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AWESHKAR SEPTEMBER 2024 ISSUE

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EDITORIAL

EMBRACING THE CIRCULAR ECONOMY: A PATHWAY TO SUSTAINABLE PROSPERITY

The term 'circular economy' has gained popularity in recent years and many governments, companies, and non-profit organizations are trying to be part of this story. It is considered a new model for sustainable growth, jobs, and emerging industries. Circular economy not only contributes to growth and innovation, but also pave way for better and optimum utilization of the resources that are available. Circular economy is defined as an economic framework in which all materials and products are recycled and reused, and waste is kept to a minimum through efficient design and manufacturing techniques. This new model envisions a regenerative system where waste is minimized, resources are reused, and product lifecycles are extended, in contrast to the conventional linear model of "take, make, dispose". This paradigm shift not only addresses pressing environmental issues but also offers various economic and social benefits. The essence of circular economy lies in pursuing economic opportunities while constraining environmental and social impacts through implementing well-planned, effective, and efficient resource and waste management practices throughout the entire value chain and product usage. Instead of discarding products after their initial use, the circular economy encourages businesses and consumers to find new ways to extend the value of materials. This approach can significantly reduce the environmental footprint of production and consumption, curbing the depletion of natural resources and lowering greenhouse gas emissions.

The circular economy has a significant impact on various aspects of society, including households, businesses, government, and the environment. Its importance is growing in the modern world, as it creates new opportunities for transforming waste into value, promoting environmental sustainability, protecting natural resources, enhancing product and process innovation, boosting competitiveness and profitability, stimulating growth and jobs, and improving the quality of life in cities and communities.

One of the most striking examples of circular economy practices is seen in the fashion industry. Traditionally, fashion has been one of the most polluting sectors, with fast fashion contributing to massive amounts of textile waste. However, forward-thinking companies are now adopting circular practices by designing clothes with longer lifespans, using recycled materials, and creating systems for garment recycling and resale. Brands like Patagonia and H&M have initiated take-back programs where consumers can return used clothing, which is then repurposed or recycled into new products.

The benefits of a circular economy extend beyond environmental sustainability. Economically, it opens up new business opportunities by creating value from waste. Companies can reduce material costs by reusing resources and capitalizing on secondary markets. For instance, the electronics industry has seen a rise in refurbished products, where devices are repaired and resold, providing affordable alternatives to consumers while reducing e-waste. Additionally, circular practices can foster innovation, as businesses are challenged to rethink product design and develop new technologies that support sustainability.

Socially, the circular economy has the potential to create jobs and promote equity. As industries shift towards circular models, new roles in recycling, remanufacturing, and logistics will emerge, providing employment opportunities in both developed and developing economies. However, the transition to a circular economy is not without its challenges. It requires a fundamental change in how businesses businesses operate and how consumers think about ownership and consumption. Companies must invest in new technologies and redesign their products with end-of-life in mind. Governments also

play a critical role in facilitating this transition by implementing policies that incentivize circular practices, such as extended producer responsibility and tax benefits for recycling initiatives.

Consumers, too, have a part to play. Embracing circular economy practices means rethinking our consumption habits—choosing quality over quantity, opting for products with longer lifespans, and supporting businesses that prioritize sustainability. Public awareness campaigns and education are essential in driving this cultural shift, helping people understand the long-term benefits of a circular economy.

At WeSchool, we actively practice and promote circular economy principles, integrating them into our curriculum and operations. Through initiatives like waste reduction, recycling programs, and partnerships with organizations focused on sustainability, we are fostering a culture that values long-term impact over short-term gains. By embedding circular economy practices into our educational framework, we are preparing the next generation of leaders to drive meaningful change in the business world.

Prof. (Dr.) Uday Salunkhe
Editor in Chief

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2. **ABSTRACT**
3. **INTRODUCTION**
4. **LITERATURE REVIEW**
5. **METHODOLOGY:** including sampling, measurements, and scaling, quantitative (or/and) quantitative methods and incorporation of the same to the topic.
6. **ANALYSISAND RESULTS:** the findings of the study
7. **DISCUSSION:** the reasoning for your findings with relevant theoretical support
8. **LIMITATIONS:** what the study could not take into account
9. **FUTURE SCOPE OF RESEARCH:** scope of improvement
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*****

RESEARCH

CAN GREEN DEPOSITS BANK ON THE YOUTH?

Dr Shubhada Apte & Priti Samant*

Abstract

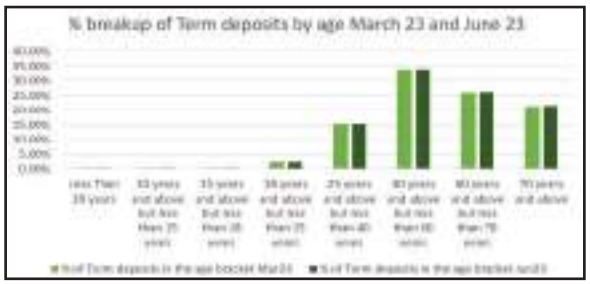
There is fierce competition between banks for deposit mobilization among Indian banks as the loan growth outpaces the deposit growth. Traditionally, bank fixed deposits are preferred by people of age groups 40 years and above. Reserve bank of India issued a circular regarding green deposits. The current study is exploratory in nature and attempts to study the influence of demographic aspects of young investors in Mumbai (between 21 years to 35 years) towards preference for bank fixed deposits and preference for green deposits. It will compare the relationship between preference for fixed deposits and preference for green deposits amongst young investors in Mumbai. Results highlight that investors prefer fixed deposits with increase in age and lower educational qualification. Females prefer bank fixed deposits as compared to males. There is no relationship between preference for fixed deposits and preference for green deposits for young investors and around 84% of the youngsters who don't prefer fixed deposits, do prefer green deposits, and 61% are not even aware about the green deposit product. This presents an opportunity for banks to tap youngsters funds by launching green deposit products and bridge the gap between loan growth rates and deposit growth rates. Mobilising green deposits will result in greater funding access for sustainable economy. Regulatory compliance will ensure avoidance of greenwashing and facilitate seamless funding to activities under sustainable development goals.

Originality: This is the first article on green deposits in Mumbai region.

Keywords : *Green deposits, Fixed deposits, Indian Banks*

INTRODUCTION

Bank fixed deposits has been an instrument avenue for many years for investors in India. It was introduced as per article 19 by the British in the 19th century in India but it started becoming popular only in 1960 post nationalization of banks in India. In 1980s, with deregulation of interest rates on deposits, market competition drove up the interest rates, making it a favored choice. Age wise breakup deposits as of Mar23 and Jun23 are depicted in the chart below.



Source: BSR 2.11 report by RBI

The picture clearly shows that bulk of the term deposits around 80% are generated from age groups 40 years and above. Therefore, young age depositors are a large group that is not being converted by banks into retail fixed depositors. Young age depositors represent untapped potential for banks to augment their deposit base. Young generation has been shown to communicate keen interest in sustainable products, services and projects. Combination of these, reflected in attitude of urban youth towards fixed deposits with banks, which would be pivoted for sustainability financing, green deposits as an investment avenue may provide exciting opportunities .

This study focusses on relevance of green deposits as a product by banks that can be targeted towards young depositors (lower than 40 years of age). In the era where credit growth is outpacing the deposit growth, refer diagram below,

* ***Dr Shubhada Apte,*** *DTSS College, Mumbai*
* ***Priti Samant,*** *Prin. L. N. Welingkar Institute of Management Development & Research (WeSchool) Mumbai*

this study will enable banks increase their deposit base through green finance products like green deposits as well as serving sustainability goals for the society.

Trend seen in credit growth and deposit growth for scheduled commercial banks is given below:

Source: RBI report

Deposits growth especially amongst the younger depositors can be useful for banks due to preferential treatment to retail deposits in LCR requirements, provide larger pool of loanable funds, support credit requirements of a growing economy like India. Also, the young age of the depositors will enable long tenor of banking relationship and encourage stable and longer tenor funding source for the banks and that too at a comparatively lower cost.

REVIEW OF LITERATURE

(Ringel & Mjekic,2023) [24] emphasized the need for standardization, transparency and improved comparability across various financial products intended for green finance; especially with reference to Germany for clean energy finance.

(Liu & Huang, 2022) [16] studied the impact of sustainable finance on financial performance of Chinese banks. They brought out that increase in sustainable finance can reduce the financial performance of the banks whereas, if strong state owned banks invest in sustainable finance, they can perform without compromising their financial position. However, for non state owned banks, increased financial performance indicated the reduction in sustainable finance.

(Chen & Chu, 2023)[13] identified technology as a tool for financial inclusion. They mentioned that higher penetration of mobile phones, collaboration of government, financial institutions and technology companies will facilitate greater inclusion. Similar thoughts were shared by (Li & Wu, 2023)[14]. (Shah, et al, 2023)[26] in their paper on systematic review re-iterated that innovations in green financial instruments and technology to increase green energy, construction and transport mechanics need to co- exist to be effective.

(Xiang & Cao, 2023)[30] studied the relationship between the oil prices, natural gas prices and coal prices with green bonds. Oil and coal prices showed positive relationship with green bonds while coal prices showed negative relationship with green bonds.

(Wu, 2022)[29] stated that increase in polluting items like coal and oil reduces the scope for green finance though they improve trade openness. It was highlighted that natural gas should be encouraged to facilitate trade and green finance simultaneously.

(Liu & Huang, 2022)[16] showed that financing sustainability is impacting financial performance of banks in China adversely.

Importance of responsible banking was highlighted by (Miroshnichenko , 2021)[20] .the paper mentioned about transformation of banking products to meet sustainable development goals of the economy.

