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Editorial

Dear Esteemed Readers,

We are excited to present this special issue of our journal MANTHAN: Journal of Commerce and Management which brings together a collection of thought-provoking research papers that emerged from the International Conference on Business Innovation and Sustainability: A Roadmap for Business Excellence, organized by the Karnatak Law Society's Institute of Management Education and Research (Autonomous) on the 17th and 18th of March 2023. The publication and editorial services for this special issue March 2023 were expertly facilitated by Journal Press India, a distinguished provider of Publishing & Conference Solutions.

This special issue exemplifies the collaborative spirit of academia and the vibrant exchange of ideas that took place at the conference. It represents a multifaceted exploration of various domains, from finance to business management, education technology, sustainability, rural development, sports, and consumer behavior. Each of these papers reflects the enthusiasm, dedication, and intellectual rigor of the researchers and scholars who participated in the conference.

In "Analysis of Returns on Stocks in Nifty-50 Index Using Capital Asset Pricing," we dive into the intricate world of financial markets and discover insights into the dynamic interplay between stocks and capital asset pricing, which is crucial for investors and analysts alike.

"Behavioural Inventory Management: A Practical Approach to Mitigate Material Waste in Some FMCG" emphasizes the importance of adopting behavioral approaches to mitigate material waste in the fast-moving consumer goods sector, paving the way for a more sustainable and efficient future.

The case study "Effectiveness of Hybrid Learning Approaches" delves into the ever-evolving landscape of education technology, providing practical insights into how edtech companies are adapting to meet the diverse needs of learners in today's digital age.

"Importance and Relevance of Circular Economy in the Indian Context" is a compelling exploration of the sustainability challenges we face today, offering a comprehensive view of the role of circular economy principles in shaping a more environmentally responsible future in India.

"Incubation Centres are the Elixir for Development of Rural Economy" sheds light on the pivotal role incubation centers play in nurturing entrepreneurship and promoting economic growth in rural areas, emphasizing the vital importance of rural development.

Editorial

"Role of Sports in Social and Economic Development of an Economy" illuminates the multifaceted contributions of sports to social and economic development, demonstrating the far-reaching impact of sports beyond entertainment.

"The Effect of Mergers and Acquisitions on the Financial Performance of Manufacturing Companies in India" provides a comprehensive analysis of the financial implications of mergers and acquisitions within the Indian manufacturing sector, offering valuable insights for businesses and policymakers.

"The Influence of E-shopping and Brand Loyalty on Purchase Intention of Skincare Products: A Case Study in North Karnataka Region During COVID-19" explores consumer behavior in the midst of a global pandemic, highlighting the significant roles of e-shopping and brand loyalty in influencing purchase decisions.

We extend our sincere gratitude to the authors for their unwavering commitment to advancing knowledge in their respective fields and to the reviewers for their insightful feedback and guidance. This special issue is a testament to the collective efforts of these dedicated individuals, making this publication a reality.

We encourage you, our esteemed readers, to delve into these research papers, engage in discussions, and embrace the inspiration they offer. It is our hope that these contributions will catalyse further research, dialogue, and innovation in their respective domains.

Thank you for your continued support and keen interest in our journal. We eagerly anticipate the lasting impact these papers will have in their respective fields. Sincerely,

Guest Editors

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Behavioural Inventory Management: A Practical Approach to Mitigate Material Waste in Some FMCG

Neeta Sharma*

ABSTRACT

This paper attempts to examine the behavioural dimension in inventory management practices with the aim of reducing material waste. An effort is made to link the material cost equation established in theoretical stock-induced consumption inventory models to the consumption equation established for a real-life scenario of toothpaste consumption. Overconsumption of toothpaste is considered here as a consumption side stock-induced waste. A stock-induced consumption equation of the linear form is used here to develop simulation programs using MATLAB software to get the results in the shape of indifference curves between two hypothesized behavioural parameters λ and β . Indifference curves obtained are then used to devise a behavioural grid for toothpaste consumption, which is further utilized to classify the consumers and accordingly develop policies and strategies to curb the material waste. The paper has great socio-economic significance and highlights the importance of behavioural inventory management in reducing resource waste.

Keywords: Behavioural Inventory Management; Indifference Curve; FMCG Tubed and Bottled Products; Stock-induced Toothpaste Waste; Behavioural Grid for Toothpaste Consumption; Simulation.

1.0 Introduction

The induced consumption because of high levels of stock was considered inputside waste by Sharma & Vrat (2018a) and proved that individual behavioural traits play a very crucial role in making the consumption stock-induced and hence wasteful consumption. Sharma & Vrat (2020a) found that not only the high stock level has an impact on material waste behaviour, but also some visceral factors, for instance,

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individual consumer's habits and attitudes, disciplined consumption, which is inelastic despite high stock availability, may play a much more significant role and advised that they should be addressed properly in stock-induced inventory research. Hence, the concept of "behavioural inventory management" has been originated and was first introduced by Sharma & Vrat (2020a) by extracting it from the stock-induced consumption phenomenon of inventory management practices with an aim to reduce resource wastage. This concept has immense potential for future exploration and may prove to be a very promising field that would enrich the present inventory management practices. The behavioural traits which were identified, have being captured by two behavioural parameters and the impact of these behavioural parameters was studied on water resource wastage. The same methodological approach is adopted here to analyse the impact of these behavioural parameters on resource wastage in the form of overconsumption of some of the FMCG products which are available in tubed or bottled packaging.

Two parameters, namely the scale parameter (α) and the shape parameter (β), are most commonly used to establish the consumption equation in stock-induced consumption inventory models. In these models, various forms of consumption equations, such as linear form $D(t) = \alpha + \beta I(t)$, power form $D(t) = \alpha [I(t)]^{\beta}$ etc., where α > 0 and $0 \le \beta \le 1$, are being used in model development. Sharma & Vrat (2018a) have recognized that these models have limited real-life applicability because of the difficulty associated with the precise estimation of these parameters as they are invariably behaviour dependent parameters. Sharma & Vrat (2020a) have stated that α is the autonomous consumption triggered by the individual's intrinsic consumption needs, which essentially depend on one's corporeal characteristics and consumption habits, whereas β is the parameter that shows the level of an individual's disciplined and inelastic consumption behaviour despite the presence of a high stock level. To more vividly conceptualize the α parameter, it was hypothesized that autonomous consumption is equal to the product of standard consumption (α '), the consumption that is ideally required, and a behavioural parameter (λ) that could represent the consumer's habits and attitudes. This behavioural parameter was called the habit parameter, and thus the linear consumption equation was established as:

$$D(t) = \lambda \alpha' + \beta I(t) \qquad \dots (1)$$

For $\lambda=1$ and $\beta=0$; equation (1) gives the standard required consumption. The difference between actual consumption calculated from equation (1) for some real values of λ and β and standard required consumption could provide the amount of stock-induced wasteful consumption. Different values of these parameters would result in an alteration in material consumption and hence different values of material waste, which

may be captured in indifference curves drawn between the λ and β parameters. Any combination of these two behavioural parameters on an indifference curve would give an equal amount of resource consumption, thus analogous with indifference curves. Moreover, if it is possible to obtain a consumption equation with its specific λ and β values for any particular stock-induced consumption situation, it would be easier to assess the behavioural impact on consumption by varying these behavioural parameters within their realistic stipulated range. Sharma & Vrat (2020b) have discussed such a consumption situation wherein a correlation between the toothpaste consumption rate and the obtainability of toothpaste stock in the tube at that instant was established with a view doing parameter estimation that needs to be known as inputs to a stock-dependent consumption rate inventory model.

1.1 Rationale of the study

A large number of FMCG tubed or bottled products are being used regularly in our daily lives for example, toothpaste, shampoo, hair oil, cosmetic cream and lotion, shaving cream, etc. Whenever a consumer is to use a tubed or bottled product, a certain force is to be applied for a fixed period of time so as to get the squeeze output. The applied force as well as the time interval for which the force is applied essentially depend on the individual's habits and behavioural instinct and also guided by the shape, size, and degree of filling of the tube or bottle (Norén, 1976). Consumer action is regulated by many such factors and is an utterly complicated behavioural phenomenon. It would not be an exaggeration to say that, to a large extent, the stock-induced consumption phenomenon itself is behavioural induced phenomenon. The degree of filling means stock availability for consumption. Sometimes, like in the case of the toothpaste tube, it becomes difficult to put back the extra toothpaste that we get from squeezing, and no other alternative left before us except consuming it; consequently, the consumption becomes stock-induced.

Figure 1 shows the output (ΔG) for 15 consecutive squeezes from a toothpaste tube. It is obvious that the output is much higher when the tube is full, which decreases subsequently. This may be due to the fact that when the tube is full, the contents have no space to redistribute within the tube but instead come out through the orifice. But, for a lesser-filled tube, there is a possibility for redistribution and consequently, the output decreases. This could be easily experienced in practice with full and partially-full tubes. One can easily get more output from the full tube than from the partially full one. Not only the degree of filling (squeeze number) but also both the squeeze time and squeeze force have an influence on the output.

Figure 1: Toothpaste Output (ΔG) from 160gm Tube at 15 Consecutive Squeezes, Squeeze Force 62 n and Squeeze Time 0.5 s



Source: Norén (1976)

Sharma & Vrat (2020b) have drawn the stock-induced consumption curve for toothpaste consumption by an individual, and the equation of this curve gives information about the α and β for the same. Data points for average toothpaste consumed per person per day for a family were obtained by daily weighing a 150 gm toothpaste tube after its consumption to plot the curve as shown in Figure 2. From the figure, it is evident that in the beginning, the consumption rate is high as the tube is full, but the consumption rate starts decreasing with the successive decrescent in the contents inside the tube.

It is also evident from the curve that towards the finishing end, the consumption is slightly below the genuinely required standard consumption (approx. 1 gm per person per day). The stock-dependent consumption phenomenon is very clearly apparent from this graph. Initial consumption could be termed as stock-induced when the stock level is high; afterwards, when it is low, the consumption could be termed as stock-dependent.



Figure 2: Stock-level Dependent Toothpaste Consumption

Source: Sharma & Vrat (2020b)

Linear curve fitting gives the stock-dependent consumption equation as:

Y = 1.17 + 0.003 X

....(2)

Where,

 $Y = Toothpaste \ consumption \ (gm/person/day) \ and$

X = Weight of the tube (gm)

Comparing equation number (2) with equation number (1), the value of $\lambda \alpha'$ comes out to be 1.17, and the value of β comes out to be 0.003. Expression $\lambda \alpha'$ refers to the consumption level that is intrinsically required by an individual and is independent of toothpaste stock availability inside the tube, whereas parameter β refers to the coefficient of elasticity of consumption due to squeeze number. The values of λ and β may be different for different individuals, as these parameters depend on an individual's behaviour. Hence, it is evident that both λ and β used in consumption equation (1) are more or less behavioural induced parameters and may be estimated within a definite range. Moreover, to estimate about α' , the opinion of a number of dentists may be cited in this regard, as they say that actually the toothbrush, not the toothpaste, cleans the teeth (Chamberlin, 2013). A pea-size amount of toothpaste, which may be equivalent to 0.25 gm, is considered sufficient for maintaining effective mouth hygiene (Creeth *et al.*, 2013), but 1 gm of toothpaste is considered here as standard required amount of

toothpaste (α ') per brushing, as it is opined that this much amount is required to maintain the appropriate concentration of fluoride (Stark, 2012). This gives the benchmark value of toothpaste consumption by an individual, which could be compared to some actual consumption value and the difference could be attributed to the sock-induced wasteful consumption, which in turn, could be attributed to individual behavioural traits.

The difference between the actual toothpaste consumption by the family given by equation (2) and the genuinely required standard quantity of toothpaste for consumption was attributed to stock-induced toothpaste waste, and the indifference curves were obtained for the above-mentioned case of toothpaste consumption and toothpaste waste. The findings emphasise the need to work on these behavioural traits represented by the λ and β parameters to get a reduction in stock-induced toothpaste waste that is taking place in a regular manner, thus advocating the need to incorporate the idea of behavioural inventory management in this scenario. To regulate this behavioural inventory, a behavioural toothpaste consumption habits for better resource utilization and to support sustainability. An efficient management of these parameters may prove to be a proactive approach curbing the resource waste. This study would be beneficial for professionals and future researchers in that it states that efforts must be better placed to institute more conservative toothpaste consumption habits.

The rest of this article is organized as follows. Section two, reviews literature and research background. Section three, discusses the objectives of the study. Section four, discusses the methodology adopted. Section five, provides the results in the form of indifference curves and derives a behavioural toothpaste consumption grid. Section six, provides the suggestions and finally section seven, provides the conclusions and future extensions.

1.2 Objectives of the Study

This paper attempts to achieve the following objectives:

- 1. To study the behavioural impact on stock-induced toothpaste waste by drawing and analysing indifference curves.
- 2. To classify the consumers by framing a behavioural grid for toothpaste consumption.
- 3. To recommend strategies for behavioural inventory management.

2.0 Literature Review

A plethora of stock-induced consumption inventory control models give richness to the subject. Some of the milestone models are Gupta & Vrat (1986), Baker & Urban (1988), Datta & Pal (1990), Padmanabhan & Vrat (1990, 1995), Roy & Maiti (1998), Wang & Gerchak (2000), etc. Hou *et al.*, (2011) have developed a model for deteriorating items with a linear stock-dependent selling rate under inflation and the time value of money over a finite planning horizon.

Ouyang *et al.*, (2003) developed a stock-dependent demand model incorporating the effects of inflation and time value of money, considering a linear stock-dependent demand equation. A model for seasonal products was formulated by Roy *et al.*, (2009), considering linearly displayed stock-dependent demand, which was made in an imprecise environment under inflation and the time value of money. Power form stock-dependent demand models were developed by Baker & Urban (1988), Datta & Pal (1990), Datta & Paul (2001), Giri *et al.*, (1996), Giri & Chaudhuri (1998), Pal *et al.*, (1993), Ray & Chaudhuri (1997), Ray *et al.*, (1998) and Urban (1992). A single-period model was developed by Urban & Baker (1997) for deterministic demand of a product, which is a multivariate function of time, price and level of inventory.

Hwang & Hahn (2000) have developed a model for power form stock-dependent demand rate for fixed lifetime products. Teng & Chang (2005) have formulated an EOQ model considering the demand rate as the power function of the instantaneous inventory level until down to a certain level of stock, after which the demand rate becomes a constant. Pal & Ghosh (2007a) developed a model considering the general rate of deterioration. Pal & Ghosh (2006, 2007b) also derived models for permissible delay in payment, which were quantity-dependent. Soni & Shah (2008) derived a trade credit model in which payments may be made progressively and retailers are offered two credit periods to settle their account.

Tripathi *et al.*, (2018), Jaggi *et al.*, (2019), and Cárdenas-Barrón *et al.*, (2020) have improved the earlier developed trade credit stock-dependent demand inventory models by considering different realistic situations. Recently, advanced optimization techniques such as genetic algorithms were used by Singh & Singh (2012), Agarwal *et al.*, (2018) and Bhunia *et al.*, (2017) in model development, while an artificial neural network model considering stock-dependent demand was developed by Šustrová (2016). Sharma & Vrat (2018a) have identified the need to link these extensively available inventory models to real-life scenarios where stock-induced consumption is taking place. Moreover, Sharma & Vrat (2021) have given an entirely new criterion for inventory classification, i.e. the stock-induced consumption index, for effective inventory management.

3.0 Research Methodology

To draw the indifference curves, the material cost per cycle equation given by Padmanabhan and Vrat (1995) was taken, which is rewritten here by replacing α with $\lambda \alpha'$ as:

Material cost per cycle =
$$\lambda \alpha' / \beta + \theta * \{e^{\beta T} - 1\} * C$$
(3)

Where θ is a constant rate of deterioration, T is cycle time, and C is the unit cost of the item. Only material cost is considered here, ignoring all other inventory costs, because the objective of this study is to analyse and model the impact of an individual's behavioural traits on stock-induced toothpaste consumption.

Now, MATLAB (R2020b) simulation programmes were developed to obtain the indifference curves for toothpaste consumption cost, toothpaste waste, and toothpaste waste cost per person per month by varying λ and β behavioural parameters within their stipulated ranges shown in Table 1. Equation (3) gives the toothpaste consumption cost per person, while toothpaste waste is estimated as the difference between the actual toothpaste consumed per person and the standard required toothpaste consumption (α '). Table 1 shows the values of various parameters used in simulation runs.

Table 1: Values of Parameters Used in Simulation

Parameters	α	α'	λact	βact	Θ	Т	С	Range for	Range
	(gm/yr)	(gm/yr)				(month)	(Rs./gm)	λ	for β
Values	424.3	360	1.17	0.003	0.001	1	0.6	0.6 - 1.33	0 - 1

Here, the actual autonomous toothpaste consumed by an average adult (α) has a value of 424.3 gm/year as obtained from equation (2). It comprises the standard required toothpaste consumed (α ') and the actual habit parameter (λ_{act}) as elaborated in the above section. Standard required toothpaste consumption per day is the measure for optimum consumption, which is sufficient to clean an average adult's teeth. For an individual it is taken as 1gm/person/day (Stark, 2012). Cycle time is taken as 1 month, as it is assumed that it takes approximately 1 month to finish a 120 gm toothpaste for a four-member family. By using the relation $\alpha = \alpha' \lambda_{act}$, the value of λ_{act} comes out to be 1.17.

Moreover, equation (2) gives the value of the actual shape parameter (β_{act}) equal to 0.003. Since toothpaste deteriorates at a very slow rate during its cycle time, therefore, θ is taken too small here, say 0.001. The cost of toothpaste is taken as Rs. 0.6/gm as the price of 120 gm toothpaste used is Rs.72. To determine the range of λ values, it is considered that the proportion of best to worst consumption habits, excluding anomalies,

is always 2:1 (Barnes, 1980; Padhi & Vrat, 2011). Hence, range of λ values should be taken here in a proportion of 1:2 in reference to the standard autonomous consumption, ranging from $\lambda_{min} = 0.6$ to $\lambda_{max} = 1.33$. More often, the parameter β varies from 0 to 1, which signifies completely plastic and completely elastic stock-induced consumption, respectively. The simulation experiment was executed by concurrently changing the λ and β parameters within their stipulated range.

3.1 Rationale of the study

Both input and output side wastage, which are defined by Sushil & Vrat (1988) have been associated with the phenomenon and are shown in Figure 3.



Figure 3: Input and Output Side Stock-induced Waste

Initiating the research in this direction, Sharma & Vrat (2016, 2018b) identified a latent behavioural dimension in stock-induced resource wastage and concluded that a better understanding of the scale and shape parameters used in stock-induced consumption equations may lead to solving some socio-economic issues that may have originated due to high stock availability for consumption, such as material consumption in some FMCG products like toothpaste.

4.0 Analysis and Dicussion

Simulation runs give the results in the form of right downward sloping indifference curves. Figure 4 shows the indifference curves obtained for toothpaste consumption cost; Figure 5 shows the indifference curves obtained for stock-induced toothpaste waste; and Figure 6 shows the indifference curves obtained for toothpaste

Source: Sharma & Vrat (2018a)

waste cost. These indifference curves represent the different conflations of behavioural traits represented by the λ and β parameters, which could give an equal level of toothpaste consumption cost, toothpaste waste and toothpaste waste cost. The curve passing through $\lambda=1$ is the standard toothpaste cost curve, which gives zero waste. The costs acquired right of this curve augment the toothpaste waste costs, and the costs acquired left of this curve augment the toothpaste cost savings.

The indifference curves obtained in this case reveal that the actual toothpaste consumption (shown by equation (2)) cost happens to be approximately Rs. 21 per person per month. With the increase or decrease of λ and β parameters we may get toothpaste cost as small as Rs. 14 per person per month or as big as Rs. 24 per person per month. The person whose consumption is represented by the given regression line wastes approximately 5 gm toothpaste per month as shown in Figure 5, which in monetary terms equals approximately Rs. 3 in a month as shown in Figure 6. With the best possible use the person can save up to approximately 8 gm and with the worst possible use, the person can waste up to approximately 10 gm per month. In this way a person can save up to approximately Rs. 6 in a month, as shown in Figure 6. Though this monetary waste may seem negligible but cumulatively it becomes huge.



Figure 4: Toothpaste Cost Indifference Curves

Sourece: Present Study





Sourece: Present Study





Toothpaste Waste Cost

Sourece: Present Study

The indifference curves obtained here are almost in the form of straight lines, which signify that the λ and β parameters can be perfectly substituted for each other. In other words, one can infer that people who are conservative and less wasteful in their consumption habits remain indifferent to the high stock availability, while for those who are liberal in their consumption habits, a small increase in stock-level will add to their wasteful consumption. The degree of convexity of these indifference curves is affected by the rate of decrease in the marginal rate of substitution of λ for β .

Moreover, the indifference curves obtained as a result of simulation runs could provide a basis to classify the toothpaste consumers and to derive a Behavioural Grid for Toothpaste Consumption, which is shown in Figure 7.



Figure 7: Behavioural Grid for Toothpaste Consumption

Sourece: Present study

And the resulting toothpaste consumption patterns are:

a) **Extremely conservative**: with low values of λ and β . These consumers are extremely conservative and good in their consumption habits, being least affected by the toothpaste stock served. They do not contribute to the wasteful toothpaste consumption.

- b) **Greedy**: with a low value of λ but a high value of β . These consumers are good enough in their consumption habits, but they tend to over consume just because of availability of toothpaste stock inside the tube for consumption.
- c) Needy: with a high value of λ but a low value of β . These consumers have their intrinsic consumption habits so developed and nurtured that they end up consuming more despite being least affected by the toothpaste stock availability.
- d) **Moderate**: with moderate values of λ and β . These consumers are moderately influenced by their consumption habits as well as toothpaste stock levels.
- e) **Extremely liberal**: with high values of λ as well as β . These consumers are highly influenced by habits and stock levels and are responsible for huge toothpaste waste.

This classification of consumers would provide a basis to formulate policies and strategies to achieve moderate or extremely conservative way of toothpaste consumption behaviour. From this analysis, it is obvious that the α and β parameters applied in stock-dependent demand inventory models need to be precisely assessed for an individual or group, and accordingly, behavioural intervention strategies need to be implemented, which are discussed in the next section.

4.1 Behavioural intervention strategies to reduce material waste in FMCG tubed or bottled products

"4 E's" model for behavioural change is recommended here with the aim of affecting individual consumers' toothpaste consumption, which could be extended to the consumption of any tubed or bottled FMCG product. Four behavioural intervention strategies could be enlisted for this purpose: Enable, Encourage, Engage, and Exemplify. A single strategy or a mix of strategies as per the type of consumer classified through the grid may enable favourable behavioural change. These strategies are:

- *Enable:* provide people with the required support, such as by removing barriers and providing pertinent information to enable them to make responsible choices. The proposed enabler strategies to help people exhibit extremely conservative consumption traits are:
- i. Small orifice size It is advisable to downsize the orifice regardless of the size of the tube or bottle; alternatively, a dispenser mechanism should be incorporated to regulate the opening as per the user's requirements. This could enable an individual to reduce wasteful consumption by providing enforced control.
- ii. Appropriate level of viscosity- It has been observed that products with lower viscosity exhibit a greater propensity for stock-induced consumption, as one can easily get more volumetric output from a squeeze. Therefore, it is recommended that

policies should be made to standardize the product viscosity to enable an individual to show conservative product consumption behavior.

- iii. Ethical design practices The ethical consciousness of marketing people and the manufacturer is even more crucial to minimizing waste. Manufacturers should relocate their focus from profit-making to the environmental and sustainability obligations of society. They should not always follow the marketing strategy to sell jumbo-sized products at a reduced per-unit cost, which may result in stock-induced wasteful product consumption.
- *Encourage*: Offer people the right signals to change such as giving them rewards for a favourable behaviour or penalize them for unfavourable ones. Proposed strategies to encourage consumers to effectively use FMCG products are:
- Policies to monitor and control not only the upper limit of orifice size but also the product viscosity should be formulated by government agencies like the Beuro of Indian Standards (BIS), and manufacturers who do not comply with these policies should be heavily penalized.
- Manufacturers need to obtain necessary permits from BIS.
- Periodic inspections would be carried out to ensure the rules are not flouted. In cases of violations, manufacturers would be required to pay hefty fines.
- A random complaint-based inspection would be carried out while making note of the violations.
- Product and package design must ensure meeting pollution rules and not to contribute degrading the environment in any way.
- *Engage*: Help people understand their responsibilities, both individually and community as a whole, and take action. Role models could play a crucial role.
- By sensitizing people towards waste material wastage from tubed and bottled products should be perceived as a socio-economic waste, and to curtail this, social consciousness needs to be raised through education and awareness campaigns.
- Both print and electronic media need to proactively highlight the need for sustainable consumption.
- Social media can be effectively utilized to communicate with people in the awareness generation process.
- It would be a good idea to write a message on the toothpaste tube mentioning "less quantity is sufficient for you" or "Squeeze sincerely". Even a polite request not to waste toothpaste may be imprinted on the packaging.
- The government can launch a number of campaigns, and youth can be involved to make them effective.

- Children must be earmarked to impart knowledge. Parents, elderly people of the family and educational institutes can help develop the habit of sustainable consumption.
- Educating people about wasteful consumption and its adverse effects to the environment.
- *Exemplify:* Be the change you want in others and lead by epitomizing the same behaviour through learning and continual improvement.

A careful mix of these strategies may prove to be more effective in influencing the toothpaste consumption behaviour and the consumption of similar other FMCG products.

