36	0.11	0.2	0.2	0.12	0.58	1.61	1.3	0.3	4.36	0.51
Himachal Pradesh	-	-	-	0	-	-	-	0.02	0.01	-	0	0.21	0.03	-	0.2	-	0.42	0.05
Jammu & Kashmir[1]	-	0	-	-	-	-	-	0.02	0.01	0.1	-	-	0.5	-	-	-	0.59	0.07
Jharkhand	0.2	0.2	-	-	-	1	-	1.29	0.38	0.2	0	-	1.27	0.77	1.2	-	3.51	0.41
Karnataka	0.1	0.1	0.1	0.3	0.1	0.3	0.1	0.95	0.28	1.3	5.6	1.31	2.99	9.08	5	1.1	26.3	3.08
Kerala	**0.1**	**0.5**	**0.6**	**0.1**	**-**	**-**	**-**	**1.24**	**0.37**	**-**	**0.1**	**-**	**0.21**	**2.36**	**-**	**0.7**	**3.37**	**0.40**
Lakshadweep	-	-	-	-	-	-	-	0	0.00	-	-	-	-	-	-	-	0	0.00
Madhya Pradesh	0	0.8	0.2	-	0	0.2	0.3	1.54	0.46	4.2	0.3	0.29	0.46	0.08	0	6.4	11.8	1.38
Maharashtra	0.3	0.5	0.8	1.3	1.8	2.4	1.2	8.29	2.47	8.8	6.7	17.3	12.2	16.5	21	7.9	90.2	10.58
Manipur	-	-	-	-	-	-	-	0	0.00	-	-	-	-	-	-	-	0	0.00
Meghalaya	-	-	-	-	-	-	-	0	0.00	0.1	-	-	-	-	0.2	-	0.24	0.03
Nagaland	-	-	-	-	-	-	-	0	0.00	-	-	-	-	-	-	-	0	0.00
Odisha	0.3	1.3	0.2	0.2	1.3	0.2	0.1	3.54	1.06	1.6	0.6	1.57	0.2	-	0.5	1.1	5.67	0.66
Puducherry	-	-	-	-	-	-	0	0.02	0.01	-	-	-	-	-	0.4	0.1	0.53	0.06
Punjab	0	0	-	-	-	0.5	0.3	0.79	0.24	0.2	0.2	0.04	0.05	0.45	0	0.2	1.09	0.13
Rajasthan	0.1	-	1.7	4.7	2.6	0.4	1	10.5	3.12	1.6	5.8	9.48	6.76	2.78	2.3	11	40.1	4.70
Sikkim	-	-	-	-	-	-	-	0	0.00	-	-	-	-	0.02	-	-	0.02	0.00
Tamil Nadu	0	0.4	0.2	0.5	2.7	0.2	0.8	4.78	1.42	0.3	3.7	1.11	5.41	4.93	6	8.3	29.7	3.48
Telangana	0	0.1	0.1	0.2	0.2	0.4	0	0.91	0.27	0.1	0.7	3.91	2.99	2	1.9	1.5	13.1	1.54
Tripura	-	-	-	-	-	-	-	0	0.00	0.2	-	-	-	-	-	-	0.24	0.03
Uttar Pradesh	-	1	-	0.2	-	0	0.1	1.23	0.37	0.7	1.2	3.06	0.69	0.6	1.7	1.6	9.49	1.11
Uttarakhand	-	-	-	-	-	-	0.3	0.31	0.09	-	0.1	1.5	0.56	2.22	0.7	0.3	5.38	0.63
West Bengal	-	-	-	0	0.1	0.7	-	0.76	0.23	0	0.1	0.08	0.66	0.77	1.2	0.5	3.34	0.39
NEC/ Not mentioned	-	-	-	-	-	-	-	0	0.00	-	-	-	0.22	-	-	-	0.22	0.03
PAN India	0.7	1.1	1.5	2.1	2.2	15	1.9	24.4	7.26	15	12	45	179	10.2	9	31	300	35.19
India	**18**	**58**	**44**	**67**	**65**	**67**	**17**	**336**	**100.00**	**45**	**50**	**119**	**228**	**174**	**159**	**79**	**853**	**100.00**

Source: Indiastat

As per Table 5, in state-wise CSR expenditure on environment protection in India - Part II (2014-2015 to 2020-2021) data, Karnataka (13.28% & 11.79%) is the highest in contribution towards environmental sustainability sector and across three sectors followed by Maharashtra (11.22% & 10.82%) and Andhra Pradesh (7.55% & 6.80%). Kerala's contribution to environmental protection, which includes environmental sustainability and across three sectors for the FY 2014-15 to 2020-21, are Rs.127.43 crores and Rs. 132.04 crores, respectively. Kerala's contribution to the abovementioned sectors is 1.68% and 1.51%, respectively.

In terms of state-wise CSR expenditure on environment protection in India - Part I (2014-2015 to 2020-2021) data, the percentage analysis shows that Bihar was the highest (75.95%) in the agroforestry sector, and PAN India (35.19%) followed by Delhi (26.36%) was the highest in the conservation of natural resources sector. Kerala's contribution to environment protection, which include agroforestry and conservation of natural resources, was Rs.1.24 crores and Rs. 3.37 crores, respectively, which signifies that Kerala's contribution to the sectors mentioned above was only 0.37% and 0.40%, respectively (See Table 6).

Table 6: State-wise CSR Expenditure on Environment Protection in India - Part I (2014-2015 to 2020-2021) (Rs. in Crore)

States/UTs	Environmental Sustainability Sector									Across 3 Sectors								
	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total	Percentage	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	Total	Percentage
Andaman & Nicobar Islands	-	-	-	0	0.1	0.21	0.06	0.37	0.00	-	-	0.06	-	0.14	0.21	0.06	0.47	0.01
Andhra Pradesh	62.5	117	80.45	84.85	78.5	86.3	62.66	572.21	7.55	62.89	126.2	82.03	90.52	81.12	88.97	63.78	595.53	6.80
Arunachal Pradesh	0.12	0.15	-	0.05	0.35	0.66	0.01	1.33	0.02	7.09	0.15	0.1	0.08	0.35	1.56	0.11	9.43	0.11
Assam	6.29	5.92	2.71	16.98	12.37	7.53	3.6	55.4	0.73	6.46	6	34.34	17.23	12.37	7.54	3.65	87.59	1.00
Bihar	3.1	2.53	2.7	5.24	4.06	0.65	15.78	34.06	0.45	20.06	53.91	39.27	57.25	57.62	46.58	15.78	290.47	3.31
Chandigarh	0.04	0.54	-	0	0.13	0.08	-	0.79	0.01	0.04	0.54	-	-	0.13	0.08	0.94	1.73	0.02
Chhattisgarh	5.76	8.72	1.68	54.28	15.12	10.04	17.46	113.07	1.49	6.42	8.94	1.68	54.36	15.12	11.45	17.46	115.43	1.32
Dadra & Nagar Haveli	0.31	0.43	0.34	0.14	0.29	9.83	0.04	11.38	0.15	0.31	0.43	0.34	0.14	0.29	9.83	0.04	11.38	0.13
Daman & Diu	-	-	-	0	0.43	0.01	0.02	0.46	0.01	-	-	-	-	0.43	0.01	0.05	0.49	0.01
Delhi	5.96	8.69	13.93	52.75	18.12	21.8	20.13	141.38	1.87	6.7	11.24	14.25	62.27	130.41	120.55	21.31	366.72	4.18
Goa	1.31	0.83	5.32	0.79	0.86	0.99	0.3	10.39	0.14	1.42	1.14	5.33	0.85	0.86	0.99	0.3	10.88	0.12
Gujarat	8.75	14.5	12.61	40.5	37.77	37.55	42.77	194.42	2.57	9.31	15.71	14.25	43.35	42.49	40.91	56.84	222.88	2.54
Haryana	7.27	13.6	27.3	14.49	27.36	29.66	16.51	136.21	1.80	7.49	13.86	27.72	15.12	28.97	30.99	16.79	140.94	1.61
Himachal Pradesh	0.58	1.95	3.78	13.98	10.23	2.38	4.26	37.16	0.49	0.58	1.97	3.99	14.03	10.23	2.54	4.26	37.6	0.43
Jammu & Kashmir[1]	1.48	17.8	17.22	2.8	10.79	3.53	1.61	55.19	0.73	1.57	17.78	17.22	3.3	10.79	3.53	1.61	55.8	0.64
Jharkhand	8.54	13.3	4.42	2.45	2.95	1.13	2.94	35.69	0.47	8.94	13.48	4.42	3.73	3.72	3.28	2.94	40.5	0.46
Karnataka	51.2	121	81.03	278.39	169.71	182.77	122	1005.97	13.28	52.62	126.5	82.4	281.67	178.84	187.99	123.2	1,033.21	11.79
Kerala	**2.17**	**18.6**	**9.21**	**17.14**	**26.72**	**41.9**	**11.65**	**127.43**	**1.68**	**2.26**	**19.25**	**9.79**	**17.4**	**29.08**	**41.9**	**12.36**	**132.04**	**1.51**
Lakshadweep	-	-	-	0.43	-	-	-	0.43	0.01	-	-	-	0.43	-	-	-	0.43	0.00
Madhya Pradesh	12.7	5.69	7.35	9.35	9.56	7.24	19.42	71.31	0.94	16.94	6.75	7.87	9.81	9.65	7.48	26.15	84.65	0.97
Maharashtra	36	82.2	180.02	123.93	139	169.12	119.8	850.04	11.22	45.05	89.41	198.13	137.43	157.25	192.38	128.9	948.55	10.82

Manipur	-	-	0.04	0	0.07	0.02	-	0.13	0.00	-	-	0.04	-	0.07	0.02	-	0.13	0.00
Meghalaya	0.43	1.1	0.97	0.42	0.34	0.14	1.27	4.66	0.06	0.52	1.1	0.97	0.42	0.34	0.29	1.27	4.9	0.06
Nagaland	-	-	-	0.02	-	0.04	1.52	1.58	0.02	-	-	-	0.02	-	0.04	1.52	1.58	0.02
Odisha	9.64	22.9	5.87	6.22	16.23	76.83	11.42	149.14	1.97	11.55	24.92	7.62	6.58	17.56	77.52	12.6	158.35	1.81
Puducherry	-	0.05	-	0.07	0.13	1.4	1.51	3.16	0.04	-	0.05	-	0.07	0.13	1.81	1.64	3.7	0.04
Punjab	19	8.05	5.11	8.73	49.34	13.89	11.31	115.46	1.52	19.25	8.2	5.15	8.78	49.79	14.4	11.77	117.34	1.34
Rajasthan	15.2	25.6	17.37	23.74	31.21	26.6	43.73	183.51	2.42	16.96	31.43	28.53	35.18	36.57	29.26	56.17	234.09	2.67
Sikkim	-	-	-	0.04	1.01	0.01	-	1.05	0.01	-	-	-	0.04	1.03	0.01	-	1.07	0.01
Tamil Nadu	11.2	28.4	26.82	27.08	47.26	85.18	44.33	270.26	3.57	11.47	32.55	28.15	32.97	54.84	91.33	53.44	304.75	3.48
Telangana	6.04	37.6	3.4	17.21	9.35	11.33	8.95	93.89	1.24	6.18	38.35	7.39	20.39	11.52	13.6	10.5	107.94	1.23
Tripura	0.3	-	0.25	0.12	0.32	-	0.07	1.06	0.01	0.54	-	0.25	0.12	0.32	-	0.07	1.3	0.01
Uttar Pradesh	10.9	18.4	22.31	31.7	36.37	21.05	36.08	176.78	2.33	11.58	20.51	25.37	32.54	36.97	22.78	37.75	187.5	2.14
Uttarakhand	1.67	1.99	2.17	2.69	4.49	3.54	3.7	20.24	0.27	1.67	2.08	3.67	3.25	6.7	4.24	4.33	25.94	0.30
West Bengal	3.02	9.2	4.87	3.77	6.29	8.08	11.33	46.55	0.61	3.04	9.28	4.95	4.43	7.11	9.98	11.85	50.65	0.58
NEC/ Not mentioned	24.4	-	-	10.25	-	3.57	-	38.17	0.50	24.35	-	-	10.47	-	3.57	-	38.4	0.44
PAN India	458	210	537.22	451.33	597.39	596.26	163.7	3014.2	39.79	473.5	222.7	583.73	632.64	609.73	620.21	196.3	3,338.75	38.10
India	**774**	**797**	**1,076.46**	**1,301.93**	**1,364.21**	**1,461.31**	**799.9**	**7,574.45**	**100.00**	**836.7**	**904.4**	**1,239.00**	**1,596.87**	**1,602.50**	**1,687.86**	**895.8**	**8,763.10**	**100.00**

Source: Indiastat

As depicted in Table 7, the number of public and private sector businesses that have filed MCA 21 registry documents for CSR expenditures in India between 2014–2015 and 2019–2020 shows that the total number of companies contributed to CSR in India were private companies, the total amount expended for the same were also by such companies. Additionally, the spending shows a progressive trend from 2014-15 till 2018-19 and a decline in 2019-2020. Whereas, in the case of the CSR spending of PSUs, it showed a fluctuating trend.

As per Table 8, showing state-wise private sector CSR spending in India (2014-2015 to 2020-2021), the highest average spending was by companies having a presence across nation (PAN India) (4423), followed by Maharashtra (2492), Karnataka (877), and Gujarat (757). However, the highest CAGR is indicated by companies located in Nagaland (0.70%) and Arunachal Pradesh (0.47%). Kerala ranks 15th with an average CSR spending of Rs. 184.60 crores and a CAGR of 0.25%.

Table 7: The number of public and private sector corporations, and the volume of MCA 21 Registry filings for CSR Expenditure in India (2014-2015 to 2019-2020) (Rs. in Crore)

Year	Description	Public Sector Units (PSUs)	Private Companies	Total
2014-2015	No. of companies	380.00	16405.00	16785.00
	Total amount spent	2816.82	7249.11	10065.93
2015-2016	No. of companies	532.00	17758.00	18290.00
	Total amount spent	4214.67	10302.52	14517.19
2016-2017	No. of companies	546.00	18993.00	19539.00
	Total amount spent	3295.98	11033.55	14329.53
2017-2018	No. of companies	535.00	20915.00	21450.00
	Total amount spent	2704.32	11185.53	13889.85

2018-2019	No. of companies	609.00	24323.00	24932.00
	Total amount spent	3835.50	14819.32	18654.82
2019-2020	No. of companies	14.00	1061.00	1075.00
	Total amount spent	438.29	7384.21	7822.50
Amount spend total 2014-2020		**17305.58**	**61974.24**	**79279.82**

Source: Indiastat, MCA - Ministry of Corporate Affairs

Table 8: State-wise CSR Expenditure by Private Companies in India (2014-2015 to 2020-2021) (Rs. in Crore)

States/UTs		2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	Average	CAGR
Andaman & Nicobar Islands	0.00	0.03	0.09	0.00	0.67	1.21	0.91	0.42	0
Andhra Pradesh	332.60	508.12	479.91	497.74	606.35	673.95	626.79	532.21	0.09
Arunachal Pradesh	0.48	1.23	12.38	9.71	20.54	11.34	7.04	8.96	0.47
Assam	34.15	43.32	30.41	60.43	43.41	60.22	70.03	48.85	0.11
Bihar	24.53	82.00	79.61	83.71	105.33	101.92	70.51	78.23	0.16
Chandigarh	1.77	5.08	21.96	20.50	11.29	15.48	13.12	12.74	0.33
Chhattisgarh	116.56	75.61	79.37	78.61	54.94	159.62	119.92	97.80	0.00
Dadra and Nagar Haveli	2.05	7.82	7.02	5.26	13.10	18.09	17.65	10.14	0.36
Daman and Diu	20.05	2.39	2.63	20.09	6.16	9.52	5.25	9.44	-0.17
Delhi	162.11	413.30	328.21	516.19	575.60	618.69	611.99	460.87	0.21
Goa	26.28	24.36	29.07	50.09	40.01	38.37	35.07	34.75	0.04
Gujarat	248.60	459.32	691.00	758.09	965.43	883.22	1296.48	757.45	0.27
Haryana	151.56	360.52	364.03	339.10	352.25	505.13	521.48	370.58	0.19
Himachal Pradesh	10.13	49.98	20.61	29.42	31.29	39.51	55.26	33.74	0.27
Jammu & Kashmir	20.89	15.45	17.84	15.73	16.57	14.74	13.42	16.38	-0.06
Jharkhand	21.05	32.40	53.71	51.42	49.89	63.08	113.47	55.00	0.27
Karnataka	372.40	665.45	805.45	962.02	1035.08	1229.53	1068.79	876.96	0.16
Kerala	**54.65**	**129.68**	**113.65**	**183.38**	**311.96**	**242.31**	**256.55**	**184.60**	**0.25**
Lakshadweep	0.00	0.00	0.00	2.07	0.39	0.00	0.01	0.35	0
Madhya Pradesh	53.76	84.43	94.94	98.43	138.13	174.55	214.89	122.73	0.22
Maharashtra	1402.09	1920.94	2306.19	2607.08	3032.50	3082.59	3092.76	2492.02	0.12
Manipur	2.22	4.97	11.93	4.79	6.33	9.84	5.56	6.52	0.14
Meghalaya	1.83	2.00	6.41	5.66	12.59	8.56	10.46	6.79	0.28
Mizoram	0.00	0.43	0.00	0.83	0.00	0.25	0.79	0.33	0
Nagaland	0.08	0.61	0.47	1.77	2.02	4.47	3.31	1.82	0.70
Odisha	107.04	181.88	123.09	161.22	147.23	193.55	245.14	165.59	0.13
Puducherry	2.02	6.37	7.43	6.09	6.78	11.32	11.77	7.40	0.29
Punjab	53.70	62.55	70.91	111.04	160.23	185.75	123.66	109.69	0.13
Rajasthan	270.97	414.70	301.03	417.64	551.01	710.95	627.78	470.58	0.13
Sikkim	0.73	1.39	5.20	6.70	4.58	9.94	6.38	4.99	0.36
Tamil Nadu	310.29	506.24	472.73	593.55	761.59	941.32	1005.45	655.88	0.18
Telangana	79.09	229.94	233.61	337.12	381.15	393.89	495.37	307.17	0.30
Tripura	0.44	0.54	0.81	1.83	2.26	1.91	3.48	1.61	0.34
Uttar Pradesh	86.18	250.44	213.71	333.83	364.84	502.39	709.28	351.52	0.35
Uttarakhand	41.52	36.59	75.43	64.36	72.45	67.92	102.57	65.83	0.14
West Bengal	126.96	201.40	247.41	293.96	331.67	382.56	364.39	278.34	0.16
NEC/ Not Mentioned	0.00	0.00	7.63	127.29	4.44	20.75	9.26	24.20	0
PAN India	2659.03	2943.02	3144.77	4102.41	5146.86	6893.95	6074.06	4423.44	0.13
Contribution to Funds included in Schedule VII of the Act	451.30	578.03	587.72	488.03	582.01	1329.38	2406.53	917.57	0.27
India	**7249.11**	**10302.52**	**11048.37**	**13447.18**	**15948.91**	**19611.80**	**20416.62**	**14003.50**	**0.16**

Source: Indiastat

Table 9: Development Sector-wise CSR Expenditure by Top Companies in India (2014-2015 to 2020-2021) (Rs. in Crore)

Development Sector	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	Average	CAGR
Agroforestry	**18.12**	**57.85**	**43.45**	**12.18**	**61.44**	**60.52**	**11.58**	**37.88**	**-0.06**
Animal Welfare	**17.29**	**66.67**	**78.65**	**59.48**	**49.61**	**36.65**	**91.94**	**57.18**	**0.27**
Armed Forces, Veterans, War Widows/ Dependants	4.76	11.14	37.86	26.77	67.35	41.67	67.37	36.70	0.46
Art and Culture	117.37	119.17	305.57	282.80	163.94	854.19	391.54	319.23	0.19
Clean Ganga Fund	5.47	32.82	24.37	4.44	2.1	1	5.77	10.85	0.01
Conservation of Natural Resources	**44.60**	**49.85**	**119.09**	**212.74**	**131.36**	**131.88**	**60.7**	**107.17**	**0.05**
Education	2589.42	4057.45	4500.82	4478.88	4043.57	4782.73	3977.33	4061.46	0.06
Environmental Sustainability	**773.99**	**796.69**	**1076.46**	**1062.55**	**1132.24**	**1178.78**	**710.72**	**961.63**	**-0.01**
Gender Equality	55.21	73.85	72.60	20.17	38.04	55.72	14.98	47.22	-0.17
Health Care	1847.74	2569.43	2484.05	2127.07	2625.67	3523.83	4989.58	2881.05	0.15
Livelihood Enhancement Projects	280.17	393.38	515.47	654.04	715.09	857.02	563.88	568.44	0.11
Other Central Government Funds	1338.40	1051.16	388.96	0.76	662.07	758.45	1271.86	781.67	-0.01
Poverty, Eradicating Hunger, Malnutrition	277.10	334.35	419.99	250.52	942.87	814.17	726.26	537.89	0.15
Prime Minister's National Relief Fund	274.70	1252.08	606.55	618.83	104.74	482.89	1224.73	652.07	0.24
Rural Development Projects	228.18	218.04	158.80	152.26	1769.59	1944.95	1510.03	854.55	0.31
Safe Drinking Water	1059.35	1376.16	1554.78	1455.57	163.91	181.78	138.86	847.20	-0.25
Sanitation	103.95	180.16	147.76	174.16	422.04	424.19	244.59	242.41	0.13
Senior Citizens Welfare	299.54	631.80	421.71	280.81	19.15	25.15	21.87	242.86	-0.31
Setting Up Homes and Hostels for Women	8.94	21.87	26.91	31.34	38.04	34.7	18.88	25.81	0.11
Setting Up Orphanage	8.74	29.28	61.97	67.63	2.05	22.32	2.4	27.77	-0.17
Slum Area Development	5.12	16.90	16.80	36.57	40.05	35.33	57.48	29.75	0.41
Socio-Economic Inequalities	101.14	14.10	51.49	30.80	96.56	139.1	53.81	69.57	-0.09
Special Education	39.04	77.97	148.01	133.85	135.84	132.53	132.33	114.22	0.19
Swachh Bharat Kosh	41.43	125.84	164.83	120.56	62.01	25.1	136.67	96.63	0.19
Technology Incubators	113.86	325.52	184.06	211.57	16.74	33.67	36.56	131.71	-0.15
Training to Promote Sports	4.74	26.34	23.09	14.55	244.43	231.15	171.79	102.30	0.67
Vocational Skills	57.62	140.12	180.33	224.93	652.42	1001.69	449.05	386.59	0.34
Women Empowerment	277.07	344.39	373.46	388.66	141.89	156.57	88.47	252.93	-0.15
Nec/ Not Mentioned[1]	72.87	122.79	141.62	194.84	81.73	495.53	269.05	196.92	0.21
Total	**10065.93**	**14517.19**	**14329.53**	**13326.68**	**14626.5**	**18463.3**	**17440.1**	**14681.32**	**0.08**

Source: Indiastat

As per Table 9, depicting development sector-wise top Indian corporations' CSR spending, from 2014–2015 to 2020–2021, it is revealed that the majority of the companies have highly contributed to the education sector, followed by health care and environmental sustainability sectors with the average of Rs. 4061.46 crores, Rs. 2881.05 crores, and Rs. 961.63 crores respectively. However, spending on environmental sustainability declined in FY 2020-21 compared to the previous four financial years. The CSR spending in other development sectors, such as conservation of natural resources and agroforestry, also declined during this period revealing that spending in these sectors has declined during the widespread Covid-19 pandemic. However, higher CSR spending was observed in the healthcare sector during 2020-2021. The results of CAGR reveal that the highest growth rate was observed in sectors such as training to promote sports (0.67%); armed forces, veterans, war widows/dependants (0.46%); and slum area development (0.41%) during 2014 to 2021. Moreover, only a 0.05% growth rate was observed for the conservation of natural resources, and no growth rate was recorded concerning environmental sustainability and agroforestry areas during this period. Nonetheless, it should be noted that top spending in animal welfare was indicated during 2020-21 (Rs. 91.94 crores), with an average expenditure of Rs. 57.18 crores and a CAGR of 0.27% during the FY from 2014 to 2021.

Table 10: State-wise CSR Spending by Indian Companies (2014–2015 through 2020–2021 up to 31.03.2022) (Rs. in Crore)

States/UTs	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	Average	CAGR
Andaman & Nicobar Islands	0.29	0.55	0.63	0.73	0.82	1.29	2.19	0.93	0.33
Andhra Pradesh	414.28	1294.28	741.52	575.07	664.87	710.00	662.39	723.20	0.07
Arunachal Pradesh	11.05	1.48	24.05	11.91	24.56	18.02	10.58	14.52	-0.01
Assam	134.78	164.60	256.92	211.33	210.00	282.14	163.21	203.28	0.03
Bihar	36.69	111.32	100.62	106.17	137.57	110.15	78.02	97.22	0.11
Chandigarh	1.77	5.34	21.96	20.51	11.46	15.58	13.12	12.82	0.33
Chhattisgarh	161.30	241.16	84.66	176.70	149.35	268.18	305.73	198.15	0.10
Dadra & Nagar Haveli	4.41	12.03	7.37	6.98	13.48	18.34	18.08	11.53	0.22
Daman & Diu	20.05	2.43	2.63	20.23	6.25	9.53	5.25	9.48	-0.17
Delhi	237.44	493.29	460.25	579.37	749.24	827.74	657.73	572.15	0.16
Goa	27.11	30.15	33.28	53.77	46.77	43.86	40.95	39.41	0.06
Gujarat	313.45	551.43	864.83	967.97	1082.09	982.53	1397.26	879.94	0.24
Haryana	187.41	375.62	386.17	363.43	377.53	521.11	536.86	392.59	0.16
Himachal Pradesh	10.95	52.29	22.83	69.23	78.79	78.61	104.60	59.61	0.38
Jammu & Kashmir	43.71	107.81	42.65	50.77	36.44	25.27	35.10	48.82	-0.03
Jharkhand	79.56	117.04	95.49	109.23	109.80	155.21	208.34	124.95	0.15
Karnataka	403.47	784.66	875.38	1145.42	1250.39	1445.80	1205.23	1015.76	0.17
Kerala	**68.23**	**148.12**	**133.82**	**219.71**	**354.67**	**295.78**	**283.78**	**214.87**	**0.23**
Lakshadweep	0.00	0.30	0.00	2.27	0.39	0.00	0.01	0.42	0
Madhya Pradesh	141.88	185.40	161.11	163.92	243.17	215.06	344.13	207.81	0.13
Maharashtra	1445.92	2052.23	2414.80	2797.53	3144.23	3336.14	3306.72	2642.51	0.13
Manipur	2.44	6.28	12.35	4.81	7.81	14.21	9.66	8.22	0.22
Meghalaya	3.53	5.59	9.75	11.18	16.54	17.65	12.46	10.96	0.20
Mizoram	1.03	1.07	0.08	1.28	0.11	0.25	0.81	0.66	-0.03
Nagaland	1.11	0.96	0.53	1.81	2.12	5.10	3.57	2.17	0.18
Odisha	252.18	624.05	316.31	504.22	688.25	714.82	547.57	521.06	0.12
Puducherry	2.02	6.46	7.43	6.09	9.15	11.32	11.79	7.75	0.29
Punjab	55.61	69.93	75.05	112.36	166.00	188.52	126.01	113.35	0.12
Rajasthan	299.76	501.45	324.23	443.35	595.44	733.95	643.07	505.89	0.12
Sikkim	1.19	1.98	6.71	7.00	5.87	10.99	15.15	6.98	0.44
Tamil Nadu	539.64	633.24	544.43	669.65	876.83	1069.45	1082.33	773.65	0.10
Telangana	101.96	265.40	256.15	380.56	428.06	445.56	579.75	351.06	0.28
Tripura	1.33	1.47	1.25	1.88	23.06	9.40	9.29	6.81	0.32
Uttar Pradesh	148.90	423.72	321.23	435.21	519.14	577.08	826.67	464.56	0.28
Uttarakhand	74.79	73.17	102.37	85.79	172.26	124.65	151.30	112.05	0.11
West Bengal	194.86	415.42	275.68	338.32	381.77	416.97	427.44	350.07	0.12
PAN India	4614.89	4741.95	4565.51	5505.31	6428.09	9373.03	7490.84	6102.80	0.07
NEC/Not Mentioned	26.94	0.00	7.63	137.93	4.44	30.43	177.51	54.98	0.31
Contribution to Funds Included in Schedule VII of the Act	0.00	0.00	787.22	799.18	1155.25	1787.89	3371.00	1128.65	0
India	**10065.93**	**14503.67**	**14344.87**	**17098.18**	**20172.07**	**24891.63**	**24865.46**	**17991.69**	**0.14**

Source: Indiastat

As indicated in Table 10, the State-wise CSR spending by Indian companies from 2014 to 2015 till 31.03.2022 shows that the highest average spending was by companies having Presence Across Nation (PAN India) (Rs.6102.80 crores) and Maharashtra (Rs.2642.51 crores). However, the highest CAGR was indicated by Sikkim (0.44%) and Himachal Pradesh (0.38%). The average CSR spending of Kerala was Rs. 214.87 crores, and Kerala ranks 11th in terms of CAGR (0.23%) in CSR spending during this period.

Suggestions

CSR spending should be allocated considering the nation's most vulnerable areas or sectors of the economy. The natural environment is one such area, which includes environmental sustainability, resource conservation, agroforestry, and animal welfare. Other sectors could only exist with the balancing of these biological environmental factors. Therefore, policymakers and companies should give much emphasis on investing in these areas. Furthermore, a mandatory provision should be made to include the companies that are highly contributing to environmental pollution or extracting much of the natural resources to invest more in the protection, restoration, and conservation of such ecological aspects subject to the financial performance or CSR filing eligibility of such companies.

Prioritizing environmental sustainability is crucial for addressing climate change, protecting natural resources, and ensuring the long-term viability of industrial sectors. Highly polluting sectors should invest in environmental sustainability as part of their Corporate Social Responsibility (CSR) for several reasons. These include addressing environmental impact, ensuring regulatory compliance, rebuilding trust and stakeholder trust, gaining a competitive advantage, driving innovation and operational efficiency, managing long-term risks, and becoming environmental leaders. By investing in sustainability, these sectors can reduce pollution, minimize negative impacts on air, water, and soil quality, and adopt cleaner production practices. By doing so, they can transform their operations, improve their standing among stakeholders, and contribute to a more sustainable and low-carbon economy. By investing in environmental sustainability as part of CSR, these sectors can transform their operations, improve their standing among stakeholders, and play a significant role in achieving environmental sustainability goals.