(Mehedi & Kuddus, 2017)[19] found that increase in deposits did not lead to increase in green finance by Dutch-Bangla Bank Ltd for the period 2011 to 2015.

(Dorfleitner , Eckberg & Utz, 2023)[9] discussed greenness ratings with respect to green bonds by different issuers. They found that ratings were significant for municipalities and companies but not for financial institutions and other public issuers.

(Lin, 2023)[15] explained that level of compliance with standards depends on level of important stakeholder expectations like political or western connections for Chinese bond issuers. It is also dependent on extent of oversight by regulatory body nationally.

(Siemionek-Ruskań, & Fanea-Ivanovici, 2023)[27] described the actions by commercial banks in Poland and Romania to create awareness about sustainable finance and the green products and services in these countries.

(Ouyang, et al, 2023) [22] figured that green finance can be at the cost of economic growth rate. Green finance will enhance the quality but not quantity of economic progress.

(Alix, 2021) [2] mentioned that Citizens financial group in US began its green deposits product launch for corporates. This showcases banks leveraging their existing banking relationships to cater to sustainable developmental mindset of their customers.

Article on CFO magazine in May 2023 [28] mentions deliberations between government and banks to encourage banks towards sustainable finance by providing special treatment for green banking products on liabilities as well as assetside.

Green financial products are an important aspect of financial investment decisions (Goodella et al. 2022)[12]. The need for green finance to support financial growth without compromising environmental balance and move in the direction of sustainable developmental goals as per)Falcone & Sica, 2019)[10], (Zhou & Li, 2019)[32] and (Cui et al, 2020)[7]

(Gáspár et al, 2023)[11] identified customer segments based on their preferences for green financial products in Hungary and found that females prefer green products as compared to financial returns. They also separated a group which is influenceable and can be targeted while marketing sustainable financial products.

(Saraf et al, 2023)[25] have studied the relationship between demography and inclination towards green banking products in Ahmedabad city. They studied the entire gamut of banking services.

Several studies have found inter connectedness between social economic aspects and investment decisions by retail investors. (Barber & Odean, 2001)[3], (Nilsson 2009)[21], (Cheah et al 2011)[6]. Comparison between investors who invest for social purposes vis a vis investors who invest in traditional products has been conducted by (Mclachlan & Gardner , 2004)[18].

(Barreda-Tarrazona et al, 2011)[4] pointed out that level of awareness regarding various financial products is significant while making investment decisions. (Diouf et al, 2014)[8] emphasized on the role of financial advisors while (Young et al 2010) [31] identified additional motivators like financial incentives, certification of end use of green funds, extent of marketing aspects as differentiators for financial decision making.

(Pham & Avnet 2004) [23] separated risk takers from risk averse investors. They found that risk takers mostly get influenced by marketing activities as these pose newer opportunities to profit while risk averse investors invest with primary motive of securing their financial position and are ready to sacrifice higher returns for lower risk.

(Bazley et al, 2022) [5] stated that taxation influences decisions making by households especially related to portfolio behavior. (Ma, et al 2021) [17] introduce a new concept of LCAPM wherein appropriate focus in given to liquidity aspect while studying asset pricing.

Innovations in financial products especially to serve the purpose of sustainable growth have been widespread (Whang & Zhi, 2016)[7] .

Green deposit circular has been issued by Reserve Bank of India in June 2023 and green deposits as a product is yet to be formally launched

by Indian banks at a large scale. This study will help banks strategize about target customers especially in the young age bracket (21 to 35 years) who do not preferred fixed deposit currently. Therefore, it becomes pertinent to study relationship between preference of fixed deposit investment and preference for green deposits amongst young investors.

There is yet a study to be conducted especially directed towards green deposits with special focus on young investors and their inclination towards green deposits. This study would enable banks to customize their interactions and green deposit offerings for younger retail depositors.

THE OBJECTIVES OF THIS STUDY ARE:

1. Study the demographic aspects influencing decision to invest in bank fixed deposits in Mumbai
2. Study relationship between preference for Bank Fixed deposits and preference for Bank green deposits amongst young investors in Mumbai
3. Study the demographic aspects influencing decision to invest in bank green fixed deposits in Mumbai.

Based on the literature review, the following hypothesis have been formulated for this research: H01 : There is no relationship between demographic aspects like age, academic qualification, gender and occupation and preference for investment in Fixed deposits.

Independent Variable	**Dependent Variable**	**Null Hypothesis**
Demographic aspect: age	Preference for investment in Fixed deposits	H01a There is no relationship between age and preference for fixed deposits
Gender	Preference for investment in Fixed deposits	H01b There is no relationship between gender and preference for Fixed deposits
Occupation	Preference for investment in Fixed deposits	H01c There is no relationship between occupation and preference for Fixed deposits
Academic Qualification	Preference for investment in Fixed deposits	H01d There is no relationship between academic qualification and preference for Fixed deposits

Basis	**Independent Variable**	**Dependent Variable**	**Null Hypothesis**
On the basis of current investment preference for Fixed deposits	Preference for Fixed deposits	preference for Green deposits	H02 There is no relationship between preference for fixed deposits and preference for Green deposits
On the basis of demographic variables	Age	preference for Green deposits	H03 There is no relationship between age and preference for Green deposits
	Gender	preference for Green deposits	H04 There is no relationship between gender and preference for Green deposits
	Occupation	preference for Green deposits	H05 There is no relationship between occupation and preference for Green deposits
	Academic Qualification	preference for Green deposits	H06 There is no relationship between academic qualification and preference for Green deposits

Basis	Independent Variable	Dependent Variable	Null Hypothesis
On the basis of information	Awareness of Green deposits	preference for Green deposits	H07 There is no relationship between awareness of green deposits and preference for Green deposits
	Transparency regarding use of green funds	preference for Green deposits	H08 There is no relationship between transparency regarding use of green funds and preference for Green deposits
On the basis of Influence	Advice from family & friends	preference for Green deposits	H09 There is no relationship between reliance on advice from family and friends and preference for Green deposits
	Advice from financial consultants	preference for Green deposits	H10 There is no relationship between reliance on advice from financial consultants and preference for Green deposits
	Acknowledgment as green financer	preference for Green deposits	H11 There is no relationship between and preference for Green deposits
On the basis of Risk sensitivity	Importance to risk while making investment decisions	preference for Green deposits	H12 There is no relationship between consideration of risk while investing and preference for Green deposits
	Expectation for better risk protection in case of default of green deposits as compared to normal bank fixed deposit	preference for Green deposits	H13 There is no relationship between awareness of green deposits and preference for Green deposits
On the basis of other factors	Importance to returns while making investment decisions	preference for Green deposits	H14 There is no relationship between consideration of returns while investing and preference for Green deposits
	Expectation about better interest rates for green deposits than normal fixed deposits	preference for Green deposits	H15 There is no relationship between expectation about better interest rates for green deposits and preference for Green deposits
	Importance to liquidity while making investment decisions	preference for Green deposits	H16 There is no relationship between consideration of liquidity while investing and preference for Green deposits

Basis	Independent Variable	Dependent Variable	Null Hypothesis
	Importance to taxation while making investment decisions	preference for Green deposits	H17 There is no relationship between consideration of taxation while investing and preference for Green deposits
	Expectation about green points that can be used for tax dispensation if invested in green deposits	preference for Green deposits	H18 There is no relationship between expectation about green points that can be used for tax dispensation and preference for Green deposits

RESEARCH DESIGN AND PROCESS

The research was conducted using a structured questionnaire which was circulated amongst management students and graduates belonging to age group (21 years to 35 years) based in Mumbai. The analysis has been conducted using cross tabs and binary logistics regression in SPSS version 25. The number of valid responses to the questionnaire were 143.

Binary logistic regression was used to determine whether age ,gender, academic qualification and occupation were associated with likelihood of preference for investment in fixed deposits.

A preliminary analysis suggested that the assumption of multicollinearity was met (VIF of all independent variables was less than 2)

There were no outliers in the standardized residual values in the dataset.

The model was statistically significant x^2 (4, (N=143) =16.83, p=.002) suggesting that it could distinguish between those who prefer to invest in Fixed deposits as compared to those who do not prefer fixed deposits.

The model explained between 11.1% (Cox & Snell square) to 15.7% (Nagelkerke R square) of the variance in the dependent variable and correctly classified 72% of the cases. As shown in the table below , age, academic qualification and gender were significant contributors while occupation did not contribute significantly to the model.

Table :Logistic Regression Predicting the likelihood of investing in bank fixed deposits

	B	S.E.	Wald	df	p	OR	95% C.I.for OR	
							LL	UL
Age	1.951	.828	5.553	1	.018	7.036	1.389	35.654
Academic qualification	-1.316	.520	6.415	1	.011	.268	.097	.743
Gender	.965	.417	5.359	1	.021	2.624	1.159	5.941
Occupation	.244	.700	.121	1	.728	1.276	.323	5.036
Constant	.588	.274	4.611	1	.032	1.800		

The table clearly shows that preference for fixed deposits increases with increase in age and reduces with increase in academic qualification. Females prefer Fixed deposits as compared to males.