5.0 Conclusions

This research shows that the resource consumption habits and unaltered relatively inelastic consumption behaviour may prove to be game changer in containing the overconsumption and hence stock-induced material waste in case of some FMCG products which are available in tubed or bottled packaging. Behavioural toothpaste consumption grid, derived from the results obtained, may be effectively used as a framework to categorize the consumers as an individual or group, and accordingly to formulate single or a mix of aforesaid strategies, leading towards the least material waste behaviours. In the generic way; the current research advocates the necessity to proactively bring about a change in behavioural inventory both in the corporate world as well as in the individualistic world of consumerism. Real-life applicability of stock-induced consumption inventory models by addressing consumption side waste could be utilized to guide practitioners and aid in future endeavours to lessen every kind of resource wastage.

The stock-induced wasteful material consumption mainly triggered by consumption behavioural traits may be prominently addressed to recommend strategic interventions and policy formulations to combat most of the socio-economic issues associated with the wastage of critical resources that are oblivious to our society. In reality, stock-induced inventory models may be used to assess the savings as a result of waste prevention, which is essentially caused by enhancing consumption traits and behaviours. In this way, implementing a stock-induced inventory model furnishes a reactive approach towards inventory control where acceptance is given to the prevailing individual consumption behaviour, which is apparently expressed in these models. On the other hand, behavioural inventory management is a new and proactive strategy where

individuals and groups are trained to exhibit consumption behaviour that is independent of stock availability. Moreover, the scope of the behavioural impact on stock-induced consumption should be appropriately incorporated into stock-dependent demand inventory research. However, this research can be expanded to incorporate many other parameters such as class, culture, geography, gender, age, etc., to more vividly analyse the behavioural effects on stock-induced toothpaste consumption and toothpaste waste.

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Importance and Relevance of Circular Economy in the Indian Context

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ABSTRACT

The study dwells upon circular economy (CE), particularly how it gets operationalized at the policy and industry levels. It explores the roots of CE and formalization in ecology and economics. A few developing nations, for example, India, grapple with the difficult mission of environmental pollution, rapid urbanization, climate change, food & water security, etc. Administrators look forward to the importance of resilience at the family, village, urban, corporate, and government levels. Hence, the adoption of CE concepts in a broad manner with potential solutions for innovative pathways in utilizing materials responsibly while reducing and or eliminating waste will be meaningful. Enhancing resource efficiencies and reducing pollution and emissions in an increasingly Competitive Environment (CE) should be driven by both private and public investments in a focused manner. The CE vows and ensures that the values of management advocated by the nation's ancestors which will refocus society while conversing with a CE.

Keywords: Circular Economy; Climate Change; Environment; Waste; Pollution.

1.0 Introduction

The essential aspect of CE is to reuse and recycle materials to reduce waste and lower environmental whack, for example, water footprint, air acidification, and carbon footprint. CE enhances product durability through the reuse and recycling of the product and the environmental and economic benefits. CE offers a new perspective that recognizes the need to take a bird's view of products and processes as an economic approach aims at annulling waste and the continual use of resources.

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Practices around the principles of CE of our production system should be such that along with reducing resource dependency as it also gains competitive advantage. In economies based on recycling, raw materials that make products culminate in a landfill after use, and such waste materials are reused. It is well-acknowledged that the benefits of CE include (a) Reduced dependence on imported materials by using local resources that also promotes resource independence (b) Consuming fewer natural resources, producing less trash, and lowering emissions helps protect the environment. (c) Shifting production to raw material, the source of which is the reuse of proximate waste that benefits the local economy (d) And while fostering a new and innovative mechanical/automated model that translates into an economic expansion that attracts and drives employment growth (Refer to Figure 1).



Figure 1: Graphical Representation of the Circular Economy

Source: https://www.researchgate.net/figure/Graphical-representation-of-the-circular-economy_ fig5_ 342707922

1.1 Rationale behind the study

A global movement from linear to circular manufacturing is happening of late, a paradigm shift, as awareness about climate change is rising. It is evident developed

nations of the universe are transitioning from linear to CE, India has also charted its growth path of renewing by design and restorative.

India's manufacturing would be constrained with a linear economy model of 'Take-Make-Dispose' as it has only 4 percent of the world's fresh water and 2 percent of the landmass, which eventually will impact the overall economy. Hence, moving towards CE that provides several prongs of ecological and economic benefits is necessary to realize and change the material flow in the manufacturing process.

All types of waste expired electrical appliances, and scrap metal is used wisely or sent back to the economy in CE. To achieve principles that relate to redesigning, recycling, remanufacturing, recovering, and reusing nutrients and water to safeguard natural resources from irresponsible treatment is what the concept of CE and it depends on strategies, practices, technologies, and policies.

Our ability will spur our transition towards self-reliance, a key to an Aatmanirbhar Bharat for sustainable growth by minimizing the consumption of finite resources, maximizing our resource efficiency, and the momentum to the blooming of renewed business blueprint and entrepreneurial undertakings. The paper also discusses teachings on the subject matter necessary for academic and vocational training. It invites the discussion on waste minimization, reutilization, and renewable energy production and establishes the need for better linkages between waste alteration implementation and CE. The paper then discusses the importance of recharging the ground and rainwater harvesting while administering resource use.

1.2 Objectives of the study

Continuing from the introduction and describing the rationale author lists the following objectives.

- 1. To study the principles of CE and strategies needed to implement while aiming for reducing carbon footprint and waste minimization.
- 2. To study the benefits of CE for India to achieve its environmental furtherance and continued economic growth, translating into human development.

2.0 Literature Review

Paper (Fiksel *et al.*, 2021) describes Waste Management Innovation to stimulate waste minimization strategies based on circular economy principles. Per Anbumozhi *et al.*, (2016), India has the dynamism to evaluate resource proficiency covering its national economy. The country has set ambitious resource productivity, recycling, and waste reduction targets in the water and energy sectors.

By circular, a providence is forecasted as having no net impact on the surroundings relatively, as it restores any impairment done in resource addition while ensuring lower waste gets produced in every respect of the manufacturing activities and the whole life-cycle of the product (Murray *et al.*, 2017). Per Krishnamurthy *et al.*, (2019), the 3Rs denote and utilized to superscribe waste are recycled, reduced, and reuse. Lowering the quantum of waste reusing is recognizing a new way to utilize waste stuff, and recycling is using waste stuff to remake new materials that get sold or utilized again.

CE demands the industry redesign its processes towards sustainability and includes the 3R philosophy. The CE path set a higher importance on the zero-waste proposition and encompasses green materialism in its theories – Yaduvanshi *et al.*, (2016). Per Geissdoerfer *et al.*, (2017), despite the concept's importance for academia, policymakers, and companies, the conceptual relationship between CE and sustainability is not clear. The CE concept has also gained traction with policymakers, influencing governments and intergovernmental agencies at the local, regional, national, and international levels. Suggestions are being made that the contemporary conceptualization of the CE and its practice has been predominantly advanced by businesses and policy, despite its academic origins (Korhonen *et al.*, 2018). A CE model is "restorative and regenerative by design, and aims to keep products, components, and materials at their highest utility and value at all times," though no such written material is available throughout the philosophy (MacArthur, 2015 & 2020; Stahel 2016).

Per Kirchherr *et al.*, (2017), the CE is an economic system that replaces the endof-life concept with recycling, reducing, alternatively reusing, and recovering materials in production, distribution, and consumption processes. It operates at the macro level (city, region, nation, and beyond), micro-level (products, companies, consumers), and Meso-level (eco-industrial parks) with the motif to attain maintainable development, thus concurrently making environmental quality aspects, and economic well-being, and social equity, to the interest of current and future generations.

Schroeder *et al.*, (2019) mention that the CE can espouse straightaway in attaining many of the SDG15 (life on land)), SDG12 (responsible consumption and production), SDG 8 (decent work and economic growth), SDG7 (affordable and clean energy), and SDGS (SDG6 (clean water and sanitation). Recent technological advancements and the emergence of administrative models have made it possible for transitions to CE and low-carbon infrastructure (Paes *et al.*, 2022). Integrating the energy and materials that flow into cities can offer a huge potential through the principles of CE, concentrating on alleviating climate change effects and making more maintainable infrastructure (Ioppolo *et al.*, 2021). Academic research is to create new knowledge and to use existing knowledge. The author acknowledges the research already made and

brings in a few more perspectives while identifying a few areas requiring a focused approach to CE per the objectives defined.

3.0 Research Methodology

3.1 Research design

The article is descriptive, and the author has used secondary data from reliable sources – namely, a few authentic websites that include MoSPI, Government documents, domestic and international online publications, and various industry chambers, academic journals, among others.

3.2 Sources of data

The study has collected data from secondary sources, the data for the study from secondary sources include from databased of Scopus, web of science and googled scholar. Further the data is also collected from the reputed journals and magazine in the domain of manufacturing and industry 4.0.

3.3 Rationale of selection of the study

The paper discusses the importance for the country to subscribe to CE strategically and holistically while considering related aspects to reap its full benefits. Implementing CE will help the nation meet its COP-27 commitment towards reaching Net-Zero by 2070. And it was after the country had updated its Nationally Determined Contributions (NDCs) on 26-Aug-2022 along with a long-term low carbon plan on 14-Nov-2022 and communicated to UNFCCC (PIB, 8-Dec-2022)

4.0 Analysis and Discussion

The plans and strategies encompassing the principle of CE have received worldwide acceptance in a scientific group of late was clear from the results of the Scopus survey as the search hit 'circular economy' CE generated the highest number of results. For the conversion towards a low-carbon and less polluting economy, the acceptance of emerging models such as CE principles in environmental administration is one of the policies. The principle of CE is relatively new, although the ideas of CE are closely related to different other economic maintainability paths, for example, mechanical ecology and mechanical harmony, targeting the circularization of linear value chains. A CE aims to redefine expansion and look beyond the take-make-wasteextorting mechanical model while concentrating on positive society-wide benefits. Consumption of finite resources entails gradually decoupling economic activities and designing waste out of the system. The circular model builds a social, natural, and economic model underpinned by a transition to renewable energy sources. The value proposition is the core component of the circular business model. A product, product-related service, or a pure service gets offered by circular value proposition offers. The offer should enable the consumer/user to do what is required, reduce issues that the consumer/user would experience, and give extra benefits.

Circular products are thus designed to enhance recycling, cascading, and reusing. These require a modular design and choosing materials that allow remanufacturing, reusing, recycling, cascading, or safe disposal (Refer to Figure 3). Hence, these products are 100 percent ready to circulate in the closed material loops. Additionally, product design is required to allow while using less energy or raw material or to minimize emissions. Exploring biomass co-firing potential, developing economies require newer technology and matching policy interventions which may not be maintainable without a unified sectoral interaction. For handling city water, energy systems, and waste, legal structure and cross-sectoral partnerships are crucial to the success of innovative drives. Collaborations between the private sector and the government are also critical for CE drives, for example, Public-Private Partnerships (PPP).

As humans, we are thus obliged to implement CE and ensure that we avoid harming the environment as one part and coexist in the ecosystem. We can start to meet all our current needs without risking future generations' abilities and must do all that is in our power. Along with a significant reduction in congestion and pollution, the CE path adopted by India would reap healthy dividends while reducing pollution and congestion significantly. Spreading of CE principles within management requires substantial efforts, particularly when waste management rules for plastic, e-waste, and municipal lack coordination with CE principles and is renascent with recent times when India seems to have been working towards the achievement of the SDGs. Coordination of waste management and renewable energy plans beneath an aegis CE strategy would provide further momentum - in the achievement of circularity and sustainable development in the Indian economy.

As defined by renewable energy & CE Status Paper, India – "a CE" is a regenerative system in which resource input and waste, emission, and energy leakages are minimized - by reducing, closing, and narrowing material and energy loops. And this is achieved through long-lasting and environmentally sensitive design, requiring lean maintenance, and promoting repair, refurbishing, reuse, remanufacturing, and recycling." To drive the country towards a CE Indian government has been actively promoting

projects and formulating policies (Refer, Figure 2). A few of the various rules those notified are: (a)E-Waste Management Rules (b) Metals Recycling Policy (c) Plastic Waste Management Rules (d) Demolition Waste Management Rules. Per Press Information Bureau, 11 committees were formed to expedite the transition from linear to CE–comprising officials from NITI Aayog, MoEFCC, industry representatives, academics, and domain experts–for 11 focus areas (Table 1).

S. No.	Focus Area	Concerned Line Ministry
1	Scrap Metal (Ferrous and Non-ferrous)	Ministry of Steel
2	Solar Panels	MNRE
3	Tyre and Rubber Recycling	Department for Promotion of Industry and Internal Trade
4	Electronic Waste	Ministry of Electronics and Information Technology
5	Agriculture Waste	Ministry of Agriculture & Farmers' Welfare
6	End-of-life Vehicles (ELVs)	Ministry of Road Transport and Highways
7	Used Oil Waste	Ministry of Petroleum and Natural Gas
8	Municipal Solid Waste & Liquid Waste	Ministry of Housing & Urban Affairs
9	Toxic and Hazardous Industrial Waste	Department of Chemicals and Petrochemicals
10	Gypsum	Department for Promotion of Industry and Internal Trade
11	Lithium Ion (Li-ion) Batteries	NITI Aayog

Table 1: Focused Areas for Transition to Circular Economy

Source: Press Information Bureau (PIB, 18-Mar-2021)

Figure 2: Proposed Framework for a CE Policy for India



Source: www.niti.gov.in



Figure 3: The Circular Economy Model, European Parliament

Source: The Circular Economy Model, European Parliament

Among the local urban bodies, a lack of awareness exists to implement recycling programs, per a few studies. Per analysis of many years of data, a recent approach to CE suggested a resolute recycling agenda. The CE epitomizes the endeavour to conceptualize the integration of environmental well-being and economic activity in a sustainable manner. Considering the related but limited ability of green consumerism to check and restrain urgent eco-issues debate in favour of CE, the overall expansion of consumerism advances to increased waste generation, particularly in Indian urban metros and cities.

Indian automotive sector is striving for by adopting sustainability initiatives, including the CE, although implementation is not up to the mark and varies. One of the reasons identified is a lack of awareness of the roadblocks hindering it. Secondly, the Indian automotive sector gives away monetary benefits of reduced waste, agile production process, lower resource utilisation, etc., and the application of CE. Consequently, the application of CE concepts by Indian automobile companies' ushers to maintainable development and expansion of the Indian economy.

The study by Agrawal *et al.*, (2021) summarised roadblocks in embracing CE concepts in the Indian automotive sector including:

- 1. A shortfall in the potential to deliver the best quality remanufactured products,
- 2. Sustaining the design of the reused product,
- 3. Lack of realization in society, and
- 4. Absence of consumer knowledge about refurbished products.

Our reliance on technology keeps increasing our electronic waste. Our e-waste has never been this higher even though many items are bought, the shelf life keeps decreasing. Electronic waste cannot get tossed away; it must be disposed of appropriately. Individuals also must make required adjustments to protect the surrounding environment. Past practices in waste management were mainly driven by reducing the costs of collection and disposal — landfill versus recycling (Refer to Figure 1). In a CE, the idea is to increase the value at every incremental point in a product's lifecycle. The conversion to a CE warrants a total directional change across the consumption and production system (Table 2).

Linear	Circular
Competition	Collaboration
Added value	Shared value
Raw materials & waste	Raw materials only
Downcycling	Upcycling
Do less bad	Do good and positive
Standardized production	Local and adapted production
Individuals	Ecosystem

Table: 2: Resource Efficiency – Transition to a Circular Economy

Source: EU-REI Course Materials for Creating a Resource Efficient India

The harmony between different rural and urban activities, through sectors, for example, energy, waste, and water is an essential way of creating CE principles by empowering the conversion of linear flows into a closed loop. Closed-loop material processes can - ameliorate the resource capacity of these processes by lowering material consumption and waste discharge, emanating momentous regional and local environmental and economic benefits.

To establish and maintain relationships and to garner revenue flow, correlate with the principles of the assets required to make, propose, and deliver value propositions via identified channels, guiding the CE in two ways. One focused on regenerating and restoring the natural capital, and the second on input choices. Natural capital restoration and regeneration concerns using energy from land restoration, reclamation, or renewable sources, saving water, operating in more efficient buildings, and selecting maintainable production locations. for example, eco-parks. To incorporate different aspects and offer a range of concepts that share the idea of closed loops, the recent understanding of the CE and its constructive applications to economic systems and industrial processes have developed. Material loops are the basic idea of the CE. This idea estimates that products, their components, and or materials can be cascaded (in the case of biological nutrients) and redistributed/reused, refurbished /remanufactured, or recycled (in the case of technical nutrients), which demand in advance collecting back from the consumer and reverse logistics (refer to Figure 1).

A CE might turn goods at the final stage of their service life into resources for others, minimizing waste and closing loops in industrial ecosystems. It might change financial reasoning - as it replaces production with sufficient recycle what cannot be reused, repairing what is broken, reusing what you can, and remanufacturing what cannot be repair. CE business models are of two types: Those that convert old goods into as-new resources by recycling the materials; and those that nurture reuse and extend service life by remanufacturing, upgrading, repairing, and retrofitting.

Manufacturing and energy sectors have solid effects and consequences on the maintainability transitions of other sectors. Therefore, CE transitions and energy for knuckling climate change focused on the energy and manufacturing sectors, for example, agriculture and waste. And the interaction of various policies at different governmental levels may result in harmony and increased efficiency of joint actions to withstand climate change.

The harmony and trade-offs between waste streams can forward swaps in the context of urban resources governance. Furthermore, the governance aspects for sustainable development can be attained by productivity encouragement, lowering waste, and waste-to-energy requisitions toward energy conversion. This reduced cost (as and when realized) in the creation of public services is advantageous for the actors involved in the PPP, besides for the local community, as the benefit of reduced cost can be transferred/given to consumers or invested in targeted social projects for water supply for the needy ones. I4 technologies (a German strategic initiative) are expected to accelerate industries toward the development of extraordinary operational competencies and improvement in productivity (Rüßmann *et al.*, 2015; Kamble & Gunasekaran, 2021).

Correcting the maintainable performance goals such as lower resource consumption and gas emission rates I4 technologies set-up will drive the operation of CE, which jointly have immense prospects. I4 was developed to create smart factories using merging technologies such as big data analytics, the Internet of Things (IoT), 3D
printing, augmented reality, cloud computing, and robotic systems to develop cyberphysical type systems.

To encourage CE and maintainable mechanical value creation environment, the composition of the IoT, big data analytics, cyber-physical system, and innovative business structure would play a crucial role.

- a) The CE practices remained focused on executing CE policies at the organizational level (single enterprise) at the micro level. Product recycling or reuse, cleaner production, green purchasing/consumption, and eco-design (ED) are the critical aspects of CE practices at the micro level.
- b) To attain Common Monetary and environmental benefits, the CE practices at the meso-level use mechanical harmony. To apportion and use the accessible resources productively and competently, at the meso-level, the CE practices are focused on making eco-industrial parks and attracting industries jointly to apportion and use the accessible resources productively and competently.
- c) At the macro level, the CE applications augment its boundaries and try to make out how physical resources and materials can be organized and used productively and competently at the territorial or national level.

5.0 Conclusion

The study is limited to a few variables and confined to a limited period. Any restriction to this study and the examination due to the situation outside the reach of one's control is unintended. The larger purpose of the study suggests bearing more learning on these and other CE variables hereafter with supportive data reviews while using both statistical and econometric tests and including more explicit discussion to help yield desirable results.

The above discussion shows that CE implementation affiliating to the recycling of e-waste, human waste, household waste, and sewage sludge will need more efforts imparting skills training and health and safety mean to avert trade-offs with targets for welfare, human health, and safe working surroundings. It appears and observed that CE awareness is centered around large industries and scattered across micro-small–medium enterprises (MSMEs). It requires teachings in academic and vocational training. CE inherently targets expanding accessibility per unit resource uprooted through waste minimization, reutilization, and renewable energy production.

The paper revealed the need for better linkages between waste alteration implementation and CE. It is crucial to recharge the ground by providing materials to organisms and plants while aiming to keep products and resources at a pricey level till it last by administering resource use. Here rainwater harvesting is crucial both for surface water and rooftop harvesting. Parking and placing components and materials into unrelated usage after life ends through various value streams. To promote the optimal use of resources, CE and renewable energy lower the material inputs by minimizing losses and increasing the material circulation and flow.

Although discrete/single search strings corresponding to renewable energy (81623) and waste management (97475) generated innumerable results, their connection with CE reduced the results significantly. However, the connecting of CE with most parts shaping development such as renewable energy and waste management, besides the policy structure, is still markedly missing. The profound inequalities revealed by Covid-19 and other spill-over disasters show us the significance of sustainable urban development. Bolstering the readiness and adaptability of cities is crucial in countering future crises (per SDG-11 by United Nations). The administrators and regulators must embrace policy moves, with amending taxation, to encourage a CE by businesses. Moreover, the scientific community must scan the ambit for innovations registering it for patent and license, thus paving the further scope for sizeable leaps in breaking-up molecules to recycle atoms. Lastly, administrators and people must join hands in improving resource effectiveness, reducing pollution and waste, and building a new CE (per SDG-12 by United Nations).

The shift to CE needs quite a different approach, beliefs, and value change. Strategies are considered on a life cycle basis to report load moving and harmonize through industrial sectors and life cycle stages. CE is demanding reality, though this paper attempted offering while identifying a few potential barriers, which will be handy for the corporate/ industry desire to proceed. The critical remarks mentioned in the paper are to encourage industrial supervisors to embrace CE practices.

Another contribution of the paper throws light on developing a plan which helps the communities and policymakers recognize the organizers for energy-saving e-waste management in India. Structuring a CE strategy for India would additionally boost renewable energy adding to the achievement of the SDGs.

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Effectiveness of Hybrid Learning Approaches - A Case Study of a Few Selected Edtech Companies

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ABSTRACT

With the emergence of advanced technologies, education has undergone a significant transformation over the years. Edtech firms have played a crucial role in the development of online and digital learning platforms that have revolutionized the traditional education system. Hybrid learning approaches are some of the models that have been adopted by edtech firms to enhance the learning experience of students. This research paper aims to explore the effectiveness of Hybrid learning approaches implemented by edtech firms. The study will examine the benefits of using these models, their limitations, and the challenges faced by edtech firms in their implementation. The research will involve a comprehensive review of relevant literature, case studies of edtech firms that have implemented Hybrid learning, and a survey to gather the perspectives of students and educators on the effectiveness of these approaches.

Keywords: Learning; Edutech; Technology; Education.

1.0 Introduction

Hybrid learning approaches are alternative models of delivering education that combine traditional face-to-face instruction with online and digital learning experiences. These approaches have become increasingly popular in recent years, particularly with the rise of EdTech firms and the need for flexible and personalized learning experiences. Hybrid learning is a model that combines traditional classroom learning with online learning (Doering, 2006).

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In this approach, students attend classes in person and also participate in online learning activities, such as watching instructional videos, participating in online discussions, and completing online assignments. This model offers students the benefits of both face-to-face interaction and the flexibility of online learning.

The objectives of the research are:

- 1. To review relevant literature on Hybrid learning approaches, including their definitions, benefits, limitations, and effectiveness in enhancing student learning outcomes.
- 2. To analyze case studies of Edtech firms that have implemented Hybrid learning approaches and to identify the strategies they have used to enhance their effectiveness.
- 3. To investigate the perspectives of students and educators on the effectiveness of Hybrid learning approaches in enhancing student learning outcomes.
- 4. To identify the challenges faced by Edtech firms in implementing Hybrid learning approaches.
- 5. To provide recommendations for Edtech firms and educators on the effective implementation of Hybrid learning approaches.

When educators use the term "hybrid learning" to elucidate the notions of blended learning or dual-mode learning, they run the risk of creating confusion due to the absence of a precise definition for this concept (Lin, 2008). As outlined by (Linder, 2017), hybrid learning is characterized as a purposeful application of technology to substitute scheduled classroom sessions, with the aim of fostering an effective learning environment.

Based on the above discussion the benefits of hybrid learning are:

- 1. Flexibility: Hybrid learning approaches provide students with greater flexibility in terms of where, when, and how they learn. They can access online learning materials at their own pace and convenience, while also receiving the support and guidance of a teacher in a traditional classroom setting.
- 2. Personalization: Hybrid learning approaches allow for more personalized learning experiences that cater to individual student needs and preferences. This can result in higher levels of student engagement, motivation, and academic achievement.
- 3. Increased Access: Hybrid learning approaches can help to overcome barriers to education, such as geographical distance or physical disabilities, by providing access to educational resources and opportunities online.
- 4. Improved Teaching: Hybrid learning approaches can also provide opportunities for teachers to enhance their teaching practices and reach a wider range of learners through the use of technology (Kulkarni *et al.*, 2022).

The limitations of the hybrid learning are as:

- 1. Technological Challenges: Hybrid learning approaches rely heavily on technology, which can pose challenges for both students and teachers. Technical issues such as internet connectivity or software compatibility can impact the quality of learning experiences.
- 2. Lack of Interaction: Online learning can be isolating and may lack the social interaction and collaboration that traditional classroom environments provide. This can impact student motivation and engagement.
- 3. Student Accountability: Hybrid learning approaches require students to take a greater level of responsibility for their own learning, which may be challenging for some students.
- 4. Teacher Training: Teachers need to be trained to use technology effectively and adapt their teaching strategies to the Hybrid learning environment. This can require additional time and resources.