Conclusion

The study analysed environmental sustainability spending of CSR-status companies in India with particular emphasis on Kerala. Spending on environmental sustainability, conservation of natural resources, and agroforestry declined during FY 2020-21 due to the widespread Covid-19 pandemic. However, the highest CSR spending was observed in the healthcare sector during 2020-2021. The highest CAGR was observed in sectors such as training to promote sports; armed forces, veterans, war widows/dependants; and slum area development from 2014 to 2021. Moreover, a lower growth rate was observed for the conservation of natural resources, and no growth rate was recorded with environmental sustainability and agroforestry areas during this period.

Nonetheless, top spending on animal welfare was indicated during 2020-21. Kerala is only 13th regarding CSR spending and spending on environmental sustainability activities in India during the FY from 2014-15 to 2020-21. Most of the CSR-eligible companies are located in Ernakulam. This study supports the previous literature that environmental sustainability is not on the priority list of CSR companies in India. However, this study is the first to indicate the environmental sustainability spending of CSR-status companies in India and Kerala as a whole. It is evident that environmental sustainability spending by companies in Kerala is not satisfactory compared with the growth in the total number of companies registereing in India and Kerala.

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Derivatives Discern in The Ambit of Behavioural Prejudices

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Abstract

Purpose: - The study is conducted with the purpose to analysis the retail trader's use of derivatives in the ambit of behavioural prejudices. The research was undertaken with the view to have understanding of the implication and suggestions to individual traders in the usage of derivatives. Research Design: - The study is based on primary data collected through conjoint analysis designed questionnaire from three hundred eighty-four respondents from central region of India. The orthogonal arrays are used to estimate the preference function in regards to conjoint analysis and regression technique (least square) is applied for calculation on a sample size of three hundred and eighty-four retail traders from countless population. Findings: – The finest preferred derivatives contracts, from all types of instruments under consideration, for decision-making by retail traders is found to be futures contracts to which retail traders give utmost preference in terms of greatest utility value. The retail traders are observed to have understanding of derivative up to certain extent and they trade on daily basis at their office establishment with the purpose of risk hedging followed by profit making through speculation or arbitration in short-terms in the ambit of various prejudices of behavioural finance. Implication: - The study uses to provide practical implication that is going to help retail traders in derivatives markets in taking more rational pronouncement. The results of study will push them in advantageous situation to have a better understanding of various facets of derivatives along with behavioural prejudices on individual basis along with better investment choice in derivatives in the ambit of behavioural biases. The judgement of the traders in derivatives marketplace while considering various behavioural prejudices on their own, but also to other players in derivatives market such as institutional or high net worth investors as well. Value: - The study is one of its kind to investigate the facets of derivatives while considering the role of behavioural prejudice at the same time by applying the tool of conjoint analysis in the derivatives marketplaces. Therefore, the research will fill the hole that left till now in regards to the association between behavioural biases and derivatives segment of the financial market, thus will provide the better understanding of the behaviour of the retail trader in the financial world.

Keywords: - Behavioural prejudices, Derivatives markets, Decision-making, Financial World, Retail traders etc.

1. Introduction

At the end of the twentieth century, the financial sector has seen tremendous growth, especially after the collapse of fixed exchange rate regime in 1971 at the Bretton Woods Conference, which gave the pave to boom of economic transactions on the global stage due to economic liberalization (Noggle and Guerrero, 2016; Sayin, 2008). This brings innovation in the field of financial contraptions which are supposed to be used for quite a number of purposes, such as for risk hedging, speculation, and so on (Glau et al., 2016). They started looking out for such an instrument which would assist them in mitigating this problem, and as a result, economic derivatives as one of the contraptions got here into being. The derivatives market or instrument serves as a fantastic device in mitigating the issues of uncertainty which arise as an end result of fluctuations in the stock market, exchange rate, interest rate and different other underlying assets (Gautam and Kavidayal, 2014). Due to undesirable risk the business may face due to uncertainty that prevails in the market, the role of derivatives as a tool to mitigate the risk of unexpected price fluctuations has emerged exponentially (Campbell et al., 2019). There are variety of derivatives instruments which serve various purposes. Various studies have been conducted in the field of forward contract, one of which found that forward contract plays a direct role on

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the financial performance of the companies (Onchari et al., 2020). However, forward contracts are applied on large scale basis for mitigating risk associated with fluctuations in foreign exchange rates faced by large multinational corporations, other small businesses are reluctant to applies these due to lack of proper regulatory norms as in the absence of defined legal norms, such contracts offer room for abuse (Djenic et al., 2012). Like forward contracts, there are futures contracts available in the market, but with some differences between the two. Unlike forward contracts, these contracts are not flexible and customized; even these are standardized and are traded on particular exchange (Stosic-Mihajlovic and Zdravkovic, 2016). Option contracts are a special type of derivative contracts which give the buyer of the option contract to exercise or execute the contract at the maturity if the agreed upon price of the underlying asset turn his/her favor otherwise he/she can let the option expire in the market (Stosic-Mihajlovic and Zdravkovic, 2016; Ecca et al., 2007). Option contracts are used for hedging risk of price and demand instigated by inflation, as retailers apply put options with portfolio contracts, i.e., by combination of put option contract with wholesale price contract (Wan & Chen, 2019). A swap contract, typically an over-the-counter contract, allows the parties to the contract to exchange the future cash flow, such as exchange the amount denominated in one currency with the amount denominated in another currency, known as currency swap, or the exchange of fixed interest rate with the floating interest rate, known as interest rate swap (Li & Mao, 2003). By applying swap contracts in businesses, managers can improve shareholders worth, reduce the cost of external debt obligations, lower the cost of financial distress, and reduce the tax payable amount (Tsouknidis and Boukrami, 2015).

Behavioural prejudices, sometimes also called as behavioural biases, in behavioural finance states those psychological or cognitive variables that come within the manner of financial choices of traders or investors in financial market. Behavioural finance is a part of a broader concept of behavioural economics which considers the psychological, emotional, social, cognitive and cultural influence on the decision making of a person and how this differs from the way decision making is explained in classical or traditional economic theories (Indriani and Sari, 2018). In this concept, it is supposed to analysis the role these biases intentionally or unintentionally play or make some contributions in the financial decision making of a person who may be a layman or a professional. EMH gained popularity in academic spheres in and around the 1970s. At that time, a revolutionary idea that engaged attention was the rational expectation in the theory of economics. The publications in research journals since then (1970s) on the go embrace the minor evidence of anomalies that are in conflict with the efficient market hypothesis assumption (Shiller, 2003). In this state, we can think of an example of articles in 1970 by Eugene Fama (Efficient Capital Markets: A Review of Empirical Work) which pointed out some evidence of minor anomalies in stock price behaviour that were in contrast to what was given in EMH. The indication of excess price volatility might occur for no reason of fundamentals but because of various things like "animal spirit" or "sunspots" or due just to mass psychology (Shiller, 2003). The decade of the 1990s provided too much evidence against the assumption of EMH and in favour of the presence of role of cognitive and emotional prejudices as part of behavioural finance as an authenticate field (Hammond, 2015). Researchers found too much evidence of anomalies, as empirical work concluded in a book published in 1996 by Campbell, Lo, and MacKinlay's namely "The Econometrics of Financial Markets" prepared the groundwork for insurgency in the field of finance. A well-known finance theorist, Richard Thaller, tried to add finance theory with economics in order to apply the theory of prospect in the financial market. Various types of behavioral prejudices, which are supposed to make influences over decision making, are anchoring, belief perseverance, over confidence, cognitive dissonance, herding, self-attribution, mental accounting, emotional gap, hindsight bias, endowment, confirmation, self-control, availability, recency (Vrooman and Sarver, 2018).

In the current study, efforts are made to analysis the retail trader's use of derivatives in the ambit of behavioural prejudices. The research was undertaken with the view to have understanding of the implication and suggestions to individual traders in the usage of derivatives.

2. REVIEW OF LITERATURE

Yantao Wen and Yuanfei Kang (2021) found that firms in China increasingly apply derivatives for the purpose of risk hedging. Huang & Yao (2022) asserted that financial derivatives these days found several development prospects along with some challenges as well. It was concluded that companies should use derivatives to hedge risk and therefore, apprehend the value of the concern by actively investing in resource support and appropriate technology. Ahmed (2021) examined the influence of derivatives on profitability and risk of banks in the developed world from the time period 2015-2019. Sahoo (2020) investigated the various factors responsible for the usage of derivatives by Indian companies. It was found that the sale of the firms. Price-earnings ratio, international exposure, financial leverage are the factors which enable the firms to use derivatives as a risk management tool. Taskin and Sarıyer (2020) examined the effect of financial derivatives on the performance and stability (financial) of the banks situated in Turkey from the period of 2007-2017. Sang-Ik Seok, Tae-Hyun Kim (2020) conducted the study on Korean firms with the objective to analyze the variable of derivatives for risk hedging along with its impact on the value of the firms. It was observed that highly leveraged and low-profitable, large in size, more diversified in to geographically and less diversified in industries, and firms having growth opportunities are supposed to use derivatives for

risk hedging. Bernal-ponce et al. (2020) tried to examine through theoretical models the derivatives' effect on the association between stock market and foreign exchange rate. The study was conducted on Brazilian and Mexican stock markets during the period from 2007-2019. Derivative effect was found to be significant, while evidence also reveals that futures foreign exchange price along with spot price elucidate the currency exposure. Mcalpine (2020) provided the evidence in regards to the influence of usage of derivatives on the performance and risk of a group of mutual funds. The study was conducted on Assets Management Funds with a sample of more than nine hundred during the period from 2002 to 2017. Chang & Hao (2022) handed the substantiation of the negativity bias, which is in discrepancy to the conventional view that judges read optimistically. It was shown that negative cast impulses are related to their relative original income growth, whether the growth is positive or negative. Hu et al. (2022) stated by this article that trading behaviors due to information jolts and investor sentimentalities subsidize distress incongruity by applying measurement of overnight returns. It was found that overnight return paying stocks (lowest) are escorted with the greatest distress risk premium (smallest) and accordingly, conditional distress probability portfolio composed with double sort of overnight returns and distress probability would yield significant profitability. Raimundo Júnior et al. (2022) revealed that notwithstanding of the market condition, herding movement in the market is significant and persistent, which is expressed with the help of volatility and market index. Wynes (2021) tried to investigates the role of ire and anxiety on information search behavior of investors. It was predicted that investors who are ire will usually search for less information and go down with low depth as compare to investors who are fearful after happening of negative event. Chen (2021) found the evidence in favour of herding behaviour among investors at country level. In the study, in order to investigate intraday herding behaviour of investors, high-frequency intraday data is used. Chakraborty & Subramaniam (2020) directed the study to explore the association concerning sentiments of the investors with the risk and returns in shares in Indian capital market. It was found that sentiments of the investors (measured by Market Mood Index (MMI)) extremely influence the returns on stock. Spyrou (2020) conducted the research in the countries of Germany, UK, USA and Japan. It was tried to analyses association between risk and macroeconomic factors on the mutual fund's profitability and risk (professionally managed portfolio). It was observed that turmoil (financial) in the European Union and United State of America, uncertainty in economy and highly volatile prices of energy and future uncertainty of market plays a significant role or become an important determinant in return on stock.

3. OBJECTIVES AND HYPOTHESES

After conducting review of various past literature along with preliminary inductive examination, the study is undertaken to analyze the usage of derivatives market in the ambit of various behavioural prejudices in Indian financial market. Therefore, various usage of derivatives market by the retail traders are considered as:

- Types of derivatives contracts used,
- Financial understanding of retail traders,
- Frequency with which retail traders use derivatives contracts,
- Place where derivatives trading is undertaken,
- Causes for applying derivatives contracts, and
- Derivatives portfolio selection.

(These conjoint designed variables are represented in table - 1)
The principal objective behind conducting this research is to identify the relative significance that retail traders put on every pre-decided behavioural prejudices which are supposed to play role over decision-making in derivatives markets. Further, modest efforts have been makes to identify the blends of attribute levels, which in turn lead to best use of various derivatives contracts for various motives. Therefore, the following hypotheses is proposed in the current study:

Null Hypotheses H01: There is no significance difference in the relative significance that retail traders put on every pre-decided derivatives in the ambit of behavioural prejudices.

Or it may be stated H01 as There is no significant relationship in the role of behavioural prejudices and the usage (pre-decided) of derivatives.

4. RESEARCH METHODOLOGY

For conducting the study, retail traders who are dealing in derivatives markets are approached by first applying simple random sampling followed by snowball sampling technique of sample selection. A total of three hundred and eighty-four retail traders are approached for taking their view in regards to various derivatives contracts on twenty-five possibilities presented with various transformation and groupings. The study is conducted in central part of India with respondents from Delhi and NCR regions are selected in conjoint design through well designed questionnaire in which twenty-five possibilities on a scale of one to ten, in which ten represent finest option whereas one means least preferred option. The finest possibilities are examined with the help of conjoint design on numerous variables such as types of derivatives contracts used, financial understanding of retail traders, frequency with which retail traders use derivatives contracts, place where derivatives trading is undertaken, causes for applying derivatives contracts, and derivatives portfolio selection. Within these variables, additionally 3 to 4 groups are made after thoroughly going through past literatures, which are presented over here as:

Table - 1: Variables and Levels

Variables Name	No. of substances	Description of variables and levels given to retail traders
Types of derivatives contracts used	Four	In the current research, four prominent derivatives contracts are finalized, *i.e.*, Forwards, Futures, Options and Swap. (Code A-1, A-2, A-3, and A-4)
Financial understanding of retail traders	Three	The financial understanding of retail traders may vary on three levels: High understanding of derivatives markets, Understanding up to certain extent, and Basic understanding. (Code B-1, B-2, B-3)
Frequency with which retail traders use derivatives contracts	Three	Derivatives markets is used by retail traders on different frequency: Daily, Weekly or monthly, and Infrequently. (Code C-1, C-2, C-3)
Place where derivatives trading is undertaken	Three	Derivatives trading may be undertaken at various places: Office, Home, and Other places. (Code D-1, D-2, D-3)
Causes for applying derivatives contracts	Four	Derivatives contracts are undertaken with different motives: Risk hedging, Profit making through speculation or arbitration, access to unavailable alternatives, and for price discovery of an assets. (Code E-1, E-2, E-3, E-4)
Derivatives portfolio selection	Three	Derivatives contract can be applied for numerous portfolio selection: Long term, medium term, and short-term. (Code F-1, F-2, F-3)

Note: - Total number of attributes = 6
Total number of levels along with all attributes = 20
Required minimum stimuli = 20-6+1=15

The technique of conjoint analysis is usually applied as a tool of statistics to study the behaviour of consumers, therefore, it is quiet popular in the field of marketing. The most advantageous part of this technique is that it has the ability to investigate the preferences of respondents even without the declarative answers in the questionnaire (Tekień et al., 2018; Ben-Akiva et al., 2019). Various researches in the field of conjoint analysis and its development to other areas like, economics, applied psychology and decision theory has also been carried out. The conjoint analysis has the ability to provide an approach for expressing the consumer preference structure and methodology for predicting the behaviour of consumers towards fresh stimuli (Green and Srinivasan, 1990). The conjoint analysis technique is applied for examining the preference of recognized variables and overall evaluation of subject under consideration (Green and Srinivasan, 1978). Firstly, this technique was introduced in the field of marketing by Green and Rao, 1971. In the same fashion, this method of analysis is applied in current research in getting through the behavioural prejudices of retail investors in selecting the various types of derivatives contracts for financial decision-making. Conjoint analytical technique is appropriately applied method in measuring the preferences of consumers as per various literatures (Green and Srinivasan, 1978; Louviere and Islam, 2008). In the same way, the application of this method of analysis may be extended to other field as well, one of them might be behavioural finance as well (Al-Omari et al., 2022; Zinkhan and Zinkhan, 1994). Herein, an advance version of conjoint analysis is used as there are large number of variables in the current study of behavioural finance (Clark-Murphy & Soutar, 2005). Therefore, conjoint analysis of choice based have been utilized, under which participants were given a continuum to rank the various derivatives contracts and thus relative importance of these is revealed, which is in turn called as utilities of various levels of attributes. OLS (Ordinary Least Square) regression technique with dummy attributes are applied for estimating the preferences of traders in conjoint analysis. IBM SPSS (Statistical Package for Social Science) version 26 is utilized for the purpose of generating orthogonal plan. Twenty-five designed cards are invested for retail traders to take their preferences in order to decide the decision-making in derivatives contracts by using ten-point Likert Scale. In the current observe, twenty-five stimuli are there, which is supposed to more than the stimuli of minimum required number that are examined by the participants so that reliability of the estimated parameters are ensured (Total level for all variables – total variables = 20). By applying regression analysis (multiple), preference score could be specified (column Y) (Shiva and Singh, 2020).

(Input range (Y) as the dependent attributes and input range (X) as independent attributes of 19 dummy variables (coded))
The OLS regression model is applied for mathematical appearance with the help of dummy attributes as:
Y = x0 + x2 (Futures) + x3 (Options) + x4 (Swap) + x5 (Understanding up to certain extent) + x6 (Basic understanding) + x7 (Weekly or monthly) + x8 (Infrequently) + x9 (Home) + x10 (Other place) + x11 (Profit making through speculation or arbitration) + x12 (access to unavailable alternatives) + x13 (Price discovery of an assets) + x14 (Medium term) + x15 (short-term)

In above equation, under each level of attributes, every first variable is taken a dummy variable for reference, i.e., forwards contract, high understanding of derivatives markets, daily usage of derivatives contract, place of trading as office, purpose of using the derivatives as risk hedging and long-term portfolio selection. These variables (dummy) are used for comparative indices by which retail trader's preferences are determined with the help of regression analysis. It is tried to analysis the preference structure in conjoint analysis of retail traders (Atul Shiva, 2019). The conjoint analytical technique is theoretical based model of functional measurement and integration of information (Louviere and Islam, 2008). The conjoint analysis dependence model is articulated as:

$$E_h = \sum_{j=1}^{j} P_j = P1 + P2 + \ldots. + P_j$$

where, E_h here means the overall influence of h – th product and P1 + P2 + …. + Pj here means the variable influence value of 1, 2, 3, …. j in h product (Shiva and Singh, 2020).

5. Data Analysis and Hypothesis Testing

Below is table representing the demographic profile of respondents:

Table - 2: Demographic Profile

Demographic Variables	N	Percent
Gender		
Male	248	64.58
Female	136	35.42
Age (in years)		
Up to 25	94	24.48
25-40	81	21.10
40-50	154	40.10
50 and above	55	14.32
Educational Qualification		
upto 10+2	96	25.00
Graduate	174	45.31
Post Graduate	114	29.69
Marital Status		
Married	214	55.73
Unmarried	170	44.27
Profession/Occupation		
Private Job	97	25.27
Government Job	86	22.39
Professional	54	14.06
Own Business	58	15.10
Others	89	23.18
Experience of Trading		
upto 5 years	104	27.08
5 to10 years	116	30.21
10 years and above	164	42.71
Total	384	100

Source: Survey

There are countless number of retail traders in derivative market in India. Therefore, the size of the sample has been decided to around three hundred eighty-four (384) which is calculated using the sample size calculator used for unknown or countless populations (Kothari, 2004), explained as follows:

Sample size = Z2*p*(1-p)/ C2

where:

Z= Standard normal deviation set at 95% confidence interval (1.96)

p= Percentage picking a choice or response (0.5)

C= Confidence interval (0.05)

Sample size = (1.96)2 (0.5) (1-0.5)/ (0.05)2

Sample size= 384

Getting through demographic profile of the respondents helps in understanding the specific information in regards to the basic phenomenon of differences among population characteristics like their gender, age, marital status, their income profile, social background etc. in a particular environment. Studies have been conducted on the role of demographic profiles of the respondents on the decision-making of an individual, therefore showing the relevance of understanding and incorporating it in the study, e.g., Rebellow has conducted the research on the role that demographic silhouette play on the decision-making of the corporate executive in the public and private sector establishments (Rebellow and Suri, 2019). Similar study has also been undertaken worldwide in the past by which researchers investigated the significance of demographic determinants on the behaviour of an individual and how understanding of it helps in predicting the humane behaviour (Kintner and Pol, 1996; Baba, 2018; Aydın and Bayır, 2016).

Demographic profile of the respondent is quite an important area to discuss the categorization of respondents in a given set of sampling frames in a specific environment. It is quite clear from the above table that majority of the respondents are male out of total three hundred and eight-four respondents under study. Gender difference do play role and make individual difference in the decision making as male and female differ significantly in their perception (García-González et al., 2019). As far as age group are concerned more respondents are from 40 - 50 years age group followed by upto 25 years, 25 - 40 years and lastly by 50 years and above. The importance of age in understanding socio-economic inequalities can be seen allostatic load (Robertson and Watts, 2016). In case of educational qualification, majority of the respondents are graduate followed by post graduate and one fourth of the total are from the category of upto 12th standard. Educational qualification is quite important demographic profile as it influences behaviour of individual such as it is found to influence need recognition of consumers (Kumar, 2013). In case of marital status, more respondents are married in comparison to unmarried respondents. Difference in the individual on the basis of marital status might be seen in various studies as one of them has studied the difference in power of decision-making in married vs. unmarried women (Jan and Akhtar, 2008). As far as their occupation is concerned, it was observed that less respondents are professional. Respondents from private and government jobs, and from other categories contribute more out of total. Researchers have investigated the influence of occupational background on risk preferences in regards to decisions with expected utility (Hill et al., 2019). In case of trading experience, respondents are more from the category of 10 years or more followed by 5 - 10 year and then by upto 5 years. Research in this field have shown that experience of an individual is a significant determinant as one of the studies has shown its importance on behaviour of marketing managers in the corporates (Perkins and Rao, 1990).

Table - 3: Regression Statistics

Particulars	Statistics Value
R	0.973
R-square	0.934
Adjusted R-square	0.834
Standard Error	0.787
Significant F Change	0.005*
Durbin-Watson	2.235

Note: - * = Significant Level at 5 percent

The results of regression analysis are shown in table - 3, in which the value of R-square is computed as 93.4 percent, which is an indication of model variation and considered as significant at 5 percent significant level. The coefficient of determination, shown by R2, decides ability of the equation to explain the variations as value of 93.4 percent of value shows the excellence of mathematical model (derived), whereas 83.4 percent of adjusted R2 shows the stability in equation. Durbin-Watson values is computed as 2.235, which indicate that there is no presence of auto-correlation (as this value is in between standard of 1.24 to 2.75). Little correlation can be observed among predictors as per the data shown in correlation table,

thus there is no any multi collinearity in the data. H01 may failed to be accepted at 5 percent significant level, which states the noteworthy difference in the retail trader's assigned relative importance to pre-decided set of derivatives contracts for investment decisions in derivatives markets (Shiva and Singh, 2020).

Table - 4: Model Unstandardized Coefficient (Beta)

Model	Unstandardized Beta	t statistic	Significant
(Constant)	6.347	13.021	0.000**
Futures	2.102	2.898	0.046*
Options	1.213	3.015	0.283
Swaps	1.010	3.897	0.000**
Understanding up to certain extent	0.357	0.845	0.016*
Basic understanding	-0.311	-0.622	0.712
Weekly or monthly	-0.465	5.143	0.000**
Infrequently	-0.401	-1.143	0.289
Home	0.912	-2.057	0.041*
Other places	-0.656	1.987	0.098***
Profit making through speculation or arbitration	2.134	5.679	0.000**
Access to unavailable alternatives	-0.352	-0.715	0.479
Discovery of price of an assets	-0.289	0.578	0.589
Medium-term	0.145	1.988	0.048
Short-term	0.169	1.897	0.035

Note: - * = Significant Level at 5 percent, ** = Significant Level at 1 percent, *** = Significant Level at 10 percent
(Source: Survey, Data Processed through IBM SPSS Version 26)

In table - 4, unstandardized coefficients (beta) are calculated after successfully running linear model of regression on measured independent variables in original scales. Since, this model is applied to explain the influence of every independent variables on the outcome, the reference dummy has been taken by applying first attribute from each paradigm in order to identify the regression equation from unstandardized beta constants. The 1st paradigm of derivatives contracts comprises level of variety of contracts such as forwards, futures, options and swaps. Forward contract has been taken as reference dummy attribute, to predict the importance of other derivatives contract and it was found that in comparison to forward contracts, the retail traders prefer other types of contracts such as futures with the favourable intension to apply for the purpose of investment or trading (Beta = 2.102, p = 0.046 < 0.05), followed by option contracts (Beta = 1.213, p = 0.283 > 0.05) and then by swap (Beta = 1.010, p = 0.000 < 0.05) for trading purpose in derivatives markets as an informational source. In the same way, in case of "financial understanding of retail traders", in comparison to "high understanding of derivatives markets" as a reference dummy attribute, retail trader shows favourable inclinations towards understanding up to certain extent (Beta = 0.357, p = 0.016 < 0.05) and unfavourable response towards basic understanding (Beta = -0.311, p = 0.712 > 0.05). In this way, retail traders are supposed to have understanding of derivatives markets upto certain extent in regards to investment decision-making. As far as frequency with which retail traders use derivatives contracts is concerned, retail traders are found to use derivatives platform more on daily basis in comparison to unfavourable response towards weekly or monthly basis (Beta = -0.465, p = 0.000 < 0.05) or infrequently use of derivatives platform (Beta = -0.401, p = 0.289 > 0.05) as the beta in these cases are negative and significant which is going to confirm the findings of regression equation. In case of place where

derivatives trading is undertaken, retail traders use to prefer derivatives trading at office space and home (Beta = 0.912, p = 0.041 < 0.05), instead of at other places (Beta = -0.656, p = 0.098 > 0.05), Further, in comparison to risk hedging as reference dummy for use of derivatives, retail traders along with for risk hedging, are supposed to use derivatives for profit making through speculation or arbitration as well (Beta = 2.134, p = 0.000 < 0.05) in comparison to negative response for price discovery of an assets (Beta = -0.289, p = 0.589 > 0.05) and for access to unavailable alternatives (Beta = -0.352, p = 0.479 > 0.05). Finally, in case of derivatives portfolio selection, in comparison to long term as reference dummy attribute, retail traders use to apply derivatives more for short-term (Beta = 0.169, p = 0.035 < 0.05) followed by medium-term (Beta = 0.145, p = 0.035 < 0.05) and not much for long-term.

6. UTILITY, VARIABLE UTILITY RANGE, RELATIVE IMPORTANCE OF EACH VARIABLES AND RANKING

As the profiles of variables along with their levels and orthogonal design has been prepared, utility value which is actually represent the value of individual level for the contribution that they make to the options which are selected and therefore, express the relative value of each level in relation to other level. Highest part worth or utility may be considered as having higher influence over the overall utility in relation to other utilities. As and when all level's utilities (part worth) are intended, then variable utility range may also be calculated. The highest utility range is considered to have highest influence to the overall utility, as the variable utility range is taken as the amount of variance that individual variable can have in product's total utility (Atul Shiva, 2019). Relative importance of each variables are calculated with the help of below mentioned formula and are presented in table - 5. Relative Importance of Variables = Variable Utility Range / Total Variable Utility Range x 100.

In the table - 5, individual level's part worth estimated utilities in selected variables along with their respective significance are presented. Combination of variable levels are resultant from value of utility, variable utility range along with relative variable importance from the observe. The outcomes of the study might be quite valuable for whole population comprising retail or other wholesale traders to understand the behaviour in the derivatives marketplace at the time when they are confronted with numerous alternatives for decision-making in the light of various prejudices of behavioural finance. The ranking of the variables is done from best to next among all six variables under consideration. The finest preferred derivatives instruments, the understanding of derivatives market, frequency of trading, place where trading is carried out, causes for using derivatives and derivatives portfolio selection along with their respective levels are tried to be presented by which retail traders have shown their preferences.

Correlation in between conjoint model projected preference scores and pragmatic preference scores with the help of R (Pearson's) and Tau for holdouts (Kendall's) are calculated in order to validate the results and establish the reliability. Coefficient of correlation of Pearson's of 0.679 and P < 0.000 shows the significance of results at five percent level and at even one percent level. Coefficient correlation's significance level shows the goodness of proposed model in the current research in predicting the preference of the retail traders for given variables in relation to decision-making in derivatives market with various contracts in the ambit of behavioural prejudices. As far Tau (Kendall's) for four holdout is concerned, its 0.347 value and P > 0.05 indicate that the results might be generalized to large area as tested by holdout cases. This detail is shown in the below mentioned Table - 6.

Table - 6: Coefficient of Correlation and Reliability Statistics

Coefficient of Correlation	Value	Significance
R (Pearson's)	0.679	0.000* and **
Tau (Kendall's)	0.517	0.000* and **
Tau for holdout (Kendall's)	0.347	0.226

Note: - * = Significance at 5 percent, ** = Significance at 1 percent

Preference structure of various derivatives contract are presented with the help of Figure -1 and 2. In term of their prominence along with variable level's utilities. Ranks given to variables in term of choice of various derivatives contracts for decision-making by retail traders for investment in the ambit of behavioural prejudices are easy to understand in this way. 6 variables along with their levels are displayed for decision-making (investment) process by retail traders in derivatives market are epitomized in the figure. Preference configuration was edified with the help of conjoint analysis (choice based). It was observed that greatest importance or preference was accorded to "types of derivatives contracts used" (43.31 percent importance) by the retail traders out of all six variables under consideration. Within the variable of types of derivatives contracts used, retail traders have conferred greatest utility to futures contract followed by options and then by swap contracts, which means that these three platforms are preferred the most for searching the information in decision-making process in derivatives markets. The forward contracts are used very less by retail traders for integrating information for derivatives markets. The 3.92 value of variable utility range is also uppermost, thus giving it 1st rank among other variables under consideration. Therefore, it may be stated that futures contract has greatest value (with importance of 1.77894 utility) in relation to all other three contracts considered under the study. Yet, options and swap also have positive utility (with 0.76834 and 0.24875 utility values, respectively), whereas forward contract have negative utility (-0.53479 value of utility) as per the responses given by sample retail traders.