RESULTS :

	Independent Variable	**Null Hypothesis**	**Outcome of chi square tests**
On the basis of current investment preference for Fixed deposits	Preference for Fixed deposits	H01 There is no relationship between preference for fixed deposits and preference for Green deposits	There is an insignificant association at 5 % level of significance between preference for Fixed deposits and preference for green deposits. (X2 =.001, df= 1, p= .97). Hence null hypothesis is accepted.
On the basis of demographic variables	Age	H02 There is no relationship between age and preference for Green deposits	There is an insignificant association at 5 % level of significance between age band and preference for green deposits. (X2 =.501, df= 1, p= .479). Hence null hypothesis is accepted.
	Gender	H03 There is no relationship between gender and preference for Green deposits	There is an insignificant association at 5 % level of significance between gender and preference for green deposits. (X2 =.656, df= 1, p= .418). Hence null hypothesis is accepted.
	Occupation	H04 There is no relationship between occupation and preference for Green deposits	There is an insignificant association at 5 % level of significance between occupation and preference for green deposits. (X2 = 1.01, df= 1, p= .294). Hence null hypothesis is accepted.
	Academic Qualification	H05 There is no relationship between academic qualification and preference for Green deposits	There is a significant association at 10 % level of significance between academic qualification and preference for green deposits. (X2 = 3.032, df= 1, p= .082). Hence null hypothesis is rejected. Increase in academic qualification increases the preferences for green deposits. (92% of post graduates prefer green deposits while 80% of graduates prefer green deposits)
On the basis of information	Awareness of Green deposits	H06 There is no relationship between awareness of green deposits and preference for Green deposits	There is an insignificant association at 5 % level of significance between awareness of green deposits and preference for green deposits. (X2 = 2.14, df= 1, p= .643). Hence null hypothesis is accepted.
	Transparency regarding use of green funds	H07 There is no relationship between transparency regarding use of green funds and preference for Green deposits	There is an insignificant association at 5 % level of significance between transparency regarding use of green funds and preference for green deposits. (X2 = 7.120, df= 4, p= .130). Hence null hypothesis is accepted.

	Independent Variable	**Null Hypothesis**	**Outcome of chi square tests**
On the basis of Influence	Advice from family & friends	H08 There is no relationship between reliance on advice from family and friends and preference for Green deposits	There is an insignificant association at 5 % level of significance between reliance on advice from family and friends and preference for green deposits. (X^2 = 3.340, df= 4, p= .503). Hence null hypothesis is accepted.
	Advice from financial consultants	H09 There is no relationship between reliance on advice from financial consultants and preference for Green deposits	There is an insignificant association at 5 % level of significance between reliance on advice from financial consultants and preference for green deposits. (X^2 = 4.467, df= 4, p= .346). Hence null hypothesis is accepted.
	Acknowledgment as green financer	H10 There is no relationship between preference for acknowledgement as green financer and preference for Green deposits	There is an insignificant association at 5 % level of significance between preference for acknowledgment as green financer and preference for green deposits. (X^2 = 3.572, df= 4, p= .467). Hence null hypothesis is accepted.
On the basis of Risk sensitivity	Importance to risk while making investment decisions	H11 There is no relationship between consideration of risk while investing and preference for Green deposits	There is an insignificant association at 5 % level of significance between consideration of risk while investing and preference for green deposits. (X^2 = 1.003, df= 4, p= .909). Hence null hypothesis is accepted.
	Expectation for better risk protection in case of default of green deposits as compared to normal bank fixed deposit	H12 There is no relationship between expectation for better risk protection for default in green deposits and preference for Green deposits	There is a significant association at 10% level of significance between expectation for better risk protection for default while investing in green deposits and preference for green deposits. (X^2 =9.018, df= 4, p= .058). Hence null hypothesis is rejected. Greater reliance on transparency of funds by investors; greater is the preference for green deposits.
On the basis of other factors	Importance to returns while making investment decisions	H13 There is no relationship between consideration of returns while investing and preference for Green deposits	There is an insignificant association at 5 % level of significance between consideration of return while investing and preference for green deposits. (X^2 = 3.154, df= 4, p= .532). Hence null hypothesis is accepted.

	Independent Variable	**Null Hypothesis**	**Outcome of chi square tests**
	Expectation about better interest rates for green deposits than normal fixed deposits	H14 There is no relationship between expectation about better interest rates for green deposits and preference for Green deposits	There is an insignificant association at 5 % level of significance between expectation about better interest rates for green deposits while investing and preference for green deposits. (X2 = .562, df= 4, p= .967). Hence null hypothesis is accepted.
	Importance to liquidity while making investment decisions	H15 There is no relationship between consideration of liquidity while investing and preference for Green deposits	There is an insignificant association at 5 % level of significance between consideration of liquidity while investing and preference for green deposits. (X2 = 4.094, df= 4, p= .393). Hence null hypothesis is accepted.
	Importance to taxation while making investment decisions	H16 There is no relationship between consideration of taxation while investing and preference for Green deposits	There is an insignificant association at 5 % level of significance between consideration of taxation while investing and preference for green deposits. (X2 = 1.710, df= 4, p= .789). Hence null hypothesis is accepted.
	Expectation about green points that can be used for tax dispensation if invested in green deposits	H17 There is no relationship between expectation about green points that can be used for tax dispensation and preference for Green deposits	There is an insignificant association at 5 % level of significance between expectation about green points that can be used for tax dispensation while investing in green deposits and preference for green deposits. (X2 = 2.399, df= 4, p= .663). Hence null hypothesis is accepted.

The results show that there is no relationship between preference between fixed deposits and preference for green deposits especially in the younger age population.

Analysis of people who do not prefer fixed deposits:

	Don't prefer fixed deposits but prefer green deposits (Not aware of green deposits)	Don't prefer fixed deposits but prefer green deposits (Aware of green deposits)	Don't prefer fixed deposits and don't prefer green deposits (Not aware of green deposits)	Don't prefer fixed deposits and don't prefer green deposits (Aware of green deposits)	% of no preference to Fixed deposits but prefer green deposits	% of no preference to Fixed deposits but prefer green deposits even if not aware of green deposits
Male	20	5	1	2	89%	71%
Female	7	5	1	3	75%	44%
Total	27	10	2	5	84%	61%

The table also shows that overall 84% of youngsters who don't have preference for fixed deposits; prefer green deposits and 61% of youngsters who don't prefer fixed deposits, prefer green deposits even when they are not aware of them. Male investors seem more inclined towards green deposits as compared to female investors.

PRACTICAL IMPLICATIONS

This reflects the huge potential of green deposit mobilization for banks especially in the metropolitan places in India. Though urban young investors do not prefer bank fixed deposits, they can consider green deposits with banks. This would be applicable to post graduate students and these investors would expect transparency regarding the end use of funds. Use of social media for creating awareness regarding impact of green deposits can also facilitate greater penetration of green deposits amongst urban young investors. Special campaigns to showcase the impact of green deposits, targeted towards post graduate educated investors like sponsorships to management institutions, higher educational institutions providing doctorate programs may improve traction. Targeting strategy can also be crafted for borrowers who are availing education loan and repaying those timely post getting jobs.

Currently, when banks are competing fiercely with each other for deposits, the launch of green deposit product and its widespread publicity may help. Green deposits may facilitate deposit mobilization but bring with them onerous monitoring and reporting requirements by banks. If banks can leverage technology to ease the regulatory reporting of green deposits, it could pose as a win - win for both banks, youngsters and the Indian economy.

SOCIAL IMPLICATIONS

Mobilising green deposits will result in greater funding access for sustainable economy. Regulatory compliance will ensure avoidance of greenwashing and facilitate seamless funding to activities under sustainable development goals.

LIMITATION OF THE STUDY

1. The study is limited to people from Mumbai area and may not be applicable to other geographies.
2. The study is conducted when awareness of green deposits is low and banks are yet to launch green deposit as a product at a large scale.

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RESEARCH

STRENGTHENING CUSTOMER RELATIONSHIPS THROUGH SOCIAL CRM

Venkatesh Ganapathy, Dr Chithambar Gupta & Dr Radhika Arora*

Abstract

Social media has become an important vehicle for businesses that seek to enhance customer engagement and loyalty. Social CRM represents a paradigm shift in how businesses interact with customers leveraging the power of social media platforms to establish meaningful connections with them, gather insights, and deliver personalized experiences. Active listening to customer conversations can enable businesses to glean valuable insights about their preferences and sentiments. This can enable the planning and execution of a more targeted and effective marketing campaign. Social CRM extends beyond mere monitoring to proactive engagement and relationship-building. By leveraging social media channels as communication platforms, businesses can initiate conversations, respond to inquiries, and resolve issues in real time, fostering a sense of trust and loyalty among customers.

This research is a conceptual effort based on an exhaustive review of the literature. The findings of the research highlight the fact that Social CRM is a strategic initiative that can support sales efforts in the qualification and nurturing of leads. Metrics such as customer satisfaction, engagement levels, and brand loyalty, can be used to assess the impact of personalized content, offers, and interactions on customer perceptions and behaviours. Personalization involves tailoring content, offers, and interactions to meet the unique needs and preferences of individual customers. By analysing data on customer demographics, behaviour, and preferences, businesses can create highly targeted and relevant experiences that resonate with their audience on a personal level. Social CRM plays a pivotal role in supporting businesses to grow a loyal customer base. Social CRM initiatives, such as personalized communication, proactive issue resolution, and community engagement, are instrumental in nurturing these bonds and fostering long-term loyalty and retention. Social CRM is also beset with challenges like managing vast amounts of unstructured data and dealing with privacy issues. The successful implementation of Social CRM efforts will involve reskilling people and training them to adapt to change.

Keywords : *Social CRM, Customer Engagement, Relationship Building, Social Media Monitoring, Personalized Experiences*

INTRODUCTION

Social CRM has become the expected standard for businesses. Valuable insights gleaned from social media interactions must be accessible to all departments within an organisation. Social CRM makes this possible. When CRM software is connected to all social media channels, team members get a clear-cut picture of customer conversations about the brand, product or service on social media channels.