The effectiveness of Hybrid learning approaches by edtech firms in enhancing student learning outcomes has been the subject of several research studies. Overall, the research suggests that these approaches can be effective in improving student learning outcomes, but the results can vary depending on the specific implementation and context. For example, a meta-analysis conducted by the U.S. Department of Education (Means *et al.*, 2013) found that blended learning environments that incorporated online learning components had positive effects on student learning outcomes compared to traditional classroom.

Challenges faced by edtech firms in implementing hybrid learning:

- 1. Access to Technology: Hybrid learning approaches rely heavily on technology, which can pose a challenge for edtech firms that lack the necessary infrastructure and resources to provide students with the required technology.
- 2. Teacher Training: Edtech firms need to ensure that their teachers are adequately trained to use technology and adapt their teaching strategies to the Hybrid learning environment. This can require additional time and resources.
- 3. Quality of Online Learning Materials: The quality of online learning materials can have a significant impact on the effectiveness of Hybrid learning approaches. Edtech firms need to ensure that their online learning materials are of high quality and provide a level of interactivity and feedback that is equivalent to in-person instruction.
- 4. Student Engagement: Online learning can be isolating, and edtech firms need to ensure that their students remain engaged and motivated throughout the learning

process. This can be a challenge, especially for students who may be less motivated or self-directed.

- 5. Technical Challenges: Technical issues such as internet connectivity or software compatibility can impact the quality of learning experiences, and edtech firms need to ensure that they have the necessary support systems in place to address these issues when they arise.
- 6. Cost: Implementing Hybrid learning approaches can be costly, especially for edtech firms that are just starting out. Edtech firms need to ensure that they have a sustainable business model and can generate sufficient revenue to cover the costs associated with these approaches.

India has a growing edtech industry, with several companies offering Hybrid learning solutions. Here are some edtech firms in India that provide Hybrid learning:

- 1. Byju's: Byju's is one of India's leading edtech companies, offering a range of digital learning solutions, including live online classes, video lessons, and adaptive practice modules.
- 2. Vedantu: Vedantu is an online tutoring platform that offers live online classes and personalized learning solutions for students in grades 1-12.
- 3. Simplilearn: Simplilearn is an online learning platform that offers a range of courses and programs in areas such as digital marketing, data science, and cloud computing, with a blend of online self-paced learning and live online classes.
- 4. Toppr: Toppr is an online learning platform that offers personalized learning solutions for students in grades 5-12, with a blend of online self-paced learning and live online classes.
- 5. Upgrad: Upgrad is an online learning platform that offers professional development programs in areas such as data science, management, and technology, with a blend of online self-paced learning and live online classes.
- 6. Talentedge: Talentedge is an edtech firm that offers live online executive education programs in collaboration with top institutions and industry experts.
- 7. iNurture: iNurture is an edtech firm that offers industry-relevant undergraduate and postgraduate programs in collaboration with universities and industry partners, with a blend of online self-paced learning and live online classes.
- 8. Emeritus: Emeritus is an online learning platform that offers executive education programs in collaboration with top institutions such as MIT, Columbia, and INSEAD, with a blend of online self-paced learning and live online classes.
- 9. Meritnation: Meritnation is an online learning platform that offers personalized learning solutions for students in grades 1-12, with a blend of online self-paced learning and live online classes.

10. Adda247: Adda247 is an edtech firm that offers online coaching for competitive exams such as banking, SSC, and railway recruitment, with a blend of online self-paced learning and live online classes.

Case studies of edtech firms that have implemented Hybrid learning show that these approaches can be effective in improving learning outcomes for students. Here are some key takeaways from case studies of edtech firms that have implemented Hybrid learning:

- 1. Byju's: The company's blended learning approach combines self-paced learning with live online classes, allowing students to learn at their own pace while still receiving guidance and support from teachers. Case studies show that Byju's blended learning approach has been effective in improving learning outcomes for students, with students reporting increased engagement, motivation, and confidence in their ability to learn.
- 2. Vedantu: Case studies show that Vedantu's hybrid learning approach has been effective in improving learning outcomes for students, with students reporting increased engagement, motivation, and performance on assessments.
- 3. Simplilearn: Case studies show that Simplilearn's blended learning approach has been effective in improving learning outcomes for students, with students reporting increased knowledge, skills, and confidence in their ability to apply what they have learned.
- 4. Talentedge: Case studies show that Talentedge's hybrid learning approach has been effective in improving learning outcomes for students, with students reporting increased knowledge, skills, and confidence in their ability to apply what they have learned.
- 5. Upgrad: Case studies show that Upgrad's blended learning approach has been effective in improving learning outcomes for students, with students reporting increased knowledge, skills, and confidence in their ability to apply what they have learned.

2.0 Literature Review

The literature on Hybrid learning approaches has grown significantly in recent years, with many studies exploring their effectiveness in enhancing student learning outcomes. This literature review will focus on the key findings from recent research on the effectiveness of Hybrid learning approaches adopted by Edtech firms. A study by (Singh *et al.*, 2022) found that hybrid learning approaches can improve student access and equity in education, particularly for students from disadvantaged backgrounds.

The current literature on hybrid learning approaches focuses on their long-term impact on student outcomes, as well as their potential for improving access and equity in education. A study by (Dziuban *et al.*, 2018) found that hybrid learning approaches can improve student outcomes, including higher levels of engagement and achievement.

A study by (Hodges et al., 2020) found that hybrid learning approaches can be effective in improving student outcomes, particularly when combined with strong pedagogical practices. (Omari et al., 2023) suggested that the effectiveness of Hybrid learning approaches depends on the quality of implementation, the teacher's ability to facilitate online and offline learning, and the willingness of both teachers and students to adapt to new technologies and teaching methods. A literature review by (Bhutoria, 2022) found that Edtech firms that adopt Hybrid learning approaches provide more personalized learning experiences, which can lead to increased student motivation and academic achievement. Another literature review by (Dontre, 2021) reported that Edtech platforms that incorporate blended learning approaches can improve student engagement, performance, and retention. Another study by (Hodges et al., 2020) explored the impact of *pedagogical design* on student engagement in online learning. The authors found that active learning strategies, such as group work, problem-solving, and discussion, were effective in promoting student engagement. In addition, the authors noted that asynchronous learning, which allows students to learn at their own pace, was also associated with higher levels of engagement.

Hybrid learning environments offer several advantages over traditional classroom or online-only environments, they also present unique challenges that can impact *student success*. One challenge is the need for students to have access to reliable technology and internet connectivity, particularly for synchronous online activities (Hodges *et al.*, 2020). One study conducted by (Gamage *et al.*, 2022) examined the effectiveness of using learning objectives in online education. The authors found that learning objectives can help to create a clear and coherent learning experience, and that they can also be used to promote student engagement. Specifically, students who were provided with clear learning objectives were found to be more engaged with the course content and more likely to complete the course. Teacher support has also been identified as a key factor in promoting student engagement and success. A study by (Park & Shea 2020) found that teacher feedback and communication were important predictors of student engagement in online learning. Specifically, students who received frequent

feedback from their teachers were more likely to be engaged with the course material and more likely to complete the course.

Infrastructure resources, such as access to technology and learning management systems, are also critical in promoting student engagement and success. A study by (Shukor *et al.*, 2015) found that access to technology and learning management systems was positively associated with student engagement in online learning. In addition, the authors noted that the availability of support services, such as technical support and tutoring, was also important in promoting student engagement. The concept of blended learning or hybrid learning, with its goal of reducing the physical distance between schools and students, has its roots in the previous century (Flynn-Wilson *et al.*, 2021). According to the definition provided by (Ferdig & Kennedy, 2014), hybrid learning involves the incorporation of both online and in-person learning within structured educational programs. (Koşar, 2016) defines hybrid learning as a configuration that combines various instructional modalities, delivery mediums, teaching approaches, and web-based technologies.

Numerous studies have explored hybrid or blended learning from various perspectives. For instance, a research project conducted by (Raes, 2022) with a sample of fifty university students revealed that those who pursued their education online achieved superior outcomes compared to their counterparts who exclusively experienced face-to-face instruction. Remarkably, the students who engaged in hybrid learning outperformed both of these groups in terms of their results. (Klimova & Kacetl,2015) undertook a research study with the objective of examining the elements and explanations of hybrid learning, utilizing an analytical research design. The findings pointed to hybrid learning being identified as one of the most efficacious educational strategies in the past decade, contributing to a more interactive learning environment. A significant contribution of the blended learning approach to education seems to be its role in promoting collaborative learning (Garrison & Vaughan, 2018).

3.0 Research Methodology

3.1 Research design

The present study is based on the primary data collected from the learners (UG & PG Students) from North Karnataka region. For this purpose, the pre-structured questionnaire was canvased among the respondents. The data was collected from 285 learners. The respondents were selected on random basis. To analyses and interpret the data various statistical tools are used like: Exploratory factor analysis, Regression model,

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structural equation model, Confirmatory factor analysis, Validity Analysis, HTMT Ratio, hypothesis testing, Standardized regression (direct effect) and Mediation effect are used. IBM AMOS (Analysis of Moment Structures) is used in the analysis. AMOS is a statistical software package designed to perform structural equation modeling (SEM). SEM is a statistical method that allows researchers to test complex theoretical models that involve multiple dependent and independent variables.

3.2 Study Hypothesis

- H1: Learning objectives have significant positive effect on perception of the models and framework of the Hybrid setup of the Edtech firms.
- H2: Teaching objectives have significant positive effect on perception of the models and framework of the Hybrid setup of the Edtech firms.
- H3: Pedagogical design have significant positive effect on perception of the models and framework of the Hybrid setup of the Edtech firms.
- H4: Teachers support have significant positive effect on student engagement in the Hybrid setup of the Edtech firms.
- H5: Infrastructure resources have significant positive effect on student engagement in the Hybrid setup of the Edtech firms.
- H6: Models and framework effects student engagement significantly in the Hybrid setup of the Edtech firms.
- H7: Models and framework and student engagement effects significantly to student success in the Hybrid setup of the Edtech firms.

The detailed theoretical model is presented in Figure 1.

3.3 Mediation effect testing

- H8: Learning objectives, teaching objectives and pedagogical design have significant positive effect on students' success through models and framework in a Hybrid setup of the Edtech firms. [(H1xH7) (H2xH7) (H3xH7)]
- H9: Learning objectives, teaching objectives and pedagogical design have significant positive effect on students' success through models and framework and student engagement in a Hybrid setup of the Edtech firms. [(H1xH6xH8) (H2x H6xH8) (H3x H6xH8)]
- H10: Teachers support, and infrastructure resources have significant positive effect on students' success through student engagement in a Hybrid setup of the Edtech firms. [(H4xH8) (H5xH8)]



Figure 1: Theoretical Model (Hybrid Edtech Model)

Source: Researchers own

4.0 Analysis and Discussion

Exploratory factor analysis: Kaiser-Meyer-Olkin (KMO) value references are 0.70 to 0.79 adequate, 0.80 to 0.89 meritorious, and 0.90 to 1.00 magnificent for standard interpretations. The Kaiser-Meyer-Olkin measure of sample adequacy in this study is 0.895 with a significance level less than 0.05. As a result, we believe the data is adequate and the factor analysis test can be analyzed. Using principal component analysis and Varimax rotation, 38 questions are factored. To create the eight factors that explain a total of 72.412% of the variation for the whole set of variables. Considering this, the KMO score of 0.895 and the Bartlett's Test of Sphericity result of less than 0.05 both suggest that the set of variables is sufficient. The eight factors derived based on the eigenvalues (>1) are as follows: All the factor loading scores of the items were greater than .680 and communalities were greater than .600. (Table 1)

S. No.	Constructs/factors	Abbr.
1	Learning Objectives	LO
2	Teaching Objective	ТО
3	Pedagogical Design	PD
4	Teachers Support	TS
5	Infrastructure Resources	IR
6	Models and Frameworks	MF
7	Student Engagement	SE
8	Students Success	SS

Table 1: List of Factors and Their Abbreviations

Source: Researchers own.

A theoretical model is verified through SEM analysis, which should adhere to the goodness of fit principle (Byrne, 2010). According to the research of the academics, acceptance or rejection of the concept is supported by these investigations. Numerous fit indices, including the 2 test, the 2 to degree of freedom ratio, the Goodness of Fit Index (GFI), the Adjusted Goodness of Fit Index (AGFI), the Root Mean Square Error of Approximation (RMSEA), the Non-Normed Fit Index (NNFI), the Incremental Fit Index (IFI), the Comparative Fit Index (CFI), and the Standardized Root Mean Square are used to base the studies (SRMR) (Table 2).

Table 2: SEM Goodness of Fit Measures

Model-Fit Criterion	Acceptable	Level Interpretation	
Chi squara	Tabled w? volue	Compares obtained χ^2 value with tabled	
Chi-square	Tabled X2 value	value for given df	
Goodness-of-fit index (GFI)	0 (no fit) to 1 (perfect fit)	Value close to .90 or .95 reflect a good fit	
Adjusted CEI	(AGFI) 0 (no fit) to 1	Value adjusted for df, with .90 or .95 a good	
Adjusted OFT	(perfect fit)	model fit	
Root-mean square residual	Pasagrahar dafinas laval	Value loss than 08 indicates a good model fit.	
(RMR)	Researcher defines level	value less man .08 indicates a good model nt	
Standardized RMR (SRMR)	<.05	Value less than .05 indicates a good model fit	
Root-mean-square error of	05 to 08	Value of 05 to 08 indicate close fit	
approximation (RMSEA)	.05 10 .08	value of .05 to .08 indicate close in	
Tucker Lewis Index (TLI)	0 (no fit) to 1 (perfect fit)	Value close to .90 or .95 reflects a good	
Tucker-Lewis Index (TLI)	o (no ne) to r (perfect ne)	model fit	
Normad fit inday (NEI)	0 (no fit) to 1 (perfect fit)	Value close to .90 or .95 reflects a good	
Normed Int Index (INFI)	0 (no nt) to 1 (perfect nt)	model fit	

Source: A Beginner's Guide to Structural Equation Modeling, Randall E. Schumacker and Richard G. Lomax, Third edition, 2010.

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Since the value of Chi-Square is compared to determine the statistical significance. However, the Chi-square statistic is extremely sensitive to sample size, which means that when the model comprises big samples, the Chi-Square statistic almost always rejects. Similar to the Chi-Square statistic, models with tiny samples may not be able to distinguish between models that fit the data well and those that don't. Owing to the Model Chi-limitations, Square's researchers have looked for alternate metrics to judge model fit. The relative/normed chi-square (2/df) is an illustration of a statistic that minimises the effect of sample size on the Model Chi-Square. The goodness of fit is also achieved when values of GFI and AGFI are over 0.8. For confirmatory factor analysis (CFA), a minimum of 100 samples is recommended. The suitable size of a sample to be between 30 and 500. Minimum requirements were, therefore, satisfied in the current study (Table 3).

Model-Fit Criterion	Acceptable	Model values
Chi-square (χ2)		
Chi-square	Tabled χ2 value	1020.163 (p=0.000)
Degree of freedom (df)		637
Absolute Fit Measure		
Goodness-of-fit index (GFI)	0 (no fit) to 1 (perfect fit) (ideal 0.90)	0.860
Root-mean square residual (RMR)		0.097
Root-mean-square error of	< 05	0.042
approximation (RMSEA)	~.05	0.042
90% confidence interval for		(0.27, 0.47)
RMSEA		(0.37, 0.47)
Standardized RMR (SRMR)	< .05	0.0504
Normed chi-square (CMIN/df)	< 2	1.602
Incremental Fit Indices		
Normed fit index (NFI)	0 (no fit) to 1 (perfect fit) (ideal 0.90)	0.879
Non-normed fit index Tucker-	0 (no fit) to 1 (norfeet fit) (ideal 0.00)	0.045
Lewis Index (TLI)	o (no nt) to 1 (perfect nt) (ideal 0.90)	0.945
Comparative fit index (CFI)	0 (no fit) to 1 (perfect fit) (ideal 0.95)	0.950
Related fit index (RFI)	0 (no fit) to 1 (perfect fit) (ideal 0.90)	0.886
Parsimony Fit indices		
Adjusted goodness of fit index (AGFI)	(AGFI) 0 (no fit) to 1 (perfect fit) (ideal 0.90)	0.837

Table 3: Overall Model Fit (CFA)

Source: Table structure from Hair at. al (2017)

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All these measurements fall within the range that is considered to be a good match (Multivariate data analysis, 7e) by Hair *et al.*, (2017). These diagnostics indicate that the model offers a good all-around fit. All of the regression weights are significant and greater than 0.70 between the constructs. This indicates that the constructs are valid and have a logical relationship. (Table 4).

	CR	AVE	SE	TS	MF	SS	IR	LO	PD	ТО
SE	0.933	0.698	0.835							
TS	0.9	0.644	0.264***	0.803						
MF	0.887	0.611	0.200**	0.064	0.782					
SS	0.9	0.643	0.397***	0.246***	0.472***	0.802				
IR	0.894	0.629	0.427***	0.169**	0.188**	0.398***	0.793			
LO	0.875	0.636	0.148*	0.084	0.358***	0.342***	0.131*	0.797		
PD	0.861	0.608	0.148*	0.118†	0.434***	0.520***	0.251***	0.182**	0.779	
ТО	0.827	0.544	0.076	0.076	0.394	0.369	0.168	0.231	0.204	0.737
	Significance of Correlations: * p < 0.050, ** p < 0.010, *** p < 0.001									

Table 4: Validity Analysis

Source: Data analysis (Gaskin et al., 2019, "Master Validity Tool", AMOS Plugin)

The average variance extracted, all AVE's are greater than 0.5 and all the CR values are greater than 0.8. According to Hair *at al.*, (2017) the AVE's estimates of factor should be greater than the corresponding intercorrelation squared correlation estimates, in this study the AVE's are greater than the corresponding intercorrelation squared correlation squared correlation estimates, therefore, this test indicates that there is no problem with discriminant validity. All the values are less than 0.900 and hence the discriminant validity is achieved. (Table 5)

Table	5:	HTMT	' Ratio
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	SE	TS	MF	SS	IR	LO	PD	ТО
SE								
TS	0.298							
MF	0.193	0.071						
SS	0.412	0.282	0.45					
IR	0.447	0.189	0.18	0.406				
LO	0.161	0.092	0.369	0.354	0.141			
PD	0.156	0.129	0.418	0.511	0.255	0.191		
TO	0.078	0.079	0.388	0.349	0.16	0.236	0.195	

Source: Data analysis (Gaskin et al., 2019, "Master Validity Tool", AMOS Plugin)



Figure 2: Path Diagram of the Theoretical Framework (Hypothesis Testing)

Source: Researchers own.

	Table 6	: Standar	dized Regr	ession (Direc	t Effect)
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Constructs			Estimates	P value	Hypothesis	Results
MF	<	LO	0.241	***	H1	Accepted
MF	<	PD	0.354	***	H2	Accepted
MF	<	TO	0.278	***	H3	Accepted
SE	<	TS	0.197	***	H4	Accepted
SE	<	IR	0.380	***	Н5	Accepted
SE	<	MF	0.119	0.028	H6	Accepted
SS	<	SE	0.320	***	H7	Accepted
SS	<	MF	0.443	***	H7	Accepted
	Note	e: all the effects	s are significant a	at the level of .	05	

Source: Data analysis.

Hypothesis	Paths	Estimate	Lower	Upper	Р				
	H1xH7	.104	.057	.164	.001				
H8	H2xH7	.187	.103	.290	.001				
	H3xH7	.174	.087	.282	.001				
Н9	H1xH6xH8	.016	.003	.037	.021				
	H2x H6xH8	.015	.003	.036	.022				
	H3x H6xH8	.043	.005	.089	.031				
H10	H4xH8	.057	.024	.101	.001				
	H5xH8	.126	.070	.202	.001				
	Note: all the effects are significant at the level of .05								

Table 7: Mediation Effect

Source: Data analysis.

All the hypotheses are signifying that the paths are positive and significant. The above model proves that the dimensions identified are proper describing the cause for the students' success (Table 6 and Figure 2).

5.0 Discussion

The effectiveness of Hybrid learning approaches adopted by edtech firms is a topic of significant interest, as these approaches have become increasingly popular in recent years. Based on the available literature and case studies, the results and discussion of the effectiveness of these approaches can be summarized as follows:

- Improved Student Outcomes: Many studies and case studies have shown that Hybrid learning approaches have a positive impact on student outcomes. Students in Hybrid learning environments tend to perform better academically than those in traditional classroom settings. This may be due to the increased flexibility and personalization of learning that these approaches offer, as well as the ability to access a variety of resources and learning modalities.
- Increased Engagement: Hybrid learning approaches often lead to increased student engagement, as they provide students with more opportunities for active learning and interaction with course material., This can be particularly beneficial for students who may not thrive in traditional classroom settings.
- Improved Accessibility: Hybrid learning approaches can make education more accessible to a wider range of learners. By providing online components, students

who may not be able to attend traditional classes in-person, such as those with disabilities, can still participate and benefit from the course.

- Implementation Challenges: Despite the many benefits of Hybrid learning approaches, there are also challenges that edtech firms face when implementing them. These challenges include issues related to technology, training and support for both teachers and students, and the need to ensure that learning outcomes are consistent across different learning modalities.
- Customization and Personalization: One of the key advantages of Hybrid learning approaches is the ability to customize and personalize the learning experience for individual students. This can be achieved through the use of adaptive technologies and other tools that allow students to learn at their own pace and in ways that best suit their individual learning styles.

The specific types of Hybrid learning models being used by edtech firms, such as flipped classrooms, online tutorials, or adaptive learning.

- The types of edtech tools and resources being used to support Hybrid learning, such as learning management systems, digital content libraries, or adaptive technologies.
- The benefits and challenges associated with implementing Hybrid learning approaches, as well as the level of support and training provided to educators and students.
- The effectiveness of Hybrid learning approaches in terms of improving student outcomes, increasing engagement, and providing greater accessibility to education.
- The satisfaction of both educators and students with Hybrid learning approaches, as well as their willingness to continue using these approaches in the future.

The research on the effectiveness of Hybrid learning approaches adopted by edtech firms aims to explore the impact of these models on student learning outcomes. Several studies have found that Hybrid learning approaches can be effective in improving student engagement and academic achievement, particularly when supported by a range of edtech tools and resources. Overall, the research on the effectiveness of Hybrid learning approaches adopted by edtech firms highlights the potential benefits of these models, as well as the challenges that need to be addressed to ensure their success. Further research is needed to explore the long-term impact of these approaches on student learning outcomes, and to identify best practices for implementing and supporting Hybrid learning models in a range of educational settings.

The research on the effectiveness of Hybrid learning approaches adopted by edtech firms has several important implications for both edtech firms and educators. For edtech firms, the research highlights the importance of providing a range of effective and engaging educational technologies to support Hybrid learning models. These tools should be designed with the specific needs of educators and students in mind, and should be flexible enough to support a range of teaching and learning approaches. In addition, edtech firms should focus on developing effective training and support programs for educators, to ensure that they are comfortable with the use of these technologies and can effectively integrate them into their teaching practice. This will be crucial in ensuring that Hybrid learning models are successfully implemented and can deliver positive outcomes for students. For educators, the research highlights the need for ongoing professional development to support the effective use of Hybrid learning models. This includes training on how to integrate edtech tools and resources into teaching practice, as well as ongoing support and guidance for students as they navigate these new approaches to learning.

6.0 Conclusion

Overall, the literature suggests that several key factors, including learning objectives, pedagogical design, teacher support, infrastructure resources, and models and frameworks, are important in promoting student engagement and success in education. By addressing these factors, educators can create a more engaging and effective learning model & frameworks and environment that leads to student achievement and student success. And also research suggests that hybrid learning approaches can be effective in improving student engagement, motivation, and academic performance. Furthermore, the adoption of these approaches by Edtech firms can provide personalized learning experiences that cater to individual student needs. However, challenges and limitations, such as lack of face-to-face interaction and technical issues, must be addressed to ensure the effectiveness of these approaches in different contexts and for different types of learners.

There are several potential future research directions related to the effectiveness of Hybrid learning approaches adopted by edtech firms. Some of these directions include:

- Long-term impact: Most studies on the effectiveness of Hybrid learning approaches have focused on short-term outcomes. Future research could examine the long-term impact of these approaches on student learning outcomes, such as academic performance and retention rates.
- Teacher training: As noted earlier, effective teacher training is crucial for the successful implementation of Hybrid learning models. Future research could focus

on identifying effective approaches to training teachers to use edtech tools and resources, and exploring the impact of this training on student outcomes.

- Student motivation: While Hybrid learning approaches have the potential to increase student engagement and motivation, there may also be challenges associated with maintaining student motivation in these settings. Future research could explore strategies for addressing these challenges and ensuring that students remain engaged and motivated.
- Technology design: The design of educational technology tools and resources is crucial in supporting effective Hybrid learning. Future research could examine the impact of different design features on student outcomes and explore ways to improve the design of these tools and resources to better support student learning.

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Incubation Centres are the Elixir for Development of Rural Economy

Sabina Malage* and B. S. Navi**

ABSTRACT

India is a nation of villages with agriculture as a backbone of the nation. The development of the rural economy depends on the entrepreneurial activities of the nation. The invention or the buzz word start up is supported with the incubation centres which in turn help the rural population. Technology is a base for every innovative idea and help to explore new business ways to the world. Startups are providing wings to youth's innovation and fly towards successful entrepreneurs and are boosting through incubation centres which motivate the youth to think differently and utilize the technology to their ideas to become self-employed through their own unit. In view of this the present paper focuses on role of incubation centres in providing employment opportunity to the rural youth and helps to develop the rural economy in general. It also helps in establishing stronger economy in the rural areas.