The next noteworthy attribute is found as "causes for applying derivatives contracts" (with relative importance of variables as 28.41 percent), with uppermost utility is accorded to risk hedging (utility value of 0.89352) followed by profit making through speculation or arbitration (utility value of 0.78476) in comparison to negative preference for access to unavailable alternatives (utility value of -0.42587) and price discovery of an assets (utility value of -0.25823). This all means that retail traders prefer derivatives due to the reasons of risk coverage and for profit making either through speculation or through arbitration, whereas they are not supposed to apply derivatives for other means like for price discovery or for accessing unavailable alternatives. This variable is found as second most important out of all six variables under consideration among the retail traders for decision-making in derivatives in the ambit of various prejudices of behavioural finance.

The next important variable from the six variables under consideration is found as "frequency with which retail traders use derivatives contracts" (with relative importance of 9.83 percent) and come at third position. Within this variable, retail traders are seen to use derivatives on daily basis with positive utility value devoted to it (0.75692), whereas, weekly or monthly basis and infrequently basis options got negative utility value (-1.34225 and -0.34989, respectively) which clearly indicates that they are regularly involved in derivatives trading not infrequently for decision-making in derivatives contract while taking into consideration the various behavioural biases. At forth level of importance, "place where derivatives trading is undertaken" is come with the relative importance value of 7.40. Simultaneously, it was found that retail traders mor prefer or participate in derivative trading while they are at their office (utility value of 1.08457) followed by when they are at home (with utility value of 0.45921).

Other place got negative value in term of preference for trading in derivatives instruments (with utility value of -1.45231), which means that they do not trade in derivatives at places other than home and office establishment. "Financial understanding of retail traders" come at fifth place in term of relative importance among all six variables (with value of 6.74). Understanding up to certain extent got maximum preference within this variable with positive utility value (0.58079) followed by basic understanding (utility value of 0.38945) and lastly by high understanding of derivatives markets (utility value of 0.34598), with all positive value, it is indicated that at least all retail traders have some understanding or knowledge of derivatives contracts.

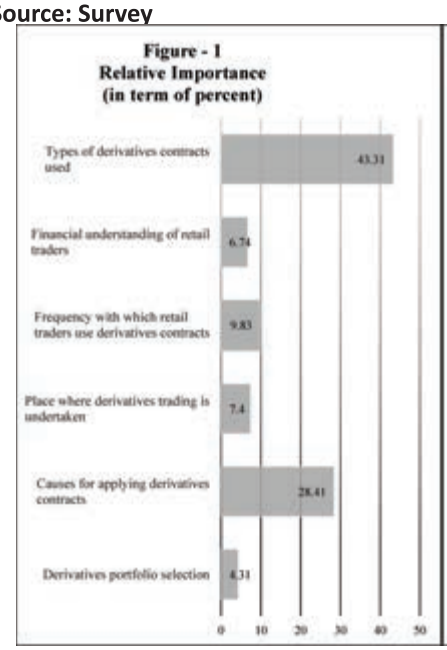
Finally, retail traders are observed to participate in derivatives contracts for short-term term basis as positive utility has been found in this case (utility value of 0.85942); whereas it was observed that retail traders do not use derivatives for medium to long-term purpose as their respective utility are found to have negative value (utility value of -1.15803 and -0.18326, respectively), which demonstrate that retail traders do prefer derivatives contract usually for short-term purpose not for long-term mean. The derivatives portfolio selection comes at last place, i.e., sixth position (rank and range value of 4.31 percent) as far as importance by retail traders are concerned in regards to decision-making in derivatives in the light of various biases of behavioural finance.

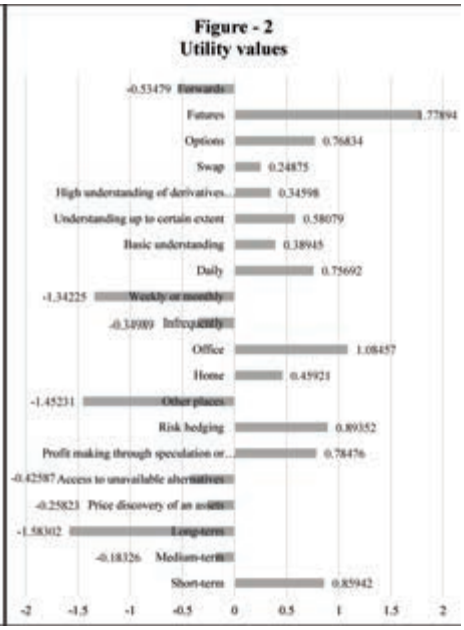
The finest preferred derivatives instruments are tried to be presented by which retail traders have shown their preference. Futures contracts for decision-making in derivatives marketplace are most preferred by the retail trader with having understanding of derivative up to certain extent and trading on daily basis at their office establishment with the purpose of risk hedging followed by profit making through speculation or arbitration in short-term by the retail traders are observed in the ambit of various biases of behavioural finance.

Table - 5 Conjoint Statistics

Variables	Level	Utility values	Variable Utility range	Relative Importance of Variables (in term of percentage)	Ranking
Types of derivatives contracts used	Forwards	-0.53479	3.92	43.31	I
	Futures	1.77894			
	Options	0.76834			
	Swap	0.24875			
Financial understanding of retail traders	High understanding of derivatives markets	0.34598	0.61	6.74	V
	Understanding up to certain extent	0.58079			
	Basic understanding	0.38945			
Frequency with which retail traders use derivatives contracts	Daily	0.75692	0.89	9.83	III
	Weekly or monthly	-1.34225			
	Infrequently	-0.34989			
Place where derivatives trading is undertaken	Office	1.08457	0.67	7.40	IV
	Home	0.45921			
	Other places	-1.45231			
Causes for applying derivatives contracts	Risk hedging	0.89352	2.57	28.41	II
	Profit making through speculation or arbitration	0.78476			
	Access to unavailable alternatives	-0.42587			
	Price discovery of an assets	-0.25823			
Derivatives portfolio selection	Long-term	-1.58302	0.39	4.31	VI
	Medium-term	-0.18326			
	Short-term	0.85942			
	Total		9.05	100	

Source: Survey





7. CONCLUSION

It is observed in the current study that Futures contracts are the most preferred derivatives instrument among the retail traders out of all other derivatives contracts. The most significant reason behind applying derivatives by the retail traders are found to be risk hedging followed by profit making through arbitration or speculation and this result was consistent to other studies conducted in the associated discipline. It was observed that retail traders use derivatives on daily basis, usually carried out trading activities at their office establishment and have understanding or knowledge of derivatives up to certain extent and makes derivatives portfolio selection for short-term purpose for decision-making in derivatives marketplace in the ambit of various prejudices of behavioural finance. The overall conclusion is represented with the help of table: 7, by which first two best choices from the all levels under each variable along with their code are epitomized and overall ranking to all six variables under consideration are embodied.

Table - 7: Preference of Variables (Summary)

Variables	Types of derivatives contracts used	Financial understanding of retail traders	Frequency with which retail traders use derivatives contracts	Place where derivatives trading is undertaken	Causes for applying derivatives contracts	Derivatives portfolio selection
Finest Choice	Futures Contracts	Understanding up to certain extent	Daily	Office	Risk hedging	Short-term
Code	A2	B2	C1	D1	E1	F3
2nd Finest Choice	Options Contracts	Basic understanding	Infrequently	Home	Profit making through speculation or arbitration	Medium-term
Code	A3	B3	C3	D2	E2	F2
Least Preferred Choice	Forwards Contracts	High understanding of derivatives markets	Weekly or monthly	Other places	Access to unavailable alternatives	Long-term
Code	A1	B1	C2	D3	E3	F1
Overall Ranking	I	V	III	IV	II	VI

Therefore, in the current study, pragmatic evidences are provided in regards to the preference of derivatives market by retail traders for decision-making in the light of various biases of behavioural finance. Simultaneously, the current observes provide a practical ground to all stakeholders associated with this filed by which they can make better pronouncement in regards to investment in derivatives marketplaces. Not only this, the favourable implications of the present research will provide understanding to future research in conducting such study and open some new insight about this. In concluding remarks, it may be stated that futures contracts are the most preferred one among others, which are traded on daily basis for short-term profit making through arbitration or speculation and for risk hedging with some understanding of derivatives market and are usually conducted by retail traders at their office establishment.

8. Ethical Consideration

In the current study, at every point of the work, moral behaviour is adhered to certain code of conduct at various stages in so far as the subsequent points:

- Informed consent of the participant is being taken care by providing them the information in regards to the purpose of the study, benefits to them as well as to society, risk if any, cost of the study etc. earlier than they determine to take part or deny to enroll in the research work. Whenever, data were collected from handicapped respondent either with low literacy or limited proficiency in English, respondents were translated in their mother tongue or with some helping material, so that they had good understanding of all aspects.
- Participants involved in the research work are totally voluntarily in the mean that they are free to make contribution without any force or coercion. All the participants were able to withdraw their response or they could refuse to be part of the study at any point of time without any feeling of guilt or an obligation or any explanation for leaving the study. Even they were clarified that there is no any adverse repercussion for any refusal.
- Anonymity was also taken care off at best level, in so far as information in regards to their personal part such as physical characteristics, photos, videos, address etc. were not asked. At many instances, it was quite impossible to truly maintain anonymity as at some point of time they were approached by electronic mean with basic detail of contact and demographic profile.
- Information confidentiality is taken care of as the information collected from various stakeholders is not shared by

unethical means with anyone else.

- No harm to anyone, either in the form of physical or social or psychological or legal, is made at best to keep it at a minimum level.
- Efforts are being made to make the research work original which is free from any sort of plagiarism, and results are provided independently without any mean of partiality. At every point of time, work of others is properly acknowledged with proper citation or bibliography.
- Misconduct of any nature had not been done by manipulating or falsifying data or by parodying results in research report.

9. Research Delimitation

Though, the results of the current research should be seen along with its restrictions, which are tried to be kept at minimum level. As the research has been carried out in central sapphire of the country of India, it could be extended to other part of the worlds as well, which in turn will incorporate the behaviour of retail traders in those constituency. Therefore, the current research is suffering from the error of sampling survey-based outcomes, which in turn up to some extent might disturb cogency of the research by which results might be generalized.

It was quite possible that some of the approached respondent might have faced the difficulty in understanding some typical terminologies or format of the questionnaire as it was found that some of the collected questionnaires were incorrectly filled by some handicapped respondents. Very fortunately, this problem was observed in initial face and was corrected accordingly by clearly mentioning some important more detailed instructions along with purpose of the study at the top of the questionnaire, so that respondent could have better understanding of the format, terminologies and motives of the research.

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The Entrepreneurial Advantage: How Information Technology (IT) Adoption Can Help Small and Micro Enterprises Succeed

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Abstract

The research paper investigates how IT adoption moderates the relationship between entrepreneurial competencies and organizational performance in India. This study stands apart from many others as it has a huge managerial implication, suggesting how organizations could use IT for their advancement. The objective is backed by a thorough literature review, based on which hypotheses have been formed. . 350+ SMEs were interviewed and Structural Equation Model (SEM) was applied to analyse the data. Results indicate IT adoption has a positive and significant moderating effect between some competencies and organization performance. The research has its own fair share of limitations, and recommendations for future research have been added.

Keywords: SME, Entrepreneurial Competencies, Organization Performance, Moderating Factor, IT Adoption

1. Introduction

The MSME sector is a dynamic and growing sector, with the potential to play an even greater role in the future.These MSMEs help towards inclusive industrial development of the country. The capability of these MSMEs in manufacturing and producing diverse range of products and services is unparallel and untapped.

One observation on Indian MSMEs, while looking at the current business ecosystem, turns out to be very interesting. Majority of the entrepreneurs show interest and talk about cutting-edge technology adoption,e.g., Artificial Intelligence (AI), Machine Learning(ML), Internet-based business etc. But the MSMEs still follow conventional methods of doing business. MSMEs are slow in IT adoption, but are now working towards business revamping with technology adoption.

The primary goal of the current study is to investigate the connection between entrepreneurial skills and small- and medium-sized business performance. The study suggests that entrepreneurial competencies can help to improve the chances of achieving corporate success, in line with Bird's definition of entrepreneurial competencies.

This study is based upon prior research exploring the relationship between entrepreneurial competencies and organizational performance, but it is unique and adds original exploration in a few ways. Firstly, a number of research have been conducted in this area, but rarely have any of them explored IT adoption as moderator between the two.
Secondly, the questionnaire, though adopted, has been thoroughly read, understood and pilot studied. Adoption was done from multiple relevant studies and questions were modified according to the ask of the study. Reliability of the instrument has also been tested.

Literature Review and Hypotheses Development

Impact of IT Adoption on performance and growth

Performance and business growth are outcomes influenced by entrepreneurial competencies. Entrepreneurial competencies play a significant role in shaping the performance and growth trajectory of entrepreneurial ventures. These competencies encompass the knowledge, skills, and attributes that entrepreneurs possess and utilize to drive business success.
Studies have shown that entrepreneurial competencies can have a significant impact on business performance and growth. For example, a meta-analysis by Taktak, Oghazi, and Paraskevopoulou (2020) found that entrepreneurial orientation, a key entrepreneurial competency, was positively correlated with firm performance.. They found a positive and significant relationship between entrepreneurial orientation and firm performance, suggesting that entrepreneurs with

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strong competencies in areas such as innovation, proactiveness, and risk-taking are more likely to achieve higher levels of performance.

Additionally, the study by Covin and Slevin (2019) emphasizes the role of competencies in driving business growth. They argue that entrepreneurs who possess strong competencies in areas such as strategic management, resource management, and innovation are more likely to achieve sustainable growth in their ventures. These competencies enable entrepreneurs to identify and capitalize on growth opportunities, effectively manage resources, and adapt to changing market conditions.

In summary, entrepreneurial competencies have a significant impact on performance and business growth. Competencies such as entrepreneurial orientation, strategic thinking, market orientation, and resource management contribute to improved performance outcomes and drive the growth trajectory of entrepreneurial ventures.

IT Adoption in MSMEs

The adoption of information technology (IT) by micro, small, and medium-sized enterprises (MSMEs) has been a topic of great interest to researchers due to its potential to drive business growth, improve operational efficiency, and enhance competitiveness. Several studies have examined the impact of IT adoption on various aspects of MSMEs' performance, including productivity, innovation, market performance, and organizational capabilities.

Moreover, IT adoption has been linked to fostering innovation in MSMEs. A study by Bharadwaj, Bharadwaj, and Konsynski (1999) emphasized the role of IT adoption in enabling knowledge management, information sharing, and collaboration, which can enhance the innovation capabilities of MSMEs (Bharadwaj et al., 1999).

IT adoption also influences market performance in MSMEs. A study by Premkumar and Roberts (1999) examined the impact of IT adoption on small businesses' market orientation. The findings suggested that IT adoption facilitates better customer relationship management, market intelligence gathering, and strategic decision-making, leading to improved market performance (Premkumar & Roberts, 1999).

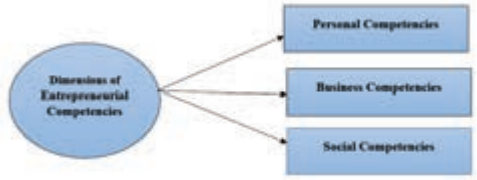
Additionally, IT adoption can enhance the organizational capabilities of MSMEs. Kohli and Grover (2008) conducted a study on the impact of IT adoption on organizational agility in small and medium enterprises. The study found that IT adoption enhances the ability to respond quickly to market changes, adapt to customer needs, and improve overall organizational effectiveness (Kohli & Grover, 2008).

In summary, the literature suggests that IT adoption has a positive influence on various aspects of MSMEs' performance, including productivity, innovation, market performance, and organizational capabilities. Overcoming challenges related to resources and skills is essential for effective IT adoption in MSMEs.

Entrepreneurial Competencies

Entrepreneurial competencies encompass various dimensions that capture the essential skills and qualities for entrepreneurial success. These dimensions include Personal Competencies, Social Competencies and Business Competencies as depicted in Figure 2.0. Successful entrepreneurs possess a combination of these competencies, enabling them to identify opportunities, navigate risks, plan strategically, build networks, manage finances, lead teams, and adapt to challenges. By developing these dimensions of entrepreneurial competencies, individuals can enhance their ability to thrive in the dynamic and ever-changing landscape of entrepreneurship.

Figure 1.0: Dimensions of Entrepreneurial Competencies



Competencies	Research Definition
Personal Competencies	These competencies focus on the individual characteristics of entrepreneurs, including self-confidence, risk tolerance, creativity, and resilience (Chen & Huang, 2009). Personal competencies are essential for entrepreneurs to manage uncertainty and adapt to changing environments.
Business Competencies	Business competencies are related to the technical skills and knowledge required to manage various aspects of a business, such as marketing, finance, and operations (Rauch et al., 2018). These competencies encompass a range of technical and managerial skills required for activities such as marketing, finance, operations, strategic planning, and resource management.
Social Competencies	Social competencies involve the ability to build and maintain relationships with stakeholders, including customers, employees, suppliers, and investors (Ozbaseran et al., 2013). These competencies include networking, communication, negotiation, leadership, and relationship-building abilities that enable entrepreneurs to effectively engage with customers, employees, suppliers, investors, and other key individuals or organizations.

would hold relevant to be studied along with IT Adoption.

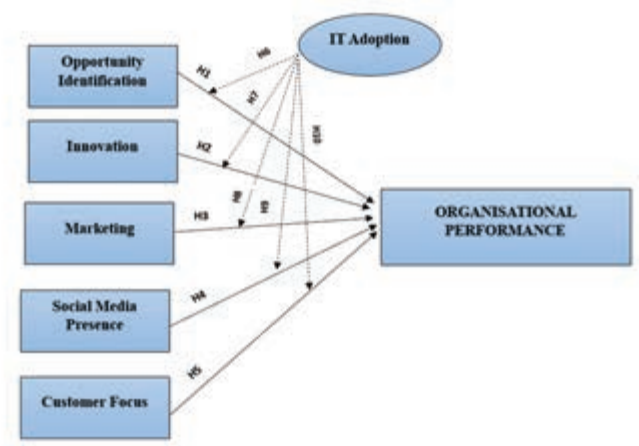
Personal Competency ⟶ Opportunity Identification and Innovation
Business Competency ⟶ Marketing and Customer Focus
Social Competency ⟶ Social Media Presence

Proposed Model

Review of literature formed the theoretical base of this paper. Fig 2. Shows the model under study, where IT Adoption acts as a moderator between five of the entrepreneurial competencies and the organization's performance.

What follows is the details of the literature reviews done which forms the basis for the linkages shown in Fig2. In the context of present study, five-dimensional model of entrepreneurial competencies has been adopted to examine the relationship

Figure 2.0: Proposed Model and Hypotheses



between entrepreneurial competency and business performance. The following section gives references based on the literature review.

Opportunity identification

According to certain research articles, being proactive means acting with the intention of seizing opportunities. For example, an entrepreneur might launch new goods or services to gain an advantage over rivals while also acting in anticipation of potential future demand (Lumpkin and Dess, 1996; Kreiser et al., 2002; Kreiser and Davis, 2010).It is an organizational pursuit for favourable business opportunities. Tang and Tang (2012) has a similar view related to proactiveness. According to Nordqvist and Zellweger (2010), "proactive firms, in search for new possibilities, always keep their eye on the future and rigorously monitor trends, identify the future needs of existing customers, and anticipate changes in demand or emerging problems".

Based on this, two hypotheses have been formed
H1: "There exists a positive relation between Opportunity identification and organization performance."
H2 : "There exists significant moderating effect of IT Adoption for the relationship between Opportunity identification and organization performance."

Innovation

Innovation is an organization's willingness to embrace a culture of experimentation, creativity, and uniqueness. (Covin and Slevin, 1988; Damanpour, 1991; Lumpkin and Dess, 1996).It displays a company's readiness to change from long-standing habits and adopt fresh approaches to accomplishing things (Cornelia, 1996; Covin and Miles 1999; Zahra et al., 1999). Innovation involves an organization's ongoing efforts to investigate novel concepts in relation to technology processes, administrative systems, and organisational procedures (Kanter, 1982; Quinn, 1985; Morris and Paul, 1987; Hult et al., 2004). Without innovation, novel goods, novel services, and novel business models would not be possible. (Heunks, 1998; Hultink and Atuahene-Gima, 2000; Wiklund and Shepherd, 2003; Edmondson and Nembhard, 2009).

Based on this, the next hypothesis is expressed as below:
H3: "There exists a positive relation between innovation and organization performance."
H4: "There exists significant moderating effect of IT Adoption for the relationship between in4ovativeness and organization performance."

Marketing

An organization's efforts to stand out in a competitive environment by focusing on ways to increase customer satisfaction constitute marketing strategy (Jain, 2004). The goal of an organization's marketing strategy formulation, according to (Owomoyela et al., 2013), is to "create, build, defend, and preserve its competitive edge." The product's positioning affects how the consumer perceives the brand and quality. Promotion influences the recipient's knowledge, attitudes, and behaviour by giving them the necessary information.

Based on this, the next hypotheses are expressed as below:
H5: "There exists a positive relation between marketing and organization performance."
H6: "There exists significant moderating effect of IT Adoption for the relationship between marketing strategy and organization performance"

Social Media Presence as competency

Online social engagement is the typical purpose of social media. YouTube, Facebook, Instagram, and other websites are today the most popular social media platforms. These are giving people the means and opportunities to communicate more frequently and more easily (Kaplan and Haenlein, 2016). Social media, according to Kaplan and Haenlein (2010), offers several advantages, one of which is the easy exchange or sharing of user-generated content. Social Media usage in the workplace for purposes other than purely recreational purposes is growing (Bughin, Chui, and Miller, 2017; Bughin and Manyika, 2016). Organisations have acknowledged that social media may encourage collaborative learning at work, and many of them use it as a platform to communicate ideas, according to Leidner and Kayworth (2016).

Based on this, the next hypotheses are expressed as below:
H7: "There exists a positive relation between social media presence and organization performance."
H8: "There exists significant moderating effect of IT Adoption for the relationship between Social Media skill and organization performance".

Customer Focus

The creation of organisational strategy and planning is based on consumer needs in this type of organisational orientation, which

is also referred to as market orientation, customer orientation, market-driven, or market focus organisations. (2005) The Saura et al. Customer orientation should have a direct impact on customer satisfaction by enhancing their comprehension of client wants and utilising this knowledge to produce better products and services (Gustafsson et al., 2003). Telecommunications firms must assess the level of consumer sensitivity and viewpoint towards service quality in order to give improved service quality (Loke, Taiwo, Salim, & Downe, 2011). In order to continue with relationship building efforts over the long term, it is vital to continuously interact with the customers in order to communicate with them more effectively. Email, SMS, and other high-tech communication devices are required for this entire mechanism's connection with the public (Berndt, Herbst, & Roux, 2005).

Based on this, the next hypotheses are expressed as below:
H9: "There exists a positive relation between customer focus and organization performance."
H10: "There exists significant moderating effect of IT Adoption for the relationship between customer focus and organization performance.".

Methodology

Using a single cross-sectional survey design, the proposed research model was assessed. SMEs engaged in manufacturing made up the study's sampling unit in the Indian state of Haryana.500 SMEs were contacted, and 350 of them expressed interest in doing the survey. Out of which 45 responses were found to be invalid. A final count of 305 SME responses were found relevant. A systematic questionnaire was used for interviews with SME owners and managers. Table 1 illustrates how to measure a construct by describing the components that make up a construct and the related mean values for both the individual items and the overall construct. The Likert scale, which includes five points, was used to score each item. Maximum likelihood estimate and the structural equation modelling technique using AMOS 29 have been used to investigate the data. The measurement model was estimated using confirmatory factor analysis (CFA), which was then used to confirm the validity and reliability of the model. In order to check the suggested model's results for model fit, the structural model was also looked at.The demographic profile of the respondents is given table 1.

Characteristics	Category	Frequency	Percentage
Age	28-40 years	126	41.30%
	41+ years	179	58.70%
Educational Background	Below Graduation	30	9.80%
	Graduated and above	275	90.20%
Scale of Operation	Micro Enterprise	161	52.80%
	Small Enterprise	144	47.20%
Impact of COVID	Somewhat impacted by COVID	182	59.70%
	Not at all impacted by COVID	123	40.30%
Nature of Business	Inherited	191	62.60%
	Purchased or newly started	114	37.40%
Gender	Female	30	9.80%
	Male	275	90.20%

Table 1 : Demographic details of respondents

Detailed Analysis

The study model was analysed using the AMOS 29. The structural model (testing the hypotheses) and measurement model (reliability and validity of the measurements) were both investigated with the suggested analytical techniques of Anderson and Gerbing (1988). Additionally, the model loadings and the significance of the path coefficients were examined.

Measurement Model Analysis

Convergent and discriminant validity were examined for evaluating the study's measurement model. The below figure illustrates the measurement model.

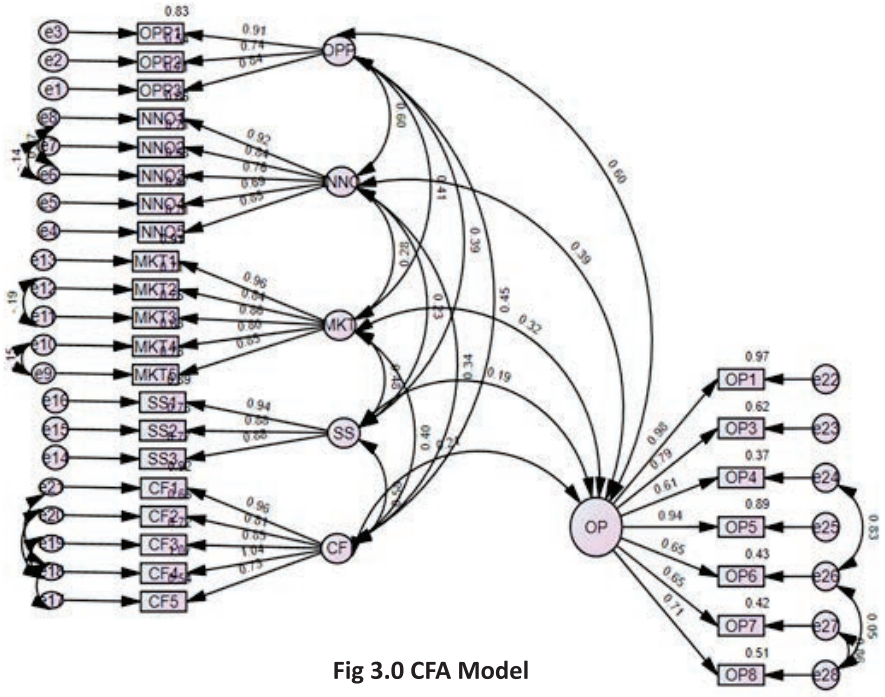


Fig 3.0 CFA Model

ConvergentValidity

The loading of the model, Chronbach's alpha, Composite Reliability, and AVE are used to assess the convergent validity. According to the literature, AVE and loadings must both be greater than 0.5. The table below shows that loadings are greater than 0.5 and AVE is greater than 0.5. Furthermore, Chronbach's Alpha was higher than 0.786.

Constructs Items	Items	Factor Loading	Chronbach's alpha	Composite Reliability	AVE
Opportunity Identification	OPP1	0.914	**0.87**	0.870	0.695
	OPP2	0.733			
	OPP3	0.839			
Innovativeness	INNO1	0.926	**0.899**	0.908	0.667
	INNO2	0.842			
	INNO3	0.764			
	INNO4	0.685			
	INNO5	0.845			
Marketing Strategy	MKT1	0.957	**0.931**	0.936	0.745
	MKT2	0.84			
	MKT3	0.865			
	MKT4	0.796			
	MKT5	0.852			
Social Media Skill	SS1	0.948	**0.928**	0.934	0.812
	SS2	0.879			
	SS3	0.875			
Customer Focus	CF1	0.96	**0.857**	0.947	0.643
	CF2	0.766			
	CF3	0.851			
	CF4	0.665			
	CF5	0.736			
Organization Performance	CF1	0.96	**0.92**	0.911	0.6
	CF2	0.766			
	CF3	0.851			
	CF4	0.665			
	CF5	0.736			

Table 2. Convergent Validity

DiscriminantValidity

As seen from the below table, all the scores are within the prescribed limits.

	CF	OPP	INNO	MKT	SS	OP
CF	**0.885**					
OPP	0.453	**0.833**				
INNO	0.342	0.598	**0.816**			
MKT	0.404	0.414	0.282	**0.863**		
SS	0.585	0.391	0.234	0.476	**0.902**	
OP	0.211	0.597	0.386	0.317	0.195	**0.775**

Table 3. Discriminant validity

The below table indicates the model fitness indices. As seen from the table, all the values are within the recommended limits. Clearly highlighting that the model has achieved goodness-of-fit.

Fit Indices	Recommended Value	Sources	Obtained Value
P	Insignificant	"Bagozzi and Yi(1998)"	0
CMIN/df	<2 to <5	"Less than 2 (Ullman , 2001) to 5 (Schumacker and Lomax, 2004)"	2.563
GFI	>0.90	"Hair et al (2010)"	0.83
CFI	>0.90	"Bentler (1990)"	0.937
TLI	>0.90	"Bentler (1990)"	0.922
SRMR	<0.08	"Hu and Bentler (1998)"	0.075
RMSEA	<0.08	"Hu and Bentler (1998)"	0.079

Table 4. Model fitness indices

Structural Model Results

Figure 2 displays the structural model's outcomes together with the causal relationships and fit statistics. When comparing the structural model's performance to the specified fit criteria, the data and model were frequently well-matched (Bagozzi & Yi, 1988; Chau & Hu, 2001; Browne & Cudeck, 2004).