Marketers face the perennial challenge of filling the sales channels with promising leads that can result in productive conversion to prospects and customers. Social CRM enables an organization's

***Venkatesh Ganapathy,** Faculty Member, ICFAI Business School, Baba Sabarapalya, Near Check Post, next to HP Petrol Bunk, Mysore Road, Kengeri, 560060 Bengaluru*

***Dr Chithambar Gupta,** Professor and Area Chair (Marketing), Presidency University, School of Management, Bengaluru*

***Dr Radhika Arora,** Professor (Marketing & Business Analytics), Presidency Business School. Bengaluru*

social connections to become leads. The interactions on social networks can be linked to business outcomes like a purchase or subscription or successful resolution of a customer grievance. The social CRM data enables an organisation to create highly targeted audiences making effective market segmentation a reality. Digital marketing is all about personalization. Social CRM is an effective enabler for digital marketing.

Social CRM is the process of managing customer-to-customer conversations to engage existing customers and prospects with a brand and enhance CRM. Conversations can happen on Facebook and Twitter but also on a company's blog, third-party blogs and reviews and ratings sites. Using conversations to foster NPD or enhance online offerings is the most exciting form of Social CRM. Quickly responding to customer enquiries and providing feedback is essential for the success of Social CRM efforts.

Social CRM is a business strategy that entails the extension of marketing, sales and customer service processes to include the active participation of customers or visitors to an Internet channel (Web or mobile) to foster participation in the business process.

Social Customer Relationship Management (CRM) entails the active engagement and attentive monitoring of customers' conversations on social media platforms. One crucial aspect of this approach is the identification and analysis of positive tweets directed towards a brand. These tweets often serve as valuable indicators of customer satisfaction, brand loyalty, and overall positive sentiment within the online community. By systematically tracking and analysing such positive interactions, businesses can gain insights into the factors driving customer satisfaction and identify successful marketing strategies.

Conversely, negative tweets about competitors represent another significant component of social CRM. Monitoring and analysing these tweets provide businesses with valuable competitive intelligence, allowing them to understand the areas in which their competitors may be falling short and capitalize on potential opportunities to attract dissatisfied customers. Additionally, negative sentiment towards competitors can inform strategic decision-making processes, such as product development or marketing campaigns, to address identified weaknesses and enhance the company's competitive position in the market.

Furthermore, blog posts and comments about a company's products or services present an opportunity to generate new leads and engage with potential customers. By analysing customers' social activity surrounding their interactions with a company's offerings, businesses can identify emerging trends, customer preferences, and areas for improvement. This proactive approach enables companies to tailor their marketing efforts and product offerings to better meet the evolving needs and preferences of their target audience, ultimately driving customer acquisition and retention.

Effective social CRM requires the active listening and analysis of customers'conversations on social media platforms. Businesses can gain valuable insights into customer sentiment, competitive dynamics, and market trends by monitoring positive tweets about their brand, negative tweets about competitors, and online discussions related to their products or services. These insights, in turn, enable businesses to make informed decisions, optimize their marketing strategies, and enhance overall customer satisfaction and loyalty.

Social Customer Relationship Management (CRM) represents an evolutionary milestone in the realm of customer engagement, integrating the dynamics of social media into traditional CRM practices. Through a systematic review of scholarly literature and industry reports, this study aims to provide a comprehensive understanding of the evolution of Social CRM and its impact on contemporary business practices like customer relationship management.

ORIGINS OF SOCIAL CRM

The concept of Social CRM emerged in the early 21st century as businesses recognized the growing influence of social media on consumer behaviour and brand perception (Hajli, 2014). Early discussions around Social CRM were characterized by a focus on leveraging social media platforms for customer engagement, feedback collection, and brand monitoring (Greenberg, 2009). Researchers and practitioners began exploring ways to integrate social media data into CRM systems, laying the groundwork for a more holistic approach to customer relationship management.

One of the seminal moments in the history of Social CRM was the publication of Paul Greenberg's book, "CRM at the Speed of Light," in 2001 (Greenberg, 2001). Greenberg's work provided a comprehensive framework for understanding the convergence of CRM and social media, emphasizing the importance of customer-centricity and engagement in the digital age. Subsequent advancements in technology, such as the rise of social media analytics platforms and CRM integrations, further accelerated the adoption of Social CRM practices (Kumar et al., 2010).

Several scholars and industry experts have made significant contributions to the development and popularization of Social CRM concepts and practices. Notable figures include Michael Wu, who pioneered the application of social network analysis in CRM (Wu & Brynjolfsson, 2009), and Esteban Kolsky, whose research on Social CRM frameworks and strategies has informed best practices in the field (Kolsky, 2014). Additionally, organizations like Salesforce and HubSpot have played instrumental roles in mainstreaming Social CRM through the development of innovative tools and platforms tailored to social media engagement and analytics.

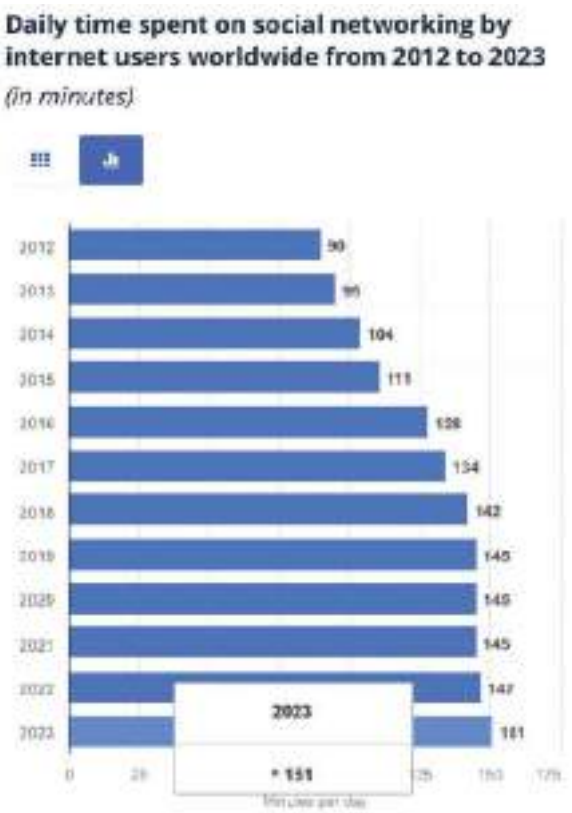
The history of Social CRM is characterized by a continuous evolution driven by technological advancements, changing consumer behaviours, and emerging business imperatives. From its nascent beginnings as a concept to its current status as a cornerstone of modern customer engagement strategies, Social CRM has transformed the way businesses interact with their customers in the digital age. Moving forward, further research and innovation will be essential to unlocking the full potential of Social CRM and its role in shaping the future of customer relationships.

REVIEW OF LITERATURE

Social Customer Relationship Management (Social CRM) has emerged as a pivotal strategy in modern business, blending traditional CRM processes with the dynamic capabilities of social media platforms. This literature review explores the evolution, implementation, and impact of Social CRM on customer engagement and business performance, with a focus on recent studies and developments.

Social CRM represents an evolution from traditional CRM by incorporating social media tools and techniques. As noted by Harrigan and Miles (2014), the transition from traditional CRM to Social CRM involves a shift from managing customer relationships through internal data and transactional information to leveraging social media interactions and user-generated content. This shift allows businesses to engage with customers in real time and understand their preferences and sentiments more deeply (Greenberg, 2010).

Implementing Social CRM requires a strategic approach that integrates social media into the broader CRM framework. Trainor et al. (2014) highlight the importance of aligning social CRM strategies with business objectives to maximize its effectiveness. This alignment involves utilizing social media channels to gather customer insights, enhance customer service, and foster community engagement. Moreover, the use of big data analytics in Social CRM enables companies to process large volumes of social media data, providingactionable insights into customer behaviour (Malthouse et al., 2013).



Source: https://mention.com/en/blog/social-crm/

Building strong customer relationships is crucial for sales success, and social media serves as an ideal platform for this engagement. With over sixty per cent of the global population actively using social media for more than two hours daily, integrating social media with customer relationship management (CRM) is essential. Social CRM allows businesses to leverage social insights to enhance customer interactions, fostering deeper connections and personalized experiences. Understanding how to implement Social CRM effectively can significantly improve customer satisfaction, retention, and overall engagement, ultimately driving sales and brand loyalty.

The impact of Social CRM on customer engagement is profound. A study by Choudhury and Harrigan (2014) indicates that Social CRM facilitates more personalized and timely interactions, leading to higher levels of customer satisfaction and loyalty. Social media platforms serve as interactive venues where businesses can respond to customer queries, address complaints, and share content that resonates with their audience. This continuous interaction helps in building stronger customer relationships and enhancing brand loyalty (He et al., 2017).

Despite its benefits, implementing Social CRM is not without challenges. One of the primary challenges is managing the vast amount of unstructured data generated on social media platforms. This data must be accurately analysed and integrated into the CRM system to be useful (He et al., 2017). Furthermore, there are concerns regarding data privacy and security, as businesses must ensure that customer data collected from social media is protected and used ethically (Greenberg, 2010).

Another challenge is ensuring that the Social CRM strategy is effectively communicated and adopted across the organization. This requires training employees on new tools and techniques, as well as fostering a culture that values customer engagement and responsiveness (Trainor et al., 2014).

The future of Social CRM is promising, with advancements in artificial intelligence (AI) and machine learning playing a crucial role. AI-driven tools can automate responses to common customer queries, analyse sentiment more accurately, and predict customer behaviour, allowing for even more personalized interactions (Malthouse et al., 2013). Additionally, the integration of Social CRM with other digital marketing strategies, such as influencer marketing and content marketing, can further enhance its effectiveness (Choudhury & Harrigan, 2014).