Keywords: Start-up; Incubation Centre; Rural Economy; Employment.

1.0 Introduction

India is a country of villages, and it has more population concentrated here only. Human resources are the biggest asset of every country. So, need to utilize it very carefully in increasing the wealth of the country (Mishra, 2023). The time when human resources involved in economic activity then only the country grow overall, and financial position of the country also improve (Kulkarni *et al.*, 2021). So, this improvement needs the involvement of human resources in every activity, if they need to involve then they should need some centres who influence them and explore their idea through technology in this modernized world(Kulkarni *et al.*, 2021).

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At present startups are the new concept bought in business world through this the innovative ideas of youths got explore and this exploration did through incubation centre, who train and educate youths towards innovation(Gokhale & Kulkarni, 2020).

1.1 Rationale behind the study

In olden days small businesses and self-employment was promoted by providing facilities like training programs, skills development, and handmade works training and so on. At present the way of promotion slightly changed, here some centres are created to educate the small entrepreneurs towards innovation and application of new technologies (Duraivadivel *et al.*, 2022).

So, this modernisation playing vital role in this business, so incubation centres are very helpful to give birth to startups in the country and it also important to know their role in promoting these startups in rural area. The researcher understood the significance of the study by considering the importance of start-ups in the present scenario and their supporting systems like incubation centres to be promoted so that more facilities can be provided to the startups, and they will help in the development of rural economy (Bhatt *et al.*, 2022).

1.2 Objective of the study

- 1. To study the importance of incubation centres.
- 2. To study the role of incubation centres in employment creation.

The very important and major issue of the country is creating employment opportunities to the rural youth. Providing employment through government is not possible, so the mindset of the people should be changed from asking jobs from others to giving jobs to others. It helps in creating jobs instead of searching employment (Subrahmanya, 2022). So, the startups are new ways of creating self-employment for the youth. For promoting these startups, facilities need to be created and this is the major problem of every startup that lack of promotional facilities (Krishnan *et al.*, 2022). It is the need to concentrate on the systems whoever taking part to establish these ideas into new business operation. Such as eco systems, incubation centres, financial system etc (Bhatia & Dhawan, 2023).

Also, with the gap in the studies like many researchers concentrated their studies on startups and incubation centres but not on the role of incubation centres (Bhatia & Dhawan, 2023). Therefore, the researcher felt to undertake the study on the topic entitled "Incubation Centres are the Elixir for Development of Rural Economy".

2.0 Literature Review

Thomas & Ki (2020) incubation centres & startups: A study on Kerala's startup ecosystem, this research studied the role & facilities provided by the incubators & its impact on startups in Kerala. For this they had gone through convenience sampling technique to select 80 startup founders & 8 incubation managers with questionnaire. The collected data were analysed through one sample t-test & presented by using tables. Finally, they concluded that startup founders are quite satisfied with the existing facilities at their incubation centres. But government need to increase technical education funding & necessary assistance to promote innovation through incubation centres.

Gupta *et al.*, (2022) role of incubator centres in promoting startups in Rajasthan, the study examines and analyse the services provided by incubation centres and perception, expectations, and satisfaction level towards these centres. So, the work is carried out by interacting with incubators in Rajasthan established in between 2013 to 2018 and they chose 239incubators for the study under simple random sampling. Interpretation of data was made through hypothesis testing such as, paired F test, one-way ANOVA & Kruskal Wallis test. Finally, they concluded the incubation centres are played vital role in promoting startups and their development.

Salem (2014) the role of business incubators in the economic development of Saudi Arabia, the paper studied importance of establishing business incubators and its role towards creation of startups through that development of national income & employment creation. Here the researchers mainly focus on incubation centres working in Saudi Arabia & its implication on national growth, it was descriptive research, so the researcher analysed the importance, objective & working procedures of incubation centres & suggested that need of introducing such a centre in the country is necessary.

Shukla *et al.*, (2015) can business incubators impact the startup success? India perspective, the researcher analysed the success of startup is based on incubation centres and their impact on startup working. Here the researcher collected information through selected managers of business incubation centres with structured questions regarding their institution benefits to startups and their role in startup success. Finally, they concluded that it was positive impact on startups & newly working units need these type incubators for better support & help to develop the nation.

Shokeir & Alsukaity (2019) the role business incubators in supporting small & medium enterprises in Saudi Arabia with special reference to some international, arb experiences, the paper studied conceptual framework of business incubators and its importance to business success. This work was theoretical in nature they presented incubation centres importance and its role in supporting small & medium enterprise in

Saudi Arabia, for this they gathered the information from some articles, journal and by interacting with some selected entrepreneurs through structured questions. Finally, they concluded that it was positive impact on small & medium enterprises on their success & working.

Dhingra (2020) start-up ecosystem in India: growth & challenge, the present study analyses the situation of startups & ecosystem available for their growth. And the study was based on secondary data and analysed it. Finally, they found that youth from smaller towns & cities for want of facilities. So, the government should take up proper dissemination of all its policies to all concerned. The startup ecosystem in India is very vibrant. Only a small push to make it more inclusive would go a long way in promoting youth to take entrepreneurship as a career.

Dwivedi (2019) India startups: analysing the vulnerabilities & prevailing challenges, this research was done by exploring the performance of startups as well as the role of various stakeholders & it also explained the different barriers such as demonetization & GST on startups for getting answer for this the researcher. Selected 100 startups from working in NCR based on convenient sampling technique & interact them with close ended questions. Finally, they got responses and represented through tables. Finally, they got result of capital & infrastructure are most critical problems faced by startups in India so they suggest that awareness level for all aspect related to startups should be raised by stakeholder & funding is crucial for startups so it should be provided through angel investors.

Chandiok (2016) India the world's fastest growing startup ecosystem: a study, this article studied the initiative & life cycle of startup with their awareness towards recent change in industry. So, for this work the researcher adopted qualitative data tools with sample size 145 under random sampling method and they interact with young & educated males & female entrepreneurs in Delhi & NCR Indian market. After analysing the data, they found that number of respondents felt that role of family are key importance in startup financing stage so that banks & other financial institutions should encourage economically disadvantaged sections to participate in the mainstream.

Patil & Wadajkar (2021) Indian startups: shining unicorns, in this paper the term unicorns were discussed how the Indians startups turning to unicorns & it presented the data of last 2 to 3 years startups whoever become unicorn and leading successful journey. And it analysed the relation between unicorns & business incubators who support the startups to become a unicorn. Finally, incubation centres & government initiatives are very necessary to become startup into unicorn.

Subud (2019) assessing startup performance: case study at national business incubator, this study analyses the startup performance of the national incubator which

includes knowledge management, business incubator & the effectiveness of innovation. For this the study gone through 339 startups established in jabodetabek to analyse the startup units. And they used confirmatory factor analysis to test path analysis by operating AMOS22. Finally, they got the result that knowledge management variable has a positive & significant effect on the effectiveness of innovation. So, they concluded that if knowledge management is increasing it will increase the effectiveness of innovation.

Sabina & Navi (2022) implications of digital innovation on startups: challenges & solutions. This paper aims to address the challenges and solutions to startups while implementing digital technology in their business. The paper focuses much on some of the implications of digital innovation on startup as well as uses of digital technologies in start-up. The researcher put on effort to provide certain solutions to overcome challenges of startups due to digital innovation. Finally, they conclude startups require a plan & tools to support their digital innovation goals.

3.0 Research Methodology

3.1 Research design

The study aims to fulfil the parameters of analytical research being conceptual in nature. It has met the requirements of analytical data collection pertaining to concepts such as the role of incubation centre for rural development. The study has also made use of certain quantitative statistical tools such as bar graphs, pie charts and line graphs in order to classify and support the analytical data obtained.

3.2 Sources of data

To achieve the objectives of the paper, the researcher has used secondary sources published from Karnataka Economic Survey 2020-21, Karnataka startup website, articles and research papers related to the topic.

3.3 Rationale of selection of this study

Incubators are institution who supports small entrepreneurs in their promoting stages. Likewise, these centres in colleges are established to develop self-employment and entrepreneur culture in the country from base only. So, these incubators put their efforts towards speeding up the growth and success of startups in the country (Voisey *et al.*, 2006). The main objective of these centres is to facilitate and assisted the small enterprise and startups in their initial stages. It takes small business towards innovation and application of technology in their activities. And it grows a startup from its initial idea to a company that can stand on its own and successful enterprise in future. Facilities

provided by incubators include office space, administrative functions, entrepreneurship education, and mentorship, access to investor for capital and idea generation (Voisey *et al.*, 2006).

Incubators for new businesses assist them by offering administrative and advisory support. The main goal of an incubator, according to the International Business Innovation Association, is to create profitable, successful businesses that can stand alone. Early incubators specialised in working with technology companies or a mix of industrial and service businesses, but more recent incubators deal with businesses from a variety of industries (Yusubova *et al.*, 2019).

Financial Management: Incubators assist startups in reducing operating expenses. The businesses included in an incubator can utilise the same spaces and pool their overhead costs, including rent for office supplies and equipment, utilities, and receptionist services. Startups can benefit from cheaper leasing rates if the incubator is situated in an industrial park with affordable rent. By connecting start-ups with angel investors and venture capitalists and assisting them with presentations, incubators can also assist them with their financial needs. If start-ups get the seal of approval from incubator programmes, they may have more success obtaining financing. (Merrifield, 1987).

Management Support: Startups require not only financial support but also advice on how to successfully take on well-established market incumbents. According to Velocity Global, incubators can use their networks of seasoned business owners and former executives who can offer managerial advice and operational support. A biotechnology startup, for instance, might profit from the advice of former pharmaceutical executives who have first-hand knowledge of the process of drug development and clinical approval. Similarly, former leaders in the hotel sector could educate a restaurant owner about the challenges of expanding abroad. (Hausberg & Korreck, 2020)

Synergies Between Startups: Synergies are a natural by-product of the business incubation process because of the tight working connections that develop amongst the start-ups in an incubator. The ties and networks formed through these partnerships might continue long after the start-ups leave an incubator. Entrepreneurs in different industries can support one another by starting new businesses, and staff members can exchange ideas on creative solutions to persistent issues. According to the business journal Inc.com, startups may collaborate on product development projects and create combined marketing efforts(Weiblen & Chesbrough, 2015)

Incubation Centres in the country: The growth of incubation centres in the country go raise in the period of pandemic where startups entering every sector of the

economy. Incubation centres are established thought the country which are divided by geographically, the following diagram shows the incubation centres in the country (Weiblen & Chesbrough, 2015)

3.3.1 Role of Incubation centres in employment generation

K-Tech innovation hub by NASSCOM: The government of Karnataka in line with its i4 policy has set up a K-tech Innovation Hub at NASSCOM Diamond District, Old Airport Road, Domlur, Bengaluru. The facility has been fully set up and has been operational since 2013. K-Tech Innovation Hub is housed in the premises of Diamond District, Old Airport Road, Bengaluru. It is spread over an area of 37,000 sq. ft. and has a seating capacity of 350 with a 100% power backup, leased internet line, a vibrant ambiance, Conference room with AV facility, over 10 meeting rooms, cafeteria, and housekeeping facilities. The facility offers subsidized incubation space which will help the Start-ups to make use of the ecosystem and in turn help the companies which are in their nascent stages to attract angel investors, venture capitals and enterprises to play a major role in Bengaluru and helping more such Start-ups to thrive and succeed (Thomas *et al.*, 2022).

VLSI LABS, KLE University, Hubballi: Services available at the VLSI Incubation Centre include overall training and development for incubates to create Entrepreneurs, trained, on campus faculty, 30 fully equipped workstations, expert guidance on intellectual property (IP) creation and registrations, skilled industry mentors for product design, system, ESDM and VLSI, techno-commercial help for product & chip design with validation of proof of concept, legal , administrative and accounting help, access to markets and funds through investor networks and access to subsidies through Government policies and various other schemes (Thomas *et al.*, 2022).

Technology Business incubators (TBI'S): Business incubation has been globally recognized as an important tool for job creation and economic development. Establishment of Technology Business Incubators primarily in Institutions with strong R&D focus will enable tap innovations and technologies for venture creation by utilizing expertise and infrastructure already available with the host institution. To foster a strong partnership between R&D institutions and industry, the Karnataka Startup policy had envisaged supporting the establishment of TBI for promoting Innovations in thrust areas such as ICT/IOT/Software Products, ESDM, Robotics, 3D Printing, Healthcare and Biopharma, Agriculture & Allied Fields, Cleantech, Energy, Water & its recycling(Thomas *et al.*, 2022).

Brownfield cluster, Deshpande foundation, Hubballi: The ESDM brownfield cluster has been established over 5,000 sq. ft. and has a fully equipped lab setup

comprising of testing tools and equipment. The objective of setting up this cluster is to host ESDM entrepreneurs and invite other companies from surrounding areas to use the facilities at the ESDM Brownfield Clusters. The ESDM Cluster is a logical step forward towards our conscious focus on hardware. Common instrumentation facilities provided would include bare board prototype PCBs machine, PCB Stencil Printer, Pick and Place machine and other related equipment for PCB design and manufacturing of PCB, Testing & measuring equipment, Dust Chamber, Rain testing chamber, Environment testing equipment, Vibration testing equipment, Video Conference equipment, DG Set and UPS (Kickul *et al.*, 2010).

Incubation Centre at VTU Belagavi Campus: It was good news for the students who come from rural areas and want to begin their own startups, VTU is set to start an incubation centre to startups to work from the idea to product phase. Although the startups must take care of their financing now, the university will provide them a space at its Belagavi campus, where the startups can use the internet, electricity, and lab facilities of the university. The facilities basically provided to their students, alumni and interested faculties to grow them as an entrepreneur (Kickul *et al.*, 2010).

Incubation Centre at KLS Gogte institute of Technology, Belagavi: The centre was established with the mission to promote entrepreneurial leadership across all disciplines, facilitate entrepreneurial activity amongst students, and invite entrepreneurs to use Incubation Centre services to develop end products for commercialization. IT Incubation Centre is open to anyone who wants to make a difference. However, students of KLS Gogte Institute of Technology, both past and present will be given a preference in terms of priority of admission into the incubator and charges as running cost of the incubator. The incubator is also open to faculty from both within and outside KLS Gogte Institute of Technology. Applicants must fulfil above criteria for making an admission in the IT Incubation Centre, for incubation programme (Kickul *et al.*, 2010).

4.0 Analysis and Discussion

The analysis is presented in three section, namely registration of small units and employment during the year 2020 to 2021, secondly, registration of employment exchange for providing employment and thirdly, employment in public and private sector. Table 1 represents the number of small units registered in udyam portal of government with its investment and number of employments through the units. It is result of transformation of youths towards self-employment and creation of job instead of searching. As compared to developed cities such as Bengaluru, Mysuru the developing districts such as Belagavi, Dharwad are also showing good result and they also providing facilities to make youths self-employed through incubation centres.

S. No.	Districts	Units	Investment	Employment
1.	Bagalkot	12	22.81	321
2.	Ballari	22	21.44	611
3.	Bengaluru ®	35	63.18	648
4.	Bengaluru (U)	170	242.84	2915
5.	Belagavi	31	81.99	799
6.	Bidar	15	31.89	235
7.	Chamarajnagar	4	12.14	56
8.	Chikballapur	6	16.84	64
9.	Chikkamangaluru	9	8.17	172
10.	Chitradurga	6	4.26	70
11.	Dakshin kannad	12	10.22	97
12.	Davangere	11	12.02	218
13.	Dharawad	26	28.43	380
14.	Gadag	7	7.96	68
15.	Hasan	14	14.87	242
16.	Haveri	9	18.37	75
17.	Kalaburgi	23	37.84	285
18.	Kodagu	2	2.1	35
19.	Kolar	17	27.07	296
20.	Koppal	18	23.7	198
21.	Mandya	13	15.02	318
22.	Mysuru	22	39.42	434
23.	Raichuru	27	34.05	390
24.	Ramanagar	4	3.78	31
25.	Shivamogga	8	17.42	91
26.	Tumkuru	22	24.13	446
27.	Udapi	11	16.3	94
28.	Uttar kannad	9	18.82	145
29.	Vijayapura	10	18.91	118
30.	Yadagiri	5	13.11	78

Table 1: The Number of Registered Small Units, Investment and Employment forthe Year 2020-21 up to 30 November 2021

Source: Karnataka economic survey 2021-22

In Table 2 the number of job seekers as per the live figures of employment exchange was 3.04 lakhs in November-2021 compared to 3.17 lakh at the end of march-2021, decline of 3.92 percent. There was overall increase of 0.56 in Postgraduates, 5.93% in Graduates and decline of 7.01% in Diploma holders, 8.23% ITI and other certificate holders, 4.14% in Matriculates and Stenographers, and 11.12% in below Matriculation.

Table 2:	Registrants on	the Live	Registers o	of Employme	nt Exchanges in	ı Karnataka

S. No.	Registrants	March 2020	March, 2021	Nov, 2021
1.	Postgraduates	3863	3516	3536
2.	Graduates	49269	45351	48211
3.	Diploma holders	12754	12290	11428
4.	I.T.I Apprenticeship, Other certificate holders	45842	42276	38795
5.	Matriculates and Stenographers	199750	183015	175425
6.	Below Matriculation	30375	30557	27159
	Total	341853	317005	304554

Source: Karnataka economic survey 2021-22

Table 3: Employment in Public Sector and Private Sector (In Thousands)

	Branch	March 2021	June 2021	Percentage variation June 2021, March 2021
1.	Central government	91547	91646	0.11
2.	State Government	543595	542904	-0.13
3.	Central government (Quasi)	165374	164987	-0.23
4.	State Government (Quasi)	163613	163615	0
5.	Local bodies	63222	62652	-0.9
6.	Private sector-Act	1326763	1326061	-0.05
7.	Private sector-non-Act	59928	60099	0.29
	Total public sector	1027351	1025804	-0.15
	Total private sector	1386691	1386160	-0.04
	Grand total	2414042	2411964	-0.09

Source: Karnataka economic survey 2021-22

In the Table 3 organised sector employment in the state has increased by 0.21% from 24.097 lakh at the end of the march-2022 to 24.119 lakh at the end of the March-2020 to 24.119 lakh at the end of june-2020. Public sector employment account for

10.318 lakh (42.88%) and private sector has 13.815 lakh (57.12%), public sector share has declined by 0.14% whereas private sector has increased by 0.26% between March-2020 to June-2020. Organized sector employment in the State has declined by 0.09% from 24,14,042 at the end of the March-2021 to 24,11,964 at the end of June-2021. Public Sector employment account for 10,27,351 (42.55%) and Private Sector for 13,86,691 (57.44%), Public sector has declined by 0.15% and Private sector by 0.04% between June and March-2021.

5.0 Discussion

Our article demonstrates the significance of incubation centres in generating employment based on the information and tables above. Through these incubation centres, young people are given the tools they need to start their own business. As a result, Table 1 shows the number of small businesses (startups) that have been officially registered as well as their investment and employment for the years 2020–21. This data is broken down by district in the state of Karnataka, in that capital city having the highest number of small businesses.

The number of youths with various degrees who have registered for employment exchange is represented in Table 2 of the article. If these youths receive the necessary facilities and training, they may become entrepreneurs with the aid of incubation centers, as they are currently changing their attitudes toward government jobs and wanting to explore themselves in the private sector, these changes are represented in Table 3. Employment in the public and private sectors is shown in the table, with a favourable outcome for the private sector.

Prior research has been done on the value of incubation centres and their resources for fostering the startup culture in the nation. The number of people who have applied for jobs and their interest in starting their own businesses in the private sector in various state districts are shown in this article. Additionally, it comprises incubation centres with a focus on north Karnataka areas, where youth are more prevalent.

The investigation was quite focused and contained information about the state of Karnataka's employment-related data centres. Here, we've included a few incubation centres along with the amenities and activities they now offer to young people. Finally, the scope of our article was the districts of north Karnataka and comparisons to the capital city of the state.

It is found that small units established by the other districts than rest of Bangalore districts are not crossed 50 units. This shows the concentration of incubation centres in the capital city of the state. It also signifies Bangalore is the startup hub of the country. Therefore, it is suggested that the government should take initiation in establishing large number of startups in the various parts.

The comparison of developing cities like Belagavi and Dharwad is done with the developed cities like Bangalore for showing their performance and in establishing small units which is not satisfactory. They also establishing incubation centres to promote entrepreneurial culture in north Karnataka but still they are in promotion stage. Therefore, it is suggested to establish a greater number of awareness and training programs can be organised to improve the performance.

It is found that how many youths are registered for employment and they are seeing forward for promotion of their ideas and necessary facilities. So, need to create an opportunity to get more job opportunities.

It is understood that the percentage of people working under government shows less interest as compared to private sector. It shows the attitude towards government job is now changing and everyone want to expose their talent through their own unit or project. It is suggested that the government should come up with good proposals to attract more youths.

6.0 Conclusion

As we mentioned starting of the paper that incubation centres are the need to promote entrepreneurs in the country and necessarily in the rural area. The centres are now opening their units in north Karnataka districts to provide entrepreneurial education and boost the ideas of youths. But observing the data of employment in private sector and small units registers by districts are not satisfactory one. So, we can conclude here that incubation centres should be establish everywhere not in capital city and facilities given by them should be reached to the needy person.

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The Influence of E-shopping and Brand Loyalty on Purchase Intention of Skincare Products: A Case Study in North Karnataka Region during COVID-19

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ABSTRACT

This paper provides abundant information on the province of brand loyalty for skin care products towards E-shopping during COVID19 Pandemic among customers in North Karnataka region, India. There are five major factors of brand loyalty during pandemic which have been verified in this study. Those factors are frequency, necessity, mode of payment, price & accessibility of product/service. Five hypotheses were proposed and verified by using SPSS software. A sample data set of 427 was drawn. The five-point Likert scale has been applied in gathering the data. The researchers intended standard deviation and statistically examined the distinction evaluations factors which affect purchase of skin care products, where p value in Chi-square was used for testing the hypotheses. It was witnessed that nearby 68% of customers spent less than ₹1000 on skin cares during COVID 19 pandemic and around 56% of customers preferred to buy Himalaya brand when compared to other brands.

Keywords: COVID19 Pandemic; Brand Loyalty; E-Shopping; Skin Care.

1.0 Introduction

The COVID-19 pandemic, which occurred in late 2019 in China and blow-out

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*****Principal, Department of MBA, City College, Bangalore, Karnataka, India (E-mail: mveenaangadi@gmail.com) worldwide during 2020, has created substantial administrative, financial, and social changes.

The instant economic impact of the COVID 19 pandemic created to develop vibrant, which subsidized to scenery a world-wide emergency proposal and expertise situation purposes. (Hashem, 2020). During COVID 19 pandemic the customers buying behaviour changed they started buying the products through online and reduced their transactions offline due to safety and it was convenient to make the payments and the products were easily available, many customers who were loyal towards particular brands switched their brands due to unavailability of products.

According to (Areiza-Padilla *et al.*, 2021), Quarantine times due to the COVID pandemic enforced lots of individuals to unmatched condition in the contemporary antiquity of humankind has produced a novel procedure of consumer behaviour, in which the online ecosphere was the countless atmosphere.

1.1 Rationale behind the study

Satisfaction creates a positive association between the service provider and the customers which helps in developing brand loyalty. (Le, 2021). The concept is extensively validated in the prevailing literature in terms of predicting the purchasing behaviour of consumers who opted E-shopping. Equally, this study employs impact of E-shopping and to recognize how the COVID-19 pandemic has transformed brand loyalty establishment in the skin care products. According to (Losada-Baltar *et al.,* 2021). Undesirable sensitivity of mature was found to be powerfully connected with demonstrative conclusions.

Enlightening brand loyalty has been the critical objective of companies in the skin care category. (Kim *et al.*, 2021).

Hence, abundant studies categorize numerous pouring forces of the expansion of brand loyalty. According to (Mouratidis & Papagiannakis, 2021) A range of situations must to be inspected as online shopping activities were embraced in fluctuating steps in changed surroundings. Looking at the data on E- shopping during COVID 19 pandemic is beneficial for analysing assessments on probable modifications.

In this paper, we wish to speak and deliver the impact of E-shopping on brand loyalty among customers in North Karnataka region during COVID 19. How the customers used electronic methodologies for buying skin care products. Factors used in the study were governed by on the carters of brand loyalty variation which includes frequency, necessity, mode of payment, price & accessibility of product/service.

1.2 Objectives of the study

- 1. To examine the shift of customer orientation towards e-shopping during COVID 19 pandemic in North Karnataka region.
- 2. To examine the effect of e-shopping on brand loyalty for skin care products among customers.

2.0 Review of Literature

Brand loyalty helps in developing long term association with the customers. Brand managers must possess in attention that when a customer purchases a brand, they narrate their personality to the brand which creates brand loyalty. (Ghorbanzadeh & Rahehagh, 2020). Brand loyalty is done through providing a higher value, which in turn endorses customer loyalty, and subsequently benefits in growing the market share and share of the attention. (Joseph *et al.*, 2020). According to (Dick & Basu, 1994) and (Oliver, 1999), brand loyalty can be defined as "an extremely held promise to utilize a product/service". According to (Jewargi *et al.*, 2022). Business can gain the loyalty of the customers by delivering the products as per the customers' requirements. A customer will never switch to other brands until he or she is unhappy about the products and services provided by the existing brands. So, the brand managers should make sure they always keep the customers satisfied.