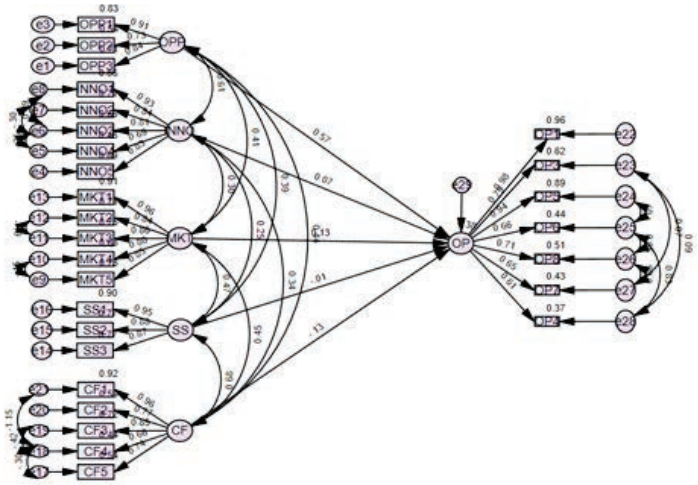


Fig 4.0 Structural Equation Model

Hypotheses Testing based on SEM Result

Hair et al.,(2017) suggests validating t-value and p-value to assess a structural model.

As suggested, beta value, p-value and t-value have been calculated and illustrated in the table below. The opportunity identification competency (β=0.742, p-value is significant, t-value=7.481), Marketing competency (β=0.155, p-value=0.033, t-value=2.137), Customer Focus (β=0.248, p-value=0.056, t-value=1.909), positively influenced organization performance. Therefore, this supports H1,H3 and H5.

The performance of SMEs was not statistically influenced by innovativeness (=0.102, p-value=0.276, t-value=1.09) or social media as a competency (=0.017, p-value=0.276, t-value=1.09). As a result, H2 and H4 are not supported by the findings.

This indicates that the MSEs still do not acknowledge the need to innovate or to use social media to promote their business.

		β-Value	P-Value	t-value	Decision
H1	OPP-->OP	0.742	.***	7.481	Supported
H3	INNO-->OP	0.102	0.276	1.09	Not Supported
H5	MKT-->OP	0.155	0.033	2.137	Supported
H7	SS-->OP	-0.017	0.848	0.192	Not Supported
H9	CF-->OP	-0.248	0.056	1.909	Supported

Table 5. Hypotheses decision based on SEM

Additionally, as R2 is 0.38, all the constructions of the chosen competences can forecast and explain 38% of SME performance. It suggests that all of the constructs have an impact on how well organisations succeed.

Moderation effect of IT adoption between Entrepreneurial Competencies(EC) and Organizational Performance(OP)

This section looks at the moderating effect of IT adoption on various EC and OP.

The following hypothesis is examined with the help of AMOS 29.

H2: "There exists significant moderating effect of IT Adoption for the relationship between Opportunity identification and organization performance".

H4: "There exists significant moderating effect of IT Adoption for the relationship between innovativeness and organization performance".

H6: "There exists significant moderating effect of IT Adoption for the relationship between Marketing and organization performance".

H8: "There exists significant moderating effect of IT Adoption for the relationship between social media presence and organization performance".

H10: "There exists significant moderating effect of IT Adoption for the relationship between customer focus and organization performance".

The results of a moderation analysis—a statistical method used to look at the interaction between two or more variables—are displayed in the table you provided. The two factors in this situation are entrepreneurial competencies (OPP, INNO, MKT, SS, and CF) and IT adoption (ITA). Performance within the organisation (OP) is the dependent variable.

The table's R-squared values show how much of the OP variance the model is able to account for. The better the model matches the data, the higher the R-squared score. The R-squared values in this instance range from 0.26 to 0.47, showing that the model satisfactorily matches the data.

The results' statistical significance is shown by the p-values in the table. If the p-value is 0.05 or lower, the findings are considered statistically significant. Since none of the p-values in this instance are greater than 0.05, the findings are considered statistically significant.

The t-values in the table indicate the strength of the relationship between the variables. A t-value of 2.0 or more indicates a strong relationship. In this case, the t-values range from 1.969 to 3.153, which indicates that the relationships between the variables are strong.

These findings support the hypothesis that IT adoption modifies the association between entrepreneurial skills and organisational performance. In other words, when IT adoption is high, the impact of entrepreneurial competencies on organisational success is larger.

Plotting the interaction term allows for deeper exploration of the specific moderating impact of IT adoption on the connection between entrepreneurial qualities and organisational performance. This would demonstrate how, at various levels of IT adoption, the impact of EC on OP varies.

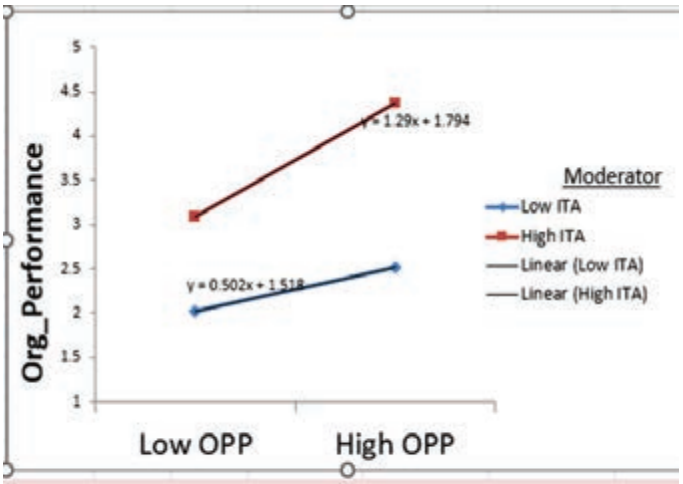
Overall, the moderating analysis's findings indicate that adopting IT can increase the effect of entrepreneurial skills on organisational success. This is a crucial discovery for businesses hoping to increase performance by utilising the abilities and expertise of their employees.

Construct	Path	R	R2	P-Value	MSE	t-value	Result
IT Adoption	ITA-->OPP-->OP	0.68	0.47	0.034	0.093	2.125	Supported
	ITA-->INNO-->OP	0.62	0.39	0.03	0.099	2.133	Supported
	ITA-->MKT-->OP	0.55	0.31	0.044	0.109	2.016	Supported
	ITA-->SS-->OP	0.51	0.26	0.049	0.107	1.969	Supported
	ITA-->CF-->OP	0.53	0.29	0.002	0.137	3.153	Supported

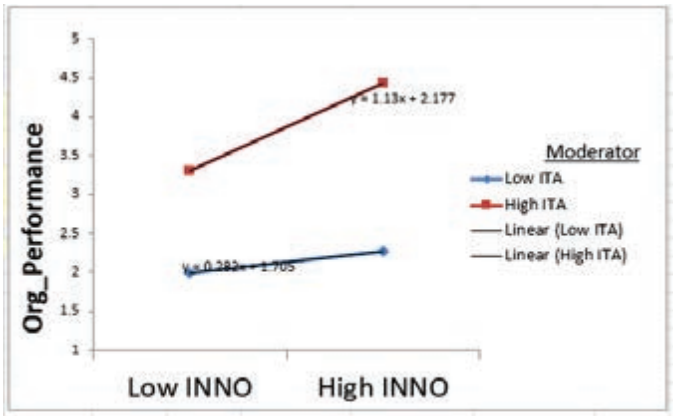
Table 6 . Hypotheses result based on Moderation

Two-Way Interaction

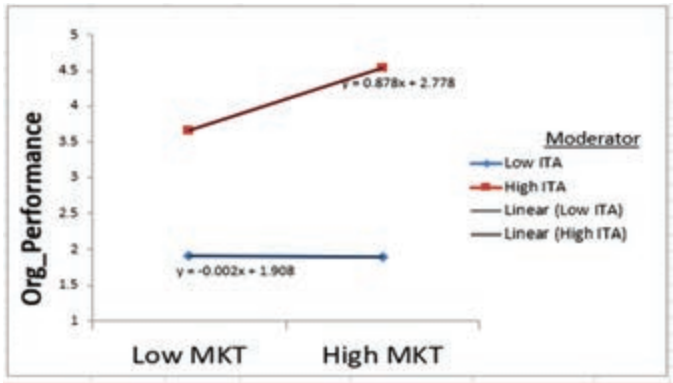
Below graphs show two-way interaction effects.



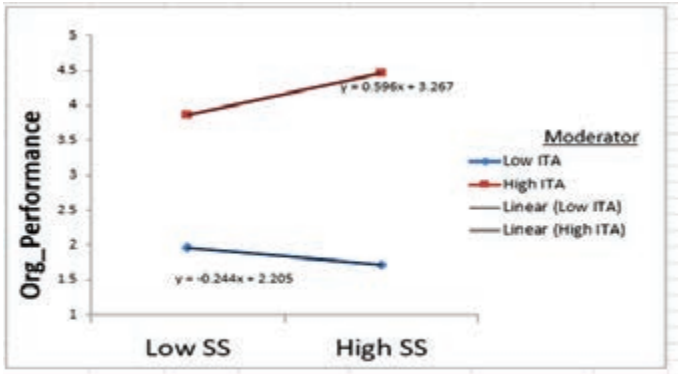
ITA strengthens the positive relationship between OPP and Org_Performance.



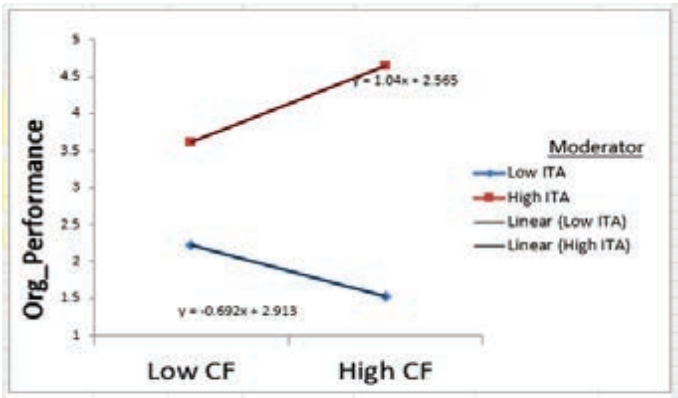
ITA strengthens the positive relationship between INNO and Org_Performance.



ITA strengthens the positive relationship between MKT and Org_Performance.



ITA strengthens the positive relationship between SS and Org_Performance.



ITA strengthens the positive relationship between CF and Org_Performance.

Fig 5. Graphs showing moderating effect of ITA between EC and OP

Overall, the graph shows a crucial findings that IT adoption positively moderates the relationship between EC and OP.

Discussions and Conclusions

The several contributions made by this study have all been covered in greater detail here. The study's conclusions offer a solid theoretical framework and background for understanding how entrepreneurial skills and the success of SMEs are related. Apart from innovativeness and social media as a competency, all entrepreneurial abilities, according to the study's conclusions, contribute to the success of SMEs.

The findings highlighted earlier have several implications. This research is multi-faceted , where 305 SMEs in Faridabad were surveyed. It shows how select entrepreneurial competencies impact organization performance. In also looks at how IT adoption moderates these select entrepreneurial competencies. The results have important consequences for both theory and practise. It is anticipated that the findings of this study will be among the first to examine the consequences of IT adoption. The study offers practical insights into the

importance of innovation in SMEs to owners and managers of those businesses. The results demonstrate that embracing IT is essential for spotting chances of any kind, being creative, and being familiar with social media.

The research however, shows how the SMEs believe innovation and communication through Social media does not necessarily get impacted by usage of technology and that eventually it may not be a factor impacting the organization performance. This implies the conventional beliefs of the SMEs, where they trust word of mouth as promotion and personal relation as customer satisfaction. As a result, this result gives way to both further researchers and to the SME owners to understand and thing differently.

The study also shows that IT adoption enhances the impact of entrepreneurial competencies on organizational performance. This gives managers a view of what technology needs to be adopted. This paper also comes as a directive or guide for the govt agencies to sanitize the SMEs regarding the importance of innovation and how usage of social media like websites, etc., could impact their presence and survival in the long run.

Limitations and Future Scope

Like any research, this too has its fair share of limitations. For the current study, micro and small enterprises have been considered. Therefore, the study should not be generalized for all the organizations regardless of their size and across the world. Also, a subset of entrepreneurial competencies have been considered. Future studies can explore more competencies and also expand the study beyond micro and small enterprises. Also, for large scale organizations, AI adoption could be explored, unlike micro and small which are struggling to adopt even basic IT enabled tools.

This study only lays the groundwork and provides a myriad of alternatives. Future research may also make use of longitudinal data to eliminate any potential bias caused by the cross-sectional design's reliance on a single respondent.

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Using Visual Interventions for Effective Change Management

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Abstract

Change-making is a never-ending process, and it is never easy to put into practice. It is crucial for the company's human resource department to make sure that the desired change is well communicated among the staff, accepted by all stakeholders to unite their Head, Heart, and Hands in it, and is implemented effectively and done so in the shortest amount of time possible when bringing about a change, possibly in accordance with the Lewin's Change Model. The challenge is deciding whether visual techniques, such as visual facilitation, will be made accessible to the teams to help them create the appropriate image or if verbal communication alone will be adequate for the teams to visualize the scenario. This study studies the implantation of such visual interventions as feedback loops of Vickery's Model of Information Transfer in order to create a "Triple Glow" of information for the acceleration of transformation. Although there aren't many resources accessible, the interventions have had a positive impact and may be used at any stage of the process.

Keywords: Change Management, Visuals, Information Transfer, Lewin's Change Model, Visual Interventions

1. Introduction

Change management, in its broadest sense, refers to the method of overseeing the objectives, methods, or technologies of an organization that are going through any kind of change, whether it is a transition, transformation, or actual change. In other words, change management encompasses all of these types of shifts in the status quo. According to Zorn et al. [1] the sole purpose of bringing about change in an organization is to have a genuine, observable influence for the benefit on a constant basis using an approach that is well-orchestrated. This is the only objective of bringing about change in an organization. In this article, we refer to "visual works" for any graphic depiction of organizational transitions, adjustments, or transformations, regardless of the kind of representation.

Through the use of visual management, the management team and those in charge of leading the change work to devise methods that will ensure employee engagement at each level of the problem-solving process. The primary objective of the incorporation of visual management into the process of change is to optimize the utilization of the potential offered by the dynamic process. On the other hand, visual management is being employed on an ad hoc basis whenever the transition process determines that it is essential [2].

2. Initiating shifts in behavior through the use of visual management

Every firm always searches for new methods to expand, whether they focus on the domestic or the global market. As a result of this, a number of different opportunities are being researched via the launch of forthcoming goods and services. It is possible to ensure that employees will remain engaged throughout the entirety of the shift by using both text and images into the communication and information transfer. The use of figures and symbols into the material helps to increase both its correctness and its level of comprehension. Visual management is thus defined expansively to encompass both models (the actual environment and people) and images (photographs, paintings, movies, and so on); the ways in which people behave and interpret visuals differ from culture to culture.

The utilization of the visual component in contemporary techniques such as Design Thinking, Theory U, storyboarding, etc. promotes people's participation in the process. This is necessary because the utilization of the linguistic component alone may not be sufficient [3]. The integration of the visual component is meant to promote communication between employees and change leaders, in addition to increasing awareness of the change process itself. The visual component of

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this process is often hand drawn, which significantly increases the amount of human engagement. As a direct result of the attendees' active participation, they have gained an understanding of the overall goal as well as the potential outcomes. Co-creating in natural settings allows participants to contribute to the formation of a comprehensive image that is accessible to everybody, as these settings are inherently dynamic and need only a minimal amount of reliance on resources [4].

In the modern business world, the reach of almost every company is worldwide, which requires companies to welcome employees from a wide range of cultural backgrounds. Visuals (including symbols and figures) have a significant amount of universality and are able to quickly traverse the gaps that exist across cultures. The utilization of visual management can thereby increase the possibility that coworkers will embrace a change [5].

Visuals, as was previously established, have the potential to be an effective instrument for conveying ideas and bringing about the desired change. In the paragraphs that follow, we will discuss the utilization of visual works as interventions for the purpose of putting the change management research into action. In addition, it will be shown how employees may be better prepared for active involvement through the use of visual co-creation.

Lewin's Change Model

In the year 1947, Kurt Lewin devised what is now known as the Lewin Change Model. This model includes three stages that must be completed before any change can be implemented. The first stage of the model is "unfreezing" the current technique and assessing the kinds of improvements that may be implemented to bring about a substantial shift in the system. When a new location of business is established, the personnel there go through a time of transition that is referred to as "shifting." The "changing" process is refined with the help of feedback loops that have been put into place so that the team may feel comfortable with it. The examination of this improved technique for acceptance brings us to the "refreezing" phase, which is the stage at which the process may be put into action [6].

However, not all alterations can be flawless in nature, and not all adjustments can be applied simultaneously. Neither of these two things is possible. Therefore, Lewin's model suggests a timeline while simultaneously executing a change that must be progressive and obvious. This is owing to the fact that every single coworker will display a level of perplexity when learning how to implement the strategy that was created.

Another iterative method known as PDCA (Plan, Do, Check, Act) that is now in use attempts to address the rigidity through the many steps of its approach, which are outlined below and illustrated in Figure 1:

Plan: This is the initial stage of the process, the issue is examined in depth, and a strategy for bringing about the desired change is devised.

Do: This is the stage in the process in which we put the modification into effect.

Check: At this stage, we have the opportunity to incorporate the comments and suggestions made by the participants into the plan of action.

Act: The updated step is then put through its paces in terms of testing and implementation.

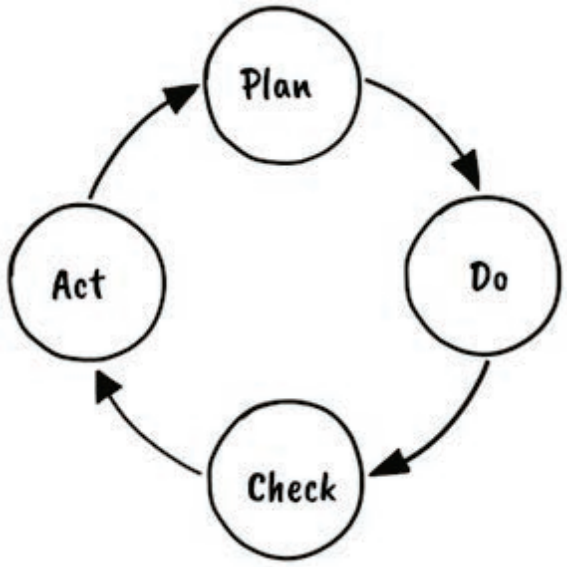

Figure 1: PDCA Cycle

When utilized in a graphical setting, PDCA gives the group a clearer picture of the problem they are trying to solve. For illustration purposes, a path from Point A to Point B can be drawn to show movement between the two points. There is a possibility that the path will be littered with speed bumps that act as cautionary markers for the journey's anticipated hills and valleys. In addition, if the employees are sketching this road in a manner that is both collaborative and creative, they may include recommendations from everyone as well as potential repairs for those speed bumps, which will make the journey more pleasurable and doable for everyone.

Vickery's Model of Information Transfer:

The latter two years of the Covid-19 outbreak brought about a comprehensive change in the information flow. According to the research that supports Vickery's Model of Information Transfer,

we are able to assimilate information more quickly with the assistance of visuals when we make use of both sides of our brains, one of which contains a verbal repository and the other of which contains a visual repository. One further component of the idea is technology, the application of which in this circumstance took an entirely new turn overnight. Work from home, sometimes known as WFH, online learning, and technology all became new buzzwords that were necessary for keeping communication going. The most major change was made to the third component, which was responsible for transporting interpersonal contact from the actual world to the virtual world [7]. The "Triple Glow" of information sharing required the change leaders to become into visual leaders so that it could be sustained. Visual interventions (works) have a considerable influence on the clarity of information transmission and can be thought of as "visual works" (Figure 2).

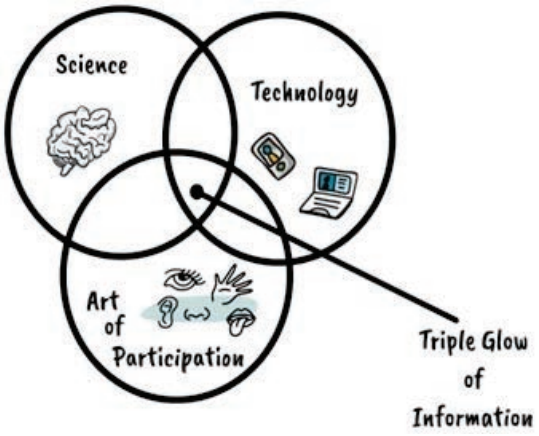

Figure 2: Triple Glow of Information

To guarantee that participants were able to take part digitally in the information exchange, cutting-edge and novel visual interventions (works) such as Miro, Mural, and JamBoard were utilized. Authors and recipients swiftly adapted to the new virtual world, where there were no longer any physical barriers limiting the flow of information, and as a result, it reached unprecedented heights in a very short amount of time. As a result, no one was had to make any physical preparations or move from one location to another in order for information to be communicated, which provided everyone with additional time to absorb the information.

According to Vickery's Model, if information is only supplied verbally, it may be understood differently by various persons even if an established method is employed for the goal of communicating it. This is the case even if the information is being communicated for the same reason. At these levels, when one must find out the modalities to eliminate interpretation discrepancies, visual interventions serve a critical function as an information transmission accelerator. This is because of the essential role that visual interventions play.

In the event of information transmission, it is essential to have a solid understanding of the recipients as well as the ways in which the author may modify the information to ensure that no one feels like they have been treated unfairly. The authors may also have a look at the top loop of Vickery's Model of Information Transfer, which outlines the process of incorporating visual aids into the text in order to enhance the flow of information. These interventions may have a collaborative quality to them in order to elicit a higher level of participation from the recipients. For example, the inclusions of a quiz or survey, or the request that the participant attach a sticky note in order to include all participant voices in change management, are examples of collaborative interventions (Figure 3).



Figure 3: Vickery's Model of Information Transfer

In light of the facts presented above, it is imperative that a visual intervention (work) be supported and incorporated into feedback loops, despite the fact that it may dramatically alter the manner in which information is distributed. During these types of interventions, science, technology, and interactive art are all important factors that need to be considered.

A number of innovative visual interventions, such as visual storytelling, graphic recording or live scribing, story boarding, design thinking, or generative scribing, are currently being suggested as potential solutions to this influence on the transfer of knowledge and information. Participants are better able to recall and retain the information that is being delivered as a result of these interactive therapies.

Even if they are interventions, they need breaking the mold of conventional information transfer and the inclusion of the catalyst (for example, a graphic recorder) in order to encourage participants to be more involved and attentive. In addition, a number of these visual interventions (works) study the bodily-kinesthetic and visual-spatial intelligences that lie dormant inside verbal, logical, and mathematical intelligence.

Conclusion

Every single model for the transmission of information has the possibility for therapies that may be visual in nature, and these treatments could be used to get rid of informational discrepancies. A new set of these visual interventions has evolved swiftly as a result of the development of technology and a new working environment. This has provided the opportunity to assess the critical thinking and creative capacities of each individual who is engaging in the change. Because, like any other adjustment, getting used to these therapies will need some time and effort on your part, extensive research into them is required. The focus of study in the future has to be on developing the conditions that are optimal for accelerating these actions. The ultimate goal of the research and development of these treatments should be to create an atmosphere in which individuals may have an open mind, an open will, and an open heart to change [8].

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A Study of Performance Level of Employees During Coronavirus (Covid-19) Period

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Abstract

Change-making is a never-ending process, and it is never easy to put into practice. It is crucial for the company's human resource department to make sure that the desired change is well communicated among the staff, accepted by all stakeholders to unite their Head, Heart, and Hands in it, and is implemented effectively and done so in the shortest amount of time possible when bringing about a change, possibly in accordance with the Lewin's Change Model. The challenge is deciding whether visual techniques, such as visual facilitation, will be made accessible to the teams to help them create the appropriate image or if verbal communication alone will be adequate for the teams to visualize the scenario. This study studies the implantation of such visual interventions as feedback loops of Vickery's Model of Information Transfer in order to create a "Triple Glow" of information for the acceleration of transformation. Although there aren't many resources accessible, the interventions have had a positive impact and may be used at any stage of the process.

Keywords: Change Management, Visuals, Information Transfer, Lewin's Change Model, Visual Interventions

1. Introduction

From employee's health safety point of view and to mitigate all health risks and a prohibition on large public gatherings during outbreak of pandemic coronavirus (COVID-19), almost all types of the organizations and manufacturing companies had to change their working style after unlock. It was definite that the performance levels of these organizations have had been changed because number of organizations had enforced stay at home orders to their non-production employees and work from home (WFH).

This research paper tried to find out the change in performance level of the employees of engineering industry, education industry and bank employees during pandemic Coronavirus (COVID-19) period.

The pilot research survey received 52 responses. The result of the research was, that there was significant difference in the work performance of the employee before and during pandemic COVID-19. Employee work performance declined during COVID-19. Individual variables wise reduction in work performance was observed - 1) Between 5% To 10%, work performance was hampered for: Trust, Integrity and Openness, Employee Engagement (Emotional connection, interaction), Employee Communication, Attention in Work, Productivity, ranging 5.03%, to 8.65%; and 2) Between 10.10% and above, significant reduction in work performance was observed for: Growth Opportunity, Interpersonal Relations (Employee's social connection with peers), Motivation, and Career Advancement, ranging 10.17% to 12.02%.

For future, organizations must focus on to address the deficiency of leadership impact on employees, motivate employees and supervision to increase the productivity. (a) Leadership needs: The need of leadership of the superiors required mostly at middle level management, (b) Motivation needs: Training for employees to improve their mental and physical health, to increase quality productivity. (c) Supervision needs: To improve the supervisor's responsiveness, and feedback to employees regarding performance level. WFH have given an opportunity for employees to become more organized to improve their work-life balance.

Research Problem

Coronavirus (COVID-19) had disturbed the working style of many of the organizations and manufacturing companies. From the safety point of view these organizations and manufacturing companies were not able to place 100% of its employee capacity

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at their regular workplaces. Production employees were present at workplaces either in rotation or in limited number and rest of the employees were working from home (WFH). This change in the working style had some impact on performance parameters and level of the employees.

Research Question

Was there a change in performance level of employees during Coronavirus (covid-19) pandemic period?

Key Words

Coronavirus (COVID-19), Employee Motivation (EM), Employee Commitment (ECt), Employee Performance (EP), Human Resource Management (HRM), Job Performance (JP), Job Satisfaction (JS), Small and Medium Enterprises (SME), Organizational Performance (OP), Quality Work-Life (QWL), Work Motivation (WM).

(For abbreviations, please consider the key words and the variables given under Performance Parameters).

Literature Review

EP is evaluated on their level of productivity [Crant, (2000); Thompson, (2005); Grant and Ashford, (2008); Parker and Collins, (2010)]. High proactive employees perform more efficiently (Thompson, 2005), initiate views, prevent probable future job environment problems and positively influence their peers (Parker and Collins, 2010). Hasibuan, M. S. P. (2010) cited by Harini, S. & Sudarijati, & Kartiwi, N. (2018) who stated that work performance is a work achievement by executing duties on skills, effort, and opportunity.

Management support has a positive relation to EP (Parker et al., 2006). This support in the form of Performance Management System, is important to plan, manage, supervise, and reward the performance, to increase company's productivity and profit, has positive relationship with EP (Ying, Z. Y., 2012).

Performance Parameters

Attention in Work (AW) – From last ten years, attention, has emerged at a more substantive level, as the exceptional top-down management control approach (Pashler, H., et al., 2001). Employees who focused (here paid attention) more on their jobs, appeared to react more to their perceived job characteristics (here performance) in the development of Organization-Based Self-Esteem (Gardner, D., & Pierce, J., 2013); increase in attention span influences productivity (Stringer, H., 2017, cited Rosen, L.); attention as a resource closely relates to working memory, a mechanism to prioritize, process and storage selective information, and maintenance of memory (Oberauer, K., 2019). Irrespective of attention technology, workers perceive efforts to evaluate their performance for jobs based on innovation than evaluation through monitoring system, can become negative and reduce their efforts if management implements monitoring system through attention technology (Halac, M., & Andrea Prat, P., 2016).

Career Development (CD) – CD influences EP (Kurniawan, A. D., et al., 2018); has no direct influence on work performance (Napitupulu, S., et al. (2017), but have direct influence (Ratnasari, S. L., et al., 2019), positive and significant effect on the EP (Mangiss, I. W., et al., 2018); where there is a positive and significant correlation between CD and the performance of the non-academic staff of the university (Dialoke, I., & Nkechi, P. A. J., 2017);

Concentration in Work (CW) – Concentration influences greater facilitation of attention, protects distractions, more dedicated focus of attention (Sörqvist, P., & Marsh, J. E., 2015). Hotel workers had a positive influence on job performance through mediating effect of self-efficacy Jung, Y. (2017).

Employee Communication (EC) – EC is a process of exchange of information and understanding employees, effective communication (Aswathappa, 2008) influences work performance; employees' overall performance (Armstrong, 2012); increases organizations' performance levels (Bush and Frohman, 1991); needed to make understanding effective (Drafke, M. W., & Kossen, S., 1998, Ch3, pp.52). Chen, et al. (2006) found correlation between job communication and EP.

Employee Engagement (EE) – Improved EE leads to direct relationship with employees (Lowe, 2012); can function to mediate the relationship between (increases the effect of) job satisfaction and job performance (Arifin, Z., Nirwanto, N., & Manan, A., 2019); delivers improved organizational and individual performance in communication organizations which in turn increases organizational profitability (Osborne, S., & Hammound, M., 2017). To mitigate the challenging WFH regime, organizations need to implement various EE practices (Chanana, N., & Sangeeta, 2020).

Feedback (F) – [Parker, & Collins (2010); Grant, & Ashford (2008)] supervisor use information as feedback while actually monitoring the job; [Price (1997); Armstrong (2012)] supervisor communicates employee regarding his performance level; employee makes feedback enquiry with supervisor about work performance [Crant (2000); Grant and Ashford (2008); Parker and Collins (2010)]; supervisor's feedback to employee regarding performance level, influences developments in the work environment and in the organization [Diamantidis, A. D., & Chatzoglou, P. D. (2018) cited Price (1997); Armstrong (2012)].

Growth Opportunity (GO) – There is a strong relationship between managers' perception of employees' organizational commitment and growth opportunities and influencing employees highly committed to their careers (Weer, C. H., & Greenhaus, J. H., 2017); significantly positive correlation

between career growth opportunity and organizational commitment in Korean MNC in Vietnam (Lee, J., et al., 2019), and between career development and the performance of the 2,630 non-academic university Staff (Dialoke, I., & Nkechi, P. A. J., 2017); significantly positive impact on organizational identification and work engagement by employee career growth (Bai, J., & Liu, J., 2018). Turnover intention is significantly influenced by career growth without mediation of employee engagement, not even by job nor organizational engagement (Putri, A. D., & Handoyo, S., 2020).