RESEARCH GAPS

Despite the advancements and successful implementations of Social CRM (SCRM), several research gaps remain to be explored. These gaps present opportunities for further investigation to enhance the understanding and effectiveness of SCRM. While AI and machine learning are

frequently mentioned as future directions for SCRM, there is a lack of comprehensive studies that detail how these technologies can be effectively integrated and what specific benefits they bring (Malthouse et al., 2013). Research is needed to develop frameworks and models that can guide the seamless integration of AI-driven tools in SCRM systems, focusing on automation, customer insights, and predictive analytics.

One of the significant gaps in SCRM research is the measurement of return on investment (ROI). While businesses invest heavily in social media and SCRM tools, there is limited empirical evidence on how to accurately measure the financial and non-financial returns of these investments (Trainor et al., 2014). Studies could explore methodologies for quantifying the impact of SCRM initiatives on customer loyalty, brand equity, and overall profitability.

The use of customer data from social media platforms raises significant privacy and ethical concerns. However, there is a scarcity of research that addresses how companies can balance the need for data-driven insights with the imperative to protect customer privacy and comply with regulations such as GDPR (Greenberg, 2010). Future research should focus on developing ethical guidelines and best practices for managing social media data within SCRM frameworks.

Most existing research tends to focus on specific industries or geographical regions, primarily in Western contexts. There is a need for more studies that examine the applicability and effectiveness of SCRM across different cultural contexts and industries (Choudhury & Harrigan, 2014). For instance, how does SCRM function in emerging markets compared to developed markets? What industry-specific challenges and opportunities exist?

Current research often takes a snapshot view of SCRM initiatives rather than examining their long-term impact. Longitudinal studies that track customer relationships over extended periods would provide deeper insights into how SCRM strategies influence customer loyalty and lifetime value (He et al., 2017). These studies could help in understanding the sustainability and evolving nature of customer engagement through SCRM.

Implementing SCRM involves significant technological and organizational changes. However, there is limited research on the challenges organizations face during the implementation phase, including resistance to change, the need for employee training, and the integration of SCRM with existing IT systems (Harrigan & Miles, 2014). Research could focus on identifying the critical success factors and barriers to successful SCRM adoption.

While large corporations have the resources to invest in sophisticated SCRM systems, SMEs often struggle with limited budgets and expertise. There is a gap in research exploring how SMEs can effectively implement SCRM and the specific strategies that can be tailored to their unique constraints and opportunities (Trainor et al., 2014). Understanding the challenges and potential solutions for SMEs would help democratize the benefits of SCRM.

Addressing these research gaps will provide a more comprehensive understanding of Social CRM and its potential to transform customer relationship management in the digital age. By focusing on these areas, future research can help develop more effective SCRM strategies that are adaptable to various technological, ethical, and organizational contexts.

RESEARCH OBJECTIVES

1. To analyse the effectiveness of social CRM strategies in enhancing customer engagement levels.
2. To investigate the role of social CRM in fostering customer loyalty and retention.
3. To explore the impact of personalized experiences on customer relationships with in the context of social CRM.

STEPS IN SOCIAL CRM

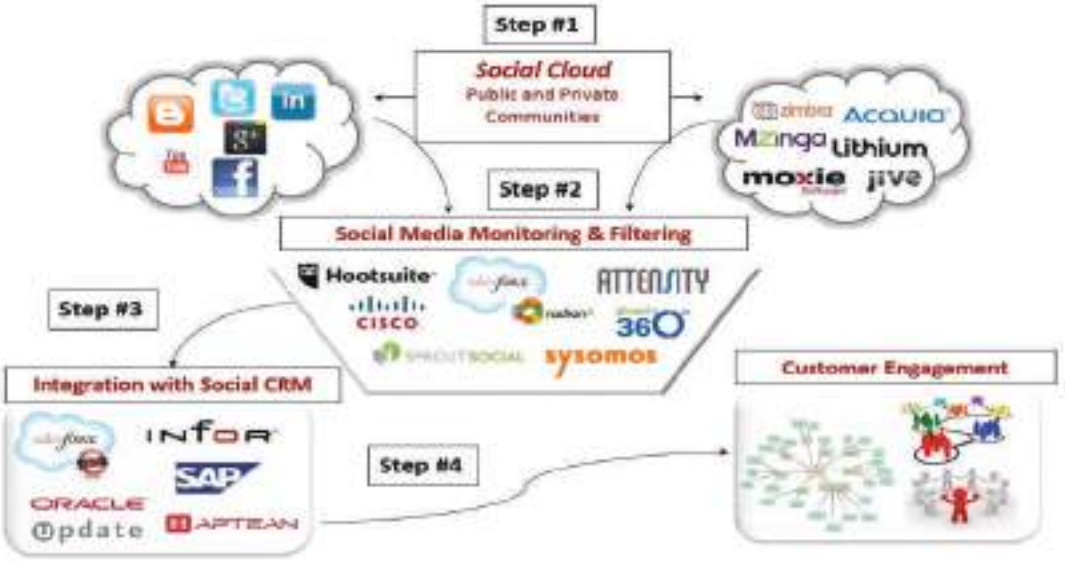
In implementing Social CRM, businesses typically follow a series of systematic steps to effectively engage with customers and leverage insights gained from social media interactions. The first step involves the establishment of clear objectives and goals aligned with the company's overall marketing and customer relationship management strategies. These objectives may include enhancing brand awareness, increasing customer engagement, improving customer service, or generating leads. By clearly defining objectives, businesses can focus their efforts and resources on activities that drive meaningful outcomes and deliver measurable results.

Once objectives are established, the next step in Social CRM is the selection of appropriate social media channels and platforms for engagement. This entails identifying the platforms where the company's target audience is most active and tailoring content and communication strategies to resonate with the preferences and behaviours of users on each platform. Whether it be Facebook, Twitter, Instagram, LinkedIn, or emerging platforms like TikTok, the choice of social media channels should be guided by insights into where customers are most likely to engage with the brand and share their opinions and experiences.

The next step is to set up a social listening program. Social listening tracks all brand conversations about a company, its products, services and key people within the organization. Targeted keywords across social media channels will give an idea about the trending topics. Hootsuite enables capturing these conversations effectively. Salesforce, Microsoft Dynamics, Zendesk and Spark Central are other examples of Social CRM software.

This is followed by the identification of a business lead on a social media network like Linked In or Facebook; and resolving a customer complaint that has been lodged on Twitter. Social CRM thus involves the integration of social media data into CRM. It enables the consolidation of conversations across multiple social media channels on a single platform. CRM data thus gets linked to people in real-time and not just profiles.

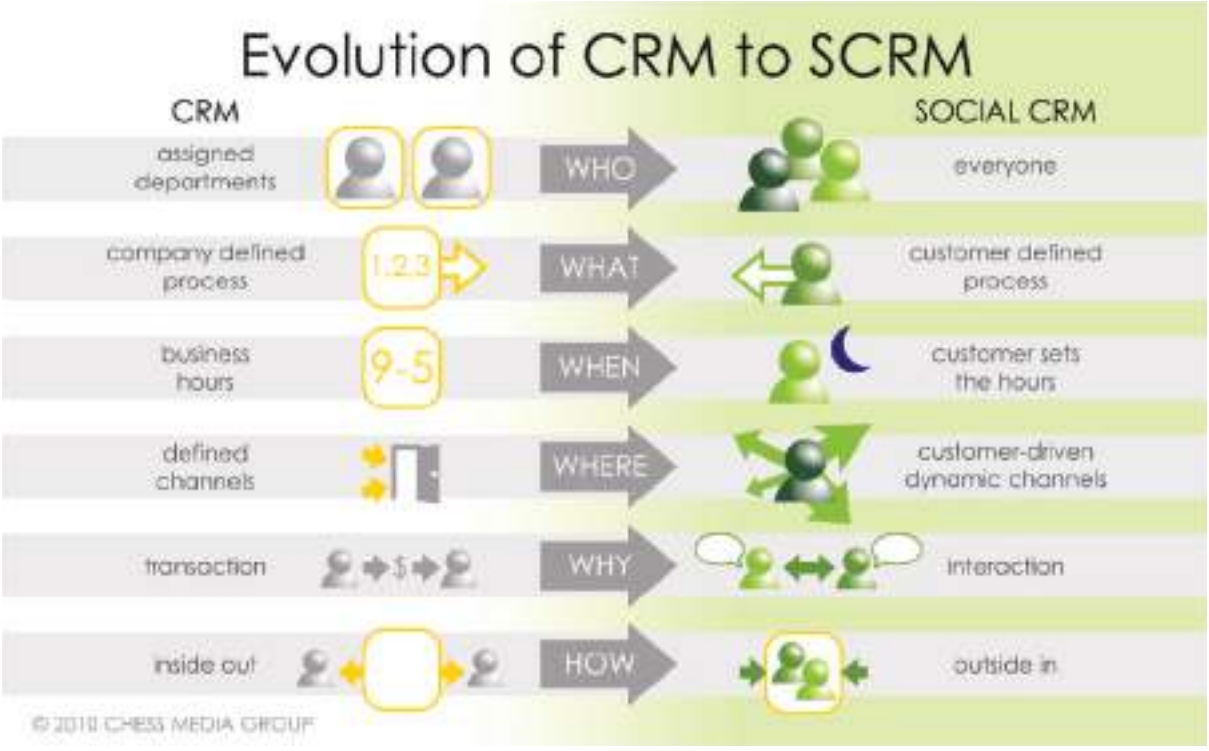
Social CRM involves gathering insights from social media, integrating this information into customer profiles within CRM systems, and using it to engage customers through their preferred channels. This approach enhances traditional customer data by incorporating sentiment analysis from social media, fostering deeper conversations that address both rational and emotional preferences. As a result, organisations can deliver personalised service, marketing, and sales offers, significantly improving customer engagement. The rise of Social CRM tools among vendors reflects its growing importance. The author emphasizes the value of case studies and future trends, including emerging technologies like mobility, gamification, and big data analytics.