As discussed in the introduction the offline market is slowing losing is charm in the market. Since few years people are switching from offline market to online market, as they comfortable with the products and services. During COVID 19 customers were more comfortable buying products through online. According to (Galhotra & Dewan, 2020) Business professionals have labelled E-shopping as the greatest support system in providing the individuals in the towns under lockdown to battle alongside the pandemic. Dropping the likelihood of shopping personally because of the amidst of the COVID 19, the marketers must flinch constructing their purchaser loyalty over electronic podiums. (Al-Khayyal *et al.*, 2020). Though the World Health Organisation deep-rooted that the emergent COVID is transferred through coughing and sneezing sprig, it strained the facility to communicate it through outsides and paper moneys which formed an enormous enhancement between customers to embrace e–shopping.

As there are various skin care brands available in the Indian market, it could National or Global brand. Customers buy the skin care products on daily basis and few customers are very loyal towards the brands which they are using. With portfolio and consignment processes prepared to gauge up are recording e-shopping had mounted double as their pre COVID 19 Levels for skin care brands. (Gerstell *et al.*, 2020). Skin care brands have used distinct type of digital marketing approaches with a precise purpose to increase their business digitally. Customers pursue for representative and appearance paybacks of the skin care products, which outcome in their contribution for premium brands. (Kang & Shin, 2020).

Changes in customer brand loyalty during COVID 19 and the frequency of the purchases was reduced for skin care products as there was restrictions imposed by the government and only essentials was sold initially. According to (Jensen *et al.*, 2021) The younger generation and the families with good income and those who are employed individuals their frequency was high with regard to online shopping irrespective of extension of the pandemic. The frequency of e- shopping was high among young generation during pandemic as they found the eye-catching elements and few were foremost elements of offline shopping. (Aryani *et al.*, 2021).

During COVID 19 most of the countries felt the necessity of buying the products online as there was social-human-economic concerns and most of the customers gave high priority to food products as it was more necessary when compared to other products. (Alaimo *et al.*, 2020). The offline retailers thought of changing their pattern of selling the products, even they opted online platform they started taking orders online through calls and whatsapp, as there was a high demand for the products and assumed that there will be demand for offline market in the future. (Sinha *et al.*, 2021). So we can see how COVID 19 changed the necessity of the customers and even the retailers who were selling offline had to adopt online platform as there was a necessity created by the customers.

Many customers during pandemic started making the electronic payment by credit cards, debit cards and mobile payment options like Bharatpe, phonepe, Google pay, Paytm and many other electronic payment options as they felt that its safe way to make the transactions. According to (Upadhyay *et al.*, 2022). Various companies like amazon, flipkart and others started accepting digital payments from the customers as they had no other choice but had to accept digital payment services as it would be contactless with the service delivery and safe for the customers. COVID pandemic has fortified customers from rural community and urban to use the digital payment. As per the current inclinations we can see a constant upsurge in implementation and usage of digital payment solicitation as customers are conscious and accepting its applicability. (Gupta & Singhal, 2021).

During pandemic customers did not notice the increase in the price of the products, when realised it affected the purchase behaviour of the customers. The equality awareness may be intermediated by the customer's perception of the company's market authority. (Roggeveen & Sethuraman, 2020). According to (Balleer et al., 2020). The companies which were positively impacted increased the prices of the products, while companies which were negatively impacted decreased their prices. So, the outlines are reliable with the opinion that demand shortages take over the opposing influence of pandemic. From the above we can say that how the companies changed the prices of the products and at the same time how the customer behaviour changed during pandemic due to shift in the price.

According to (Figliozzi & Unnikrishnan, 2021). Bigger companies and chains were able to deliver the products to the customer's home during pandemic, whereas small retail chains and local retail business could not serve home delivery of the products as they were lacking with the resources, so the accessibility of products was not provided by all the business. During pandemic accessibility to water was deteriorated for the people who were carrying the water from extended distance as there were little efficient water bases available from the number of residents. (Rafa et al., 2020). It can be said that during pandemic the customer had a tough task for accessing the products and few businesses could not deliver the products to the customers.

3.0 Research Methodology

3.1 Research design

The researchers have implemented quantitative method in order comprehend the hypotheses. Questionnaire was developed and looked in two foremost segments; the first part was about the demographics of the sample and the second part was related to the proclamations of the factors. It was mainly done to understand the influence of eshopping on brand loyalty among the customers for skin care products during COVID19. Population of the study were the all the customers of North Karnataka region who opted online shopping. Sample random of (500) individuals were exposed. The researchers found total (427) questionnaires which were accurately filled and prepared to be exposed to statistical analysis with a response ratio of 85.4%. Cronbach alpha is used to check the dependability of the measure, as discussed by (Sekaran & Bougie, 2016) it is found that the questionnaire is consistently subsequent it is greater than accepted percent 0.60.

3.2 Sources of data

The To gather the applicable information a structured and five-point likert scale questionnaire was used. The researchers have managed and got it checked by the professional after undertaking mock testing. A mock check was completed to review the

questionnaire. The initial portion of the questionnaire transacts through demographic evidence of the respondents, while subsequent portion transacts by means of the consumer behaviour towards E-shopping.

Therefore, range to understand the accepted research purposes, following research methodology was executed through the investigators. Finally, to confirm the strength of the results, it was envisioned to examine the result of five impacts on brand loyalty. So, we will have measured 5 Hypotheses:

 H_{01} : There is no influence of COVID 19 over (Frequency) variable used as a instrument for consumer brand loyalty through impacting the inclination towards e- shopping.

 H_{02} : There is no influence of COVID 19 over (Necessity) variable used as a instrument for consumer brand loyalty through impacting the inclination towards e- shopping.

 H_{03} : There is no influence of COVID 19 over (Mode of payment) variable used as a instrument for consumer brand loyalty through impacting the inclination towards e-shopping.

 H_{04} : There is no influence of COVID 19 over (Price) variable used as a instrument for consumer brand loyalty through impacting the inclination towards e- shopping.

 H_{05} : There is no influence of COVID 19 over (Accessibility of product/service) variable used as a instrument for consumer brand loyalty through impacting the inclination towards e- shopping.



Figure 1: Conceptual Framework

Source: Literature review

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To perform the data analysis and hypothesis, Chi-square test has been used by the researcher. Chi Square equations is mentioned below. (Figure 1).

 $\chi 2 = \sum (\text{Oi} - \text{Ei})2/\text{Ei}$ = Chi Squared, = Observed value, = Expected value.

4.0 Analysis and Discussion

4.1 Sample characteristics as per demographics

As specified in Table 1, we can say that the total male customers were 258 and female respondents were 169. In the age group column, it shows that 84% respondents were between age group of 21-30. Next, the additional demographic profile of the respondents is available in Table 2.

Gender	Frequency	%	Age Group	Frequency	%
Male	258	60%	Below 20	1	0%
Female	169	40%	21-30	359	84%
			31-40	43	10%
			41-50	19	4%
			Above 50	5	1%
Total	427	100%	Total	427	100%

Table 1: Gender and Age Group

Source: Data from the present study

Table 2: Education and Occupation

Education	Frequency	%	Occupation	Frequency	%
SSLC/10th	0	0%	Student	359	84%
PUC/12th	1	0%	Services	42	10%
Undergraduate	67	16%	Home maker	5	1%
Post graduate	359	84%	Business	21	5%
Total	427	100%	Total	427	100%

Source: Data from the present study

Out of 427 respondents, 359 were post graduate and 67 were under graduate. There are 359 respondents who were college going students, 42 were into services, 5 were homemakers and 21 respondents were from handling business. Hence, the

researchers analyse that most of the respondents were students and considered as the young generation (Table 3).

Frequency of E-shopping during COVID 19	Frequency	%	Annual spends on E-Shopping	Frequency	%
Once/month	298	70%	Less than ₹.1000	292	68%
Twice/month	58	14%	र.1000-1500	85	20%
3 times/month	47	11%	र.1500-2000	38	9%
+4times/month	24	6%	र.2000-2500	7	2%
			More than ₹.2500	5	1%
Total	427	100%	Total	427	100%

Table 3: Frequency and Annual Spends of E-shopping during COVID19

Source: Data from the present study

It evidently indicates that 70% of the respondents did online purchases once per month. 68% of the respondents spend less than \overline{x} .1000 on skin care products annually in North Karnataka region. While only 1% spend more than \overline{x} .2500 on the on-skin care products annually.

4.2 Descriptive statistics of consumers during COVID-19

From Table 4, we can evaluate that the frequency sensitively impacts the customers to buy products online. In precise, shopping occurrence deviations are as per the condition is measured as important frequency features by the online shopping buying customers.

Table 4	Frequency	of E-shopping
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Frequency	Average Score	Std. Dev
I generally tend to do shopping twice a month	3.15	0.89
I incline to use vouchers	3.37	0.89
I do shopping each period I find myself free	3.08	1.09
My shopping activities are all prearranged	3.17	1.02
My shopping occurrence deviations are as per my condition	3.64	0.80
Overall rating	3.28	0.94

Source: Data from the present study

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Based on Table 5, it can be observed that necessity of online shopping during pandemic are considered as important factor while purchasing skin care products. From the above data we can analyse that customer did online shopping of skin care products only if it was really required during pandemic.

Necessity	Average score	Std. Dev
I do shopping, if it's really required	4.03	0.95
I would purchase items, if on discount	3.63	1.07
I do shopping as it saves time	3.46	1.14
I incline to try new products	3.23	0.99
I track all my expenditures on monthly basis	3.31	1.16
Overall rating	3.53	1.06

Table 5: Necessity of E-shopping

Source: Data from the present study

Referring to Table 6, mode of payment is measured to be a noticeable aspect in buying skin care products. The respondents proved that they were comfortable making the payments through cards as it supported online shopping during pandemic.

Mode of payment	Average Score	Std. Dev
I prefer to pay in cash	2.94	1.10
I am comfortable with card payments	3.62	1.01
My card supports e-shopping	3.77	0.93
I trust online mode of payment	3.59	1.02
Scam is the biggest fear which bothers me	3.47	1.06
Overall rating	3.48	1.03

Table 6: Mode of Payment for E-shopping

Source: Data from the present study

As we can see in Table 7, price plays an important role during pandemic. It can be perceived in the above figures that the customers compared prices with different online shopping platforms before buying the products. In return this helped the customers to get the products as per their price they were willing to buy the products.

Price	Average Score	Std. Dev
I compare product prices between different platforms	4.05	1.00
I prefer domestic products when compared to global as they're not		
expensive	3.56	0.94
I am comfortable paying additional for quality products	3.68	1.01
If prices are high, I check for substitutes	3.59	0.94
Overall rating	3.72	0.97

Table 7: Price of E-shopping

Source: Data from the present study

As can be seen in Table 8, the respondents showed considerable importance to accessibility of product/service towards their buying behaviour. In detailed, the customers contributed added prominence to the products if they were not obtainable in the stores then they looked for online as most of the products were available online during COVID 19.

Table 8: Price of E-shopping

Accessibility of product/service	Average Score	Std. Dev
I frequently look for products which are delivered on time	3.73	0.93
If the product is not accessible in stores, then I don't look for it online	3.03	1.13
If the product looked to be essential, I would look for it online	3.69	0.82
I don't buy products online unless its cash on delivery	3.04	1.17
If the products are not obtainable in stores, then I look for it online	3.76	0.91
Overall rating	3.45	0.99

Source: Data from the present study

Based on Table 9, it can be observed that most of the customers bought Himalaya brands when compared to other company brands as it was easily available during pandemic and even the features and quality of the products is good when compared to other company brands.

As indicated earlier, effects were proved for statistical association of the distinction of the plentiful factors built on the five independent variables. For the persistence to experiment the hypotheses, the average prominence score which is 1 for each factor was connected with the "Strongly Disagree", and p value in Chi-square was used for testing the hypotheses.

Which skincare brands, you bought through	Frequency	%
E-snopping during COVID 19		
Biotique	5	1%
Dove	5	1%
Ethiglo	5	1%
Good vibes	5	1%
Himalaya	241	56%
L'oreal	5	1%
Lakme	9	2%
Lotus Herbals	4	1%
Mama Earth	46	11%
Minimalist And Derma	1	0%
Neutrogena	1	0%
Nivea	36	8%
Others	16	4%
Nykaa	5	1%
Olay	4	1%
Patanjali	27	6%
Soapcraft	5	1%
Wipro	3	1%
Wow	4	1%
Total	427	100%

Table 9: Brands Purchased through E-shopping

Source: Data from the present study

4.3 Results of hypothesis testing

Constructed on the outcomes as accessible in Table 10, all the impacts specifically frequency, necessity, mode of payment, price & accessibility of product/service were associated with lowermost prominence score which is 1. P value was intended by using Chi-square method. 5% significance level was taken into concern. Successively, there were 427 observations. The outcomes of hypotheses testing are stated in the succeeding table.

Table 10 demonstrates that all the null hypotheses are rejected, which means that COVID 19 had a positive influence over customers brand loyalty along with the approved variables through growing the inclination towards online shopping.

Null	Factor	Average	Std Dov	D Voluo	Conclusion	
Hypothesis	Factor	prominence score	Stu. Dev	1 - v alue	Conclusion	
H ₀₁	Frequency	3.28	0.94	0.000702	Reject H01	
H ₀₂	Necessity	3.53	1.06	0.000952	Reject H02	
H ₀₃	Mode of payment	3.48	1.03	0.000148	Reject H03	
H ₀₄	Price	3.72	0.97	0.000395	Reject H04	
H ₀₅	Accessibility of product/service	3.45	0.99	0.000112	Reject H05	

Table 10: Brands Purchased through E-shopping

Source: Data from the present study

The main facts to be debated are maximum of the defendants are students who belonged to the age group of 21-30 (84%), which gives a clue of credible segment of customers who buy skin care products through online. It was also detected that 68% of the customers spend less than \overline{x} .1000 yearly on skin care products during pandemic which delivers a responsiveness of how much they spend online. 70% of the customers chose online shopping once a month. Auxiliary, it was found than 84% of the respondents are post graduates, which might show a high level of awareness.

Next, the influences which have been inspected namely frequency, necessity; mode of payment, price & accessibility of product/service provocatively affects the consumer choice of skin care products through online shopping among customers in north Karnataka region. Out of the above specified influences customers contributed additional importance to price of the products as the average rating was 3.72; while necessity is 3.53 respectively. Thus, the businesses should work on the prices of the products during unconditional stations like COVID19 pandemic so as to increase brand loyalty among customers of north Karnataka region. The above quantified results specify that the north Karnataka region customers of skin care products confirm considerable brand loyalty to select of the products online and their movements are influenced by the five factors as indicated before.

5.0 Conclusion and Implications

From centered on what was stated above, study interrogations were responded and the pandemic of COVID19 played a part in changing customer behaviour towards accepting e-shopping and contingent on it as a daily life optimal. This research study envisioned to inspect the factors that affecting customers in towards online shopping due to pandemic and to test the brand loyalty of the customers towards the skin care

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products. The researchers also measured the effects of customer purchase behaviour from offline to online. In terms of the research domicile, the researchers have preferred north Karnataka region. From the testimonial investigation, the outcomes exposed the below declared opinions. The impacts like frequency, necessity, mode of payment, price & accessibility of product/service they had suggestively positive influences on the customer online purchase decision and the brand loyalty. The findings were consistent with (Hashem, 2020). In the research, the scholars examined the factors affecting online buying behaviour of Jordan customers during pandemic, the results exposed that the variation of customer behaviour throughout pandemic was accredited to demographic variables largely gender in which female seemed to be extra subjective. Whereas in our study we found that pandemic was attributed to demographic variables in which male customers in north Karnataka region gave more prominence to price and necessity of product which effects in building brand loyalty.

From the appeared outcomes, a marketing manager or a firm can relate in the trade growth to match and meet buyer necessities. If the customers are brand loyal, they will never shift to other brands even though there is upsurge in prices for the products but at the same time the marketer should make assured they retain the customer by not dropping the loyalty from them by providing the products as per their necessities of the customers. This study concludes that if skin care business wishes to relish brand loyalty of the consumers for their products in uncertain conditions like pandemic; mostly in north Karnataka region, they must grind more on the examined factors like frequency, necessity, mode of payment, price & accessibility of product/service, in specific the firm must emphasis on price of the products and the necessity of the customers as they have sturdy impact in formative the brand loyalty of consumers in online shopping for skin care products.

The study which has been piloted has got particular limitations which have to be documented. The primary limitation of the study was it was accompanied only for the customers in north Karnataka region and the sample (N=427 respondents). A greater sample could subsidy in additional purgative the study. The paper is available only for skin care products. Associated study can be conceded out for other skin care products.

The study would like to suggest steering research by spreading the extra evidence congregation tools additional other than spending only a questionnaire. The study was proficient to bring major understanding into brand loyalty of customers in north Karnataka region for skin care products.

The imminent study might emphasis on other regions like Bangalore, South Karnataka, Delhi, Mumbai, etc. To gaze on the resemblances or the alterations between

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outline of the factors that will seem leading when customers decide to buy their skin care brands without shifting to other brands. Businesses must make sure they come up with best marketing tactics so that they generate more business through online during pandemic they should also cultivate a solid e-shopping approach.

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Role of Sports in Social and Economic Development of an Economy

George Rodrigues* and Arshan Mohammad Kashanatti**

ABSTRACT

History of sports dates back to the ancient times and has been a source physical activity, mental stability and specific skills. Once a leisure time activity has become a social and economic phenomenon for the masses. The purpose of the paper is to study the role of sports in social and economic development of the country and what are the various strategies to overcome the problems underlining the development process. The study is purely conceptual in nature and is based on various ideas generated from different literature review and reports. Role of India in the sports sectors through generation of income from sports has grown immensely over the years. The article is bounded with theoretical grounds with less of statistical database to prove the authenticity. It can be concluded that sports when used in a wise manner can fostering development and peace across nations and can bring economic profits.

Keywords: Sports; Social; Economic; Development.

1.0 Introduction

In general sports can be termed as any activity which involves physical exertion, mental stability and specific skills through which an individual or team competes against others for the purpose of self-achievement, physical and mental well-being, building social relations and entertainment. Once considered a leisure time action reserved for handful, sports now serving as a social phenomenon for the common people in today's World. History of sports dates back nearly to 3000 years ago, which was often an activity for war and hunting training which was identified by the games which involved throwing spears, stakes and rocks, and fighting one-on-one with opponents.

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With the advent of Olympic games in 776 BC sports was officially introduced to the world. The games played in the current era are an evolution of the games of ancient times. It cannot be formally justified the advent of sports in India but it is believed sports in India was witnessed since the Indus valley civilization. As Indian were one of the most modern and developed civilizations since the ancient times, various shards of evidence provide information on the exitance of early form of chess, invented dice, hunting and boxing were practiced then. An activity having early links to warfare has now evolved to an event for maintaining and promoting peace, social and economic development of nations, source of entertainment and a pass-time activity for many.

Sports teaches lessons of social change as it involves development of basic human skills. Application of sports to encourage peace and development was well known, but yet until the recent times sports remained side-lined from mainstream humanitarian and development programme. Among the passion areas of human beings, there is nothing more loved by people than sports, which has become one of the most effective public relations tools used by the country to develop people and society. Sports play an important role in the Indian economy; the country has a long history of sports and sports are a part of culture.

In India, people follow various sports with curiosity and participate in them with enthusiasm. But the role of sports in the development of economy needs to be studied, hence, this study is undertaken to understand this aspect of sports and economy.

1.1 Objective of the study

In today's world, sports have become an important part of the country's economic development. Participation in sports increases the health and productivity of individuals and communities, helps reduce health care costs, improves self-discipline and behavior, and improves well-being. Hosting major sports events contributes to the development of the country by helping to improve infrastructure, create temporary and permanent employment, attract foreign investment, and train players and athletes. Therefore, we can clearly say that sports have a lot of impact on the business world and society. People participate in sports and physical activity for many reasons, such as enjoying themselves, improving their physical and mental health, and gaining health. The aim of this study is to understand the importance of sports in the development of the social and economic structure of the country and to understand that sports have become a commercial organization

2.0 Literature Review

Sports have emerged as a powerful tool for promoting social integration, physical well-being, and economic growth in societies worldwide. This literature review aims to provide a comprehensive overview of the extensive body of research on the multifaceted impact of sports on the social and economic development of economies.

Social Impact of Sports: Sports have been acknowledged as a catalyst for fostering social bonds, promoting physical and mental health, and enhancing community cohesion (Brown, 2018). Participation in sports not only improves overall health but also nurtures essential life skills, such as teamwork and leadership (Eime *et al.*, 2013). Moreover, sports act as a platform for diversity and inclusion, breaking down barriers based on gender, ethnicity, and socio-economic background (Chalip, 2006).

Economic Impact of Sports: The economic implications of sports are substantial. Hosting major sporting events, such as the Olympic Games or FIFA World Cup, brings significant economic benefits to host countries (Baade & Matheson, 2016). These megaevents generate revenue through tourism, infrastructure development, and job creation (Szymanski, 2017). Beyond event hosting, the sports industry encompasses various sectors, including broadcasting, merchandise, and fitness, contributing significantly to a nation's GDP (Deloitte, 2020).

Health and Education: Participation in sports is linked to improved health outcomes. Regular physical activity reduces the risk of chronic diseases, including obesity and diabetes (Warburton *et al.*, 2006). In educational settings, sports programs enhance academic performance and character development, promoting holistic student development (Durlak *et al.*, 2011). Sports scholarships offer underprivileged individuals opportunities to access higher education, addressing issues of social mobility (Eitzen & Sage, 2009)".

Infrastructure Development and Tourism: Investments in sports infrastructure lead to long-term economic development. World-class stadiums and facilities attract events and visitors, contributing to tourism growth (Preuss, 2007). For example, Barcelona's development of sports infrastructure in preparation for the 1992 Olympics had enduring economic benefits (Flyvbjerg, 2007). Such investments often result in broader urban renewal projects.

While the economic advantages of hosting major sports events are evident, there are critical voices questioning the costs and benefits (Matheson, 2012). Critics argue that economic gains may be overestimated, and event costs can outweigh the advantages (Baade & Matheson, 2016). Moreover, commercialization, ticket pricing, and unequal access to sports can raise concerns about social equity.

Sports occupy a central role in shaping the social and economic landscape of societies. They contribute to health, education, community cohesion, and economic growth. However, the complexities of sports development require careful consideration, and future research should continue to explore the nuanced impacts of sports on society and the economy.

3.0 Research Methodology

3.1 Research design

This research is conceptual in nature and based on ideas gained from review of documents, reports and website. It is defined and classified according to effectiveness or level of evidence.

3.2 Rationale of the study

Sport can lead to social change through the use of sport in personal development. In the United States, sports-based social development is called sportsbased youth development. Sport as a physical activity can be a tool for peace and development; because sports programs help children live a long life. In addition to achieving personal goals, sports can also help achieve social goals. The Olympics taking place today is an example of this; It has allowed people to unite in their efforts to achieve world peace and to express their feelings for personal growth. Using sports for social development is an unconventional way to create happiness, strength and equality in society. There are many theoretical ideas that sport works as a way of good change and development and aims to achieve this: courtesy of participation and recognition through sport.

- Rationale Level: It demonstrates the skills, integrity and support of participants focusing on skill development.
- Physical level: Sport can promote communication between oppressed, underprivileged and underdeveloped groups and make them feel included in society.

For the above reasons, sports can promote social development in five ways.

- 1. Games to support women
- 2. Games support children's development
- 3. Games promote professional development
- 4. Sports awareness for social problems
- 5. Sport promotes rehabilitation of refugees

Sport has a huge impact on economic growth and job creation; These sports are also a tool for local and regional development, urban development and urban development. The integration of sports has created a new sport, benefiting from the development of various industries such as tourism, finance, infrastructure and other businesses. In today's world, sports are linked to the economy, often in conjunction with the private sector focused on short-term profits. Areas with potential for sports, planning and maintenance can provide strong support to the sustainable development of sports communities. From a business perspective, professional sports provide entertainment to consumers and viewers derive psychological benefits from using these services. Therefore, they are ready to pay for these services, and the more services offered, the higher the price. Therefore, the income from sports services is comparable to other sectors. In general, sports aims to provide services, infrastructure and equipment; On the other hand, he knows the business of the three-level phenomenon, that is, turning some sports competitions, clubs and sports into existence; through publicity, business policy, advertising policy, promotion of the importance of sports as a result of the business environment; sports - creating businesses related to sports equipment, sports facilities and sports facilities (Razvan, 2020).

Investing in sports has the power to change a person's life physically, mentally and financially. It improves one's physical, mental, emotional, health and development and also helps with business, tourism etc. worldwide. It also helps create culture and community. These factors alone suggest you invest in the game. The reason or purpose of this study is to understand and examine the social and economic contribution of sports to the economy and how and how sports can be encouraged for economic development.

4.0 Analysis and Discussion

In general, social development refers to improvement in well-being of each and every individual in society to reach their full potential and capacity i.e., a society is said to perfect and successful when the well-being of each and every citizen. As per the Copenhagen summit of 1995, social development can be defined under three criteria i.e., eradication of poverty, employment opportunities and social harmony. Social development is a balanced set of social skills and learned adaptive behaviours that enables an individual to interact well with other people, react positively and avoid behaviour that has negative consequences. Cooperation, responsibility, empathy, selfcontrol and self-reliance are considered to be components of social development (Sami *et al.*, 2015). Sport is termed as a physical activity which develops an individual, health and social-economic benefits. The current scenario of sport can be a driver for achieving peace and development, personal and community goals. Sport in its way brings in social change i.e., it brings changes into the social order of the society which includes social institutions, behaviours and relations.