Interpersonal Relations (IpR) – High work demands leads to conflicts and negative IpR and exclusion among low skilled workers and subordinates, and feeble association for supervisors, affecting EP, employees' social connection with peers (Stoetzer, U. et. al., 2009; Abe, I. I., & Mason, R. B., 2016; Diamantidis, A. D., & Chatzoglou, P. D., 2018); enhancement in interpersonal relationship leads to positive impact on organizational effectiveness (Velmurugan, C., 2016); where, Muhammad, K., et al. (2018) found significant relationship between IpR and JP among employees, and workplace IpR significantly influenced organizational productivity (Nwinyokpugi, P. N., & Omunakwe, P. O., 2018); direct positive effect on job satisfaction under cordial work place environment with positive ambience (Lodisso, S. L., 2019); higher the IpR quality, lower the counterproductive work behavior (Szostek, D., 2019).

Job Autonomy (JA) – JA is a flexibility, freedom, liberty and power to work (degree independence to work out spontaneously) for employee to decide about when and how to perform the job with efficiency, speed, & method of doing it to increase the performance considering objectives of the work (Drafke, M. W., & Kosson, S. (1998, Ch.11, pp.330); Morgenson, et al., 2005; Noe, et al., 2006; Grant, & Parker, 2009; Diamantidis, A. D., & Chatzoglou, P. D., 2018); positively associates with EP (Noe, et al., 2006). Parker, et al. (2006) found positive correlation between JA to commitment and proactivity; where, employee-related intrinsic motivation influenced relationship between JA and EP (Dysvik, & Kuvaas, 2011)

Job Environment (JE) – JE has a positive and significant impact on employee productivity and performance (Kopelman, et al., 1990; Harini, S., et al., 2018); correlation with EP (Van Veldhoven, 2005); employees' perception about the organization environment (Armstrong, 2012); makes employee to be productive and proactive (Fawcett, et al., 2008); satisfies employees' social needs (Diamantidis, A. D., & Chatzoglou, P. D., 2018 cited Fawcett, et al., 2008); influences work performance and changes person's mood while working (Harini, S., et al., 2018 cited Sarwono, 2008). Building workplaces, religious places of worship, special transportation facilities, spacious work spaces, and ventilation of air exchanges develop work environment (Harini, S. et al., 2018 cited Siagian, 2008), and organizations must manage JE uncertainty to be effective (Daft, R. L., 2009, Ch.3, p.86).

Leadership Impact (LI) – Focus of LI is more on work functions than individual employee (Schein, E. H., 1983, 3e., p.133, 139); has positive affect on employee performance [Arizona, D. et al. (2013); LiLin, & Shiqian, W. (2018)]; at work, it leads task and socio-emotions effectively (de Alberdi, L. C., 1990, Ch.4, pp.66); influences ability, attitudes, individual or a groups' behavioral approach, beliefs, contribution, motivation, perceptions of group members to get job done (job performance), and qualitative and quantitative task centered relations, and use of power, towards attainment of organizational change and goals and support subordinates' needs and personal ambitions at workplace [Moorhead, D. G., & Griffin, R. W. (1999, Ch.14, pp.380-381); Wilson, E. (2001); Haslam, S. A. (2004, Ch.3, pp.40); (Daft, R. L., 2009, Ch.15, pp.451-455); Griffin, R. W. & Moorhead, G. (2009, Ch.12, pp.318); Dash, C. S. (2013, Ch.9, pp.307); [LiLin, & Shiqian, W. (2018) cited: Hersey, & Blanchard, (1974); Hsu, (2001); LiLin, & Shiqian, W. (2018) cited: Hersey, & Blanchard, (1974); Hsu, (2001)]; influences the relationship between supervisors and subordinates and significantly carries job performance [LiLin, & Shiqian, W. (2018) cited: (Dale, & Fox, 2008)]; and motivates employees to take initiative, energizes, and stimulates to perform their duties in time and coordinates the activities of group members to meet organizational activities and goals (Chandan, J. S., 1994, Ch.17, pp.338; Moorhead, D. G., & Griffin, R. W., 1999, Ch.14, pp.380-381); monitors and directs a group activity (Arnold, J., et al. (1996, Ch.13, pp.226); attains organizational objectives (Williams, H., 1996, Ch.3, pp.48-50); stimulates employees to bring change, confidence, high degree of control, reliable honesty, high standard of human integrity for the goals of the organization (Kumar, A., 1997, Vol.2, Ch.1, pp.1-2); facilitates employees to work that matches organizational goals / objectives (Drafke, M. W. & Kosson, S., 1998, Ch.13, pp.368); increases employees' feelings of power (Makin, P. J., et al. (1999, Ch. 6, pp.175); works better in large groups, with clarifications of the group goals and influencing complex reactions from the similar groups (Muchinsky, P. M. (2000, Ch.12, pp.365; Dwivedi, R. S., 2001, Ch.2, pp.43); found positive and significant effect on the employees' performance of manufacturing company (Riyadi, S., 2005). Luthar, H. K. (1996, pp.335-352) concluded that in general, autocratic managers are lower performers than democratic managers; Sari, V. N., et al. (2020) leader's style had positive and significant effect on OP and leader's innovation had negative effect on OP.

Motivation (M) – Motus is the Latin word for motivation, means to affect, encourage, influence, move take further interest in work, achieve targets, and goals; a force of energy within or external that determines its form, intensity, and duration that influences a strong need for achievement, and determines employees' ability, a process of activating a wellness and goal-

directed behavior, experience, perception, under given work environment, a challenging incentive, and rewards to act, that actuates, directs and propels employees in to action (what to do), efforts (intensity of try), persistence (how long it should be done) and satisfy the employees' deprived needs and expectations needs to match the organizations' expectations and to work for accomplishment of organizational goals (de Alberdi, L. C. (1990, Ch.3, pp.44); Drafke, M. W., & Kosson, S. (1998, CH.10, pp.273-275); Moorhead, D. G., & Griffin, R. W. (1999, Ch.5, pp.118-119); Muchinsky, P. M. (2000, Ch.11, pp.331 cited Pinder, 1998, p.11); Haslam, S. A. (2004, Ch.4, pp.60); Armstrong (2006, p. 252); Draft, R. L. (2009, Ch.16, pp. 479-480); Griffin, R. W. & Moorhead, G. (2009, Ch.4, pp.85-86); Sudan A. S., & Kumar, N. (2009, Ch.10, p.281); Arnold, J., et al. (2010, ch.8, pp.310)]; an impulse within an individual (Sudan A. S., & Kumar, N., 2009, Ch.10, p.281); a psychological process of experiencing employee needs (Gupta, S. S., 2008) that drives them with organizations' motivational methods (organizational policies and procedures) (Aswathappa, K. (2008, p.176) to enhance performance in organizations (Griffin, R. W., & Moorhead, G., 2009, Ch.5, pp.119) to match the organizations' expectations (Griffin, R. W., & Moorhead, G., 2009, Ch.4, pp.85-86).

Motivation is a positive approach offered to employees (Griffin, R. W., & Moorhead, G., 2009, Ch.4, pp.85-86) that brings challenges (high level of achievement, commitment, and responsibility) in the job and relate reward (recognition, promotion) and management intelligence, planned initiative to inspire employees psychologically to work in persistence & intensity [Cowling, A., & James, P., 1994, Ch.4, pp.55; Tosi, H. I., et al., 1998, Ch.7, pp.206-7]; willingness or desire to do something i.e., motivated employees apply more effort to perform a job than the non-motivated (De Cenzo, & Robbins, 1996); a goal directed behavior consisting three sequential characters: motive (biological need, psychological need), incentive (external environment) and a goal value (Deckers, L., 2818, 5ed); an opportunity for satisfaction of higher-order needs of the employee and to understand and perceive what employees desire from their work, determining the work motivation factors (challenge with significance), against certain rewards and influencing them to set goal direction (what to do), efforts (level of try) and persistence of work behavior (period an employee keeps doing)] to enhance work performance and to get autonomy on job performance, and job satisfaction, and to achieve organizational effectiveness and goals & objectives [(Cooper, C. L., 1996, Ch.10, pp.171-187); Kumar, A., 1997, Vol.2, Ch.6, pp.109-115) & Vol.4, Ch.6, pp.148-151); Schultz, D., & Schultz, S. E.; 1998, Ch.8, pp.236-274; Makin, P. J., et al., 1999, Ch.4, pp.138-139; Agarwal, N. P., & Tailor, R. K., 2008, pp.199-200)]; determine rewards or punishments against employees' performance that affects the organizational need deficiency (Moorhead, D. G., & Griffin, R. W., 1999, Ch.5, pp.118-119). Motivation increases EP (Arizona, D., Riniwati, H., & Harahap, N. (2013); intrinsic motivation influences job performance in best possible way (Diamantidis, A. D. & Chatzoglou, P. D., 2018); positive motivation increases motive satisfaction and vice-a-versa (Memoria, C. B. & Rao, V. S. P., 2012, p.513); more the motivation (positive attitude towards the job), more the encouragement & interest in employees to achieve their affiliation, goals, mission, organizational objectives, performances, productivity and success and profit for the organization. The organization must study / perceive the employees' certain kind of satisfaction & dissatisfaction facets under prevailing work situations, because employees' intrinsic motivation is related to EP (Boxall, & Purcell, 2011). Motivation level of employee determines the level of effective performance. Biologically derived needs or instincts motivates people (Schein, E. H., 1983, 3e., p.73 & 93); WM influences EP [Kurniawan, A. D., et al. (2018); Ratnasari, S. L., et al. (2019)], therefore, firms must strengthen employee motivation to increased EP (Delaney, & Huselid, 1996). Marshal, J. (1984) women managers got motivated by the job itself than by instrumental motives; work motivation has significant direct positive effect on the EP of manufacturing company (Riyadi, S., 2005); significant positive relationship between employee motivation (EM) and employee performance (EP) of SMEs (Sandhu, M. A., et al. (2017).

The researchers opine that: motivation influences behavior (a psychological change) of the employee against the workplace characteristics, circumstances, and the work quality the employee possesses) to get achievement that affect the level of job performance.

Need for Supervision (NSu) – Supervision has a major role to establish friendly environment for employees' growth and productivity (Omisore, B. O., 2014), behavioural relationship between supervisors and viable employees (Min, J. et al., 2020); has a positive and significant effect on EP [Besigwa E.T. (May 2011); Nasution, M. I. (2017); Rulandari, N. (2017); Hannang, A., et al. (2020)]; higher level of supervision and work discipline leads to high EP, and vice versa (Wahyuningsih, S., 2016). Koske, D. K., & Atambo, W. (2018) indicated that employees got challenged by supervisor's delegated powers and duties in diverse working conditions to improve performance; Lee, C. W., & Kusumah, A. (2020) supervision possesses a positive effect on employee performance through work motivation.

Organizational Commitment (OC) – (Kaplan, M., & Kaplan, A., 2018) linked OC theoretically and empirically to EP; normative and affective commitment is positively linked to performance, while continuance commitment is negatively related (Meyer, & Allen,1997); employee work influences OC (Ferris, K. R., 1981); OC components influence job performance (Dinc M. S., 2017); affective commitment relates to performance, continuance commitment does not relate to performance. OC and performance may depend on motivation rather than ability (Angle, H. L., & Lawson, M. B., 1994); OC affect the performance

of employees (Kurniawan, A. D., et al., 2018); OC has negative affect on EP (Arizona, D., et al., 2013). OC have positive and significant impact on job performance (LiLin, & Shiqian, W., 2018).

Productivity (P) – Level of productivity links to performance standards [Thompson (2005); Armstrong (2006)]; it is important to choose appropriate productivity measures (incentives) and performance measures (evaluation and rewarding) to improve workers' productivity (Sauermann, J., 2016); accumulation of individual output due to reduced conflict and improved efficiency enhances organizational productivity (Koske, D. K., & Atambo, W., 2018); it is viable to influence work-related outcomes (productivity and performance) (Grimani, A., et al., 2019).

Responsiveness (R) – Leader responsiveness affects significantly on JS, organizational citizenship behavior, and organizational commitment (Shore, T., et al., (2006). Responsiveness worked as a significant indirect effective mediator for employee satisfaction on customer satisfaction (Grandey, A. A., et al., 2011); supervisor's responsibility is to develop employee friendly safe environment that brings autonomy, motivation and self-awareness for the employee development (Omisore, B. O., 2014); employee's responsiveness could affect positively but not significantly on OP and was negatively and insignificantly affected by leadership style and but positively and significantly affected by leader's innovation (Sari, V. N., et al., 2020); supervisor attends and respond to employees' requests and inquiries [Price (1997), Armstrong (2012)]; Beaton, D. E., et al. (2009) Workplace Activity Limitations Scale (WALS) was consistently the strongest performer to evaluate health-related at-work productivity loss in terms of responsiveness to change in work ability; work-family responsiveness significantly differs among industries (Milliken, F. J., et al., 1998).

Teamwork and Cooperation (TC) – Successful Teamwork is employees' qualitative and quantitative productive output with substantial involvement for a common purpose that provides JS and enhances the organizational adaptability and organization's potential (Dwivedi, R. S., 2001, Ch.8, pp.313, Ch.18. Exibit 18.2, pp.547). On-the-job teamwork improves individual output (Koske, D. K., & Atambo, W., 2018); strong and significant impact of teamwork on work performance of employees (Sanyal, S. & Hisam, M., 2018);

Training and Development (TD) – TD is a meaningful system and defined activity to approach and a planned learning exercise extended to employees to modify and enhance their abilities, attitude, cognitive issues, knowledge, and skill behaviour to shorten employee time to reach peak efficiency levels and achieve effective performance and to satisfy current and future needs of the organization [Beordwell, I., & Holden, L., 1995, Ch.9, pp.335) cited Manpower Services Commission, 1981a); Glaser (1982); Chatterjee, B. (1995, Ch.3, pp.133); Porteous, M. (1997, Ch.6, pp.86-88) cited: Campbell (1971); Muchinsky, P. M. (2000, Ch.6, pp.171); Truelove, S (2000, Ch.11, pp.219); Gupta, S.S. (2008)]; structured opportunities to learn and develop within their work-role (Arnold, J. & Randall, R., et al., 2010, ch.11, pp.404), significantly contributes to increase the organizations' commitments and objectives (Towers, B., 1978, Ch.14, pp.311). Under training, employee learn job-related competencies; (Ch.2, p.70) acquaintance of knowledge and skills needed to perform a particular job and is influenced by employee roles, a need to motivate / develop employees (Noe, R., & Kodwani, A., 2012, Ch.1, p.6); positively affects the EP (Hale, 2002); TD programs improved EP levels (Krishna B., 2017). Training has a direct impact on the EP of the telecommunications industry in Uganda (Nassazi, A., 2013). Porteous, M. (1997, Ch.6, pp.86-88) cited: Campbell (1971); criticized about the low level of ad-hoc nature of training research and the delivery of the training;

Trust, Integrity, and Openness (TIP) – Trust positively associates between work and supervisor satisfaction (Jiang, L., & Probst, T. M., 2016); trust and openness build shared understanding, and encourages commitment (Ghazinejad, M., et al., 2018); where, organizational leader's level of psychological capacities significantly impacted employees' perceived trust (Norman, S. M., et al., 2010). Role of coworker mediated and influenced positive relationship between employees' autonomy and performance and, leader behavior integrity (Choi, Y., et al., 2020). Openness predicted unique variance in job performance (Bing, M.N. & Lounsbury, J.W., 2000) and had positive relationship with performance in high complexity jobs (Mohan, G., & Mulla, Z. R., 2013);

Work Accuracy (WA) – Wilkerson, J., & LeVan, B. (2017) in their study for perceived accuracy and utility of performance appraisals, t-tests results: small firms employees (≤ 100 employees) interpreted their performance appraisals as more authentic and favorable than large firms employees (≥ 1,000 employees); Lee, J., et al. (2020) results regarding contingent and non-contingent work performance feedback: both feedbacks were equally effective under the non-visible condition, where contingent feedback was > effective than non-contingent feedback.

Work Conflict (WC) – Work conflicts within group influences misunderstandings (Dwivedi, R. S., 2001, Ch.13, pp.520); where, relationship conflict significantly (adversely) affect EP, while, task and process conflicts positively influence work output (Donkora, P., et al., 2015); where, low team performance affects association between task conflicts and relationship conflict (Guenter, H., et al., 2016); and communication, organizational structure and personality conflicts affect JP (Said, N.S. M., 2016). Organizational conflict significantly impacted on Bangladesh

bank employees' performance (Hossain, M. Z., 2017); where, workplace politics significantly negatively influenced the relationship between workplace conflicts and employee productivity (Hafeez, M. et al., 2020).

Work Coordination (WCo) – WCo influences positive relationship with output quality and, less positive with output quantity under higher level of uncertainty (Cheng, J. L. C., 1984); where, relational co-ordination and service operations has significant correlations between them (Gittell, J. H., 2000); and when intra and inter components has effective and efficient coordination, there are less organizational complications and betters' performance and high trust (Osifo, C., 2013).

Work Equity (WE) – WE affect EP unequally in different work places, when improved, as perceptions about weighing rewards differs (Barazi. M., 2018); influence higher performance and productivity (Inuwa, M., 2017); and had positive and notable relationship with JP among non-academic staff of the University (Inuwa, M., 2017).

Work Facilities (WFa) – Pandemic COVID-19 has become the reason for future work challenges, under HRM. Post pandemic, under new-normal, organizations must build a significant positive relationship between WFa and EP [Karihe, J. N., et al. (2015); Pratiwi, N. J., et al. (2019)].

Work Flexibility (WFl) – Flexible working models under flexible working environment improve EP (Altindag, E., & Siller, F. (2014) where, time flexibility influences significant relationship and positive impact on EP (Hashim, M. et al., 2017), and work-life balance and employee motivation prone to flexible working environment, develop affirmative organizational productivity (Austin-Egole, I. S., et al., 2020), which has been proved in the banking industry in Kenya (Mungania, A. K., 2016). Workspace flexibility (partial home working and working from office) has been appreciated and become a new normal, new work motivation, increasing OP (Davidescu, A. A., et al., 2020).

Work Innovation (WI) – WI behavior driven by work engagement, influences EP [Osman, S. (2016); van Zyl, L.E., et al. (2019)]. Management's commitment for effective workplace innovation influencing employee participation add to employees' performance, their quality work life, and OP (Pot, F., 2011); where, employee autonomy mediates the positive relationship between openness and innovation (Burcharth, A., et al., 2017). Organizational innovation, innovative performance, and financial performance are significantly affected by level of employees' resistance (Lin, W., et al., 2020).
Work Quality (WQl) – WQl is EP indicator, positively and significantly relates to EP (Harini, S., et al., 2018 cited Dharma, 2008) and affects OP (Daniel, C. O., 2019); ECt significantly affects the relationship between QWl and OP (Nayak, T. & Sahoo C. K., 2015); higher QWl significantly influences positive impact on their work performance (Thakur R, Sharma D. A. 2019).

Work Responsibility (WR) – [(Maier, R., 2018) talked about self-responsibility). (Applying this concept as the employee responsibility)] means investing in oneself as a human capital over a long-term perspective of fixing the one's work value, work life.

Work Targets (WT) – Goal setting gives direction and purpose and positively impact and relate to employee effectiveness and organisation effectiveness (Teo, T. C. & Low, K. C. P., 2016); WT based on goal clarity positively affects team performance (van der Hoek, M., et al., 2016); WTs (goal rationale) creates significantly positive association of work meaningfulness among employees (Devarajan, R. et al., 2018). Goal-oriented WT enhanced workers performance by 12 to 15% in an industrial production process (Asmus, S., et al., 2015).

Work Timeliness (WTm) – Andreadakis, S. (1987) timeliness brings / reviews / analyses the competence of the organization to produce a reply within the time limits of the task requirements; (Harini, S. et al., 2018) cited Dharma, (2008) timeliness is EP indicator.

Research Methodology:

Respondents: This research study got data from respondents of engineering, education, and banking organizations.

Method: Quantitative & Qualitative Research

- Questionnaire under survey method for investigating work performance level of employees before and during the pandemic Corornavirus COVID-19.
- Statistical tools used for data analysis:

Measures of test Validity (construct and expert) and, Reliability (Cronbach's Alpha), Measures of Central Tendency, Measures of Variability, Paired Samples Statistics, Significance of the Difference between Means, Paired Samples Test (Mean, Standard Deviation, Standard Error Mean, 95% Confidence Interval of the Difference, Degrees of Freedom), Two-Tailed Test of Significance, Parametric 't' Test Analysis.

Data Analysis And Results:

This pilot survey received responses from 52 employees.

Nomenclature:

B = Before COVID-19 and A = During COVID-19

Table: 1

NOMENCLATURE			
PAIR NO.	**VARIABLE**	**B = Before COVID-19**	**A = During COVID-19**
1	Attention in Work.	BAIW	AAIW
2	Career Advancement.	BCA	ACA
3	Concentration in Work.	BCIW	ACIW
4	Employee Communication.	BEC	AEC
5	Employee Engagement (Emotional connection, interaction).	BEE	AEE
6	Feedback (Supervisor's feedback to employee regarding performance level).	BF	AF
7	Growth Opportunity.	BGO	AGO
8	Interpersonal Relations (Employee's social connection with peers).	BIR	AIR
9	Job Autonomy.	BJA	AJA
10	Leadership Impact.	BLI	ALI
11	Motivation.	BM	AM
12	Need for Supervision.	BNFS	ANFS
13	Productivity.	BP	AP
14	Responsiveness (Supervisor's willingness to listen and respond to employee's requests and inquiries).	BR	AR
15	Teamwork and Cooperation.	BTC	ATC
16	Training & Development (Strategic movement towards managing high individual & group performance).	BTD	ATD
17	Trust, Integrity, and Openness.	BTIO	ATIO
18	Work Accuracy.	BWA	AWA
19	Work Conflict.	BWC	AWC
20	Work Commitment.	BWCO	AWCO
21	Work Disturbance (By internet network, family members, relatives, friends social contacts).	BWD	AWD
22	Work Equity.	BWE	AWE
23	Work Flexibility.	BWF	AWF
24	Work Innovation.	BWI	AWI
25	Work Quality.	BWQ	AWQ
26	Work Responsibility.	BWR	AWR
27	Work Targets.	BWT	AWT
28	Work Timeliness (The fact or quality of happening work at the best possible time or at the right time).	BWTI	AWTI

Validity: The face validity, and content validity of the questionnaire has been approved by expert, to conduct the survey.

Reliability: The reliability of the test items of the questionnaire satisfied the conditions with Cronbach Alpha reliability values both [(n = 28), (N = 52)] for, before COVID-19: 0.975 and during COVID-19, 0.958>0.7.

Cronbach Alpha: Before Covid: 19

Table: 2

Case Processing Summary

		N	%
Cases	Valid	52	100.0
	Excluded[a]	0	.0
	Total	52	100.0

a. Listwise deletion based on all variables in the procedure.

Table:3

Reliability Statistics

Cronbach's Alpha	N of Items
.975	28

It satisfies the condition as Cronbach alpha value 0.975>0.7.

Table: 4

Case Processing Summary

		N	%
Cases	Valid	52	100.0
	Excluded[a]	0	.0
	Total	52	100.0

a. Listwise deletion based on all variables in the procedure.

Table: 5

Reliability Statistics

Cronbach's Alpha	N of Items
.958	28

It satisfies the condition as Cronbach alpha value 0.975>0.7.
Normality:

As might have been anticipated, with only limited number of respondents (N = 52), it was difficult to establish a broad relationship conclusively for normality as Shapiro-Wilk p-values are less than 0.05.

Paired Samples 't' Test

Table: 6

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	BCOVID-19	3.4286	52	.59493	.08250
	ACOVID-19	3.3441	52	.67159	.09313

Table: 7

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	BCOVID-19 ACOVID-19	.08448	.68734	.09532	-.10688	.27584	.886	51	.380

The difference of mean .09 (.08448) concludes that there is no significant difference between work performance before COVID-19 and during COVID-19. SD .68734, indicates low variability.

Correlation is not significant at the 0.05 level (2-tailed) test.

However, there is a difference between work performance before COVID-19 and during COVID-19 between individual variables given in Table: 9.

Table: 8
Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	BAIW	3.615	52	.7959	.1104
	AAIW	3.346	52	.8831	.1225
Pair 2	BCA	3.519	52	.6414	.0889
	ACA	3.096	52	.9551	.1324
Pair 3	BCIW	3.654	52	.9050	.1255
	ACIW	3.500	52	.8745	.1213
Pair 4	BEC	3.558	52	.8725	.1210
	AEC	3.365	52	.9907	.1374
Pair 5	BEE	3.404	52	.8227	.1141
	AEE	3.231	52	1.0777	.1494
Pair 6	BF	3.442	52	.8023	.1113
	AF	3.327	52	.9645	.1338
Pair 7	BGO	3.404	52	.7478	.1037
	AGO	3.058	52	.9983	.1384
Pair 8	BIR	3.385	52	.8667	.1202
	AIR	3.019	52	.9180	.1273
Pair 9	BJA	3.269	52	.7699	.1068
	AJA	3.231	52	.8771	.1216
Pair 10	BLI	3.423	52	.8006	.1110
	ALI	3.308	52	.7551	.1047
Pair 11	BM	3.500	52	.8284	.1149
	AM	3.096	52	1.0712	.1485
Pair 12	BNFS	3.231	52	.7034	.0975
	ANFS	3.346	52	.9264	.1285
Pair 13	BP	3.558	52	.7775	.1078
	AP	3.250	52	1.0455	.1450
Pair 14	BR	3.365	52	.7148	.0991
	AR	3.250	52	.9877	.1370
Pair 15	BTC	3.538	52	.7787	.1080
	ATC	3.500	52	.9802	.1359
Pair 16	BTD	3.462	52	.8509	.1180
	ATD	3.385	52	1.1573	.1605
Pair 17	BTIO	3.442	52	.7253	.1006
	ATIO	3.269	52	.9313	.1291
Pair 18	BWA	3.558	52	.7253	.1006
	AWA	3.481	52	.9800	.1359
Pair 19	BWC	2.962	52	.6250	.0867
	AWC	2.788	52	.8480	.1176
Pair 20	BWCO	3.558	52	.7518	.1043
	AWCO	3.654	52	1.0075	.1397
Pair 21	BWD	3.019	52	.7538	.1045
	AWD	3.327	52	1.0426	.1446
Pair 22	BWE	3.231	52	.5813	.0806
	AWE	3.115	52	.9425	.1307
Pair 23	BWF	3.269	52	.7440	.1032
	AWF	3.635	52	1.0295	.1428
Pair 24	BWI	3.423	52	.7234	.1003
	AWI	3.692	52	1.0392	.1441
Pair 25	BWQ	3.577	52	.8006	.1110
	AWQ	3.423	52	1.0909	.1513
Pair 26	BWR	3.596	52	.8227	.1141
	AWR	3.846	52	.9977	.1384
Pair 27	BWT	3.615	52	.7709	.1069
	AWT	3.519	52	.9391	.1302
Pair 28	BWTI	3.423	52	.7758	.1076
	AWTI	3.577	52	.9970	.1383

Table: 9
Paired Samples Test

Variables		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	BAIW - AAIW	.2692	.9521	.1320	.0042	.5343	2.039	51	.047
Pair 2	BCA - ACA	.4231	.9771	.1355	.1510	.6951	3.122	51	.003
Pair 3	BCIW - ACIW	.1538	.9158	.1270	-.1011	.4088	1.211	51	.231
Pair 4	BEC - AEC	.1923	1.0486	.1454	-.0996	.4842	1.322	51	.192
Pair 5	BEE - AEE	.1731	1.0237	.1420	-.1119	.4581	1.219	51	.228
Pair 6	BF - AF	.1154	1.0414	.1444	-.1745	.4053	.799	51	.428
Pair 7	BGO - AGO	.3462	1.1356	.1575	.0300	.6623	2.198	51	.033
Pair 8	BIR - AIR	.3654	1.1720	.1625	.0391	.6917	2.248	51	.029
Pair 9	BJA - AJA	.0385	1.0090	.1399	-.2424	.3194	.275	51	.785
Pair 10	BLI - ALI	.1154	.8321	.1154	-.1163	.3470	1.000	51	.322
Pair 11	BM - AM	.4038	1.2873	.1785	.0454	.7622	2.262	51	.028
Pair 12	BNFS - ANFS	-.1154	.9833	.1364	-.3891	.1584	-.846	51	.401
Pair 13	BP - AP	.3077	1.1638	.1614	-.0163	.6317	1.907	51	.062
Pair 14	BR - AR	.1154	.8553	.1186	-.1227	.3535	.973	51	.335
Pair 15	BTC - ATC	.0385	.9280	.1287	-.2199	.2968	.299	51	.766
Pair 16	BTD - ATD	.0769	1.1856	.1644	-.2532	.4070	.468	51	.642
Pair 17	BTIO - ATIO	.1731	.9229	.1280	-.0839	.4300	1.352	51	.182
Pair 18	BWA - AWA	.0769	.9465	.1313	-.1866	.3404	.586	51	.560
Pair 19	BWC - AWC	.1731	.9014	.1250	-.0779	.4240	1.385	51	.172
Pair 20	BWCO - AWCO	-.0962	.9343	.1296	-.3563	.1640	-.742	51	.461
Pair 21	BWD - AWD	-.3077	1.1468	.1590	-.6270	.0116	-1.935	51	.059
Pair 22	BWE - AWE	.1154	.7835	.1087	-.1027	.3335	1.062	51	.293
Pair 23	BWF - AWF	-.3654	1.2372	.1716	-.7098	-.0210	-2.130	51	.038
Pair 24	BWI - AWI	-.2692	1.2385	.1718	-.6140	.0756	-1.568	51	.123
Pair 25	BWQ - AWQ	.1538	1.1442	.1587	-.1647	.4724	.970	51	.337
Pair 26	BWR - AWR	-.2500	1.0266	.1424	-.5358	.0358	-1.756	51	.085
Pair 27	BWT - AWT	.0962	1.0893	.1511	-.2071	.3994	.637	51	.527
Pair 28	BWTI - AWTI	-.1538	.8719	.1209	-.3966	.0889	-1.272	51	.209

Individual variable wise difference in work performance:
Reduction in work performance:

Moderate Reduction in work performance (0% To 5%):
Teamwork and Cooperation – 1.09%, Job Autonomy – 1.18%, Work Accuracy – 2.16%, Training & Development (Strategic movement towards managing high individual & group performance) – 2.22%, Work Targets – 2.66%, Feedback (Supervisor's feedback to employee regarding performance level) – 3.35%, Leadership Impact – 3.37%, Responsiveness (Supervisor's willingness to listen and respond to employee's requests and inquiries) – 3.43%, Work Equity – 3.57%, Concentration in Work – 4.21%, Work Quality – 4.30%, Work Commitment – 4.87%.