Source: https://ismguide.com/social-crm-the-next-wave-in-crm/

Businesses must implement tools and technologies to effectively monitor, analyse, and manage interactions with customers across these platforms. Social CRM platforms and analytics tools enable businesses to track mentions of their brand, monitor sentiment, identify key influencers, and measure the impact of their social media efforts. By leveraging data and analytics, businesses can gain actionable insights into customer behaviour, preferences, and sentiment, enabling them to tailor their marketing strategies, improve customer service, and foster deeper relationships with customers. Moreover, these insights can inform decision-making processes across the organization, from product development and marketing to sales and customer support, driving continuous improvement and innovation.

Social CRM is an evolved strategy that focuses on customer engagement and interactions, integrating social media insights into traditional CRM systems. It emphasizes collaboration with customers, allowing brands to address business challenges and foster relationships that can turn customers into advocates. Social CRM enhances the role of public relations in managing brand presence and customer engagement on social platforms. The shift reflects changing consumer expectations, as organizations must adapt to meet the demands of social customers. Ultimately, Social CRM aims to transform interactions from mere transactions into meaningful relationships that drive customer loyalty and advocacy



Source: https://www.socialmediaexaminer.com/what-is-social-crm/

BENEFITS OF SOCIAL CRM

CRM helps you understand who your existing customers are. Social CRM enables translation of the data into highly targeted new lookalike audiences for social ads based on age, location, social behaviours and so on. Social CRM is strategic in its orientation. It enables a business to understand the value of a social lead over the long term. Social media data can be used to render better customer service.

Social CRM offers a myriad of benefits for businesses seeking to enhance their customer

relationships and brand image. Firstly, it facilitates quick and accessible customer service, allowing teams to promptly resolve issues and address concerns. Secondly, it enables businesses to engage with prospects and customers in real time, fostering meaningful interactions and strengthening connections. Moreover, Social CRM helps create a positive brand image by empowering teams to respond effectively to social media complaints, demonstrating a commitment to customer satisfaction. Additionally, it enables businesses to identify and celebrate their biggest fans and advocates, fostering loyalty and advocacy within the customer base. Social CRM allows businesses to nurture better relationships with their audience by delivering personalized experiences and tailored communication, ultimately driving customer loyalty and long-term success.

Customer conversations from different social media platforms like Instagram, Facebook, WhatsApp and Linked In can be displayed in one place. Customers expect consistent interactions from all departments. Different responses from sales, service and marketing on the same issue can frustrate customers.

Social CRM gives a holistic picture of a customer's relationship with the brand including social connections. It helps a business to interact with real people. Social CRM can create a real connection with customers to boost sales and breed customer loyalty. All the social notifications can be in one place. Social CRM software has to connect with communication tools. Social CRM gives insights into consumer behaviour that can help in the formulation of the right marketing and sales strategies. Social CRM allows organizations to leverage word-of-mouth advocacy and social reach. This helps to support brand loyalty and engagement. Social media must be treated as two-way conversations.

It is sometimes hard to distinguish the hype around social media from the genuine value that it can bring. Social CRM adds a social dimension to the way you think about customers and your relationship with them. Social CRM helps you to track the social media activity of leads, prospects and customers.

In today's digital age, social media has become an integral part of customer interactions. Integrating social media with CRM systems offers businesses numerous benefits, including real-time engagement, valuable insights, improved customer service, enhanced lead generation, and brand reputation monitoring.

While integrating social media into CRM systems can be challenging due to data overload, privacy concerns, technical complexities, maintaining consistency, and negative feedback, businesses can overcome these challenges by defining clear objectives, selecting the right tools, analyzing data, personalizing interactions, monitoring and responding promptly, protecting customer data, training teams, maintaining consistency, and continuously improving their strategy. By effectively integrating social media into their CRM systems, businesses can build stronger relationships with their customers, improve customer satisfaction, and drive growth in the competitive digital landscape.

CHALLENGES IN SOCIAL CRM

Social CRM has evolved significantly, transforming from simple databases to a crucial tool for businesses. By integrating social media data with CRM systems, businesses can gain valuable insights into customer behaviour and tailor their interactions accordingly. This comprehensive approach empowers businesses to provide personalized support, enhance customer relationships, and drive growth.

The major hurdle in the successful implementation of Social CRM has to do with the management of change. Sales and customer service teams have to get accustomed to using new tools or rethink existing ways of working. This adjustment period can be challenging as individuals adapt

to new processes and technologies. However, the benefits of Social CRM are substantial and can significantly improve the effectiveness of sales and customer service efforts.

A customer service associate will benefit if he has full knowledge of a customer's history. With access to comprehensive customer data stored within the Social CRM system, customer service representatives can provide more personalized and efficient support. Likewise, sales teams can leverage this data to identify high-quality leads with a higher conversion rate to prospects and subsequently to customers. By understanding the preferences, behaviours, and past interactions of potential customers, sales teams can tailor their approach and increase the likelihood of closing deals.

Furthermore, the marketing team can formulate better strategies to arrive at quality decisions based on social media feeds. By analysing social media data captured through Social CRM platforms, marketers can gain valuable insights into customer sentiment, preferences, and trends. This information enables the marketing team to create more targeted campaigns, optimize messaging, and allocate resources effectively. As a result, businesses can enhance their overall marketing effectiveness and drive better results from their marketing efforts.

However, the second bottleneck in Social CRM is the massive volume of data that can be overwhelming. Social media platforms generate vast amounts of data in real time, including posts, comments, likes, shares, and mentions. Managing and analysing this data can be a daunting task for businesses, particularly those without the necessary resources and expertise. Screening criteria may be needed to weed out data that has little value, allowing businesses to focus on the most relevant and actionable insights.

Furthermore, any business that plans to embrace Social CRM as a business strategy or philosophy must remember that the acquisition of data is a gradual process. Building a comprehensive database of customer information takes time and requires ongoing effort. Moreover, the quality of data will play a crucial role in quality decision-making. Businesses must ensure that the data collected through Social CRM platforms is accurate, relevant, and up-to-date to derive meaningful insights and make informed decisions.

While Social CRM offers significant benefits in terms of improving customer engagement, driving sales, and enhancing marketing effectiveness, businesses must address challenges related to change management and data management. By overcoming these hurdles and leveraging the full potential of Social CRM, businesses can gain a competitive advantage and achieve sustainable growth in today's digital landscape.

While the vast amount of data available can provide valuable insights, it can also be overwhelming to identify truly meaningful information. Staying up-to-date with new platforms and trends is crucial, as customer habits and preferences constantly evolve.

To effectively leverage social media data, it's essential to organize and analyze customer information to develop targeted strategies. This requires teams to adapt to changing market conditions and customer needs. While the process may take time, persistence and consistently excellent customer service are key to realizing the long-term benefits of social media data analysis.

SUCCESSFUL EXAMPLES OF SOCIAL CRM

Combining social data with CRM data provides a more comprehensive understanding of customers, enabling businesses to tailor their interactions and marketing efforts effectively. Social CRM allows businesses to respond promptly to customer inquiries across various channels, fostering stronger relationships and improving customer satisfaction. By analysing social media behaviour, businesses can create more effective marketing

campaigns tailored to specific customer segments, increasing engagement and conversion rates.

Parle's Rola-a-Cola is a product that was relaunched in 2019 thirteen years after it was discontinued in 2006. A fanboy of the product with its famous tagline 'Cola Ka Gola' tweeted to Parle requesting that the company relaunch the product. Parle replied to the tweet immediately and said that they would bring back the product if there were 10000 retweets.

This was a digital movement that was completely orchestrated organically by consumers. The entire social media campaign of Rola-a-Cola attracted 5 million digital footprints. Though nostalgia played a role in the product's relaunch, Parle managed to formulate a strategy that did not exclude the most important market segment today – millennials.

Consumers were given a platform to voice their opinion and the ploy worked. The overall campaign reached 40 million users on Facebook and 35 million users on Instagram.

Peter Shankman, founder of HARO – a publicity services firm has more than 150000 Twitter followers. He was in the midst of meetings and travel when he tweeted, "Hey@Mortons - can you meet me at Newark airport with a porterhouse when I land in two hours?" K, thanks :) The smiley indicated that he was merely joking. Morton's, a prestigious New York steakhouse, has always understood the significance of monitoring online activity around the brand.

Nestlé, a global leader in the food and beverage industry, leverages social CRM (Customer Relationship Management) to deepen connections with its customers across various digital platforms. By harnessing data analytics and social listening tools, Nestlé effectively monitors online conversations, identifies consumer trends, and addresses customer queries and feedback in real time. This proactive approach not only enhances customer satisfaction but also allows Nestlé to tailor its marketing strategies, product development, and customer service initiatives to meet evolving consumer preferences. Through social CRM, Nestlé fosters meaningful relationships with its audience, driving brand loyalty and advocacy in an increasingly competitive market landscape.

Parle-G, an iconic brand under Parle Products, has established itself as a household name in India, representing much more than just a biscuit. With its humble beginnings dating back to 1939, Parle-G has grown to become a symbol of affordability, quality, and nostalgia for millions across the country. Its popularity spans generations and socioeconomic backgrounds, making it one of the most beloved snacks in India. Parle-G's success can be attributed to its simple yet timeless recipe, consistent quality, extensive distribution network, and innovative marketing campaigns that resonate with consumers of all ages. Beyond being a tasty treat, Parle-G holds a special place in the hearts of Indians, embodying the essence of shared moments, fond memories, and the warmth of home.