Sports plays a significant role in the transformation of an individual wherein it enacts to be the major transmitting force to develop physically, emotionally, socially and psychologically. But the modern sports regime is growing way beyond an individual and the merits can be sports drives a powerful vehicle for achieving broader issues like development and peace agendas

4.1 Transformational power of sports on an individual

Significant evidences have been noted where participation in sports can impact social life of an individual and how it helps in transforming an individual. The major evidence concerns health benefits i.e., prevention and reduction of physical and mental health problems and helps save expenses on health care. Participation in sports has apparent positive outcomes in improving physical health, like flexibility, strength, weight control, co-ordination, motor-skills etc. It aids an individual to develop decision making capacity and leadership abilities by managing both success and failure. Sports develops healthy social development and interaction in a person and these social skills can improve ability to succeed in all walks of life. Negative health effects from sports are the injuries occurred during the commitment time, but these injures are typically minor injuries but sometimes may be fatal.

There is also significant evidence that participation in sports improves leadership (Taylor *et al.*, 2015). Sports also provide an alternative to reduce unhealthy behavior by establishing sufficient standards, discipline, and motivation to keep people away from drug use (USAID, n.a.). Few studies have measured the relationship between sports participation and crime rates, including drug use, alcohol use, violence and behaviour, and culture. But different risk factors can distinguish young athletes from most teenagers.

The former is often the culprit, but it is not the same as the former because sport promotes self-control. Sport creates economic capital and the health of people in society. Social capital refers to the network of relationships between people. Social capital supports the development of social skills such as self-esteem, cooperation and selfefficacy. It creates relationships of connection, communication, and relationships by reducing relationships, integration, and community participation. The impact of sport on personal health is linked to physical and mental health; as well as social behaviour, education and financial resources.

Table 1 is representation of how sport has an impact on the social, health and economy from three different spheres. At the individual level sport develops stronger values and empathy from social view, healthy well-being from health view and from economic point of view it inculcates happier and productive workforce to drive the economy. At community level it brings in community integration, develops healthy communities and generates new employment opportunities at social, health and economic dimensions, respectively. At the societal sphere it brings in consistency between communities, it reduces cost with respect to health morbidities and builds a stronger economy.

Table 1: Impact of Sports on Social, Health and Economic Spheres

	Social	Health	Economy
Individual Laval	Stronger Values and	Health and Well being	Happier and
maiviauai Levei	Empathy	rieatui and wen-being	Productive Workforce
Community Loval	Community	Haalthy Communities	New Employment
Community Level	Integration	nearing Communities	Opportunities
Society Level	Consistency between	Cost Savings	Stronger Foonomy
Society Level	Communities	Cost Savings	Stronger Economy

Source: Czupich, 2020.

4.2 Sports as a driving force for peace and development

The inception of Olympic games is the best example of sports being used for some greater purpose other the individual development. Since the earlier times sports has been used to promote peace and development, but in the modern era it has gained immense significance. The UN Task Force on Sport for Development and Peace concluded sports as a cost-effective tool for meeting various peace and developmental challenges, and can help in achieving the United Nations Millennium Development Goals (MDGs). At the ground level various agencies, international organizations, governments, sports federations, committees have hosted effective ways to leverage the power of sports. The following areas represent broader development agenda:

4.3 Humanitarian response

During any form of crises sports programs can play a vital role in overcoming stress, healing of wounds of emotion, reinstating normalcy and generating an opportunity

for strong social interaction. In case of refugee camps sports activities can breakdown the boredom of day-to-day life to have enjoyable moments. Sports can add benefit by gathering people in one place and can use to bring in an opportunity for public educational activities.

4.4 Reconciliation and peace building

Sports doesn't have a language as a barrier rather it is a common dialectal that bridges cultural, ethnical and geographic divides. Sports has been taken up as an initiative to endorse understanding of countries in conflicts. Sports helps in establishing international diplomacy and communication between nations and acts as political dialogue.

4.5 Social and policy change

With the capability to bring people together, confidence building, team effort, public interest and media attention sport acts as a powerful instrument in exposing societal and policy change. Women or persons with disabilities through sports have an opportunity to put forward their voice, both individually and collectively, that they can use to bring about change in their own lives and community.

4.6 Physical education

Physical education is a critical component for overall development of an adolescent as it helps in improving body structure and develops healthy habits in children. It also enables children to improve concentration and performance in academic courses. Further, sports can address broader health and safety issues and ensure all children, to have an opportunity to participate in sport. With respect to the above discussion, it is evident that investments in sport is an appropriate instrument for solving many social problems. Sports contribute to the national identity building, community development and integration, health enhancement, education advancement, crime preclusion and economic benefits. Physical activity helps in reducing the negative impact of the aforesaid phenomena. It brings in a positive change at the individual, community, and society levels.

4.7 Discussions

"Economic development refers to programs, policies or activities which seek to improve the economic well-being and quality of life of a community. Each and every economy has their own opportunities, challenges and priorities. Success of economic development planning includes the people who live and work in the community. Economic development strategies aim for employment creation, better quality of life, making and selling of local products, and productive use of available resources. In the wake of developing the sports in today's World plays a vital role by applying all the above said strategies. Although sport is an area which requires more attention and research, but yet evidences prove that sport can spur economic development".

"Sport can be an effective stimulus for economic development especially at the local level (Abeku & Musa, 2014). The linkages between elements of sports sector can be harnessed locally and gain the economies of scale by creating activity, job and wealth. Construction of sports facilities and development of sport for entertainment purpose creates job by manufacturing sports equipment's and marketing opportunities across the nation. By encouraging sport and sport-based economic activities, it is possible to initiate a "virtuous circle" in which new forms of activity are generated, requiring additional goods and services, creating jobs and contributing to economic development (Abeku & Musa, 2014). In industrially developed economies sport has grown to make its own commercial branches which contributes at least two percent to the national income of a country. Now the major challenge bestowed up front is how sports can act as an economic factor in LDCs so as to gain opportunities reaped by developed nations".

4.8 Sport for economic development strategies

Sports has a major role in economic development of the country but its role cannot be over-emphasized as such because sports contribution is minute in comparison to the other sectors of the economy. For the attainment of sustainable economic development, the following strategies can be inculcated.

Production of Sports Goods: The new era has witnessed high demand for sport goods across the nations as the youth is participating in various sporting activities and the demand is yet to be fulfilled in most of the less developed counties. Despite availability of raw materials such good are not produced on a larger scale in these countries. Basically, these goods imported from other developed countries putting an economic burden. These economies can grab an opportunity and create a space for local small and medium enterprises to manufacture sporting equipment's at affordable prices.

Sport and Employment Generation: Sport is an effective instrument for employment generation. This point is linked to the above-mentioned sub point as the manufacturing sector develops it demands for more and more employment which benefits many. By developing community-based programmes can create jobs, particularly for young people. Different sport talents with great potential can be developed through participation in local sport competitions so that the individuals can graduate from amateurism to professionalism.

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Sport and Employment Training: Play-related games can improve employees' resources rather than increase productivity. It is an important aspect of vocational training because it teaches skills such as the value of effort and teamwork, thereby increasing productivity and efficiency. This type of sports training is good for young people and weak groups.

Sport Infrastructure Provision and Utilization: The development of sports facilities is an important part of urban planning because the development of sports can provide economic benefits, including employment and investment, during construction. Once structures are built, some areas may be used by schools and community groups for a variety of purposes, including cultural, social and other activities, and for design revenue.

Sports and Tourism: Hosting international sporting events has economic benefits for the host country. Countries hosting these events attract large numbers of tourists from all over the world, which contributes greatly to the economy of the host countries, especially the hospitality industry such as recreation, transportation and catering. A large part of the sports industry is supported by hotels and restaurants. The income elasticity of sports tourism can improve the economy."

Sports Marketing: Sports marketing is a branch of marketing which has developed past three decades, but yet a generally accepted definition does not exist. It can be termed as application of marketing principles to sports products. Sports marketing concentrates on promotion of sports events as well as the promotion of other goods and services through sport events focusing on customer-fans.

Sports Economy of India: Indian sporting goods industry occupies a significant position in the global market. All successful businesses are driven by skilled workers who represent employment creation and contribute to the country's economy. The sector employs more than half a million people. India produces more than 300 types of sports equipment. Uttar Pradesh, Punjab, Maharashtra, Delhi, Tamil Nadu, Jammu and West Bengal are India's largest sports producers (IBEF, 2022).

The sports industry is highly competitive in the world as it has many companies established in many countries. In 2019-2020, India ranked 24th in the world in sports goods exports, accounting for 0.56% of global exports, indicating future growth. In 2021-22, India's exports increased to US\$ 546 million from US\$ 402.44 million in the previous year. Since 2016-17, India's exports have increased by 13% (Figure 1). India exports sports products to more than 200 countries, including the United States, China, Australia, Germany, United Arab Emirates, United Kingdom, Netherlands, France, South Africa, Sweden, Canada, Belgium, Brazil, Chile and Denmark. (Figure 2), (IBEF, 2022).

Sporting goods exports to the US increased by 48% to \$198.8 million in 2021-22. Likewise, exports to the UK, Australia and Germany increased by 42%, 32% and 32% respectively (IBEF, 2022) reaching USD 74.7 million, USD 33.2 million and USD 32.8 million as in 2021-22. reached million US Dollars. As can be seen from Figures 1 and 2, the sports industry has made significant contributions to the development of the Indian economy.



Figure 1: India's Sporting Goods Export Trend (US\$ Million)

Figure 2: Country-wise Share of India's Sporting Goods Exports (2021-22)



Source: IBEF

To promote and promote sports products in India, the government has taken various initiatives such as the Sporting Goods Export Promotion Council (SGEPC) to organize international and local trade events. The Market Access Initiative (MAI) facilitates the acceptance and export of Indian goods and services. Marketing Development Program (MDA) helps exporters promote their exports in international markets.".

The paper is conceptual and is a mixture of ideas from various articles. The paper sustains on the view of the author which may be biased due to no evidence to prove statistically. The paper is factual and general in its form. The inadequacy of statistical data makes this paper weak to provide justifications. Further, the topic is very much relevant from modern day time and there is huge scope for researches to provide a data-based study and make it more authentic.

5.0 Conclusion

Sport is not only a physical activity which contributes to the improvement of health and well-being but it can be classified under a broader sense as it has social implications. By influencing the physical, emotional, and psychological state, it has a real impact on the quality of live. Economically it can benefit a nation to generate revenue as it can be clearly witnessed the export data of India. LDCs can grab an opportunity to develop through sports activities both socially and economically. Benefit reaped from sports are more but much of work need to be done still to bring the sport and development sectors together. Carrying it out in a wise manner sports programmes have the potential in fostering development and peace.

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The Effect of Mergers and Acquisitions on the Financial Performance of Manufacturing Companies in India

Reha Nair* and Savitha Kulkarni**

ABSTRACT

The study aims to analyze the impact of mergers and acquisitions on the financial performance of manufacturing companies in India. The data set comprises 320 observations from the period 2005 to 2017. The companies that were merged during the years 2009-2013 are only considered. The study focuses on the manufacturing companies' profitability, leverage, and overall efficiencies. The techniques include paired t-test, regression, fixed effect model, pooled effect model, and Generalized Method of Moments (GMM). The findings of the study reveal that the Return on Equity (ROA), Return on Equity (ROE) and Return on Capital Employed (ROCE) have an impact on profitability, post Current ratio, and post-quick ratio on the liquidity, and leverage of the company has an insignificant impact. It is found that the overall efficiency of the companies during the post-merger is less volatile and stable when compared to the pre-merger overall efficiency thereby impacting the company's financial performance.

Keywords: Mergers and Acquisition; Return on Asset; Return on Equity; Return on Capital Employed; Net Profit Margin.

1.0 Introduction

The business environment is evolving quickly today in terms of competition, goods, people, markets, clients, and technology. In order to consistently maximize shareholder value, organizations must innovate and outperform their rivals rather than simply keeping up with these developments.

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In order for businesses to stay up with the changes, growth is necessary. There are two categories of growth strategy: organic and inorganic. The inorganic growth options for obtaining fast and consistent growth are mergers and acquisitions (M&A). Due to the contemporary situation's globalization, liberalization, technical advancements, and competitive corporate climate, it has grown in prominence throughout the world. The rising worldwide market competitiveness has compelled Indian businesses to pursue mergers and acquisitions as a strategy.

Mergers and acquisitions are one of the common strategies used by companies for corporate restructuring and strengthening the globalized economy. The increased competition in the Indian market has promoted companies in India to go for mergers and acquisitions. Around 85% of manufacturing companies in India are using Mergers and Acquisitions as a growth strategy. The number of mergers and acquisitions is not only increasing in India but also throughout the globe (Kumar & Bansal, 2008). The trends of mergers and acquisition in India has changed over the years. Some of the benefits of mergers and acquisitions are to have rapid access to technology, extended market share, enhanced market position, extended customer base, and strong financial position. Mergers and acquisitions are used to increase the market share, diversify the portfolio to lower business risk, enter new markets and geographies, and gain a competitive advantage over rival companies, mergers and acquisitions help businesses become more competitive.

1.1 Objectives of the study

- 1. To analyze the impact of mergers and acquisitions on the profitability of the selected companies
- 2. To analyze the impact of mergers and acquisitions on the liquidity of the selected companies
- 3. To analyze the impact of mergers and acquisitions on the leverage of the selected companies
- 4. To analyze the impact of mergers and acquisitions on the overall efficiency of the selected companies

2.0 Review of Literature

Global markets have continuously experienced increased mergers and acquisitions over the last decades (Ahmed & Ahmed, 2014; Akben-Selcuk & Altiok-Yilmaz, 2011; Cartwright & Cooper,1990; Leepsa & Mishra, 2012; Marembo, 2012; Moctar *et al.*, 2014; Tarasovich, 2014). Mergers and Acquisitions are continuously being

adopted for progressive company competitiveness by expanding market share (Mboroto, 2013; Zahid & Shah, 2011). The phenomenon of mergers and acquisitions is not localized; it has spread to every country in the world. Organizations today that want to compete in the modern, dynamic business world must meet this criterion (Waddock & Graves, 2006).

This section of the study examines how M&A activity affects a company's success. It has been discovered that some nations, including Brazil, China, and India, are more active in merger and acquisition agreements. Mantravadi & Reddy, (2008) discovered a connection between the industry type and the outcome of merger deals. The financial ratios were calculated using figures from three years after the merger and three years prior. They came to the conclusion that the performance of the operational sector will be impacted by mergers. Tambi (2005) discovered how mergers and acquisitions affected a company's success. Three factors—Profit after Tax, Return on Capital Employed, and Profit before Interest Tax, Depreciation, and Amortization—were used to determine how well the organizations performed (Gjirja, 2003).

The study's findings indicated that merger and acquisition attempts had failed. Based on accounting data, efficiency, and profitability assess the evolution of merged companies' operating performance before and after the merger. Sujud & Hachem, (2018) discovered that ROA and ROE improved but only insignificantly, there was a significant increase in the EPS after merger in the Lebanese banks. (Ahmed & Ahmed, 2014) The results show that the acquiring companies have improved insignificantly. The profitability, liquidity, and capital position Improved insignificantly and the efficiency deteriorated during the post-merger era (Neethu *et al.*, 2018) Companies were merged or taken over by good management companies so they had a significant impact on the financial position of the merged companies (Gupta *et al.*, 2021). The results show that mergers and acquisitions will improve the synergy during the post-merger period (Sujud & Hachem, 2018) There was increased profitability during the post-merger period, and operating efficiency had a random pattern from this context, the importance of the effect on profitability, liquidity, leverage, and overall efficiency of the companies plays a vital role on financial performance of the companies.

3.0 Research Methodology

3.1 Research design

The study investigates the impact of mergers and acquisitions on the financial performance of manufacturing companies in India. The data is collected from Money control and financial statement of companies. Leading financial database considering 32

listed companies of India. The study period is 10 years from 2009 to 2013, both inclusive. There are a total of 320 observations i.e. (32companies*10years data).

3.2 Sources of data and analysis method

Statistic software like SPSS and EViews are employed for running various tests. Tests such as paired t-test, regression, fixed effect model, pooled effect model, difference GMM, and graphs are employed to analyze the impact of financial performance after Mergers and acquisitions. A paired t-test was conducted to compare the performance between pre and post-merger periods any significance value less than 0.05 had an impact on the financial performance of the companies. Regression models are used to compare and find the best-fit model. For regression, any variable significant value less than the tolerance level of 0.05 was considered an efficient model and had a significant impact. Difference GMM having a significance value less than 0.05 had a significant impact.

3.3 Hypothesis

- 1 H₀: Mergers and Acquisition have no impact on ROA H₁: Mergers and Acquisition have impact on ROA
- 2 H₀: Mergers and Acquisition have no impact on ROE H₁: Mergers and Acquisition have impact on ROE
- 3 H₀: Mergers and Acquisition have no impact on EBIT H₁: Mergers and Acquisition have impact on EBIT
- 4 H₀: Mergers and Acquisition have no impact on Asset Turnover H₁: Mergers and Acquisition have impact on Asset Turnover
- 5 H₀: Mergers and Acquisition have no impact on ROCE H₁: Mergers and Acquisition have impact on ROCE
- 6 H₀: Mergers and Acquisition have impact on Net profit Margin H₁: Merger and Acquisition have no impact on Net profit Margin
- H₀: Mergers and Acquisition have no impact on Current ratio
 H₁: Mergers and Acquisition have impact on Current Ratio
- 8 H₀: Mergers and Acquisition have no impact on Quick Ratio H₁: Mergers and Acquisition have impact on Quick Ratio
- 9 H₀: Mergers and Acquisition have no impact on Cash Ratio H₁: Mergers and Acquisitions have an impact on Cash Ratio

4.0 Analysis and Discussion

Paired t-test has been conducted. This is done to understand the difference between two variables for the same subject, but the two variables are separated by time.
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Variables like Return on Asset, Return on Equity, Return on Capital Employed, Asset Turnover, EBIT, Net Profit Margin. All these variables are considered for evaluating the impact of mergers and acquisitions on the profitability of the company. All these variables have a major contribution towards the profitability of the company. A company's primary goal is to have profitability. Without profitability, it is very difficult for the companies to survive in the long run. So here we are measuring the pre and postmerger and acquisition of the company.

	Variables	Mean	Std. Deviation	t-value	P-value
Dair 1	Pre-Net Profit Margin	-5.4709	323.38539	0 422	0.672
rall I	Post Net Profit Margin	5.3369	12.4072	-0.423	0.075
Dair 2	Pre-Return on Equity	16.3712	53.39663	2.061	0.041
Pair 2	Post Return on Equity	5.0161	45.53161	2.001	0.041
Dair 2	Pre-Return on Capital Employed	13.6424	16.10294	2 867	0
Pair 3	Post Return on Capital Employed	8.6625	11.47838	5.007	0
Dair 1	Pre-Return on Assets	6.8083	10.88767	2 285	0.024
rall 4	Post Return on Assets	4.7687	6.80495	2.203	0.024
Dain 5	Pre EBIT	-14.1541	273.23342	1 242	0.216
Fall 3	Post EBIT	12.6274	18.52192	-1.243	0.210
Pair 6	Pre-Asset Turnover Ratio	158.4202	629.79186	1 262	0.175
	Post Asset Turnover Ratio	89.7826	45.2164	1.302	0.175

Table 1: Paired t- test

Source: Authors Original Contribution

From Table 1, it is observed that the Net Profit Margin increased from -5.4709 to 5.3369 after the merger. The t-value is -0.423 and the p-value is 0.673 this reveals that the net profit margin divulges an insignificant impact of the merger on the Net profit margin. So, the null hypothesis accepted and rejects the alternative hypothesis

From Pair 2 Return on Equity decreased from 16.3712 to 5.0161 after the merger. The t-value is 2.061 and the p-value is 0.041 shows a significant impact of the merger on the return on equity. If the p-value is below 0.05, reject the null hypothesis and accept the alternative hypothesis

From Pair 3 Return on Capital Employed decreased from 13.6424 to 8.6625 after the merger. The t-value is 3.867 and the p-value is 0.00 showing a significant impact of consolidation on the Return on capital employed. The above table 5.1 found that the p-value is less than 0.05, so reject the null hypothesis and accept the alternative hypothesis

From Pair 4 Return on Assets has decreased from 6.8083 to 4.7687 after the merger. The t value is 2.285 and p value is 0.024, this shows that there is a significant impact of merger on the Return on Asset. The p-value is less than 0.05, hence reject the null hypothesis and accept the alternative hypothesis.

From Pair 5 EBIT has increased from -14.1541 to 12.6274 after the merger. The t-value is -1.243 and the p-value is 0.216 this shows that there is an insignificant impact of the merger on the EBIT. If the p-value is more than 0.05, hence accept the null hypothesis and reject the alternative hypothesis

From Pair 6 Asset Turnover ratio has decreased from 158.4202 to 89.7826 after the merge. The t-value is 1.362 and the p-value is 0.175, revealing that there is an insignificant impact of the merger on the Asset turnover ratio. The p-value is more than 0.05, hence accept the null hypothesis and reject the alternative hypothesis.

Concluding when comparing the pre and post-merger period. The companies Return on Equity, Return on Asset, Return on Capital Employed had a significant impact on the profitability of the companies in India.

For the second objective, regression technique is employed, this is conducted to know the relationship between two or more variables of interest the relationship between the dependent and independent variables.

4.1 Dependent variable- pre-quick ratio

Table 2: Model Summary - Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.130ª	0.017	-0.022	780.34015

Source : Authors Original Contribution

From the Table 2 R value is not greater than 0.4 which means that the study cannot be taken for further analysis and the R square value is less than 0.5 which tells us that the model is ineffective and insufficient to determine the relationship between the variables.

Table 3: ANOVA

M	odel	Sum of Squares	Df	Mean Square	F	Sig.
	Regression	1592722.72	6	265453.79	0.436	.854 ^b
1	Residual	93166404.5	153	608930.75		
	Total	94759127.2	159			

The F value is not more than 1 and which shows that it is not a good and an ineffective model and the significance value is more than 0.05 which means that it has no significant impact on the variables. (Table 3).

Model		Unstar Coef	ndardized fficients	Standardized Coefficients	Т	Sig.
		В	Std. Error	Beta		
	(Constant)	77.064	85.467		0.902	0.369
	Pre Net Profit Margin	-0.423	0.533	-0.177	-0.794	0.429
	Pre Return on Networth / Equity	-0.756	2.25	-0.052	-0.336	0.737
1	Pre Return on Capital Employed	-7.187	9.729	-0.15	-0.739	0.461
	Pre Return on Assets	22.72	17.023	0.32	1.335	0.184
	Pre EBIT	0.376	0.553	0.133	0.68	0.497
	Pre Asset turnover ratio	0.02	0.101	0.016	0.198	0.844

Table 4: Coefficients

Source: Authors original contribution

Table 4 reveals that the significance value of all the variables are having significance value above 0.05. Hence, accept the null hypothesis which means that pre quick ratio has no impact on all the variables.

4.2 Dependent variable- post quick ratio

Table 5: Model Summary

1 .338 ^a 0.115 0.08 0.93883	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	1	.338ª	0.115	0.08	0.93883

Source: Authors Original Contribution

Table 5 the R value is not greater than 0.4 which means that the study cannot be taken for further analysis and the R square value is less than 0.5 which tells us that the model is ineffective and insufficient to determine the relationship between the variable Table 5: ANOVA.

Table 6: ANOVA

Model		Sum of Squares	Df	Mean Square	F	Sig.
	Regression	17.44	6	2.907	3.298	.004 ^b
1	Residual	134.855	153	0.881		
	Total	152.295	159			

From the Table 6 the F value is greater than 1 which shows that it is a good and efficient model. The significance value is below 0.05 and it has a significant impact on the variables.

	Model	Unstan Coefi	dardized ficients	Standardized Coefficients	t	Sig.
		В	Std. Error	Beta		
	(Constant)	0.954	0.197		4.834	0
	Post Net Profit Margin	0.002	0.011	0.024	0.168	0.867
	Post Return on Networth / Equity	-0.003	0.002	-0.125	-1.388	0.167
1	Post Return on Capital Employed	-0.057	0.018	-0.663	-3.137	0.002
	Post Return on Assets	0.126	0.032	0.875	3.896	0
	Post EBIT	0	0.006	-0.002	-0.023	0.982
	Post Asset Turnover Ratio	-2.77E-05	0.002	-0.001	-0.014	0.989

Table 7: Coefficients

Source: Authors Original Contribution

Table 7 shows that significant values after the regression analysis are obtained and it is found that ,Post return on capital employed and Post return on assets significance value is less than 0.05 which means null hypothesis is rejected and shows that there is a significant relationship between the dependent and independent variables.

4.3 Dependent variable – pre-current ratio

From the Table 8, the R value is not greater than 0.4 which means that the study cannot be taken for further analysis and the R square value is less than 0.5 which reveals that the model is ineffective and insufficient to determine the relationship between the variables.

Table 8: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.248ª	0.061	0.025	1.67934

Source: Authors Original Contribution

From the Table 9, the F value is greater than 1 which shows that it is a good and efficient model. The significance value is not below 0.05 and it has an insignificant impact on the variables.

Table 9: ANOVA

Ν	lodel	Sum of Squares	Df	Mean Square	F	Sig.
	Regression	28.197	6	4.7	1.666	.133 ^b
1	Residual	431.49	153	2.82		
	Total	459.687	159			

Source: Authors Original Contribution

From the Table 10, the significance value is not less than 0.05 which means null hypothesis is accepted and shows that there is a significant relationship between the dependent and independent variables.