Considerable Reduction in work performance (5% To 10%):
Trust, Integrity, and Openness – 5.03%, Employee Engagement (Emotional connection, interaction) – 5.09%, Employee Communication – 5.41%, Attention in Work – 7.45%, Productivity – 8.65%.

Significant Reduction in work performance (10.10% and above):
Growth Opportunity – 10.17%, Interpersonal Relations (Employee's social connection with peers) – 10.80%, Motivation – 11.54%, Career Advancement – 12.02%.

During the pandemic Coronavirus COVID-19, most of the employees were working from home (WFH). Due to this there could be reasons for limitations for adequate work facilities like no sufficient work space, uninterrupted internet connection to work online, disturbance from family members, guests and visitors obstructing work pace and work speed, due to which reduction in work performance is observed for Attention in Work – 7.45%, Concentration in Work – 4.21%, Employee Communication – 5.41%, Employee Engagement (Emotional connection, interaction) – 5.09%, Productivity – 8.65%, Work Accuracy – 2.16%, Work Commitment – 4.87%, Work Quality – 4.30%, and Work Targets – 2.66%. WFH has also restricted employee social connection (face-to-face interaction / collaboration with peers), mainly with customers and social contacts.

Increase in work performance:
Moderate increase in work performance (0% To 5%):
Work Timeliness (The fact or quality of happening work at the best possible time or at the right time) – 4.49%,
Considerable increase in work performance (5% To 10%):
Work Responsibility – 6.95%, Work Innovation – 7.86%.
Significant increase in work performance (11% and above):
Work Flexibility – 11.17%.

Work from home extend work flexibility, as employees saves travelling time (to and from), home to office and can manage domestic as well as office work, work timeliness, but need to give attention on work accuracy and achieving work targets though moderate reduction of 2.16% and 2.66% respectively. Additional spare time while working from home has given employees a considerable opportunity to improve innovation opportunities and sharpening their problem-solving skills, develop analytical solutions in their work. Employees have given justice to their work responsibility even in adverse conditions under COVID19, a severe environmental and social disturbance, which led to restrict the movements globally.

Effect of Work-Life Balance on work performance (paying attention to children's online education & home-work, etc.):
Under present COVID-19 situation, 59.62% employees agreed that their work-life balance has been affected during the pandemic Coronavirus COVID-19, while 28.85% employees disagreed for affect in their work-life balance, and 11.54% employees remained neutral (Strongly Disagree – 9.62%, Disagree – 19.23%, Neutral – 11.53%, Agree – 34.62%, Totally Agree – 25%).

The COVID-19 situation has affected work performance for 48.08% employees, while 36.54% employees disagreed for affect in their work performance, and 15.39% employees remained neutral (Strongly Disagree – 15.39%, Disagree – 21.15%, Neutral – 15.39%, Agree – 30.76%, Totally Agree – 17.31%).

DISCUSSION:

The objectives of the research work were: To study the performance parameters of the employees before and during the Coronavirus (COVID-19)) pandemic period and; To study the change in performance level of the employees during the Coronavirus (COVID-19) pandemic period.

The participating employees are independent of one another. The analysis of individual variables before and during COVID-19 work performance under paired sample statistics, for mean values, positive values indicate the reduction in work performance while negative values indicate increase in work performance, as stated under individual variable wise difference in work performance.

The results of individual variable wise difference in work performance, indicates concerns by both the employees and the organization, affecting the work performance, as under:
Employees' concerns:
Moderate Reduction in work performance (0% To 5%):
Job Autonomy – 1.18%, Need for Supervision – 3.57%, Work Equity – 3.57%, Concentration in Work – 4.21%.
Considerable Reduction in work performance (5.01% To 10%):
Trust, Integrity, and Openness – 5.03%.
Significant Reduction in work performance (10.01% and above):
Growth Opportunity – 10.17%, Work Disturbance (by internet network, family members, relatives, friends social contacts) – 10.19%, Interpersonal Relations (Employee's social connection with peers) – 10.80%, Motivation – 11.54%, Career Advancement – 12.02%.

Organization's concerns:
Moderate Reduction in work performance (0% To 5%):
Teamwork and Cooperation – 1.09%, Work Accuracy – 2.16%, Work Targets – 2.66%, Work Quality – 4.30%, Work Commitment – 4.87%.

Considerable Reduction in work performance (5.01% To 10%):
Employee Engagement (Emotional connection, interaction) – 5.09%, Employee Communication – 5.41%, Attention in Work – 7.45%, Productivity – 8.65%.
Hypothesis Testing:
Based on objectives, following hypothesis was formed:

Ho: There is no significant change in performance level of employees during the Coronavirus (COVID-19) pandemic period.

H1: There is significant change in in performance level of employees during the Coronavirus (COVID-19) pandemic period.

Since the value of two-tailed test of significance for determining the significance of the difference between two computed mean values is 0.380 >0.05, exceeding the yardstick of 1.96 standard deviation, meaning there is no significant difference in the work performance of employees before and during the Coronavirus (COVID-19) pandemic period. Hence, it up-held the null hypothesis and is accepted.

CONCLUSIONS:

Statistical analysis indicates that there is no significant difference in work performance of employees between before and Coronavirus during COVID-19, but the COVID-19 situation has affected work performance for 48.08% of employees and work-life balance of 59.62% employees.
Both the employees and the organization have scope of concern on each other to improve the performance and organizational development. Both need to focus on the respective factors mentioned above.

SUGGESTIONS:

To improve the performance level of the employees, which is a main objective to achieve the quality productivity, targets, and profit level both in percentage and volume and the respective support by the organization, both employees and the organization need to focus on following points.

Employees needs to focus on:

Though it is a moderate reduction (</=5%) in work performance of following factors, employees need to improve on these factors to further improve their work quality and performance level, Attention in Work, Concentration in Work, Productivity, Work Accuracy, Work Commitment, Work Quality, Work Targets, and specially improve Interpersonal Relations (Employee's social connection with peers) which has been reduced by 10.80%.

Organization needs to focus on:

Viz-z-viz, Organization (management) also needs to address the deficiency of leadership impact (abilities, skills) on employees, motivate employees and supervision to increase the productivity.

(a) Leadership needs:

The need of leadership of the superiors required mostly at middle level management (as respondent employees fall in this management level). As Employee Engagement (Emotional connection, interaction) has been reduced by 5.09%, indicates that employees have expressed that they find less emotional connection, interaction between peers and superiors. The superiors need to work on improving employee engagement among employees. The superiors need to interact more with their subordinate employees further improve superior-subordinate relationships. In addition to this, the management need to extend further training and development activities helping employees to achieve desired quality productivity and targets to bridge the gap of training & development needs to achieve strategic movement towards managing high individual & group performance.

(b) Motivation needs:

Motivating employees on improving their communication by providing adequate training for soft-skills, organizational etiquettes, social connection will improve their work and social connection confidence. Motivating employees to adopt measures like mindfulness-meditation and physical exercises to improve their mental and physical health to improve their attention in work, reducing their burnout, blood pressure, fatigue, stamina to work for long hours, work anxiety, work stress, work under pressure, improving sleep quality, also improving their work creativity, decision making abilities, reducing absenteeism, cardiovascular diseases, frustration at work, which will lead to increase quality productivity.

(c) Supervision needs:

To improve the responsiveness (supervisor's willingness to listen and respond to employee's requests and inquiries) and feedback (supervisor's feedback to employee regarding performance level), the supervisors need to give more attention on subordinates to satisfy their need for supervision and improve timely feedback to them.

Last but not the least, that WFH have given an opportunity for employees to become more organized to improve their work-life balance.

LIMITATIONS:

This was a pilot survey covering limited quantum of sample of population. As reliability of the test items of the questionnaire satisfied the conditions with Cronbach Alpha, same questionnaire can be exercised to cover mass number of employees (population) of other management levels of various other organizations and industries of different geographical areas. Data collected from large sample population will give scope for using additional statistical tools, so the acceptance of hypothesis may differ.

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Consumer Brand Engagement Through Marketing 4.0: A Case of Indian Luxury Fashion Industry

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Abstract

The technological advancements and rise of social media increased the interconnectivity among consumers manifolds. They are more digitally empowered, active, demand personalized products and services and do not allow the organizations to alter their purchase decisions. So, it becomes imperative to skillfully handle such customers by adopting the technologies of marketing 4.0 that integrates offline and online medium to enhance consumer brand experience. The central idea of this concept is collaborative marketing that allows the companies to co-create the products and services with the customers to increase their retention value. Thus the present study explains the adoption of marketing 4.0 by Indian luxury fashion industry to increase consumer brand engagement. Luxury brands remained laggards in embracing digital technologies in the fear of dilution of their exclusivity and hence brand value. But the changing consumers, their lifestyles, demand patterns and competition scenario compelled the brands to imbibe marketing 4.0 technologies to enhance their brand value. The present study investigates the adoption of marketing 4.0 by Indian luxury brands. By adopting the case study approach, this study select stop five international luxury fashion apparel brands and examines their digital marketing practices across different social media platforms. For this purpose, data has been collected from various secondary sources like industry and company reports, extant literature review, company websites, and newspaper articles. The findings reveal that augmented reality, virtual reality and artificial intelligence are the most commonly used marketing 4.0 technologies by these brands. The paper further discusses implications of the study along with future research directions.

Keywords: Augmented reality, Artificial intelligence, Digital technology, Marketing 4.0, Virtual reality.

1. Introduction

In the words of Phan and Heine (2011) "Luxury is anything that is desirable and more than necessary and ordinary".While luxury has not been defined formally, but some salient attributes distinguish it from other goods. The brands known for their scarcity, exclusivity, uniqueness and personalized experience that makes them inaccessible to the most are termed as luxury brands. Luxury brands enjoy irresistible demand and worldwide appeal. The global market for these experiential brands (Berthon et al., 2009)is increasing exponentially across the world and is expected to grow at CAGR of 10% between 2020 and 2025 with valuation from USD 217 to 370 billion. United States, Japan and China account for 46% of global luxury sales in 2020 (Veloutsou et al., 2022).However this growth is not limited to only developed nations but over the past few years, several emerging nations such as Brazil, Russia, and India have attracted the attention of international luxury brands. India is one of the fastest growing markets in the world emerging as a lucrative destination for international brands. Indian luxury goods market amounts to USD 30 billion in 2021and is expected to grow to more than 200 billion by 2030.This booming luxury industry is steered by millennials and Gen Z who are estimated to constitute around 77% of total Indian population by 2030 (Indianretailing.com, 2019).This new generation of tech savvy consumers is well educated, fashion conscious and has high purchasing power that compelled the luxury brands to reach to this segment by investing in digital marketing and social media channels.

Despite of the benefits of social media in terms of wider reach, cost effectiveness, customer reviews, increased consumer engagement, better customer relationships and loyalty, luxury brands could not find the courage to mark their presence online with the fear of dilution of their "dream value" (Athwal et al., 2019).The risk of brand image dilution with the entry of non target customers on social media platforms acted as a catalyst in the dilemma of being present in digital landscape (Park et

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al.,2020) and they remained laggards in this context. Fortunately, with the changing socio-cultural trends, favourable consumptions habits of people and identification of the huge potential of social media, luxury brandsre-evaluated their marketing strategies and startedinvesting in different social media platforms, maintaining their brand heritage (Arrigo, 2014b; Parrott et al., 2015). Luxury brands like Chanel, Dior, Burberry and Prada have started implementingsocial media marketing strategies (Dhaoui, 2014; Lee & Watkins, 2016) and have experienced enhanced brand image. But still the social media platforms could not be milked in terms of consumer brand engagement.

Consumer brand engagement is defined as "consumer's positively valenced brand related cognitive, emotional and behavioural activity during or related to focal consumer/ brand interactions" (Hollebeek et al., 2014).This concept is of immense importance as buying luxury is an emotional and personalised experience. It is important to study consumer engagement with luxury brands as it provides insights to how to holistically manage the customer buying experience without disrupting their brand legacy. Various researches have been undertaken on studying consumer engagement with luxury brands in social media context that how social media marketing enhances consumer trust, loyalty, as well as brand relationship quality (Kim & Ko, 2012; Venkatesan, 2017). This brings the motivation to explore the digital marketing strategies of top international luxury brands. Further, this study attempts to explore how the luxury fashion brands are adopting marketing 4.0 technologies like augmented reality, virtual reality and artificial intelligence to provide delightful consumer experience. To accomplish this objective case study approach is followed. Five top most popular brands (Luxe Digital Report, 2021) are selected on the basis of various parameters like online search interest, social media reach and online popularity etc. The secondary data is analysed to find out the adoption of marketing 4.0 technologies by luxury fashion brands to increaseonline consumer engagement.

2. EVOLUTION FROM MARKETING 1.0 to 4.0

Marketing has transitioned itself from stage 1.0 to stage 4.0 around the globe in response to the changes taking place in the world. The globalization, advances in information technology, abolishing geographical and cultural boundaries among the nations and rise in social media converted the international markets to global markets.The changing needs, demands, preferences and rolesof the interconnected customers changed the business behaviour and traditional marketing activities. To accomplish the ultimate objective of sustainability, companies are now more dependent on the consumer data and re-evaluating their marketing strategies and operations in the light of changing consumers. Thus the marketing activities have also transformed from physical marketing (marketing 1.0) to virtual marketing (marketing 4.0).

Marketing 1.0

The industrial revolution has started marketing 1.0 (Jara et al., 2012). With the small players in the market, the main aim of this product centric marketing was to produce and sell large volume of standardised products without considering the needs of the customers (Kotler and Keller, 2006). The proliferation of new players and rising number of substitutes in the market drove the businesses to focus on the concept of product rather than production. They started differentiating their products on quality but soon the increase in competitionfainted this idea and introduced the selling concept with advertising and promotions. The customers were persuaded heavily with one way communication messages through traditional media (Erragcha and Romdhane, 2014) however the reliability of the messages was ignored. These misleading communications broke the myth of more profits in the long run without considering customers as the central point of their production activity. This led to the emergence of new marketing approach i.e. Marketing 2.0.

Marketing 2.0

This customer centric era portrayed the customers demanding something "New". They were more aware and hence made comparisons among product's value. Moreover the technological advancements, better economic conditions, changing social scenario and faster communications increased their purchasing capacity and influenced their buying decisions. Further, the emergence of internet technologies and web 2.0 communications marked the beginning of information age, that changed the communication from uni-directional to bi-directional (Tarabasz, 2013).Now customers could ask for opinions, suggestions, and reviews and thus alter their purchase decisions on the basis of functional as well as emotional utility of the brand. This led to the change in business orientation from product centric to customer centric. They started feeling the importance of attracting and retaining the customers. They were treated like a "King"(Craven, 2005).To serve them to their best, companies started establishing research departments responsible for identifying customer needs and preferences and offer them with wide product options suited to their requirements. This led to the concept of customer relationship management (CRM) to nurture, strengthen and maintain the relationship with the customers (Jara et al., 2012). Consequently the traditional marketing mix altered from 4P's to 4C's i.e. customer solution, customer cost, communication and convenience (Lauterborn, 1990).

Marketing 3.0

This human centric era refined marketing vision by focusing on 'human'as a whole rather than customer (Varey and Mckie, 2010). Humans in this era are considered as active, creative and intelligent individuals, who are conscious about their needs and

choices. Marketers understood that such customers could not be served by touching solely their mind and heart. Hence, business models were redesigned in the manner that relate to the consumer concerns and touch their soul. So marketing 3.0 aligned the functional benefits (marketing 1.0) and emotional associations(marketing 2.0)and attempted to create the value to touch the spirit of the consumer with mind and heart (Erragcha and Romdhane, 2014).This value driven marketing projected the idea of corporate social responsibility where businesses projected themselves being sensitive to social and environmental concerns. This attempt of 'looking good' demanded a collaborative role from all stakeholders to find out the solutions to make the world a peaceful place to live in. Social media emerged as the major building block. Consumers were active on virtual platforms for expressing their opinions, voicing their concerns, sharing information and writing the reviews. Keeping in view the increasing presence of customers in digital space, businesses started investing in digital marketing increasing their online presence on different social mediaplatforms. This has brought challenges for organizations on how to effectively manage the consumer brand relationships, because customers have become vocal about their choices, desires and concerns. Thus organisations started collaboration with the customers as that they can participate, cooperate and co-create in the value generation process of the organization.

Marketing 4.0

The introduction of web 4.0, big data, internet of things and social media marketing, accelerated marketing 4.0. It is considered as a sequel to marketing 3.0 as it considers the needs, desires, satisfaction and values of the customers and in addition to that it considers the emotional experience journey of the customer in online and offline world (Vassileva, 2017). Marketing 4.0 is a marketing approach that places consumers at the heart of the digital system where they come in direct contact with the enhanced technology (Jara et al., 2012). It aims at maintaining an effective balance between human interactivity and digital technologies to enhance customer participation and collaboration. Consumers' role has changed from passive consumers to prosumers (Nowacki, 2015), where they themselves become the producers of the products and services. Thus in this era the main goal of marketing function is to facilitate better customer interaction, participation and hence engagement of the customer. It rests on three important pillars i.e customer insights data, predictive analytics and data management to predict future trends so that company can mould its marketing activities accordinglyand gain competitive advantage (Vassileva, 2017). The transition of marketing through different stages from 1.0 to 4.0 is shown in Figure 1.

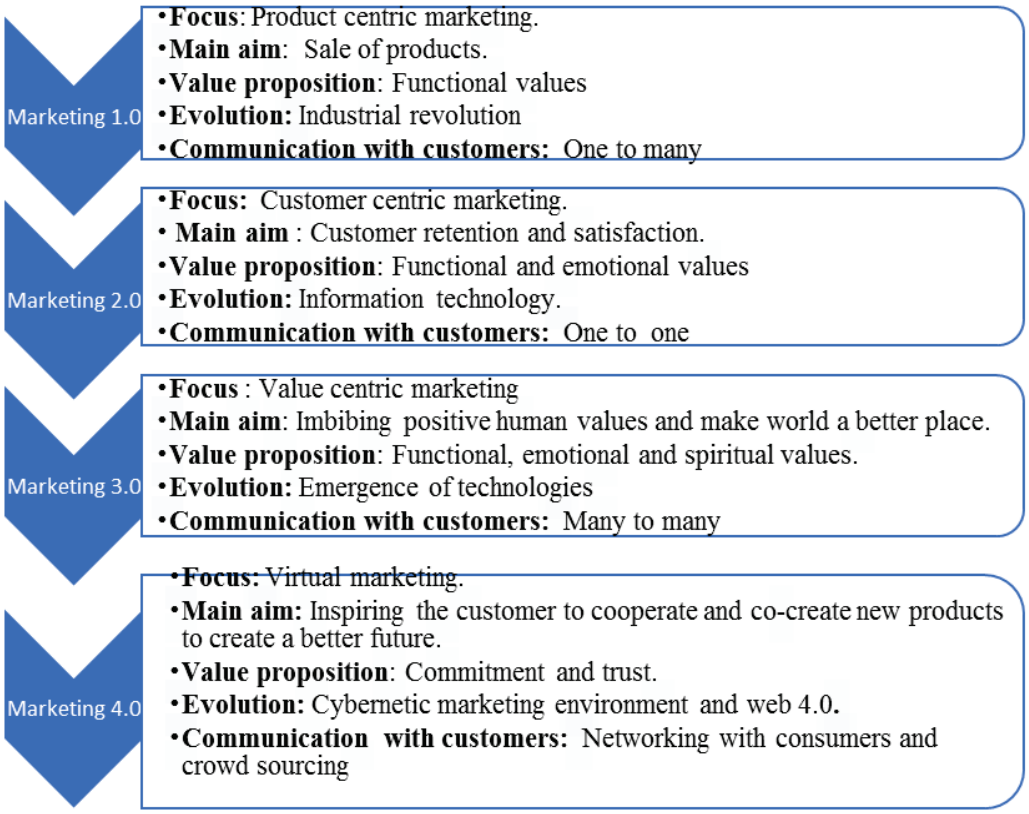

Figure 1: Evolution of marketing from 1.0 to 4.0
Source: Kotler et al., 2010, Tarabasz (2013)

3. LITERATURE REVIEW

The latin origin of the word luxury is "luxus" which means "involvement of the senses, regardless of the cost" (Nueno and Quelch, 1998). The subjective and relative nature of luxury (Phau and Prendergast, 2000; Vigneron and Johnson, 1999) has made it difficult for the scholars and practitioners to reach on consensus on the exact definition of the meaning of "Luxury" (Weidermann et al., 2007).Ko et al., 2019 defines luxury as a "branded product or service which offers authentic value to its customers, providing psychological satisfaction, has a prestigious image in the market and is worthy of commanding a premium price and is able to inspire a deep connection or resonance with the consumer". Luxury brands can be differentiated from non luxury brands on the basis of functional, emotional, psychological and hedonic benefits (Vickers and Renald, 2003). According to Vigneron and Jackson (2004), the four primary categories of luxurious items are fashion apparels, perfumes and beauty products, wines and fashion accessories. Automobiles, hotels and tourism, private banking, home interiors, and airlines were later added (Chevalier and Mazzalovo, 2008). Luxury fashion goodsconstitute the largest portion of luxury brand sales amounting to USD 111.50billion in 2023 with online sales revenue expected to reach 25 % by 2025 (Statista,2023). It reveals that growing online presence will be a major driver of growth for luxury brands sales (Athwal et al., 2019).Previous researches have primarily focused on consumption patterns of western markets (Jin et al., 2021), limited research has been done in emerging economies like India (Jain et al., 2021).

Various theories have evolved over a period of time to study the consumption patterns and consumer's motivation to buy luxury goods. The most popular and oldest theory of the time is the Veblen theory (1899). This is also called as "Conspicuous consumption". In this theory it is assumed that people those who are more status conscious buy these goods to showcase status, wealth and are even willing to pay premium price for the products (Amatulli et al., 2020; Brun and Castelli, 2013). Another prevalent theory is social comparison theory, which states that people buy luxury goods to gain the recognition of the membership group of which they aspire to belong and try to emulate the prestige goods of successful others to make an impression on them (Eastman, 2018; Mandel et al., 2006). Research on luxury brand consumption reveals another theory which is called as self concept theory which states that people buy luxury goods to feel good about themselves through its ownership (Kessous and Valette-Florence, 2019; Mubushar et al., 2020). They consider luxury goods as a self reward, a social badge through which they can enhance their self identity and image. With the growing interest in luxury brand marketing various other researcheshave been undertaken analyzing the luxury consumption patterns (Khan, 2015; Srivastava et al., 2016). Luxury consumption is influenced by various macroeconomic factors like technological advancements, globalization, cross-cultural comparisons, wider markets increase in internet shopping, wide international travel and rising number of young affluent customers and social media platforms (Chadha and Husband, 2010;Okonkwo, 2009). Now luxury is not accessible to not only wealthiest and elite section of the society, but also to middle class due to increase in disposable income of the people (Ansarin and Ozuem, 2015). This is called as "luxurification of society" which increases the scope of luxury marketing and provides them the opportunity to have a wider customer clientele (Frenken and Schor, 2017).

Millennials and affluent young customers are driving the growth of luxury goods industry. These new age consumers expect personalized attention, brands presence across different channels, creative and interesting content online to have continuous interactions to improve their overall brand experience journey (Abtan et al., 2016; Eastman et al., 2020).Luxury brands have responded to these consumer trends by embracing digital technologies. Since the Covid-19 pandemic, the internet has emerged as the main sales channel for luxury brands, giving consumers access to the brand experience through experiential storytelling and livestreaming catwalk shows and photo shoots across different social media platforms (Klaus, 2021; Mandler et al., 2020). It reveals that key growth driver for luxury brand retailers will be consumer brand engagement in the digital environment.

Consumer brand engagement is called the "Holy Grail of social media" (Habibi et al., 2014). It is considered an effective strategy to maintain consumer brand relationships in a competitive digital space (Hollebeek et al., 2014). Luxury brands engage the customers intensively through its sensory experiences and charisma so it becomes essential for luxury brand marketers to study consumer engagement in social media context (Kim et al., 2016). Although some research studies (Dhaoui, 2014) studied key attributes for effective luxury brand marketing and its effectiveness in enhancing consumer brand engagement. In the context of SPA brand marketing, Kim et al., (2014) investigated the impact of different fashion collaboration types on consumer reactions and brand equity. Zyminkowska and Katarzyna, 2015 and Abeyeskara and Safwa, 2016 identified the factors which influence online consumer engagement. There is limited academic research about digital marketing practices by luxury fashion apparel brands using marketing 4.0 technologies to strengthen consumer brand engagement.

4. RESEARCH METHODOLOGY

The present study aims to explore various digital marketing strategies adopted by top five international luxury fashion apparel brands using marketing 4.0 technologies. The current research relies on the case study analysis of leading five international fashion apparel brands to assess the digital

marketing strategies adopted by them. The paradoxical nature of modern luxury brands, requires in-depth analysis and insights (Beverland, 2004). Case study is a viable research method as it uncovers various complexities of the situations, depicts how with the passage of time things have shaped up and presents different perspectivesor opinions on a given topic (Rossman and Rallis, 2003).

In the present study, top five international luxury fashion apparel brands namely Gucci, Louis Vuitton Moet Hennessy (LVMH), Coco-Chanel, Christian Dior and Hermes international S.A are selected. These brands are chosen due to diversified product range and wide international appeal. Fashion industry is chosen as an ideal industry for this study as it is creative industry (Veechi, 2008) where people develop emotional associations with them and derive pleasure from their use. Technology adoption is also extensive in this sector as compared to other sectors as it is more creative and customer driven industry (Florida and Gates, 2001). Data has been collected from various secondary sources such as research papers, newspaper articles, company reports and case studies of international luxury brands.

5. LUXURY BRAND MARKETING AND CONSUMER BRAND ENGAGEMENT

5.1 Consumer brand engagement through marketing 4.0

With technological advancements and innovations, fashion industry has undergone a drastic transformation. Some of the brands like chanel, hermes, Louis vuitton and burberry have been able to survive only because they have started to interact and engage with the audience online. In this competitive era, the key to survival of these brands is only through engagement of its audience. Social media has played a great role to connect and communicate with its audience through online brand communities in which aspirers of the brand can easily connect and communicate with other likeminded people.

Companies are also using innovative marketing 4.0 technologies like artificial intelligence, virtual reality and augmented reality to engage with the customers. For instance, Burberry introduced a 24/7 online chat system for its Chinese client. The brand also operates two Chinese social networking sites and micro blogging sites where celebrities post comments to burberry account (Spillecke and Perrey, 2012).Louis Vuitton live streamed its fashion shows on its facebook page, enabling fans to enjoy the show and behind the scenes activities (Kapferer, 2012). Hermes launched "J'aimmemon Carre", a website dedicated for its scarf lovers. The website is directly linked to its facebook page where it showcases how young hip hop girls are having fun by wearing different styles of scarf as turban, ties and as belt. Social media gives the power to luxury brands to facilitate personalised experience to the consumers through virtual try-ons, posting videos about their latest collections through models to fantasize their products and make the customers feel the value of brand ownership. They even engage young affluent customers by inspiring them to post their selfies with the products on different social media platforms. To strengthen the relationships with the customers, they collaborate and co-create products with them through online brand communities and fan pages which ultimately drive consumer engagement.

The following section outlines the consumer brand engagement through Marketing 4.0 technologies by selected top five luxury fashion brands.

GUCCI

This Italian luxury fashion brand found, in 1921 as a leather goods company and later has evolved as one of the most luxurious and prestigious brand worldwide. It is a fashion conglomerate that has grown in value from 148 billion Euros in 2009 to USD 18.1 billion in 2022 (Statista, 2022). It is acclaimed as the number one luxury brand with the highest digital IQ score as per report by Gartner L2 digital index. It has remained the most online searched brand since 2017. In 2021, it is ranked first among the top luxury brands with 15.6% online search interest (Luxe Digital Report, 2021). It is the first brand to invest in top tier functionality, for content creation, robust search with aesthetically planned product pages. Its website features collection of its products, where the users can browse amongst its virtual collections along with a customer to get in touch with them. Gucci has partnered with various gaming sites like Roblox where they allow the users to dress up their avatars with Gucci products. It is continuously reinventing itself by adopting latest technologies of marketing 4.0 like augmented reality, virtual reality, chatbots, applications to increase brand awareness among millennials. Over 50 % of its purchases are targeted at its audience less than 35 years of age. In 2018, for its summer

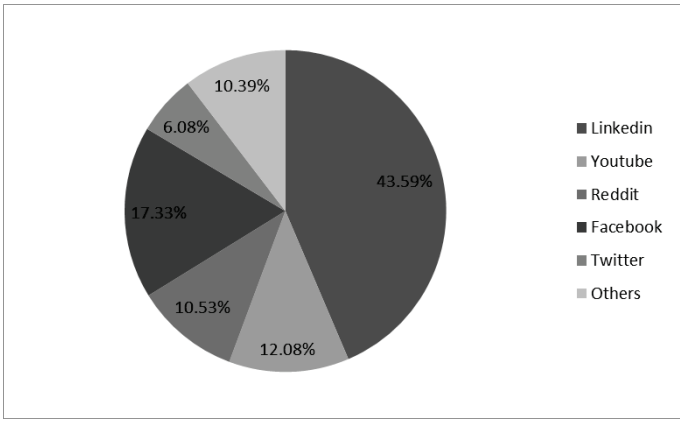

Figure2: Social network distribution by gucci
Source: https://www.similarweb.com/website/gucci.cn/#overview

spring collection, it has used augmented reality to make the customers feel that they are part of the campaign. Gucci has always believed in developing an aura of elitism and creativity aimed at enhancing user experience. In Figure 2, top social networking sites driving traffic to Gucci website are shown below.