Parle-G has effectively leveraged Social CRM (Customer Relationship Management) to strengthen its engagement with consumers and maintain its legacy as a beloved brand. By allocating 15-20% of its marketing budget to digital platforms, Parle-G has established a robust presence on social media channels such as Facebook, Instagram, and Twitter. Their strategy includes creating engaging content that resonates with various audience segments, utilizing meme marketing, and capitalizing on trending topics to keep the brand relevant and top of mind. Campaigns like "#YouAreMyParleG" and partnerships with popular events and shows help foster a deep connection with consumers, while their involvement in social responsibility initiatives enhances brand loyalty. This multi-faceted approach ensures that Parle-G not only retains its traditional customer base but also appeals to younger, digital-savvy audiences.

Big Basket leverages Social CRM (Customer Relationship Management) to enhance customer engagement and streamline their operations. They utilize social media platforms such as Facebook, Instagram, Twitter, and YouTube to interact with customers, promote products, and share content like recipe videos and health tips. Their social media strategy focuses on creating engaging posts and videos, running exclusive campaigns, and collaborating with influencers to reach a wider audience. Additionally, they emphasize customer feedback and reviews on platforms like Quora and Mouth Shut, ensuring they address complaints promptly to maintain a positive reputation. This approach helps Big Basket build a loyal customer base and improve its service continuously.

To implement a successful social CRM strategy, businesses should invest in the right tools, involve relevant teams, utilize social listening, and measure results. By effectively leveraging social CRM, businesses can enhance customer engagement, drive growth, and stay ahead in today's competitive landscape.

FINDINGS OF THE STUDY

Social Customer Relationship Management (CRM) has emerged as a vital strategy for businesses seeking to bolster their customer engagement efforts. The first research objective aims to delve into the effectiveness of various Social CRM strategies in elevating customer engagement levels. Social CRM encompasses a range of activities, including proactive social media monitoring, personalized communication, and real-time customer support.

Social media platforms serve as dynamic hubs of customer activity, providing businesses with unprecedented opportunities to connect with their target audience. However, effectively engaging with customers on these platforms requires more than just a presence; it necessitates a proactive approach that involves listening to customer feedback, responding to inquiries promptly, and providing relevant and personalized content. Social CRM strategies enable businesses to achieve these objectives by leveraging the power of social media to foster two-way communication and build deeper relationships with customers.

Building customer loyalty is a cornerstone of sustainable business success, and Social CRM plays a pivotal role in this endeavour. Customer loyalty goes beyond mere repeat purchases; it encompasses a strong emotional connection between customers and brands, characterized by trust, advocacy, and a sense of belonging. Social CRM initiatives, such as personalized communication, proactive issue resolution, and community engagement, are instrumental in nurturing these bonds and fostering long-term loyalty and retention.

By examining factors such as customer satisfaction, brand advocacy, and repeat purchase behaviour, we can gain insights into the drivers of customer loyalty in the context of Social CRM. Moreover, by comparing the effectiveness of different Social CRM strategies in building customer loyalty, we can identify best practices and actionable recommendations for businesses looking to cultivate loyal and devoted customer relationships.

Personalization lies at the heart of successful customer relationships, and Social CRM offers unique opportunities to deliver personalized experiences at scale. Personalization involves tailoring content, offers, and interactions to meet the unique needs and preferences of individual customers. By analysing data on customer demographics, behaviour, and preferences, businesses can create highly targeted and relevant experiences that resonate with their audience on a personal level.

By examining metrics such as customer satisfaction, engagement levels, and brand loyalty, we can assess the impact of personalized content, offers, and interactions on customer perceptions and behaviours. Potential trade-offs between personalization and privacy concerns can be

explored ensuring that businesses strike the right balance between customization and consumer trust in their Social CRM initiatives.

By examining the effectiveness of various Social CRM strategies, investigating their role in fostering customer loyalty and retention, and exploring the impact of personalized experiences on customer relationships, we can provide valuable insights and actionable recommendations for businesses seeking to leverage Social CRM to strengthen their customer relationships and drive long-term success.

Using Social CRM, social leads can fill the sales funnel. Qualification of leads can become quick and accurate. Nurturing leads needs suitable bespoke offers and campaigns. Social selling consists of making connections via social media by sharing helpful content, replying to customers' posts, engaging prospects in dialogue, following your prospects and social listening. Social listening involves using Social CRM software to receive alerts anytime someone mentions your brand on social media.

Drip campaign/ marketing is the use of a series of pre-planned and automated messages to existing customers and prospects to encourage interactions and sales. This kind of automated outreach will enable nurturing a continued relationship with customers. There can be an opt-in newsletter or a drip campaign so that special offers are exclusively available to social leads.

KEY INSIGHTS ABOUT SOCIAL CRM

Social CRM is a customer relationship management strategy that leverages social media platforms to engage with customers. It integrates social media with traditional CRM systems to gain insights into customer interactions and improve customer engagement.

Unlike traditional CRM, which focuses on current customers, social CRM targets prospective customers through social media. It also offers more convenient and personalized customer service through social media channels. While traditional CRM emphasizes direct advertising and sales, social CRM focuses on customer engagement and brand exposure.

Social CRM tracks customer interactions on social media and review platforms, creating a pathway to potential customers. It provides quick responses to customer inquiries through their preferred social media channels, fostering trust and loyalty.

To measure the level of successful customer engagement, social CRM tools use metrics such as traffic and conversion rates from social media platforms, user engagement with social media content, number of followers and their interaction with the brand, and brand mentions and customer sentiment.

Examples of social CRM in action include creating a fan page on social media platforms, sharing company news and updates, monitoring conversations about the brand, responding promptly to customer feedback, and gathering customer insights for product development. Social CRM is essential for businesses to expand their reach, increase brand visibility, attract new customers, and engage existing customers in a meaningful way in the age of social media.

The growing number of social media users presents a significant opportunity for businesses to connect with existing and potential customers. A CRM system integrated with popular social media platforms is essential for effectively navigating the intricate web of social media and building your brand.

By centralizing social media interactions and making them accessible to customer-facing teams, you can ensure seamless and consistent engagement. This includes tracking interactions across various channels such as emails, phone calls, and live chats, allowing for timely responses to customer inquiries.

Social CRM is the integration of social media into a company's CRM efforts. It allows businesses to use social media for various objectives, like better engagement with customers, increased analysis, lead generation, and better customer service. Because so much customer feedback takes place on social media, businesses should integrate social CRM as part of their customer service efforts. Social CRM is a tool that integrates social media with customer relationship management, allowing businesses to better understand and interact with their customers. By leveraging social media data, businesses can gain valuable insights into customer behaviour, preferences, and needs.

One of the key benefits of social CRM is its ability to streamline the lead-generation process. By providing data-driven insights and enabling personalized campaigns, businesses can effectively identify, qualify, and nurture potential customers. Another significant advantage of social CRM is its potential to enhance customer experience. By offering complete context for each customer interaction, businesses can respond proactively to customer issues and provide a seamless customer experience. This, in turn, can lead to increased customer satisfaction and loyalty.

Social CRM also empowers businesses to personalize their marketing efforts. By analysing customer interactions and engagement rates, businesses can create ideal buyer personas and tailor their content to specific customer segments. This personalized approach can improve customer engagement and conversion rates. In addition to these benefits, social CRM can also help businesses save time and resources through automation. By automating repetitive tasks such as data entry, ticket generation, and issue resolution, businesses can free up their teams to focus on more strategic activities.

Furthermore, the integration of generative AI with social CRM can provide even more valuable insights. By analysing vast amounts of data, generative AI can identify trends, patterns, and areas for improvement. This data-driven intelligence can help businesses make informed decisions and optimize their marketing and customer service strategies. Social CRM offers a wide range of benefits for businesses, including improved lead generation, enhanced customer experience, effective personalization, automation, and data-driven insights. By leveraging the power of social media and customer relationship management, businesses can strengthen their brand, improve customer satisfaction, and drive growth.

CONCLUSION

In the age of social media, customers are better connected to companies than ever before. Smartphones enable customers to talk about a company's product or service whenever and wherever they want. Customer opinions about the product or brand can shape the market's perception of the organization. The web provides endless forums for customers to share their experiences through blogs, Twitter, Facebook and countless interest-based sites and forums. Social listening allows you to monitor conversations on your brand page or otherwise find new leads, study industry trends and never miss a mention of your product.

Social CRM brings marketing and customer service teams closer. Generally, these two teams are often siloed. Social CRM is not an initiative that a business can plunge into with both feet. The organization has to solve product and service fundamentals before launching social media initiatives. A well-designed social media campaign cannot substitute shoddy customer service or a poor-quality product. The value proposition has to be clear.

Companies try to create a presence on different channels expecting customers to visit but it doesn't happen that way. Companies have to go where customers are instead of vice versa. This is one of the fundamental requirements of digital

(inbound) marketing. Social CRM bridges this gap. With Social CRM, a business has to place the customer right at the heart of the organization. Companies will have a broad overview of the brand's reach and a granular, detailed view of each customer interaction. Customer service, sales and marketing benefit by having a clear picture of the customer.

Businesses have to encourage customers to become part of the service or marketing equation. Customer engagement can enable a firm to uncover hidden needs and target the right set of customers. Authenticity and personal relationships with customers can surpass technology. The key is personalization. Businesses have to develop authentic and meaningful relationships that span physical and digital realms. Enabling a long-term relationship with the prospect will enable the company to win and retain the best customers.

In the post-COVID-19 era, where consumer behaviours and expectations have undergone significant shifts, the fusion of marketing and empathy has become indispensable for businesses navigating the new landscape. Customer care is no longer merely a component of PR or marketing strategies; it has become the cornerstone of brand reputation and differentiation. As trust emerges as the foundation of enduring customer relationships, businesses must prioritize empathy, transparency, and genuine concern for customer well-being in all their interactions. By demonstrating empathy and authenticity in their marketing efforts and customer care initiatives, businesses can not only build trust but also forge deeper connections with their audience, driving loyalty and advocacy in the long term.