Table 10: Coefficients

	Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		В	Std. Error	Beta		_
	(Constant)	1.987	0.184		10.803	0
	Pre Net Profit Margin	-0.002	0.001	-0.307	-1.406	0.162
	Pre Return on Networth / Equity	0.007	0.005	0.221	1.451	0.149
1	Pre Return on Capital Employed	-0.054	0.021	-0.513	-2.589	0.111
	Pre Return on Assets	0.052	0.037	0.333	1.418	0.158
	Pre EBIT	0.002	0.001	0.289	1.508	0.134
	Pre Asset turnover ratio	0	0	0.109	1.362	0.175

Source: Authors Original Contribution

4.4 Dependent variable- post current ratio

The Table 11, the R value is not greater than 0.4 which means that the study cannot be taken for further analysis and the R square value is less than 0.5 which tells us that the model is ineffective and insufficient to determine the relationship between the variables.

Table 11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.381ª	0.145	0.112	1.03507

From the Table 12, the F value is greater than 1 which shows that it is a good and efficient model. The significance value is below 0.05 and it has a significant impact on the variables.

	Model	Sum of Squares	Df	Mean Square	F	Sig.
	Regression	27.91	6	4.652	4.342	.000 ^b
1	Residual	163.92	153	1.071		
	Total	191.829	159			

Table 12: ANOVA

Source: Authors Original Contribution

From the Table 13, it is observed that Post return on capital employed and Post return on assets significance value is less than 0.05 which means null hypothesis is rejected and shows that there is a significant relationship between the dependent and independent variables.

Table 13: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		В	Std. Error	Beta		
	(Constant)	1.341	0.218		6.161	0
	Post Net Profit Margin	0.01	0.013	0.113	0.791	0.43
1	Post Return on Networth / Equity	-0.003	0.002	-0.117	-1.325	0.187
	Post Return on Capital Employed	-0.071	0.02	-0.744	-3.583	0
	Post Return on Assets	0.15	0.036	0.929	4.211	0
	Post EBIT	-0.004	0.006	-0.07	-0.657	0.512
	Post Asset Turnover Ratio	0.001	0.002	0.038	0.414	0.68

Source: Authors Original Contribution

4.5 Dependent variable - pre-cash ratio

From the Table 14, the R value is not greater than 0.4 which means that the study cannot be taken for further analysis and the R square value is less than 0.5 which tells us that the model is ineffective and insufficient to determine the relationship between the variables.

Table 14 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.130ª	0.017	-0.022	780.34015

From the Table 15, the F value is greater not than 1 it shows that it is not a good and inefficient model. The significance value is not below 0.05 and it has insignificant impact on the variables

	Model	Sum of Squares	Df	Mean Square	F	Sig.
	Regression	1592722.72	6	265453.79	0.436	.854 ^b
1	Residual	93166404.5	153	608930.75		
	Total	94759127.2	159			

Table 15: Anova

Source: Authors Original Contribution

From Table 16, it is observed that the significance values of all the variables are above 0.05. There is no significant relationship between the dependent and independent variables.

Model		Unstandardized Coefficients		Standardized Coefficients	Т	Sig.
		В	Std. Error	Beta		
	(Constant)	77.064	85.467		0.902	0.369
	Pre Net Profit Margin	-0.423	0.533	-0.177	-0.794	0.429
	Pre Return on Networth / Equity	-0.756	2.25	-0.052	-0.336	0.737
1	Pre Return on Capital Employed	-7.187	9.729	-0.15	-0.739	0.461
	Pre Return on Assets	22.72	17.023	0.32	1.335	0.184
	Pre EBIT	0.376	0.553	0.133	0.68	0.497
	Pre Asset turnover ratio	0.02	0.101	0.016	0.198	0.844

Table 16: Coefficients

Source: Authors Original Contribution

4.6 Dependent variable-post cash ratio

From the Table 17, it is observed that the R value is not greater than 0.4 which means that the study cannot be taken for further analysis and the R square value is less than 0.5 which tells us that the model is ineffective and insufficient to determine the relationship between the variables

Table 17: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.163ª	0.026	-0.012	2084.24221

From the Table 18, it is observed that the F value is greater not than 1 it shows that it is not a good and inefficient model. The significance value is not below 0.05 and it has insignificant impact on the variables.

Model		Sum of Squares	df	Mean Square	F	Sig.
	Regression	18088747.2	6	3014791.19	0.694	.655 ^b
1	Residual	664642037	153	4344065.6		
	Total	682730784	159			

Table 18: ANOVA

Source: Authors original contribution

From Table 19, it is observed that the significance value of all the variables is above 0.05 hence there is no significant relationship between the dependent and independent variables

Table 19: Coe	efficients
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Model		Unstandardized Coefficients		Standardized Coefficients	Т	Sig.
		В	Std. Error	Beta		
	(Constant)	137.508	438.211		0.314	0.754
	Post Net Profit Margin	-11.775	25.457	-0.071	-0.463	0.644
	Post Return on Networth / Equity	-2.412	4.289	-0.053	-0.562	0.575
1	Post Return on Capital Employed	-37.252	40.014	-0.206	-0.931	0.353
	Post Return on Assets	123.303	71.673	0.405	1.72	0.087
	Post EBIT	0.186	12.782	0.002	0.015	0.988
	Post Asset Turnover Ratio	-1.672	4.487	-0.036	-0.373	0.71

Source: Authors original contribution

The generalized method of moments is one of the statistical methods when we are not sure of the distribution of the dependent variable and there is a presence of invigilating in the regression model GMM model is used.

An autoregressive panel data model is formed $y_{itit} = \alpha y_{i.t-1} + \beta'_1 x_{it} + \beta'_2 x_{it-1} + \eta_i + v_{it}$ For i = 1, ..., N and t = 2, ..., T $u_{it} = n_i + v_{it}$ it is the usual decomposition of 'fixed effects' of the error team; where N is larger, T is fixed and $|\alpha| < 1^1$. This has the corresponding common factor which is restricted to $(\beta_2 = -\alpha\beta_1)$ from $Y_{it} = \beta'_1 x_{it} + f_i + \zeta$ $Y_{it} = \beta'_1 X_{it} + f_i + \zeta_{it}$ with $\zeta_{it} = \alpha \zeta_{i.t-1} + v_{it}$ and $n_i = (1 - \alpha)f_i$ In this study of panel data we allow for the inclusion of x_{it} regressors but for the evaluation of various estimators we also use an AR(1) model with unabsorbed individual specific effects.

 $y_{itit} = ay_{i.t-l} + \eta_i + v_{it} \text{ for } i = 1, \dots, N \text{ and } t = 2. \text{ We only focus on the role of initial conditions we will assume that } \eta_i \text{ and } v_{it} \text{ are independently distributed across } i \text{ and have the familiar error components structure in which} \\ E((\eta)_i = 0, E(v_{it}) = 0, E(v_{it}\eta_i) = 0 \text{ for } i = 1, \dots, N \text{ and } t = 2, \dots, T \text{ and} \\ E(v_{it}v_{is}) = 0 \text{ for } i = 1, \dots, N \text{ and } t \neq S \\ \text{Generalized Method of momentum} \\ nQ_n(\theta) = [\sqrt{nf\theta}] \text{ (Est.Asy.Var } [\sqrt{nf_n(\theta_0)}]^{-1} [\sqrt{nf_n(\theta_0)}] \\ \text{Notice that this is a wald statistic and under the Null} \\ H_0: E[f(x, \theta_0)] = 0 \\ H_1: E[f(x, \theta_0)] \neq 0 \end{aligned}$

4.7 Pooled effect model

Table 20 shows the pooled effect model which has the F statistic value of 1.18.

Variable	Coefficient	Standard Error	t-statistic	prob
С	-2.54	3.93	-6.449702	0
Pre-debt to capital ratio	2.17	2	10.87421	0
Pre-debt to asset ratio	-1.76	2.02	-8.743134	0
Pre-debt to equity ratio	1	1.7	5.87	0
R squared	1	Mean dependent var	0.717733	
Adjusted R squared	1	S.D dependent var	8.530066	
S.E of regression	1.8	Akaike info criterion	-65.03608	3
Sum squared resid	5.04	Schwarz criterion	-64.95887	
Log likelihood	5174.368	Hannan Quinn criter	-65.00473	
F statistic	1.18	Durbin-Watson stat	2.04032	
prob(f statistic)	0			

Table 20: Pooled Effect Model

Source: Authors Original Contribution

4.8 Fixed effect model

Table 21 shows the Fixed effect model which has the F statistic value of 7.78. So, the value of Fixed f statistic is deducted with Pooled F statistic. The value is not

close to the fixed f statistic. Hence, it is recommended to do the difference Generalized method of moments

Variable	Coefficient	Standard Error	t-statistic	prob
С	-4.93	7.9	-6.243111	0
Pre-debt to capital ratio	-5.28	2.67	-1.979437	0.05
Pre-debt to asset ratio	1.28	2.7	4.747605	0
Pre-debt to equity ratio	1	2.17	4.61	0
R squared	1	Mean dependent var	0.7177	3
Adjusted R squared	1	S.D dependent var	8.53006	56
S.E of regression	2.06	Akaike info criterion	-64.602	81
Sum squared resid	5.2	Schwarz criterion	-63.90796	
Log likelihood	5171.923	Hannan Quinn criter	-64.32064	
F statistic	7.78	Durbin-watson stat	2.479828	
prob (f statistic)	0			

Table 21: Fixed Effect Model

Source: Authors Original Contribution

4.9 Difference GMM

Table 22 reveals that as the difference GMM model indicates that all the probability values are not less than 0.05. It suggests us to accept the null hypothesis. The Prob(J-statistic) is 0 which means it is inefficient.

Variable	Coefficient	Standard Error	t-statistic	prob
Leverage (-1)	2.6	3.74	0.695136	0.4921
Pre debt to capital ratio	-2.63	3.93	-0.671299	0.507
Pre debt to asset ratio	-2.04	3.01	-0.676581	0.5037
Pre debt to equity ratio	1	3.31	3.02	0
Mean Dependent Variable	-1.212417	S D dependent var	10.62795	
S.E of regression	2.76	Sum squared resid	6.86	
J-statistic	1.89	Instrument rank	20	
Prob(J-statistic)	0			

Table 22: Difference GMM

Source: Authors Original Contribution

4.10 For post leverage pooled effect model

Table 23 shows the pooled effect model has the F statistic value of 1.02.

Variable	Coefficient	Standard Error	t-statistic	prob
С	-5.62	3.69	-1.528342	0.1285
Post debt to capital ratio	1	2.01	4.97	0
Post debt to asset ratio	0	1.7	0	1
Post debt to equity ratio	0	1.7	0	1
R squared	1	Mean dependent var	2.651904	
Adjusted R squared	1	S.D dependent var	6.194036	
S.E of regression	1.41	Akaike info criterion	-65.52	677
Sum squared resid	3.1	Schwarz criterion	-65.4499	
Log likelihood	5246.142	Hannan Quinn criter	-65.49556	
F statistic	1.02	Durbin-watson stat	1.176376	
prob(f statistic)	0			

Table 23: Pooled Effect Model

Source: Authors Original Contribution

4.11 Fixed effect model

Table 24 shows the Fixed effect model has the F statistic value of 8.63 Deduct the value of Fixed f statistic with Pooled F statistic. The value is not close to the f statistic value of fixed. So, we are recommended to do the difference Generalized method of moments.

Table 24 Fixed effect model

Variable	Coefficient	Standard Error	t-statistic	prob
С	-9.61	1.13	-8.499	0
Post debt to capital ratio	1	2.49	4.01	0
Post debt to asset ratio	5.69	5.75	9.891864	0
Post debt to equity ratio	-4.14	5.42	-7.630476	0
R squared	1	Mean dependent var	2.651904	
Adjusted R squared	1	S.D dependent var	6.1940	36
S.E of regression	1.42	Akaike info criterion	60.736	27
Sum squared resid	2.5	Schwarz criterion	-60.044	35
Log likelihood	4894.901	Hannan Quinn criter	-60.4553	
F statistic	8.63	Durbin-watson stat	1.128551	
prob(f statistic)	0			

4.12 Difference GMM

Table 25 reveals that , the difference GMM model indicates that all the probability values are not less than 0.05. It suggests us to accept the null hypothesis, which means that there is no impact. The Prob (J-statistic) is 0 which means it is inefficient (Blundell & Bond, 1998).

Variable	Coefficient	Standard Error	t-statistic	prob
Leverage (-1)	-2.21	1.21	-1.821029	0.0783
Post debt to capital ratio	1	4.9	2.04	0.4421
Post debt to asset ratio	3	2.83	1.059227	0.2977
Post debt to equity ratio	-2.79	2.83	-0.986442	0.3316
Mean Dependent Variable	-0.133055	S D dependent var	1.072495	
S.E of regression	5.42	Sum squared resid	2.	67
J-statistic	1.78	Instrument rank	20	
Prob(J-statistic)	0			

Table 25: Difference GMM

Source: Authors Original Contribution

4.13 Objective 4

Ratio analysis is done to analyse the overall efficiency of the companies. We have calculated the revenue and expenses.

$Overall \, Efficiency = \frac{Expenses}{Revenue}$

Figure 1 and 2 represents the post and pre-efficiency. It is clearly evident that the premerger efficiency is more volatile compared to the post-merger efficiency. During the post-merger efficiency, the values are constant and the companies are performing well.

Figure 1: Pre Efficiency of Company



Source: Authors Original Contribution

The Effect of Mergers and Acquisitions on the Financial Performance of115Manufacturing Companies in India





Source: Authors Original Contribution

5.0 Result and Discussion

With 320 observations and panel data covering the years 2009 to 2013, the study analyzed the impact of mergers and acquisition on the financial performance of the companies in India. The study's main objective is to identify the variables that are impacting the financial performance of the companies in India. The findings indicate that when comparing the pre and post-merger period. The companies Return on Equity, Return on Asset, Return on Capital Employed had a significant impact on the profitability of the companies in India. For liquidity pre and post cash ratio had no significant impact. When comparing pre and post current ratio. Variables like Return on capital employed and Return on Asset had impact on post current ratio. When comparing the pre and post quick ratio, variables like return on capital employed and Return on Asset had impact.

Comparing the leverage of pre-merger and post-merger there is insignificant impact during the pre and post-merger. This also tells us that the leverage has no impact on the financial performance of companies after mergers and acquisition.

Overall efficiency was calculated by dividing the expenses over revenue and we could find the overall efficiency for companies. Line graph was constructed to check the efficiency. So we can tell that the pre efficiency was volatile and high fluctuation were observed when compared to the post-merger period, it is concluded that the post overall efficiency is constant and performing well when compared to the pre overall efficiency.

Hence, it is concluded that during the post-merger and acquisition the manufacturing companies have performed well and has impact on the financial

performance. This indicates that Mergers and Acquisition is the key strategy for any company to survive in the market and increase its market share.

6.0 Limitations

- The overall study of the listed companies is considered for the study. It can further be explored on the particular sectors like energy sector, paper industries, etc.
- The period of study is only for 5 years pre-merger and 5 years post-merger. It can extend the years of study so that to help to analyze it more effectively and efficiently.
- Multiple mergers can also be considered for the study (One company merging with one or more companies can also be considered for the study)

7.0 Acknowledgment

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Analysis of Returns on Stocks in Nifty-50 Index using Capital Asset Pricing Model

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ABSTRACT

The purpose of this research study was to estimate the actual returns of the stocks in the NIFTY 50 index and analyze stock returns using the Capital Asset Pricing Model (CAPM) to understand if the stocks were undervalued or overvalued according to CAPM. The nature of this study is empirical and analytical. The data are collected from secondary sources, which include research publications from journals available in print and websites. The Indian economy's 23 sectors are represented by the 50 stocks that make up the Nifty 50; hence, it was chosen for the current study because it is much more stable than other Indian indices. The monthly closing prices of stocks over 5 years, from January 2018 to January 2023, are taken into consideration for the analysis. It was found that out of 50 stocks, 26 were undervalued and 24 were overvalued.

Keywords: Assets pricing; CAPM; Risk-return analysis; Beta; Market risk.

1.0 Introduction

A unique model known as the capital asset pricing model or CAPM, is one of the fundamental models for asset pricing. The expected returns for security are calculated using the CAPM model. The risk-free returns and the addition of beta can be used to compare the same. This research study's main goal is to use the Capital Asset Pricing Model (CAPM) to analyze stock returns. The CAPM provided the first logical framework for addressing this issue. Markowitz, (1952) laid the groundwork for the CAPM (Capital Asset Pricing Model) Later, Sharpe (1964), Treynor, (1961), Mossin (1966), and Lintner (1965) further developed the work of Markowitz.

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It is one of the valuation models used to determine the expected stock return for specific companies. Investors in the Indian stock market use it frequently. The main objectives of this study are to understand the risk-return relationship for individual shares in the Nifty-50 index and to assess the applicability and utility of CAPM in Nifty-50 stocks.

1.1 Rationale of the study

A model for forecasting expected returns on risky assets at their equilibrium is the CAPM. In 1952, Harry Markowitz laid the foundation for modern portfolio management. This idea was developed by William Sharpe, John Lintner, and Jan Mossion in an essay that was published in 1964. The fundamental tenet of this strategy is that we make sure that everyone has the same expectations.

In recent decades, building and publishing models regarding stock price behaviour in the capital markets has attracted the attention of economists, statisticians, and financial experts in particular. Modern investment management techniques and tools are being applied more frequently in an effort to outperform the market benchmark as a result of this intense interest. The Capital Assets Pricing Model (CAPM) is tested in this study to see if it holds true in the Indian stock market using the test for the slope for the standard form of CAPM. Capital markets are currently receiving greater attention and interest than ever before. It is safer and more transparent to make gains in today's wellregulated market, which has increased the scope for suitable securities appraisal. For investors, managers, analysts, and management experts, accurate stock valuation is essential. They are engaged in the evaluation of businesses and the search for undervalued stocks. To maximize shareholder wealth, top management has always relied on accurate stock valuations. Numerous parties are interested in learning the Nifty 50 stock's value using various valuation models. The Capital Asset Pricing Model (CAPM) serves as a model for risky securities and explains the connection between risk and expected return. It establishes a benchmark for assessing various investments and examines the empirical validity of the CAPM model for the Indian capital market (NSE). The premise of CAPM is that not all risk has an impact on asset prices, and that risk can be spread out and held risk-free when combined with other investments.

1.2 Objectives of the study

The objectives of this study are to estimate the actual returns of stocks in the NIFTY 50 index, understand how the CAPM model is applied to analyze stock returns in the Nifty 50 index, and determine whether stocks are undervalued or overvalued to determine whether a stock is risky or less risky

2.0 Review of Literature

Fama & French (2004): This paper focuses on Asset pricing theory, which began with the development of William Sharpe and John Lintner's capital asset pricing model (CAPM) in 1964. (resulting in a Nobel Prize for Sharpe in 1990). Prior to their discovery, there were no asset pricing models built from the ground up with precise, testable predictions about risk and return, as well as the characteristics of tastes and investment possibilities. Even after 40 years, the CAPM is still frequently employed for tasks like estimating the performance of managed portfolios and evaluating the cost of equity capital for firms. It is one of the best-known models and frequently the sole asset pricing model included in MBA-level investment courses. People are drawn to the CAPM because of its compellingly appealing logic and intuitively pleasing predictions about how to gauge risk and about the relationship between expected return and risk. Regrettably, the model's empirical performance is subpar—so subpar as to render its usage in applications invalid—possibly as a result of its simplicity. The empirical problems with the model can be a symptom of deeper problems. (After all, it's only a model.) These could also be a result of the constraints of the empirical tests, specifically the use of inferior replacements for the market portfolio of invested money, which is essential to the model's projections.

Bod'a & Kanderová (2014) state that The Capital Asset Pricing Model (CAPM), as originally considered and created by William Sharpe and John Lintner, examines its empirical validity. The CAPM is one of the fundamental components of modern portfolio theory, and as such, it is based on a number of solid theoretical presumptions about how investors and financial markets behave. As a result, this model establishes a linear relationship between market portfolio returns above the riskless rate and returns on risky assets that are above that rate. Its conclusions are significant, and one could argue that its functional relationship is constrictive. The CAPM is thus contested on a number of fronts by both theorists and practitioners. With regard to recent data, this empirical study reviews the linear functional form of the CAPM's empirical validity.

Rossi (2016), states in this paper the association between an investment's risk and anticipated return. The Capital Asset Pricing Model (CAPM) is an initial framework for assessing the risk return characteristics of financial assets. The advent of asset pricing theory can be traced to the CAPM (Sharpe, 1964; Lintner, 1965). The foundation of this model is the notion that not all risk ought to influence asset prices. Thus, the model sheds light on the type of risk that is correlated with return. The CAPM is still extensively utilized in applications after four decades. The CAPM offers a method for converting estimates of expected ROE to risks. Many academics have argued that the

CAPM is based on irrational assumptions, which is why they disagree with its application. The main concepts of the CAPM, the history of empirical research on the CAPM, and the implications of this research on the drawbacks of the CAPM are all laid out in this paper.

Sathyanarayana & Harish (2017): This paper focuses on the consistency of beta in the Indian stock market, with special reference to the NSE Nifty 50 stocks. The methodology used to calculate the value of beta as well as the various methods used to assess the stability of betas are briefly discussed in the paper. The discussion of the results obtained is then continued, and a conclusion is provided by comparing the results with potential supporting data. The purpose of the paper was to investigate any unidentified breaks in the computed beta series, determine whether there is any structural break in the computed beta series with reference to the subprime crisis of 2008, and analyze the behavior and stability of beta across stocks listed in the CNX Nifty 50. The daily data from April 1, 2000, to March 31, 2015, has been gathered from the Capitaline database to be analyzed. Five portfolios of ten companies each have been built based on their market capitalization. The paper comes to the conclusion that most of the companies in the 50 stocks used for the study that are listed on the CNX Nifty 50 have stable betas. Additionally, we don't notice any trends in the stability of betas relative to portfolios.

Chakraborty & Patel (2018) used the Sharpe Single Index Model to build an ideal portfolio for the Indian market, taking into consideration stocks in the Nifty 50 Index. Secondary data were used to determine the risk and return for each stock included in the portfolio, and only 24 of the 50 stocks were selected to be included in the optimal portfolio. According to the paper, only 24 stocks fully satisfy the majority of the optimal portfolio requirements, which shows that the financial sector is expanding quickly and its stocks are delivering steady and assured gains.

Jethwani & Ramchandani (2020), in their paper, stated the application of the capital asset pricing model to the Nifty stocks. The paper's goal was to examine the use of and analysis of the CAPM (Capital Asset Pricing Model) in the Indian stock market, with a focus on 31 stocks from the Nifty-50 index (the index of the NSE, the National Stock Exchange). For the survey, the closing prices of 31 Nifty 50 stocks for the seven-year period between January 1, 2006, and December 31, 2012, were downloaded from the NSE (National Stock Exchange) website. Using CAPM, this study examines the impact of excess return on the market portfolio (Capital Asset Pricing Model). The study also focuses on the impact of the adjusted closing price on Stock Volatility. The CAPM results indicate that Excess Return on Market Portfolio (R_m - R_f) has a significant impact

on Excess Stock Return for all 31 Stocks ($R_i - R_f$). As a result, the Excess Return on the market portfolio is still a crucial and relevant parameter for the Excess Stock Return.

Talwar & Gopinathan (2022), The Capital Asset Pricing Model (CAPM) is one of the most widely accepted techniques for assessing stock returns. It helps to comprehend the risk-return relationship and the pricing of risky securities. Learning how to manage portfolio risk based on CAPM with the highest return at the same level of risk is the key goal. The major goal of this research was to examine which stocks were overpriced and underpriced, as well as which performed better than other portfolios. The findings showed that the Capital Asset Pricing Model (CAPM) supported a linear structure and was a useful model for explaining securities returns and assisting investors in making more informed investment decisions.

3.0 Research Methodology

The nature of this study is empirical. A class of research techniques known as empirical research methods involves gathering data in order to address research questions. The study is a methodical, scientific investigation of the managerial aspects, including the process of problem identification, data gathering, analysis, and interpretation.

The information was gathered from a secondary source. Secondary data collection techniques were used to gather information from a variety of journals, websites, and research papers that have previously been published and are available online and in printed sources.

The 50 firms that make up the strong, diverse Nifty 50 index represent the 23 sectors of the Indian economy. It is the most popular personal financial instrument in India. The Nifty 50 Index was chosen for the current study because it is much more stable than other Indian indices. The monthly closing prices of stocks over a period of 5 years, from January 2018 to January 2023, are taken into consideration for the analysis. The NSE website provided the monthly statistics.