The top most social media channels driving audience to Gucci.com are Youtube (23.93%), facebook (19.76%), and pinterest (16.85%).Reddit, twitter and other media contribute (16.85%), (12.80%) and (18.25%) respectively in engaging the customers online.

Louis Vuitton

Louis Vuitton is a Paris based fashion house founded in 1854 which is engaged in the manufacturing of high-end items. It operates several product lines, including those for wines and spirits, clothing and leather goods, cosmetics, jewellery, and watches. The brand is known for its flair, luxury, and ability to merge tradition with modern desires. It is ranked as the most valuable brand with a brand value of USD 23.4 billion in 2022 (Statista, 2022). In 2014, it was accorded as the creative marketer of the year award. It has a huge fan following across different social media channels. It has 7.5 million twitter fans and an instagram following of 35.4 million fans as of 2019.They follow the golden rule of "post often". They use a mix of photos and videos in cat walk shows, ad campaigns, promotional events and influencers' campaigns showcasing and promoting their products.Every single post is hash tagged with # Louis vuitton and its followers can get track of happening of its specific events. Their cohesive hash tagging helps in maintaining brand integrity across all social media channels. Moreover they have developed a special application where the users get immersed into the world of Louis vuitton browsing its online collections and virtual try-ons. It is the first organization who has used facebook ad for its store traffic objective. They have used it to selectively target its facebook audience who is most likely to visit its physical store.LVMH (LVMH Moet Hennessy Louis Vuitton) its marquee brand has invested heavily in "we chat mini program" to target chinese consumers to give them one to one online customer experience. This program is designed to educate the consumers about the latest Louis Vuitton products and engage over one billion users. Louis vuitton have been very famous worldwide for its "make a promise" campaign collaborated with UNICEF to help the needy and malnutrition children. Various social networking sites driving traffic to its website is presented in Figure 3 below.

Louis vuitton gets most of its social media traffic from Linkedin (43.59%) followed by facebook (17.33%) and Youtube (12.08%).Reddit, Twitter and other medias contribute around (10.53%), (6.08%) and (10.39%) respectively.

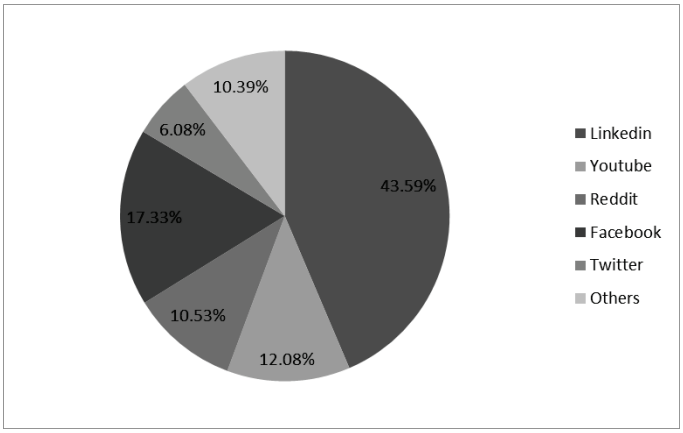

Figure 3: Social network distribution by Louis vuitton
Source: https://www.similarweb.com/website/louisvuitton.com/#overview

Hermes

Hermes International S.A was founded by Thierry Hermes in 1837. It is one of the most prestigious and oldest brands with a franchise of more than 150 years. The family behind hermes is one of the richest to the tune of USD 25 billion dollar. The brand has been a consistent performer and is ranked 28th among the most valuable brands with a brand value of USD 2.2 billion (Statista, 2021). It has positioned itself as a unique, iconic brand with an image of quality, wealth and style. It embraces newness with technology and remains modern and relevant. They don't have a separate marketing department. It is entirely handled by in-house creative designers, who are free to incorporate new themes and designs. It uses an omni-channel distribution approach with a combination of traditional and digital mediums to make its easily accessible. Its digital strategy includes podcasts and documentaries and releasing newsletters showcasing different products for promotion. They have pop up stores to promote their products. Their documentaries show their new product developments and innovations by an aged expert named "H".Their brand strategy rests on two important pillars: testimony of elegance and product quality. They have strong international presence worldwide in 45 countries and

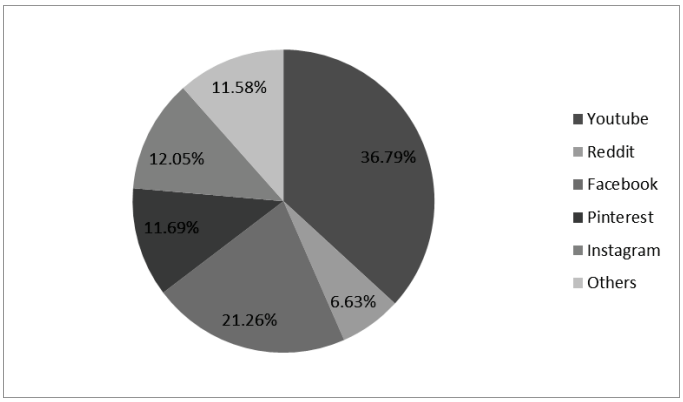

Figure 4: Social network distribution by Hermes
Source: https://www.similarweb.com/website/hermes.com/#overview

their marketing strategy varies according to different countries of business. The different social networks used by hermes is shown below in figure 4.

Most prominent social media channels used by hermes are Linkedin (48.75%) followed by youtube (19.99%). Facebook and Pinterest contribute around 8.48% and 8.57% followed by instagram contributing (4.24%) and others contributing (9.97%) in engaging online audience.

Chanel

It is a high end luxury brand located in Paris which is founded by Gabreile Coco Chanel in 1909.It manufactures luxury items like haute couture, perfumes, sneakers, earings, and cosmetics. It is one of the most recognised luxury brands across all social media platforms. It is famous for its perfume "little black dress", the Chanel No.5 and the Chanel suit. It is one of the most famous luxury brands online with 89.1millions followers (Statista2022). Chanel has been shying away from e-commerce believing in "less is more" approach for e-commerce. They have modernized their brand image with wide social media presence by becoming a master of online videos. Their social media profiles are filled with exclusive content and videos featuring the life of Coco Chanel and stories about the young and liberated woman. Their brand collections exclusively focused on feminism and exclusivity. In 2018 Chanel partnered with Farfetch, a digital platform for physical retail augmentation, launching a boutique of tomorrow concept in Paris. For the summer collection of 2020, they have launched for the first time a seven minute video named "Balade- en. medditerrane, a trip around the mediterranean when their offline event got cancelled. Different social media channels driving traffic to Coco chanel are shown in Figure 5 below.

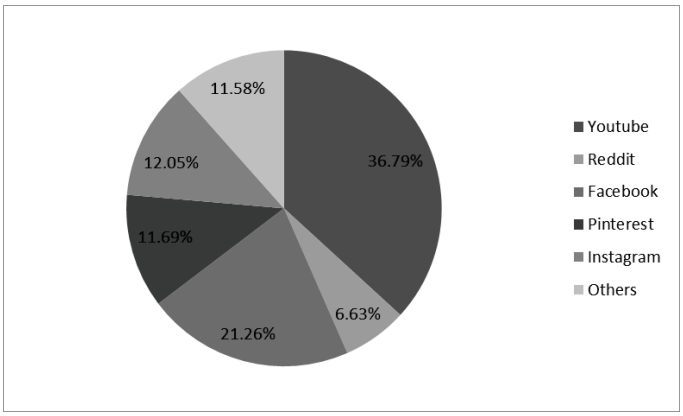

Figure 5: Social network distribution by Chanel
Source: https://www.similarweb.com/website/chanel.com/#overview

Around 36.79 % traffic to chanel.com is generated by youtube. Pinterest and facebook contribute around 11.69% and 21.26% respectively. Instagram contribute around 12.05% and reddit 6.63% followed by others constituting 11.58%.

Christian Dior

It is founded in 1905 in France. It specialises in producing and selling clothing, shoes, accessories, watches, perfumes and beauty line products. It is ranked amongst the top five brands due to its wide online presence, experimentation, localisation efforts and exclusive collection of its premium products. It is the first luxury brand to promote its product through its website to we chat users in 2015 and introduce capsule collection online especially targeting millennials through its we chat boutique. It is known for its ambitious exhibitions showcasing dior rich heritage and history of dresses, perfumes, cosmetics and accessories in different parts of the world.They have become very famous for continuously experimenting with digital strategies.Dior has partnered with Digitas LBI labs to create virtual reality headsets to give its users a glimpse of backstage events to make them feel as they have a back pass. They have followed a great omni-channel distribution approach integrating offline and online channels thus bringing cohesive experience to its customers. Different social media channels used by Christian dior are shown in Figure 6 below.

Maximum traffic to website of dior is generated by Youtube contributing 30.06%, followed by Linkedin contributing 28.97% , facebook contributing 12.43% ,reddit contributing 5.07% and pinterest contributing 12.05% followed by others contributing 11.42%.

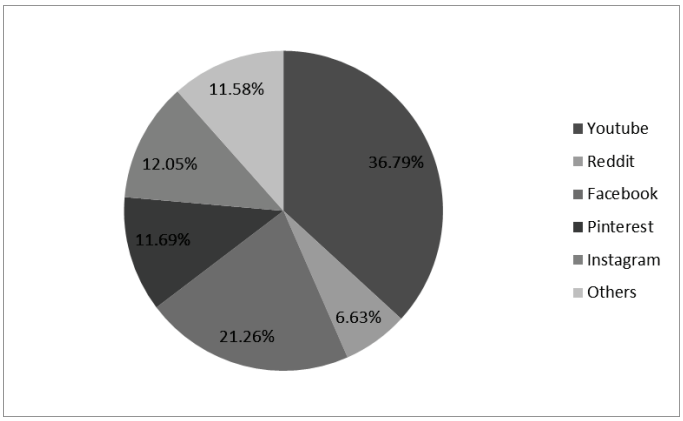

Figure 6: Social network distribution by Christian dior
Source: https://www.similarweb.com/website/dior.com/#overview.

Table 1 shows the summary of percentage distribution of social networks used by top five international luxury fashion brands in driving online audience.

Table 1: Social Network Distribution by Top 5 Luxury Brands in April, 2023

	Linkedin	Youtube	Reddit	Facebook	Pinterest	Others
Gucci	12.80% (Twitter)	23.93%	8.42%	19.76%	16.85%	18.25%
Louis Vuitton	43.59%	12.08%	10.53%	17.33%	6.08% (Twitter)	10.39%
Hermes	48.75%	19.99%	4.24% (Instagram)	8.48%	8.57%	9.97%
Christian Dior	28.97%	30.06%	5.07%	12.43%	12.05%	11.42%
Chanel	12.05% (Instagram)	36.79%	6.63%	21.26%	11.69%	11.58%

6. CONCLUSION

This study explains the adoption of marketing 4.0 technologies by the Indian luxury fashion industry to increase consumer brand engagement. The findings highlight that with the integration of marketing 4.0 technologies like augmented reality, artificial intelligence and virtual reality across various social media platforms luxury brands have been successful in creating new customer brand experiences and has attracted the attention of millennials and gen Z by providing them customized fashion products. With the adoption of these technologies luxury brands are finding a way to walk on the path of sustainability and pure digitalization. Given the scarcity of the literature on luxury brand customer engagement, future research should focus on longitudinal studies examining the connection between brand and consumer across different social media platforms.The study could be extended cross cultural identifying consumer's motivation to engage with luxury brands and how consumer's perceive the social media marketing strategies of luxury brands in different cultural contexts. Future research should employ quantitative analysis in addition to secondary data; primary data could be collected in the form of interviews with fashion experts who could provide a holistic understanding of the concept.

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A Study on Customer Engagement with Reference to Indian Telecom Industry

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1. Introduction

The telecom sector is crucial in providing users with end-mile connections. The modern telecom business is facing difficulty as Indian mobile customer behaviour is fast changing; factors contributing to this change in customer behaviour include smartphone adoption, an exponential rise in data usage, etc. Therefore, in this context, it is crucial to study the customer's engagement.

2. Literature Review

Different views and circumstances of customer engagement processes distinguish the numerous definitions of customer engagement. This is determined by the consumer-facing brands, products, services, customer profiles, attitudes, behaviours, messages, and channels of communication that are employed. Different definitions of the Customer Engagement construct are available in the literature, for example. Customer Engagement (CE) is the term used to describe "client visits" to the company's or product's service channels. Customer engagement (CE) is defined as "an intimate long-term relationship with the customer"(The Economist Intelligence Unit, 2007).

In the telecom sector, a client contacts an engagement channel to fix his problems. If that problem is resolved, the customer may be pleased and recommend the business. In their 2017 assessment of the Western European telecom market, McKinsey distinguished between traditional and digital methods of customer engagement (Figure 1).

Customer connection using digital channels like social media, interactive voice response (IVR), SMS-based strings, and mobile apps is referred to as digital engagement. Traditional engagement is defined as service channels where a customer speaks to a live person, such as in a contact centre. Companies nowadays are promoting more digital channels since they are scalable, cost-effective, and accessible 24 hours a day. Despite a 21% greater level of satisfaction than traditional transactions, the survey finds that just 15% of total transactions involve consumer contact through digital service channels. According to a study, it is, therefore, necessary to study consumer engagement (McKinsey, 2017).

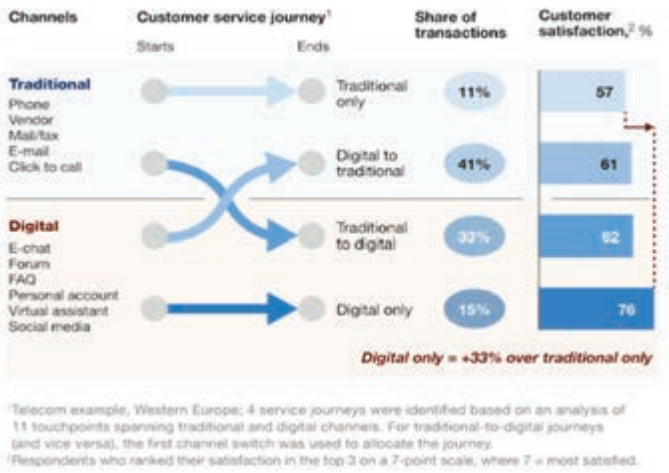

Figure no. 1: Customer Engagement and Satisfaction Level of Service Channels
Source: McKinsey (https://www.mckinsey.com/~/media/mckinsey/dotcom/client_service/Telecoms/PDFs/Digitizing_customer_care.ashx)

2.1 Factors Affecting Customer Engagement

Numerous customer service channels exist for consumer engagement, including inbound and outbound call centres, mobile apps, chat services, social media, and more, according to Chopra (2014), Baxendale et al. (2015), and McKinsey (2017). Mobile applications are evolving into the preferred means of interaction in today's digital environment due to their efficiency, scalability, high dependability, and error-free performance. Additionally, multilingual support for visual and video modes in mobile apps helps customers who have trouble understanding complicated operations.

Customer engagement is divided into self-assisted and non-self-assisted modes, according to Bika (2016). Customers that use self-assisted engagement service channels don't need a person to help them. Contrarily, non-self-assisted engagement service

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channels are used when customers need assistance from people to interact with a company. Numerous models of customer engagement, including call centres, email, websites, physical stores, mobile apps, letters, chat services, Short Messaging Services (SMS), WhatsApp, chatbots, Unstructured Supplementary Service Data (USSD), interactive voice response (IVR), and social media, are described by researchers like Berg (2015), Barger et al. (2016), Bika (2016), Robyn (2020), and Breuer et al. (2020).

Regarding the dimensionality of the customer interaction construct, there are conflicting views. Customer engagement is viewed as a uni-dimensional concept in one set of studies, whereas it is confirmed to be multi-dimensional in another set of studies. The proponents of a uni-dimensional perspective on consumer engagement, such as Flynn (2012), Vivek et al. (2014), Kuvykait and Tarut (2015), and McKinsey (2017). On the other hand, some support a multifaceted perspective on consumer engagement (Brodie et al., 2011; Vivek et al., 2014). Both arguments have a strong theoretical foundation. Consequently, a uni-dimensional approach to customer engagement constructs is taken into consideration in the context of the current study.

2.2 Need for Research and Research Gap

In the Scopus database, a search for "customer engagement" with a date filter up to the end of 2022 reveals a total of 5029 publications; 1250 of these (700 publications in 2022 and 550 publications in 2021) are recent publications, indicating that customer engagement is a relatively new construct that can be further explored in the new digital environment (Elsevier). According to the researcher, customer engagement has a limited reach that is not appropriate for the digital environment. In a new environment, customers' ways of interacting with the business are quickly evolving (Mckinsey, 2017). The change in the environment in Indian telecommunications impacted customer choices for engagement (Wipro, 2020; Barger et al.,2016; Bika,2016; Robyn,2020). India is the second-largest smartphone market with a high 4G mobile penetration rate. Because consumer preferences are changing and it is becoming more challenging for businesses to design their plans for service engagement channels, research into this topic is urgently needed (Mckinsey, 2017; Wipro,2020). The research that is now available in this area has limits because it was only investigated in markets like the American or European ones, which have very different surroundings than India. This work makes an effort to close this gap.

3. Objectives

The research objectives for the given study are to find the factors affecting customer engagement and their relative importance with reference to the Indian telecom industry.

4. Research Methodology

A purposive data sample strategy is used to gather information from 1600 mobile data users for the study, and Bhale (2022) measurement scale is employed. The sample is divided into 800 groups with similar characteristics for the analysis. EFA is applied to the first set of samples, and then CFA is applied to a second group of 800 samples.

5. Analysis

5.1 EFA

EFA Customer Engagement: The SPSS output for factor analysis of customer engagement is shown below in Table No. 1.

Table No. 1: Initial Eigenvalues Customer Engagement Constructs

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
1	8.45	46.97	46.97
2	1.40	7.80	54.78
3	.98	5.48	60.26
4	.90	5.01	65.27
5	.80	4.48	69.76
6	.64	3.56	73.32
7	.59	3.28	76.61
8	.56	3.11	79.72
9	.53	2.99	82.72
10	.47	2.65	85.37
11	.44	2.44	87.81
12	.39	2.17	89.99
13	.37	2.08	92.07
14	.33	1.85	93.93
15	.32	1.78	95.72
16	.28	1.57	97.29
17	.25	1.41	98.71
18	.23	1.28	100.00

Extraction Method: Principal Component Analysis.

Table no. 2: Total Variance Explained Customer Engagement Constructs

Component	Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.45	46.97	46.97	5.07	28.19	28.19
2	1.40	7.80	54.78	4.78	26.59	54.78

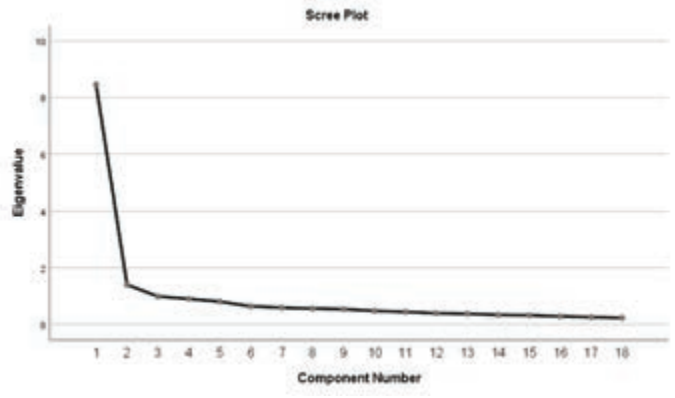

Figure no. 2: Scree Plot of Customer Engagement Constructs

The above analysis (Table no. 2) shows that two factors have greater than one eigenvalue and the scree plot (Figure no. 2) indicates the first major drop in eigenvalues after the second factor. So it was concluded that the above analysis can be carried out with two factors. The correlation matrix (principal component analysis), indicates that 54.78 per cent of the total variation is explained by two factors only.

Table no. 3: Rotated Component Matrix of Customer Engagement Constructs

	Component	
	1	2
E2	.80	.21
E1	.78	.31
E5	.78	.26
E3	.77	.16
E4	.70	.37
E6	.63	.29
E7	.62	.40
E12*	.47	.46
E17*	.45	.37
E8	.24	.73
E10	.28	.71
E16	.20	.70
E11	.28	.70
E14	.34	.67
E18	.22	.66
E15	.20	.58
E13	.42	.51
E9*	.46	.48

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
a. Rotation converged in 3 iterations.
*Attributes/variable less than 0.5-factor loading, hence removed from the factor analysis

5.2 Explanation of the Factors Derived for Customer Engagement

From 18 attributes, two factors were derived by factor analysis. These attributes have been divided into two constructs. The results of the factor analysis show that Factor 1 is the most important factor, accounting for 28.19% of the total variation. 26.59% of the total variation is explained by factor 2. Additionally, all statistically significant variables account for 54.78 per cent of the variation. This indicated that 54.78 per cent of customer engagement can be explained by these two factors.

Factor 1: Human-based Customer Engagement: This customer engagement factor is responsible for explaining 28.19% of the variance. Significant scale items are supported by high factor loadings (>0.5). Call centres, multibrand stores, retailers, written letters, franchisee stores, and company stores are included in this factor. This factor is named as "human-based customer engagement".

Factor 2, is a factor that accounts for 26.59 per cent of variance explanations. The relevance of scale items is justified by high factor loadings (> 0.5). This element includes websites, emails, SMS, webchat, IVR, third-party apps, mobile apps, and SMS. This factor is named as "machine-based customer engagement"

5.3 Statistical Significance of the Factor Analysis

The value of Cronbach's Alpha indicates the internal consistency of scale items. The following Table no 4 indicates the SPSS output indicating the values of Cronbach's Alpha for two factors

Table no.4: Reliability Test Customer Engagement

Factor Name	Cronbach's Alpha	N of Items
Machine-based customer engagement	0.90	7
Human-based customer engagement	0.87	8

In the above-mentioned reliability statistics (Table no. 4), it is clear that Cronbach's Alpha indicates a high level of reliability (more than 0.6) for the two constructs. The extracted two factors explain 54.78 per cent of the variance cumulatively.

5.4 Confirmatory Factor Analysis of Customer Engagement Constructs

When conducting the confirmatory factor analysis with 800 respondents, the factors generated from the exploratory factor analysis are employed. For the study at hand, the confirmatory factor analysis for the customer engagement dimensions is examined. Below is a presentation of how each component of the customer engagement construct was measured and validated.

5.5 Measurement and Validation of Human-Based Customer Engagement Scale

The CFA model (Figure no.3) is developed from the factors derived from exploratory factor analyses. The result of the CFA model reveals a Chi-square index of 87.11 with 14 degrees of freedom i.e. a Normed Chi-square index of 6.22, GFI = 0.97; AGFI = 0.94; NFI = 0.97; CFI = 0.97; RMR = 0.09 and RMSEA = 0.08. Standardized residuals (Table no. 5).

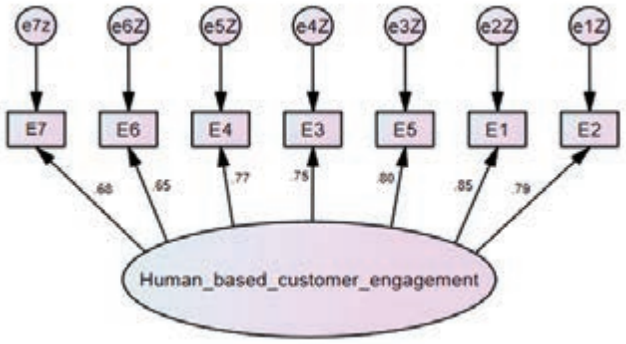

Figure no. 3: CFA Model for Human-Based Customer Engagement Scale

Table no. 5: Standardized Factor Loadings and Residuals for Human-Based Customer Engagement Scale

Item code	Standardize factor loading	Standardized Residuals Covariances						
		E7	E6	E4	E3	E5	E1	E2
E7	0.68	0						
E6	0.65	2.12	0					
E4	0.77	-0.87	0.08	0				
E3	0.75	-1.63	0.46	0.43	0			
E5	0.8	-0.52	-0.69	0.77	-0.06	0		
E1	0.85	0.36	-1.36	-0.11	0.56	0.19	0	
E2	0.79	0.94	1.00	-0.50	-0.41	-0.23	-0.05	0

The above result raises questions regarding the model fit indices, as the Normed Chi-square index of 6.22 is higher than the acceptable level; as a result, modified indices (MI) were applied to enhance the model fit. The higher MI value from Table No. 6 was chosen to remove, and the updated model was created and tested for model fit indices (Mohamad, 2012).

Table no. 6: Modified Indices for Human-Based Customer Engagement Scale

			M.I.	Par Change
e6Z	<-->	e7z	20.53	.32
e5Z	<-->	e7z	5.40	-.17
e4Z	<-->	e7z	17.26	-.27
e3Z	<-->	e5Z	7.07	.16
e2Z	<-->	e6Z	20.47	-.24
e2Z	<-->	e4Z	5.04	.10
e1Z	<-->	e7z	7.25	.16
e1Z	<-->	e6Z	7.38	.15

The result of the modified CFA model (Figure no. 4) reveals a Chi-square index of 41.59 with 12 degree of freedom i.e. a Normed Chi-square index of 3.46, GFI = 0.98; AGFI = 0.96; NFI = 0.98; CFI = 0.99; RMR = 0.07and RMSEA = 0.05.Standardized residuals (Table no. 7).

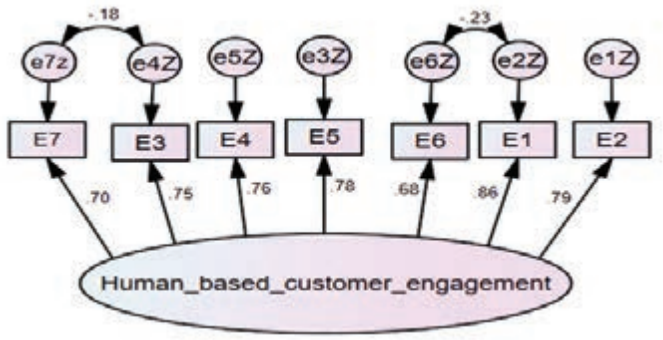

Figure no. 4: Revised CFA Model for Human-Based Customer Engagement Scale

Table no. 7: Revised Standardized Residual Covariances for Human-Based Customer Engagement

Item code	Standardize factor loading	Revised Standardized Residual Covariances						
		E7	E6	E4	E3	E5	E1	E2
E7	0.70	.00						
E6	0.68	1.29	.00					
E4	0.76	-1.03	-.31	.00				
E3	0.75	.00	-.24	.44	.00			
E5	0.78	-.65	-1.06	1.17	-.020	.00		
E1	0.86	-.16	.00	-.12	.18	.22	.00	
E2	0.79	.68	.49	-.25	-.51	.06	-.17	.00

The validity analysis shows CR=0.90 and AVE =0.58, hence no validity concern.

5.6 Measurement and Validation of Machine-Based Customer Engagement Scale

For the machine-based customer engagement factor, the CFA model (Figure no.5) is developed basis on the exploratory factor analysis of the customer engagement construct. The CFA model fit indices are Chi-square index of 98.27 with 20 degree of freedom i.e. a Normed Chi-square index of 4.91, GFI = 0.97; AGFI = 0.94; NFI = 0.96; CFI = 0.97; RMR = 0.09; RMSEA = 0.07; CR=0.89 and AVE=0. 52. Standardized residuals (Table no.8).

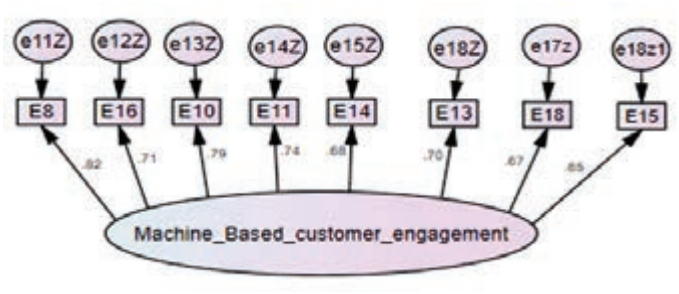

Figure no. 5: CFA Model for Machine-Based Customer Engagement Scale

Table No. 8: Standardized Factor Loadings and Residuals for Machine-Based Customer Engagement

Item code	Standardize factor loading	Standardized Residuals Covariances							
		E15	E18	E13	E14	E11	E10	E16	E8
E15	0.65	.00							
E18	0.67	-.36	.00						
E13	0.70	.21	-.95	.00					
E14	0.68	-1.77	.45	.55	.00				
E11	0.74	1.57	-.25	.62	.61	.00			
E10	0.79	-.80	.012	-.27	.02	.18	.00		
E16	0.71	-1.17	.99	.07	1.68	-1.45	-.03	.00	
E8	0.82	1.23	.039	-.13	-1.08	-.50	.37	.12	.00

Validity Analysis shows that CR = 0.80 and AVE = 0.50 is within the acceptable range hence no validity concern here.

5.7 Measurement and Validation of Customer Engagement (Uni-dimensional)

The uni-dimensional view of the CFA model for customer engagement construct has been presented in Figure 4.7. To simplify the CFA below coding was done for factor name, factor: F1: Human-based customer engagement, F2: Machine-based customer engagement. The CFA model (Figure no. 4.7) reveals a Chi-square index of 309.91 with 64 degree of freedom i.e. a Normed Chi-square index of 4.71 GFI = 0.94; AGFI = 0.92; NFI = 0.94; CFI = 0.95; RMR = 0.13 and RMSEA = 0.06. Standardized residuals (Table no. 4.21).