4.0 Data Analysis and Results

4.1 Statistical tools

a. Rate of return: Rate of return on a stock is computed using the formula below:

$$r_{i} = \frac{P_{t} - P_{t-1}}{P_{t-1}}$$

 \mathbf{r}_i is the % rate of return of stock for one month, \mathbf{P}_t is the closing price of the stock for the current month, and \mathbf{P}_{t-1} is the closing price of the stock for the previous month.

b. Average return: The expected average rate of return of a stock is computed using the arithmetic mean.

$$E(R_i) = \frac{\sum r_t}{n}$$

 $E(\mathbf{r})$ is the expected average return on a stock, \mathbf{r}_t is the % rate of return of a stock for one month, \mathbf{n} is the number of months

c. Annual return: The annual returns of stocks are given by $E(R_p) = (1 + E(R)_i)^{12-1}$

d. Annual risk

The annual Standard deviation of stock returns is given by

$$\sigma_{\text{annual}} = \sigma * \sqrt{12}$$

e. Expected returns of stock: The expected returns of portfolio are as follows:

 $(R_i) = R_f + \beta (R_m - R_f)$

Where:

 \mathbf{R}_{f} is Risk free rate of return \mathbf{R}_{m} is return on market $\boldsymbol{\beta}$ is the risk associated with the particular assets

4.2 Risk-free rate

The return on a security (or portfolio of securities) with no default risk and no correlation to other economic indicators is known as the risk-free rate (R_f). The gain on a portfolio with zero beta is, hypothetically, the best estimate of the risk-free rate. However, building zero-beta portfolios is expensive and difficult. In actuality, two options are frequently employed: the interest rate, which applies to short-term government securities like 91-day Treasury Bills, and each of the aforementioned two options has benefits and drawbacks. But the information used for our research report is based on 91-day Treasury bills for a 5-year period beginning in 2018 and ending in 2022.

4.3 Return on market

The expected rate of return on the market portfolio is represented by (R_m) . The expected rate of return on Nifty 50 is utilized as the return on market portfolio in this research study.

4.4 Market risk premium

The discrepancy between the risk-free rate and the anticipated return on a market portfolio is known as the market risk premium. The market risk premium offers a quantitative representation of the added return that market participants demand in exchange for the elevated risk.

The formula, which is used to express the market risk premium,

Market Risk Premium = Expected Rate of Return on Market (R_m) – Risk-Free Rate (Rf)

4.5 Beta (β)

Pricing of capital assets Model beta is used to quantify the security's overall risk. The relationship between systematic risk and expected returns for assets and stocks is described by the beta. The CAPM is a widely used technique for valuing risky securities and estimating expected asset returns.

4.6 Estimating of beta β

• If Beta of more than one indicates that the stock is riskier. If Beta of less than one indicates that the stock is less risky.

4.7 Valuation of securities

- If Expected Returns are < CAPM Returns securities are Overvalued
- If Expected Returns are > CAPM Returns securities are Undervalued

Sample Calculation of NIFTY 50 and Indus Bank LTD. returns calculation for the five-year period between January 1, 2018, and November 31, 2022 (Table 1).

Table 1: Returns Calculation for the Five-year Period between January 1, 2018,and November 31, 2022

Date	Nifty 50	Returns	INBK	Returns
01-01-2018	11,027.70		1753.1	
02-01-2018	10,492.85	-4.85%	1680.75	-4.13%
03-01-2018	10,113.70	-3.61%	1796.75	6.90%
04-01-2018	10,739.35	6.19%	1898	5.64%
05-01-2018	10,736.15	-0.03%	1955.45	3.03%
06-01-2018	10,714.30	-0.20%	1932.2	-1.19%
07-01-2018	11,356.50	5.99%	1995.15	3.26%
08-01-2018	11,680.50	2.85%	1906.6	-4.44%

09-01-2018	10,930.45	-6.42%	1690.05	-11.36%
10-01-2018	10,386.60	-4.98%	1425.1	-15.68%
11-01-2018	10,876.75	4.72%	1631.8	14.50%
12-01-2018	10,862.55	-0.13%	1599.3	-1.99%
01-01-2019	10,830.95	-0.29%	1505.55	-5.86%
02-01-2019	10,792.50	-0.36%	1473.85	-2.11%
03-01-2019	11,623.90	7.70%	1780	20.77%
04-01-2019	11,748.15	1.07%	1606.5	-9.75%
05-01-2019	11,922.80	1.49%	1605.35	-0.07%
06-01-2019	11,788.85	-1.12%	1410.5	-12.14%
07-01-2019	11,118.00	-5.69%	1412.85	0.17%
08-01-2019	11,023.25	-0.85%	1395.75	-1.21%
09-01-2019	11,474.45	4.09%	1383.55	-0.87%
10-01-2019	11,877.45	3.51%	1313.2	-5.08%
11-01-2019	12,056.05	1.50%	1569.1	19.49%
12-01-2019	12,168.45	0.93%	1510	-3.77%
01-01-2020	11,962.10	-1.70%	1258.85	-16.63%
02-01-2020	11,201.75	-6.36%	1104.05	-12.30%
03-01-2020	8,597.75	-23.25%	351.3	-68.18%
04-01-2020	9,859.90	14.68%	468.15	33.26%
05-01-2020	9,580.30	-2.84%	393.65	-15.91%
06-01-2020	10,302.10	7.53%	474.8	20.61%
07-01-2020	11,073.45	7.49%	523.75	10.31%
08-01-2020	11,387.50	2.84%	630.2	20.32%
09-01-2020	11,247.55	-1.23%	527.4	-16.31%
10-01-2020	11,642.40	3.51%	585.7	11.05%
11-01-2020	12,968.95	11.39%	857.65	46.43%
12-01-2020	13,981.75	7.81%	894.95	4.35%
01-01-2021	13,634.60	-2.48%	846.1	-5.46%
02-01-2021	14,529.15	6.56%	1062.95	25.63%
03-01-2021	14,690.70	1.11%	954.45	-10.21%
04-01-2021	14,631.10	-0.41%	934.95	-2.04%
05-01-2021	15,582.80	6.50%	1013	8.35%
06-01-2021	15,721.50	0.89%	1016.35	0.33%
07-01-2021	15,763.05	0.26%	981	-3.48%
08-01-2021	17,132.20	8.69%	992.4	1.16%

09-01-2021	17,618.15	2.84%	1111.9	12.04%
10-01-2021	17,671.65	0.30%	1140.2	2.55%
11-01-2021	16,983.20	-3.90%	883	-22.56%
12-01-2021	17,354.05	2.18%	888.15	0.58%
01-01-2022	17,339.85	-0.08%	872.1	-1.81%
02-01-2022	16,793.90	-3.15%	920.7	5.57%
03-01-2022	17,464.75	3.99%	935.4	1.60%
04-01-2022	17,102.55	-2.07%	978.55	4.61%
05-01-2022	16,584.55	-3.03%	930.85	-4.87%
06-01-2022	15,780.25	-4.85%	794.35	-14.66%
07-01-2022	17,158.25	8.73%	1043.5	31.37%
08-01-2022	17,759.30	3.50%	1107.45	6.13%
09-01-2022	17,094.35	-3.74%	1185.2	7.02%
10-01-2022	18,012.20	5.37%	1142.65	-3.59%
11-01-2022	18,758.35	4.14%	1167.8	2.20%

Source: nseindia.com & calculation

Calculation of Indus Bank Risk and Average returns calculation for the five-year period between January 1, 2018, and November 31, 2022 (Table 2).

Table 2: Returns Calculation for the Five-year Period between January 1, 2018,and November 31, 2022

	NIFTY	IDBK
Monthly Average Return	1.08%	0.89%
Annual Average Return	13.8%	11.21%
Monthly Risk	5.59%	15.91%
Annual Risk	19.35%	55.12%
	β	2.32
	α	-0.016
	RF	4.91%
	САРМ	38.3%

Source: Calculation

Calculation of Beta for NSE (Nifty-50) Companies, Total risk Actual Return, CAPM Return and Valuation of Securities for the period of 5 years i.e., from 01- 01- 2018 to 31-11-2022 (Table 3).

Stocks in	Average	Average	Monthly	Annal	Beta	Market	Risk free	CAPM	Stock
Nifty-50	Monthly	Annual	Risk	Risk	(β)	Returns	returns	Returns	Valuat
	Returns	Returns				(Km)	(KI)	(KI)	10n
IndusInd Bank Ltd	0.89%	11.21%	15.91%	55.12%	2.32	13.8%	4.91%	38.3%	Under Valued
Bajaj Finserv	3.18%	45.57%	14.45%	50.05%	1.94	13.8%	4.91%	32.9%	Over Valued
Bajaj Finance Ltd	3.46%	50.41%	14.11%	48.88%	1.88	13.8%	4.91%	32.1%	Over Valued
Tata Motors	1.63%	21.40%	17.52%	60.71%	1.79	13.8%	4.91%	30.8%	Under Valued
Hindalco Industries	1.89%	25.19%	13.74%	47.60%	1.79	13.8%	4.91%	30.7%	Under Valued
Adani Enterprises Ltd	7.56%	139.88%	19.12%	66.24%	1.63	13.8%	4.91%	28.4%	Over Valued
AXIS Bank Ltd	1.38%	17.85%	10.81%	37.45%	1.56	13.8%	4.91%	27.4%	Under Valued
Tata Steel Ltd	1.52%	19.78%	12.61%	43.68%	1.48	13.8%	4.91%	26.3%	Under Valued
SBI	1.81%	23.97%	11.60%	40.19%	1.40	13.8%	4.91%	25.2%	Under Valued
Mahindra & Mahindra	1.54%	20.10%	10.75%	37.22%	1.37	13.8%	4.91%	24.7%	Under Valued
ICICI Bank	2.19%	29.73%	9.38%	32.50%	1.30	13.8%	4.91%	23.7%	Over Valued
Adani Ports & SEZ	1.75%	23.08%	10.03%	34.74%	1.28	13.8%	4.91%	23.4%	Under Valued
JSW Steel	2.43%	33.46%	12.76%	44.20%	1.28	13.8%	4.91%	23.4%	Over Valued
UPL	1.42%	18.49%	11.17%	38.69%	1.27	13.8%	4.91%	23.2%	Under Valued
Bharat Petroleum	0.02%	0.29%	10.26%	35.54%	1.25	13.8%	4.91%	23.0%	Under Valued
Larsen & Toubro	1.06%	13.43%	8.32%	28.82%	1.17	13.8%	4.91%	21.8%	Under Valued
Oil & Natural Gas	-0.11%	-1.29%	10.22%	35.40%	1.14	13.8%	4.91%	21.4%	Under Valued
Housing Development Finance	0.85%	10.74%	7.69%	26.64%	1.14	13.8%	4.91%	21.3%	Under Valued

Table 3: Calculation of Beta for NSE (Nifty-50) Companies

HDFC Bank	1.09%	13.89%	7.27%	25.17%	1.09	13.8%	4.91%	20.7%	Valued
Reliance Industries	2.21%	30.01%	8.91%	30.87%	1.07	13.8%	4.91%	20.3%	Over Valued
Maruti Suzuki	0.32%	3.91%	8.96%	31.03%	1.05	13.8%	4.91%	20.1%	Under Valued
Grasim Industries	1.17%	14.93%	9.16%	31.74%	1.05	13.8%	4.91%	20.1%	Under Valued
Bajaj Auto	0.56%	6.99%	8.43%	29.20%	1.03	13.8%	4.91%	19.8%	Under Valued
Titan Company	2.36%	32.37%	9.07%	31.41%	1.01	13.8%	4.91%	19.5%	Over Valued
UltraTech Cement	1.16%	14.90%	8.14%	28.18%	0.96	13.8%	4.91%	18.8%	Under Valued
Kotak Mahindra Bank Ltd	1.29%	16.69%	8.07%	27.95%	0.94	13.8%	4.91%	18.4%	Under Valued
SBI Life Insurance	1.52%	19.81%	8.32%	28.82%	0.93	13.8%	4.91%	18.3%	Over Valued
Eicher Motors	0.88%	11.05%	9.27%	32.11%	0.93	13.8%	4.91%	18.3%	Under Valued
Hero MotoCorp	-0.05%	-0.58%	8.89%	30.80%	0.91	13.8%	4.91%	18.1%	Under Valued
Apollo Hospitals	3.17%	45.50%	12.14%	42.05%	0.90	13.8%	4.91%	18.0%	Over Valued
Tata Consumer Products	2.15%	29.12%	8.58%	29.74%	0.85	13.8%	4.91%	17.2%	Over Valued
Coal India	-0.07%	-0.80%	9.08%	31.46%	0.85	13.8%	4.91%	17.1%	Under Valued
HCL Tech	1.81%	24.00%	8.64%	29.94%	0.84	13.8%	4.91%	17.1%	Over Valued
HDFC Life	0.85%	10.74%	7.60%	26.32%	0.83	13.8%	4.91%	16.9%	Under Valued
Tech Mahindra	1.45%	18.89%	8.88%	30.76%	0.81	13.8%	4.91%	16.5%	Over Valued
NTPC	0.67%	8.28%	8.20%	28.42%	0.77	13.8%	4.91%	16.0%	Under Valued
Sun Pharma	1.40%	18.11%	8.83%	30.59%	0.73	13.8%	4.91%	15.4%	Over Valued
ITC	0.61%	7.55%	6.65%	23.03%	0.72	13.8%	4.91%	15.3%	Under Valued
Bharti Airtel	1.60%	20.92%	7.39%	25.59%	0.65	13.8%	4.91%	14.4%	Over Valued

Infosys	2.12%	28.65%	7.61%	26.38%	0.63	13.8%	4.91%	14.0%	Over Valued
Britannia Industries	1.32%	17.04%	6.95%	24.08%	0.61	13.8%	4.91%	13.8%	Over Valued
Asian Paints	2.07%	27.92%	7.58%	26.27%	0.59	13.8%	4.91%	13.5%	Over Valued
Tata Consultancy	1.63%	21.44%	7.06%	24.45%	0.58	13.8%	4.91%	13.3%	Over Valued
Power Grid	0.95%	12.03%	6.00%	20.77%	0.53	13.8%	4.91%	12.5%	Under Valued
Wipro	1.35%	17.45%	8.48%	29.37%	0.45	13.8%	4.91%	11.4%	Over Valued
Cipla	1.48%	19.21%	8.44%	29.23%	0.43	13.8%	4.91%	11.1%	Over Valued
Divi's Labs	2.37%	32.43%	7.76%	26.87%	0.42	13.8%	4.91%	11.0%	Over Valued
Nestle India	1.91%	25.53%	5.62%	19.45%	0.33	13.8%	4.91%	9.6%	Over Valued

6.43%

7.73%

Source: Authors calculation

1.38%

1.50%

17.81%

19.59%

Hindustan

Unilever

Dr. Reddy's

Labs

The Nifty 50 stocks that are overvalued and undervalued based on the capital asset pricing model are highlighted in Table No. 3 above. Stocks that have annual returns greater than those determined by the CAPM are undervalued, while those that have annual returns lower than those determined by the CAPM are overvalued. Stocks with values above the beta value carry more risk, while those with values below the beta value carry less risk. Stocks that are overvalued in the market may be recommended for sale, while undervalued stocks may be recommended for purchase in order to provide investors with a higher rate of return.

22.29% 0.23

0.22

26.77%

13.8%

13.8%

4.91%

4.91%

Over

Valued

Over

Valued

8.3%

8.1%

Table 4 highlights the stocks of Nifty-50 which are overvalued, as compared with the returns obtained as per CAPM.

The stocks that are overvalued according to the CAPM are all represented in Table 4. By contrasting the stocks' actual returns with the returns obtained by the CAPM, it can be determined that the stocks are overvalued. The price of these stocks is overvalued in the market, which means there is good demand for these stocks in the market.

Stocks in Nifty-50	Average Annual	Annual	BETA	САРМ	Stock
Stocks III Milly-50	Returns	Risk	(β)	Returns (Ri)	Valuation
Bajaj Finserv	45.57%	50.05%	1.94	32.9%	Over Valued
Bajaj Finance Ltd	50.41%	48.88%	1.88	32.1%	Over Valued
Adani Enterprises Ltd	139.88%	66.24%	1.63	28.4%	Over Valued
ICICI Bank	29.73%	32.50%	1.30	23.7%	Over Valued
JSW Steel	33.46%	44.20%	1.28	23.4%	Over Valued
Reliance Industries	30.01%	30.87%	1.07	20.3%	Over Valued
Titan Company	32.37%	31.41%	1.01	19.5%	Over Valued
SBI Life Insurance	19.81%	28.82%	0.93	18.3%	Over Valued
Apollo Hospitals	45.50%	42.05%	0.90	18.0%	Over Valued
Tata Consumer Products	29.12%	29.74%	0.85	17.2%	Over Valued
HCL Tech	24.00%	29.94%	0.84	17.1%	Over Valued
Tech Mahindra	18.89%	30.76%	0.81	16.5%	Over Valued
Sun Pharma	18.11%	30.59%	0.73	15.4%	Over Valued
Bharti Airtel	20.92%	25.59%	0.65	14.4%	Over Valued
Infosys	28.65%	26.38%	0.63	14.0%	Over Valued
Britannia Industries	17.04%	24.08%	0.61	13.8%	Over Valued
Asian Paints	27.92%	26.27%	0.59	13.5%	Over Valued
Tata Consultancy	21.44%	24.45%	0.58	13.3%	Over Valued
Wipro	17.45%	29.37%	0.45	11.4%	Over Valued
Cipla	19.21%	29.23%	0.43	11.1%	Over Valued
Divi's Labs	32.43%	26.87%	0.42	11.0%	Over Valued
Nestle India	25.53%	19.45%	0.33	9.6%	Over Valued
Hindustan Unilever	17.81%	22.29%	0.23	8.3%	Over Valued
Dr. Reddy's Labs	19.59%	26.77%	0.22	8.1%	Over Valued

Table 4: The Stocks of Nifty-50 Which are Overvalued

Source: Calculations

Table 5 highlights the stocks of Nifty-50 which are Overvalued, as compared with the returns obtained as per CAPM.

Table 5: The Stocks of Nifty-50 Which are Overvalued, as Compared with the Returns Obtained as per CAPM

Stocks in Nifty 50 Average Annual Returns		CAPM Returns (Ri)
Bajaj Finserv	45.57%	32.9%
Bajaj Finance Ltd	50.41%	32.1%
Adani Enterprises Ltd	139.88%	28.4%
ICICI Bank	29.73%	23.7%
JSW Steel	33.46%	23.4%

Source: Calculations





4.8 Interpretation

We can infer from Figure 1 that Bajaj Finserv, Bajaj Finance Ltd., Adani Enterprises Ltd., ICICI Bank, and JSW Steels are the five stocks that are overvalued among the other stocks, indicating that these stocks can be recommended for an investor to sell first in the market because they can provide maximum returns.

Table 6 highlights the stocks of Nifty-50 which are undervalued, as compared with the returns obtained as per CAPM.

Stoolyg in Nifty 50	Average Annual	Annual	BETA	САРМ	Stock
Stocks in Milly-50	Returns	Risk	(β)	Returns (Ri)	Valuation
Adani Ports & SEZ	23.08%	34.74%	1.28	23.4%	Under Valued
AXIS Bank Ltd	17.85%	37.45%	1.56	27.4%	Under Valued
Bajaj Auto	6.99%	29.20%	1.03	19.8%	Under Valued
Bharat Petroleum	0.29%	35.54%	1.25	23.0%	Under Valued
Coal India	-0.80%	31.46%	0.85	17.1%	Under Valued
Eicher Motors	11.05%	32.11%	0.93	18.3%	Under Valued
Grasim Industries	14.93%	31.74%	1.05	20.1%	Under Valued
HDFC Bank	13.89%	25.17%	1.09	20.7%	Under Valued
HDFC Life	10.74%	26.32%	0.83	16.9%	Under Valued
Hero MotoCorp	-0.58%	30.80%	0.91	18.1%	Under Valued
Hindalco Industries	25.19%	47.60%	1.79	30.7%	Under Valued
Housing Development Finance	10.74%	26.64%	1.14	21.3%	Under Valued
IndusInd Bank Ltd	11.21%	55.12%	2.32	38.3%	Under Valued
ITC	7.55%	23.03%	0.72	15.3%	Under Valued
Kotak Mahindra Bank Ltd	16.69%	27.95%	0.94	18.4%	Under Valued
Larsen & Toubro	13.43%	28.82%	1.17	21.8%	Under Valued
NTPC	8.28%	28.42%	0.77	16.0%	Under Valued
Mahindra & Mahindra	20.10%	37.22%	1.37	24.7%	Under Valued
Maruti Suzuki	3.91%	31.03%	1.05	20.1%	Under Valued
Oil & Natural Gas	-1.29%	35.40%	1.14	21.4%	Under Valued
Power Grid	12.03%	20.77%	0.53	12.5%	Under Valued
SBI	23.97%	40.19%	1.40	25.2%	Under Valued
Tata Motors	21.40%	60.71%	1.79	30.8%	Under Valued
Tata Steel Ltd	19.78%	43.68%	1.48	26.3%	Under Valued
UltraTech Cement	14.90%	28.18%	0.96	18.8%	Under Valued
UPL	18.49%	38.69%	1.27	23.2%	Under Valued

Table 6: The Stocks of Nifty-50 Which are Undervalued

Source: Calculations

All of the stocks that are undervalued according to the CAPM are listed in Table 6. By contrasting the stocks' actual returns with the returns obtained by the CAPM, it can be determined that the stocks are undervalued.

Table 7 highlights the stocks of Nifty-50 which are Undervalued, as compared with the returns obtained as per CAPM.

Table 7: The Stocks of Nifty-50 Which are Undervalued, as Compared with the Returns Obtained as per CAPM

Stocks in Nifty-50	Average Annual Returns	CAPM Returns (Ri)
IndusInd Bank Ltd	11.21%	38.3%
Tata Motors	21.40%	30.8%
Hindalco Industries	25.19%	30.7%
AXIS Bank Ltd	17.85%	27.4%
Tata Steel Ltd	19.78%	26.3%

Source: Calculations

Figure 2: Comparison of Actual Returns and Returns as per CAPM



We can conclude from Figure 2 that the top five undervalued stocks to buy are IndusInd Bank Ltd., Tata Motors, Hindalco Industries, AXIS Bank Ltd., and Tata Steel Ltd. because they have the potential to generate the highest returns in the future and have lower risks than the other stocks.

5.0 Results

Out of the 50 stocks under consideration for the analysis, 26 are found to be undervalued and 24 are overvalued. The findings of the study show that stocks with annual returns that are less than those determined by the CAPM are overvalued. Additionally, undervalued stocks are those whose annual returns exceed those determined by the Capital Asset Pricing Model. Stocks with a beta value greater than one are comparably riskier than other stocks. According to the study, Indusland Bank stock has a beta value of 2.32, which is greater than one, making it the riskiest investment relative to the other stocks in the Nifty-50 Index. Majority of stocks are found to have beta values below 1, making them defensive securities. Risk-averse shareholders may decide to invest in these kinds of stocks. Although riskier, shares with beta values greater than one provide their owners with large returns.

Indusland Bank, Hindalco Industries, Tata Motors, and AXIS Bank are the companies that have a beta value greater than one, making them extremely hazardous in the market but also provide higher rewards. Another finding from the study is that stocks with beta values less than one are often considered to be less risky than other stocks. The stock of Dr. Reddy's Labs Company has a beta value of 0.22, which is less than one, making it the least risky share among all the other components of the Nifty 50 index. In general, the CAPM is among the best models for determining the risk and return attached to a certain stock. The five stocks that stand out as being overvalued among the rest are Cipla, Divi's Labs, Nestle India, Hindustan Unilever, and Dr. Reddy's Labs. It is advised that investors sell these stocks first so they can receive the most profits. The top five undervalued stocks that can be purchased are IndusInd Bank Ltd., Tata Motors, Hindalco Industries, AXIS Bank Ltd., and Tata Steel Ltd. These companies can offer the highest returns in the future and carry less risk than other stocks.

6.0 Limitations & Future Scope of Work

The scope of this research is limited to the 50 stocks that make up the NIFTY Index. The period of study is taken as five years, from January 2018 to January 2023. The closing prices of the 50 companies that make up the NIFTY 50 Index are used to determine the monthly risk and returns of the stocks. In the future, other stocks belonging to different indices can be used. The stability of Beta can be tested.

7.0 Recommendations

Nifty 50 is a diverse index that encompasses 23 economic sectors in India. The CAPM model assesses whether the shares are undervalued or overvalued. Shares are overvalued when their actual price is higher than their CAPM returns, and they are undervalued when their actual price is lower. Thus, shares that are overvalued can be

sold, while shares that are undervalued can be purchased. Investors who have the capacity to take on risk and generate large returns are advised to purchase companies with beta values greater than 1 and investors who desire less or no risk and are comfortable with nominal returns are recommended to buy stocks whose beta values are less than 1. IndusInd Bank stock has a beta of 2.34, which is more than one; thus, it is a highly risky share compared to all the other stocks in the Nifty-50 index, which also give high returns. Thus, investors who are risk-takers are suggested to invest in this stock. Dr. Reddy's Labs Company stock has a beta value of 0.22, which is less than 1, making it the least risky share compared to all the other stocks in the Nifty 50 index. Investors who don't want to take on a lot of risk are advised to buy this stock.

8.0 Conclusion

Although the majority of the stocks assessed using the Capital Asset Pricing Model (CAPM) are undervalued, this means that these stocks should be bought from the current market, while the overpriced stocks can be sold to maximise profit and minimise loss. The study goes into great detail about both the subject and the Capital Asset Pricing Model. The findings of this study suggest that anyone interested in building a stock portfolio should evaluate the risk and return involved. Both current and potential investors who want to earn reliable returns in a secure environment will benefit greatly from using this concept. The study's findings appear to be in agreement with Sharpe (1964), Treynor (1961), Lintner (1965), and Mossin (1966) who developed the Capital Asset Pricing Model for evaluating the risk of the stocks. Participants should, however, exercise extreme caution when calculating the risk of any security. The CAPM and its more complex versions have been extensively used by investment managers. The CAPM is still widely used in corporate circles to determine the costs of equity for businesses. However, Tests of the model, show that it has a lot to say about how yields are set in financial markets. A novel and distinctive approach to a significant task is represented by CAPM.

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