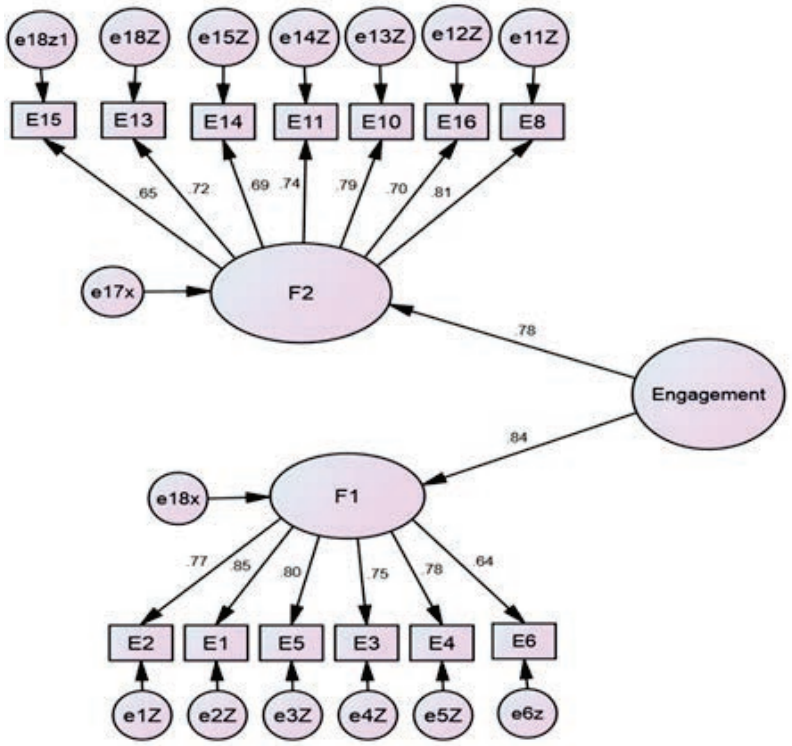

Figure no. 6: CFA Model for Customer Engagement (Uni-Dimensional) Construct

Table no. 9: Standardized Residuals for Customer Engagement (Uni-Dimensional) Construct

	Standardized Residuals Covarinces												
	E6	**E4**	**E3**	**E5**	**E1**	**E2**	**E15**	**E13**	**E14**	**E11**	**E10**	**E16**	**E8**
E6	0.0												
E4	0.2	0.0											
E3	0.7	0.2	0.0										
E5	-0.5	0.4	-0.3	0.0									
E1	-1.1	-0.4	0.5	0.0	0.0								
E2	1.5	-0.5	-0.2	-0.1	0.2	0.0							
E15	0.7	-0.7	-1.3	0.1	-0.4	-2.3	0.0						
E13	1.6	1.7	-0.1	1.9	1.2	1.9	0.0	0.0					
E14	1.5	3.2	0.1	1.2	2.1	-0.1	-1.9	0.1	0.0				
E11	1.2	1.6	-1.3	0.4	0.4	0.8	1.5	0.1	0.3	0.0			
E10	-1.1	1.5	-1.2	-0.5	0.4	-1.1	-0.7	-0.6	-0.1	0.1	0.0		
E16	-0.4	-1.1	-1.9	0.0	0.9	-1.6	-1.0	-0.1	1.7	-1.4	0.2	0.0	
E8	-1.3	-1.6	-2.3	-0.1	-0.9	-1.8	1.5	-0.3	-1.0	-0.4	0.7	0.6	0.0

Validity Analysis shows that CR is 0.79, and AVE is 0.66 are within the acceptable range. Since only one latent variance so there is no correlation matrix.

6. Discussion, Findings And Conclusion

The goal of the study is to define several aspects of customer engagement and conceptualise them within the context of the Indian telecom industry. According to the study, connecting with customers through strategic customer engagement is done by service providers. , crucial attributes of consumer engagement include call centres, multi-brand stores, retailers, written letters, franchisee stores, company stores, mobile apps, SMS, webchat, interactive voice responses, third-party apps, emails, and websites. It is noteworthy to notice that the study's attributes can be grouped into two main factors: human-based customer engagement and machine based customer Engagement.

A call centre, a multibrand outlet, a retailer, a written letter, a franchisee store, and a company store are all defined as essential components of human-based customer engagement in the EFA and CFA outcomes. In a similar vein, machine-based customer engagement includes attributes like mobile applications, SMS, webchat, interactive voice response (IVR), third party apps, emails, and websites.

Human-based customer interaction and machine-based consumer engagement are both important components of the customer engagement constructs. Human-based customer engagement is crucial for Indian mobile customers because it is the only avenue of engagement with the mobile service provider for non-data (internet) users. Because India constitutes around 50% of the customers with basic/feature phones, human-based customer engagement is their primary means of engagement with service providers. The findings are consistent with the Bharat 2.0 Internet Study, which revealed that 60% of the rural population and 41% of consumers in urban India have limited Internet access, emphasising the need for human-based customer engagement channels (Agarwal, 2022; Jha, 2022). Machine-based customer engagement is equally critical because of changing scenario of the Indian telecom sector where a lot of emphasis has been given to digitization (Dwivedi et al., 2021).

The present study shows that in the Indian telecom, context human-based customer engagement initiatives play a greater role viz-a-viz machine-based customer engagement initiatives taken by various service providers. The human-based customer engagement initiatives explain 28.19 per cent variance while defining customer engagement construct viz-a-viz machine-based customer engagement which explains 26.59 per cent variance. The above findings are in line with the existing literature (e.g., Dinner et al., 2015; Peltier et al., 2016; Frimpong, 2017; McLean & Osei-Frimpong, 2017; Mckinsey,2017; Sharma, 2017; Kohlmeyer,2017; Appel et al., 2019; Breuer et al., 2020; Soluno, 2020; Breuer et al.,2020; Kumar, Comeche & Ruthven, 2021).

Figure no 7 shows the proposed model of customer engagement construct in Indian telecom.

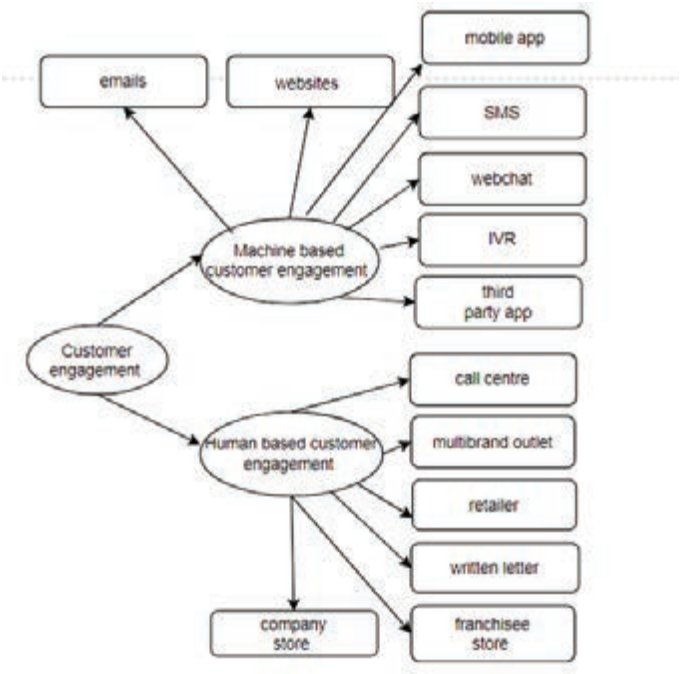

Figure no 7: Proposed Model for Customer Engagement

7. Recommendations

Based on the analysis and interpretation of data, the author proposed the below recommendation

- Both human-based and machine-based customer engagement are essential components of the customer engagement constructs. Managers in the Indian telecom business must place equal focus on both human-based and machine-based channels of customer contact.
- Despite the fact that the results show that human-based engagement channels are more important than machine-based engagement. However, the significance of machine-based customer engagement cannot be overstated. Machine-based customer engagement is equally important due to the changing landscape of the Indian telecom business, where much focus has been placed on digitalization.

8. Implications for Management Practitioners / industry

Cellular service companies can use the research findings to develop customer engagement management strategies. It will also assist service providers in determining their service channel strategy as well as developing their marketing and investment strategies. Human-based customer engagement and machine-based consumer engagement are key factors of customer engagement and managers must have a customer engagement plan in place. These findings are consistent with the literature

(e.g., Dinner et al., 2015; Peltier et al., 2016; Frimpong, 2017; McLean & Osei-Frimpong, 2017; Mckinsey,2017; Sharma, 2017; Kohlmeyer,2017; Appel et al., 2019; Breuer et al., 2020; Soluno, 2020; Breuer et al.,2020; Kumar, Comeche & Ruthven 2021).

9. Limitation and Future Scope

The existing study is carried out with the purposive sampling method; hence the results are depending on the ability of customers to answer the questions. The study can be extended to in near further to other demographic variables like income, location etc.

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Clean-tech Startups as Drivers of Sustainable Development Goals: A Society 5.0 Perspective

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Abstract

The study aims to describe the concept of clean-tech startups and their role in actuating sustainable development goals through the lens of society 5.0. in India. The study is conceptual and exploratory in nature. Insights are offered to coherently link clean-tech startups and society 5.0 solutions with specific sustainable development goals. Clean-tech startups, due to their green technology and agility can offer sustainable solutions that are in alignment with Society 5.0. They can play a vital role by bringing in new innovations to achieve SDGs. While ample literature on sustainable entrepreneurship exists, studies distinct to clean technology/ green tech startups and their relevance, especially in the context of society 5.0 and SDGs in the Indian scenario are limited. This paper aims to highlight the present contribution of such startups and provide a base for further future studies. The study also includes a conceptual framework linking the explored concepts as well as provides an overview of current SDG performance of India.

Keywords: Cleantech, Green-tech, Society 5.0, Startups, Sustainability, Sustainable Development Goals.

1. Introduction

The world has undergone massive transformations in the last few decades. From the I.T. revolution of the '90s to the latest Industry 4.0, the leaps of progress made by humanity have been tremendous. However, all this progress comes at a cost, in this case being environmental degradation and lack of sustainability. The balance between progress and environmental degradation has always been a dicey equation, especially in developing economies. Economic growth, energy consumption, food production, etc. have been the major contributors to environmental degradation in third-world countries (Sarkodie, 2018). While economic growth cannot be sidelined, a conscious and innovative effort is needed to tackle the problem. In the developing world, host of deep-rooted problems still exist. The best results will come from developing nations mobilizing their resources and implementing policies that emphasize the social and economic facets (Khalid et al., 2021). The measures need to highly prioritize green mass urban transport networks, safe, intelligent, and efficient energy systems, targeted afforestation, and incorporating sustainable practises across every major sector and industry (Zhang et al., 2023). With science and technology-based companies playing a crucial role in sustainability efforts, policymakers in developing countries are increasingly seeing science, technology, and innovation (STI) as a way to achieve the Sustainable Development Goals (SDGs) (Surana et al., 2020). The present literature points towards a global, science based cooperation especially among the developing nations (Sharma & Varshney, 2023, Bandyopadhyay, 2023).

Clean tech startups, though still in embryonic stages in India, are already paving the way towards fulfilling India's COP26 commitments and sustainable development goals (United Nations General Assembly, 2015) through their breakthrough technology, smart processes, and intent to solve the much pressing problems, without compromising on their offerings or profits. Hence, going forward, different entities need to align with the vision and philosophy of society 5.0, which is based on creating a super smart, human-centric society, by merging cyberspace and physical space, while still propelling economic growth with the resolution of solving social problems (Deguchi et al., 2020).

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2. Literature Review

2.1 Startup Ecosystem in Indian Perspective

Merriam-Webster dictionary describes a start-up as "a fledgling business enterprise". Though it has been close to five decades since the word was first used by Forbes magazine in 1976, there have been different approaches by different scholars to define the word (which has evolved to become quite a phenomenon in the past decade). Some of the earliest definitions of the word were based on the "newness" of the venture. Keebel (1976) defines a startup as a creation of a new enterprise that did not exist before. Other analogous definitions of the era include "A new firm which began production for the first time" by Gudgin (1978) and "A start-up is a newly born company, without previous history of operations" by Carter et al (1996). However, the later definitions of the word focused on the concept of innovation, problem solving and transformation. India's Ministry of Commerce, in its startup definition, focuses on attributes like innovation, development, technology, intellectual property etc.

According to Krejci, Strielkowski, and Cabelkova, "A startup is a new and temporary company that has a business model based on innovation and technology"(Krejcí et al., 2015). Another modern definition by Paoloni and Modaffari, describes a startup as an entity that has been established for no more than 60 months as well as having as an object social and prevalent innovative products and/or services with high technological value, and is considered innovative (Paoloni & Modaffari, 2018).Flexibility, innovativeness and an entrepreneurial mindset are the key characteristics of a startup(Bulha lopes pereira, n.d.) . Startups are crucial at local as well as global levels. Compared to large corporates, startups contribute more towards technological development and innovation due to their agility(Bulha lopes pereira, n.d.).A startup ecosystem pays attention to a particular region, where entrepreneurs and supporting organizations come together to create new startups and boost the existing ones(Tripathi et al., 2019).

After USA and China, India has the third largest start-up ecosystem in the world, with Bengaluru being one of the leading startup cities in the world. Bengaluru is also home to India's first bank branch entirely dedicated to startups. The SBI branch, inaugurated in August 2022 in Koramangala, has eight unicorn entities within its two kilometre geographical distance. Post-COVID 19 too, the government of India has been trying to give an additional thrust to the startup ecosystem. A new framework for the same has been developed under Startup India program. Some of the key initiatives are: USISTEF (COVID-19 Ignition Grants, Action COVID-19 Team,Omidyar Network India Rapid Response Fund, SIDBI Covid-19 Startup Assistance Scheme ('CSAS') Bexley Advisors Covid-19 Action Fund (BACoAF). The Indian startuo landscape is fast emerging as a hotspot for global investors (Sreekumar et al., 2022). The emergence of technology based startups in the ecosystem has also been rapid (Loganathan, 2022).

Startups in the nation are thriving, as the present number of recognized startups in the country has crossed the 72000 mark.

2.2 Clean Technology and Startups

Scholars and practitioners of climate policy generally agree that tackling environmental and development issues requires technological transformation as a crucial precondition (Malhotra et al., 2021, Fagerberg et al., 2007). The recent literature also suggests that such tehnology based sartups can be pivotal for economies like India (Bhatt et al., 2022, Bhatnagar et al., 2022)

Clean technology/ green form of technology aims to mitigate the negative impact on the environment and seeks to promote sustainability. Such tech is not limited to only drastic or disruptive innovations but also focuses on smart, solution-oriented problem-solving. Clean technologies and clean tech startups focus on reducing or minimizing environmental damage along with more efficient resource use (Anna Gubanova, et al, 2015). Such entities are key contributors to the green economy and sustainability.

These startups can also be understood as a spillover of impact entrepreneurship which can be described as "the development of sustained applications and solutions that collectively address grand challenges to make the world better"(Markman et al., 2019). Clean-tech startups also seem to fulfill the conditions which Breuer et al. (2018) deemed essential for an enterprise to be considered as sustainable which include:

- Sustainability-orientation.
- Extended value creation.
- Systematic thinking.
- Stakeholder integration

Anna Gubanova et al,(2015) further classified clean tech startups into eight categories named as forestry/agriculture, energy efficiency, waste and water management, renewable energy, transportation, green building, eco-tourism , environment, and environment quality safety. To align the goals of technology with impact growth, numerous clean-tech startups have evolved in the past decade. In today's economic scenario, such startups are built on the philosophy of: sustainability, product stewardship, impact innovation, triple bottom line, and cradle to cradle economy approach. The Indian government anticipates that these firms will promote job creation, sustainable development, and economic expansion across India (De Noronha et al., 2022, Vandenberg et al.,2020).

2.3 Sustainable Development Goals

SDGs are a set of seventeen goals given by the United Nations Organization. Also called as global goals, these goals are a critical element of the 2030 Agenda for Sustainable Development. The goals are aimed to induce a collaborative worldwide action with People, Planet, Peace, Prosperity and Partnerships at the heart of such efforts. The goals recognize the need of a strategy and a roadmap to end poverty, global hunger, and economic inequalities and to usher an era of more inclusive economic growth, all the while protecting the oceans, forests and reversing climate change. The SDG's are the fruits of comprehensive international endeavors that have spanned decades.

The formal efforts that began in 1992 at Rio Earth Summit culminated in 2015 when Sustainable Development Goals were adopted by the member nations in New York city. However, the multiple significant events that paved this path actually started decades before the Rio Summit and more than half a century before the adoption of SDG's. The 1962 book 'The Silent Spring' by Rachel Carson was among the first notable works to shed light on the harmful impact of chemicals and pesticides. The book also fueled the global environmental movement.Today, the High-Level Political Forum On Sustainable Development and Division For Sustainable Development Goals are the key organs in the United Nations to support and overview the progress of the goal.

2.4 Society 5.0. for Sustainable Development Goals

In 2016, the government of Japan introduced the idea of society 5.0., a smart society driven by scientific and technological innovation. The concept focuses on integrating cyberspace and physical space using technologies like Artificial intelligence, the Internet of Things, Big data analytics, etc. However, the key aspect of society 5.0 is that all the innovations are geared towards a people-centric society, where humanity acts as the focal point of all progress and development. This human-centered society focuses on the resolution of social issues without leaving behind any individual (Matsuoka & Hirai, 2020).
The key characteristics of Society 5.0 in harmony with SDG's as per the report of Keidanren Japan Business federation are: Value creation (Responds to diverse needs and focuses on problem-solving to create value), Diversity (A diversity of people, talents, and values), Decentralization- (Decentralization of wealth, information, and equal opportunities for all) and Resilience and natural harmony (Free from concerns of climate change, social unrest, or cyber threats).The core value of Society 5.0 directly aligns with SDGs. Both provide a vision and a sustainable roadmap for future. The alignment of Society 5.0 and Sustainable Development Goals (SDGs) from the United Nations Development Program is a universal appeal for making significant strives by 2030 towards protecting planet, peace, and prosperity(Narvaez Rojas et al., 2021). The Japanese government is already utilizing the global SDGs framework and incorporating it in its Society 5.0. vision, which is evident through initiatives like the "SDGs FutureCity" program (Deguchi, 2020) . Society 5.0 also helps economic entities to contribute directly towards sustainable development goals by the means of ESG investing and by promoting innovation. It calls for a harmonious ecosystem of multiple stakeholders by enabling digital transformation, changing socio-economic structure, tackling environmental issues, and bringing a change in people's mindsets (Keidanren Japan Business Federation).

3. Research Methodology and Objectives

A qualitative research design has been adopted by the authors for the present study. For the purpose of the research, a systematic analysis has been undertaken by the authors, utilizing reliable sources of qualitative data. Quantitative data regarding various SDG indicators has also been studied to support the research. The authors have analysed data from various secondary sources has been utilized to fulfil the below stated objectives:

1. To understand India's current SDG performance and draw a global comparison.
2. To establish a link among the reviewed concepts that include Sustainable development goals, startups and Society 5.0.
3. To put forth possible tech based society 5.0 solutions for achieving the SDGs and identify the current Indian clean tech startups working for the stated goals.

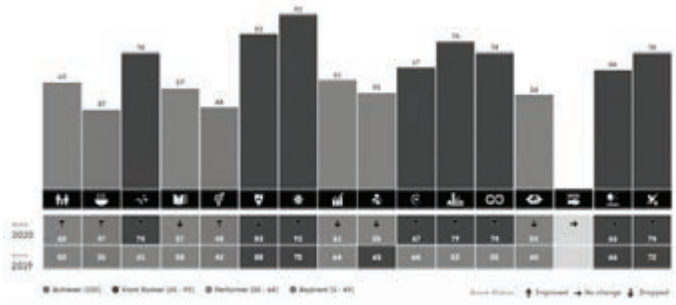
A reliable study of the available academic literature as well as various e-resources has been carried out for the analysis to analyse the objectives.

4. Findings and Analysis

4.1 India's Current SDG Performance

Major challenges still remain for India in 11 out of 17 SDGs comprising SDG 2,3,5,6,8,9,11,14,15,16 and 17 (Figure 2). Out of these, SDG related to hunger and health are most critical. In terms of hunger, there is still prelevance of malnutrition while Tuberclosis, high neonatal and maternal mortality rate have negatively affected the health related targets.India is steadily improving on SDG 1,4,7 and 10. These goals together represent declining poverty and inequality alongside increasing access to resouces like energy and educationHowever, India has done well in terms of climate action(SDG 13) and responsible consumption and production(SDG 12), an area where top countries seem to still struggle.

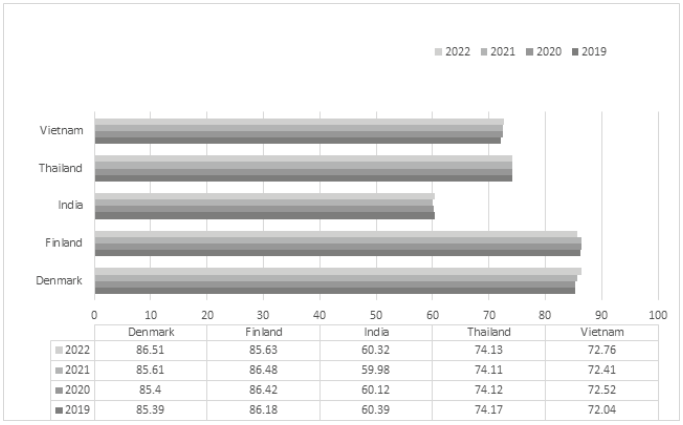
Figure 2: India's goal wise performance (Data Source: NITI Aayog)



Finland and Denmark lead the world rankings (Table 1 and Table 2) with composite scores above 85 as per the SDG report. Both countries have achieved three SDGs respectively. Among Asian countries, Thailand and Vietnam have shown promising performance. India stands at ranking of 121 out of 163 surveyed countries with a composite score of 60.3. India's overall SDG performance remains poor compared to the rest of the world as well as in Asia where the top performers are Thailand and Vietnam.

In Asia, India's performance is only slightly better than the geographical neighbors Pakistan and Afghanistan. Despite being one of the top economies of the world, India ranks below most countries. Other neighbouring countries like Bangladesh and Nepal are performing better than India in terms of SDGs. India also saw a slight dip in the score post-Covid 19.

Table 1: Comparing SDG Scores



	Denmark	Finland	India	Thailand	Vietnam
2022	86.51	85.63	60.32	74.13	72.76
2021	85.61	86.48	59.98	74.11	72.41
2020	85.4	86.42	60.12	74.12	72.52
2019	85.39	86.18	60.39	74.17	72.04

(Data Source: Sustainable Development Report 2023)

4.2. Interdependence Relationship Between SDG's, Startups and Society 5.0. based on Triple Bottom Line Approach

Sustainability is often defined in terms of three pillars; economic, social, and environmental (Elkington 1997; Cohen et al. 2008; Rosário et al., 2022) . These three pillars together form the dimensions of sustainability's triple bottom line. The economic dimension is concerned with financial growth, economic resilience, and profits. The social dimension focuses on ethics, social problems, and societal well-being. The environmental dimension seeks to judiciously use and preserve natural resources and reverse environmental problems.

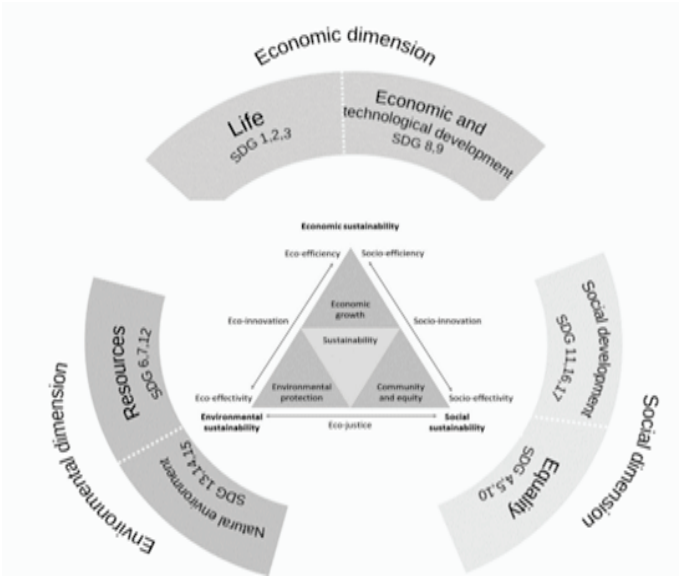


Figure 3: Author's own framework adapted from Palomares et al., (2021); Serpa & Ferreira, (2019)

The triple bottom line framework helps in creating mutually supportive goals across all three dimensions. The TBL framework can be extended to sustainability-driven organizations, where entrepreneurs aim to find a balance between all three dimensions as part of their strategic ambition(Fischer et al., 2020) . Serpa & Ferreira, (2019) linked the three pillars with sustainable digital innovations and aligned them with the perspective of Society 5.0. Sustainable digital innovation with regards to TBL pillars is climacteric for Society 5.0.

The SDGs too have a clear economic, social, and environmental dimension(Palomares et al., 2021) .Palomares et al., (2021) further classified the SDG's beyond the original three pillars into six perspectives of human needs. The six perspectives along with the corresponding SDG's are shown in the Figure 3.

4.3. Current Challenges and Suggested Society 5.0 enabled Solutions for Achieving SDG's with Examples of Indian Startups

Table 3 presents an overview of the current performance regarding every Sustainable Development Goal. The table also puts forward the potential society 5.0 solutions concerning each goal alongwith the examples of Indian clean-tech startups that are already working with the identified solutions.

SDG'S	CURRENT PERFORMANCE	SOCIETY 5.0 SOLUTIONS	INDIAN STARTUPS
No Poverty	Significant challenges remain	Digitalfinancial, inclusion Smart blockchain solutions	Insta Dapp DeFI RevFin
Zero Hunger	Major challenges remain	Precision farming Food Shelf-life extension Malnutrition tracking	Greenpodlabs Zaarabiotec Trebirth
Good Health and Well-being	Major challenges remain	AI based health monitoring Telemedicine + Capsule surgery Digital health platforms	SigTuple Qureai
Quality Education	Challenges remain	AI in learning Individualized smart learning	Eupheus Jungroo Labster Convegenius
Gender Equality	Major challenges remain	Professional women networks Women financial support Fem Tech	 Myrna Labs Leap.club
Clean Water and Sanitation	Major challenges remain	Aqua tech solutions Water data management	Blue drops Swajal WEgOt Vassar Labs
Affordable and Clean Energy	Significant challenges remain	Smart grids IoE (Internet of Energy)	Greenco Avaada energy Energly Grampower
Decent Work and Economic Growth	Major challenges remain	Digital upskilling Digital employment ecosystems	Coinlancer MIMO gocoop Last forest
Industry, Innovation and Infrastructure	Major challenges remain	AI in supply chains Automated robotic processes Brain– machine interface Smart infrastructure solutions	 Jiffy AI Unbox robotics Infinite uptime
Reduced Inequality	Significant challenges remain	Solutions for physically challenged Representation and inclusion of marginalized groups	Trestle MYavatar labs
Sustainable Cities and Communities	Major challenges remain	Urban air quality Green urban mobility Smart housing solutions	NetraDyne Yulu Altiux innovation
Responsible Consumption and Production	SDG achieved	Smart recycling and upcycling Waste innovation Eco innovations	Zerund Zeroplast Labs Recykal Doodlage
Climate Action	SDG achieved	EaaS Solutions Digital tools for climate action Carbon offsetting	 Ambee Blue sky Braham works

Sustainable Cities and Communities	**Major challenges remain**	**Urban air quality** **Green urban mobility** **Smart housing solutions**	**NetraDyne** **Yulu** **Altiux innovation**
Responsible Consumption and Production	SDG achieved	Smart recycling and upcycling Waste innovation Eco innovations	Zerund Zeroplast Labs Recykal Doodlage
Climate Action	SDG achieved	EaaS Solutions Digital tools for climate action Carbon offsetting Consumer powered climate balance	 Ambee Blue sky Braham works
Life Below Water	Major challenges remain	Water quality monitoring Coastal Intelligence Sustainable aquaculture	Ocean Cleanerz Detect Technologies
Life on Land	Major challenges remain	Wildlife and forest monitoring Soil health monitoring	Krishitantra TERN Syngenta
Peace and Justice Strong Institutions	Major challenges remain	Social Impact measurement Public Key Infra (PKI) Legal and civic tech Smart surveillance	 Staqu Uncanny vision
Partnerships to achieve the Goal	Major challenges remain	SDG aligned impact investing Multi stakeholder technology	Letsendorse Jan saathis

Table 2 Possible 5.0 solutions to achieve SDG and list of identified Indian startups
(Source: Author's own work)

5. Implications

Implications for Policy Makers

The connection between the SDGs and clean technology startups has numerous implications. From the policymaking perspective, a better investment in the presented technology based solutions can lead to fulfilling the planned SDG targets. However, before utilizing such technologies at a macro level, it must be ensured that such technologies are ethical, sustainable and efficient to avoid any negative consequences (Vinuesa et al., 2020). A strategic and focused approach should be adopted to achieve ground level results that doesn't compromise on the ethos of the goals. As suggested by previous literature (Mahajan & Singh, 2022), sustainability financing, both from government as well as corporates should be increased.

Implications for Academicians

SDGs exhibit a complex relationship with external, environment factors. From an academic standpoint, researchers should focus on interaction of SDG with other avenues like Industry 4.0, transformational entrepreneurship, artificial intelligence. These inter-linkages should be better understood and channelized. The existing theory and literature regarding SDGs are also weak (Swain & Wallentin, 2020). A strong theoretical foundation regarding SDGs is also needed for better measuring and monitoring the results. The present study has made an attempt to link the existing literature and theories to novel concepts which had not been explored together before. This shall open avenues for more future research, grounded in strong foundational theory.

6. Limitations and Future Recommendations

The presented study acknowledges certain limitations. The current study focuses on broader goals and scores. Future studies should take individual SDGs as a focal point. An in-depth analysis of individual indicators can provide a clearer picture in the future. A longitudinal study of such startups is also recommended to assess the impact creation. A case-study approach focusing on the identified startups can also be impactful. The study was also limited to Indian startups, future research can focus on more global ventures.

7. Conclusion

To achieve the SDG's, a joint collaboration between various interest groups is needed. India can achieve such synergy and alignment through startups and impact entrepreneurship. Entrepreneurship for sustainable development works on multilevel and acts as a bridge between social, economic, and environmental dimensions (Johnson & Schaltegger, 2019),while impact entrepreneurship makes use of business principles to

correct environmental, social, and economic wrongdoings and use technology for positive impact creation (Markman et al., 2019). Based on the above research, it is evident that Indian startups are crucial to create such impact. There is a direct link between clean technology, SDG's and society 5.0 innovations. A good number of Indian startups are already working in the right direction and providing innovative, tech-based sustainable solutions. Such solutions are the way forward for India to meet its sustainability targets and for the localization of SDG's. Government should support such technology and startups by developing special policies. Corporations should also work in alignment with small startups. ESG investing should also be promoted across different levels. Further research related to clean tech in the context of SDG'S should be undertaken to help better policy formulation and strengthen the cleantech ecosystem.

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