Social CRM can humanize your brand and create a true connection with your customers through social CRM. Social CRM is like a business having a tool wherein it can view and respond to all conversations on different social media channels and company blogs/third-party blogs in one place. This is used to cater to the requirements of existing customers and attract prospects through better lead qualification.

Furthermore, in the realm of targeted advertising and customer acquisition, the significance of leveraging look-alike audiences based on past customer behaviour cannot be overstated. Research indicates that a look-alike audience modelled on individuals who have previously made purchases from a business is more likely to yield conversions compared to a look-alike audience derived solely from fans or followers on social media platforms. This approach allows businesses to identify and target individuals who share similar characteristics, preferences, and purchasing patterns as existing customers, thereby increasing the likelihood of driving meaningful engagement and sales. By harnessing the power of data-driven insights and segmentation techniques, businesses can optimize their marketing efforts and maximize the effectiveness of their campaigns in reaching the most receptive audience segments.

Social CRM represents a significant advancement in how businesses manage customer relationships. By leveraging the power of social media, companies can engage with their customers more effectively, gather valuable insights, and build stronger, more loyal customer relationships. While there are challenges to its implementation, the benefits of Social CRM in enhancing customer engagement and driving business performance are substantial. Future developments in AI and machine learning are likely to further enhance the capabilities of Social CRM, making it an indispensable tool for modern businesses.

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RESEARCH

SUSTAINABILITY IN OPERATIONS: STRATEGIES FOR ENVIRONMENTAL AND SOCIAL RESPONSIBILITY

Rajjat Dhawan*

Abstract

The important nexus between operational effectiveness and sustainability in modern company practices is examined in this paper. Long-term success now depends on an organization's ability to integrate sustainable practices into its operations as it deals with societal expectations and environmental problems. To determine the critical variables that connect sustainability initiatives to improved operational performance, the study synthesises the body of existing literature and empirical data. The paper presents best practices for integrating sustainability into daily operations and supply chain management through a thorough analysis of methodology, including case studies and qualitative assessments. It highlights how crucial it is to involve stakeholders and set specific, quantifiable sustainability targets. The results highlight how implementing sustainable practices advances a more just and ecologically conscious future in addition to enhancing corporate reputation and operational effectiveness. Businesses attempting to manage the difficulties of sustainability in their operations might benefit greatly from this research.

Keywords : *Sustainability, Operational Performance, Business Practices, Stakeholder Engagement Supply Chain Management, Environmental Responsibility, Corporate Reputation, Best Practices.*

INTRODUCTION

The term "sustainability in operations" refers to the adoption of policies and procedures that reduce how negatively corporate activities affect society and the environment while simultaneously maintaining long-term financial viability. This entails using a triple bottom line strategy that considers social and environmental performance in addition to financial performance.

In an era marked by increasing environmental challenges and social responsibility demands, the concept of sustainability has emerged as a critical focal point for businesses across the globe. As organizations strive to balance profitability with ethical practices, the integration of sustainability into operations has become not just a strategic advantage but a necessity. This research delves into the multifaceted relationship between sustainability and operational performance, aiming to provide a comprehensive understanding of how sustainable practices can enhance business outcomes while minimizing negative impacts on society and the environment.

The objective of this study is to synthesize existing literature and empirical findings to identify key variables and mechanisms that link sustainability initiatives to improved operational performance. By examining a diverse range of methodologies and case studies, this research seeks to uncover best practices that organizations can adopt to embed sustainability into their daily operations and supply chain management. Furthermore, it emphasizes the importance of stakeholder engagement and the establishment of clear sustainability goals as essential components of a successful sustainability strategy.

As businesses face mounting pressure from consumers, regulators, and investors to demonstrate their commitment to sustainability, this research aims to contribute valuable insights that can guide organizations in their efforts to create a more sustainable future. Ultimately, by embracing sustainability, companies can not only enhance their reputation and operational efficiency but also play a pivotal role in fostering a more equitable and environmentally responsible world.

***Rajjat Dhawan,** PGDM 2022-24, Prin. L. N. Welingkar Institute of Management Development & Research (WeSchool), Mumbai*

RESEARCH METHODOLOGY

1. Literature Review: Many studies, such as those discussing the conceptual frameworks of sustainability, likely begin with a comprehensive review of existing literature to identify key themes, theories, and gaps in the current understanding of sustainability practices in operations management.

2. Empirical Data Collection: Some studies, utilize empirical data collection methods, such as surveys or questionnaires, to gather quantitative data on sustainability practices and their impacts. This data is then analyzed using statistical methods to validate hypotheses.

3. Case Studies: The research mentions case studies, which are often used to provide in-depth insights into specific instances of sustainable practices in real-world settings.

4. Framework Development: The development of conceptual frameworks, as seen in the discussions of operational eco-efficiency, sufficiency, and the circular economy, involves synthesizing existing theories and empirical findings to propose new models for understanding sustainability in operations.

These methodologies collectively contribute to a comprehensive understanding of sustainability in operations, allowing researchers to draw meaningful conclusions and recommendations for businesses and policymakers.

LITERATURE REVIEW

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The potential of Industry 4.0 and the circular economy to support resilient, sustainable operations management is examined in this article. The authors contend that through cutting waste, boosting efficiency, and fostering collaboration, these two frameworks can be utilised to enhance the sustainability and resilience of operations. The paper starts out by defining the circular economy and Industry 4.0. Fourth industrial revolution known as "Industry 4.0" is characterised by the application of cutting-edge technologies including big data analytics, cloud computing, and the Internet of Things. An economic concept known as the "circular economy" tries to reduce waste and pollution by extending the useful life of products and materials. The next section of the article addresses how resilient sustainable operations management can be enabled by Industry 4.0 and the circular economy. The authors contend that through eliminating waste, boosting efficiency, and fostering collaboration, these frameworks can be utilised to enhance the sustainability of operations. The problems of integrating Industry 4.0 and the circular economy in operations management are then covered in the paper. The authors contend that large infrastructure and technological investments are needed for these frameworks. They contend that these frameworks necessitate a mental shift on the part of organisations because they force them to reconsider how they view waste and resources. The implications of the findings for managers and policymakers are covered in the paper's conclusion. According to the authors, managers should adopt a comprehensive strategy for sustainability that incorporates Industry 4.0 and the circular economy. They contend that governments should promote the adoption of these frameworks by creating an enabling environment.

2. Figge, F., & Thorpe, A. S. (2023). Circular economy, operational eco-efficiency, and sufficiency. an integrated view. Ecological Economics, 204, 107692. https://doi.org/10.1016/j.ecolecon.2022.107692

The research suggests a conceptual framework that combines operational eco-efficiency, sufficiency, and the circular economy. The three ideas, according to the authors, can be combined to promote sustainable development. The three notions are first defined in the study. A system known as the "circular economy" tries to reduce waste and pollution by extending the useful life of products and materials. Operational eco-efficiency is the lessening of negative effects on the environment as a result of better resource management. The ability to meet demands while using less is sufficient. The conceptual framework is then presented in the paper. The circular economy, operational eco-efficiency, and sufficiency are the framework's three pillars. Two feedback loops, the resource loop and the value loop, link the pillars together. The resource loop demonstrates how the circular economy can lessen the consumption of resources. The value loop demonstrates how operational eco-efficiency and sufficiency can contribute to maximising resource value. The ramifications of the framework for managers and policymakers are then covered in the study. According to the authors, managers should take a comprehensive approach to sustainability that incorporates operational eco-efficiency, sufficiency, and the circular economy. They contend that policymakers should foster an environment that encourages the adoption of these ideas.

3. Tripathi, V., Chattopadhyaya, S., Mukhopadhyay, A. K., Sharma, S., Kumar, V., Li, C., & Singh, S. (2023). Lean, Green, and Smart Manufacturing: An ingenious framework for enhancing the sustainability of Operations Management on the shop floor in industry 4.0. Proceedings of the Institution of Mechanical Engineers, Part E: Journal of Process Mechanical Engineering, 095440892311598. https://doi.org/10.1177/09544089231159834

People in the sector struggle with a number of issues when trying to achieve operational efficiency. These challenges include workplace ergonomics, environmental waste, inefficiency in work processes, negligence on the shop floor, and employee apathy. The shop floor's operational excellence is improved by the operations management teams using a variety of strategies, such as lean manufacturing, smart manufacturing, green manufacturing, and artificial neural networks. These methods work to increase productivity by removing issues with shop floor operations management. Lean, green, and smart manufacturing ideas are used in this study to provide a framework for improving operational excellence and sustainability in operations management on the shop floor in an industry 4.0 context. In the study, working and operational performance on the shop floor were evaluated using a strategic ergonomics assessment and an environmental assessment. Implementing the created framework in the mining machinery manufacturing industry has allowed researchers to examine its adaptability. The framework was created using knowledge gleaned from prior studies, experts in the field, and a brainstorming examination of issues with operations management on the shop floor in an industry 4.0 workplace. Because no model has been created for achieving operational excellence on the shop floor in industry 4.0 utilising the smart, lean, green manufacturing idea, the present study is innovative. The created framework had a remarkable 85% increase in productivity, a 21% increase in machinery utilisation, a 65% decrease in production time, a 96% decrease in manufacturing faults, and a 75% decrease in production cost. According to the current research, the proposed model would help businesspeople improve operational excellence on the shop floor in an industry 4.0 setting by creating a more qualified and clean working environment using the resources at hand.

4. Yavuz, O., Uner, M. M., Okumus, F., & Karatepe, O. M. (2023). Industry 4.0 technologies, sustainable operations practices and their impacts on sustainable performance. Journal of Cleaner Production, 387, 135951. https://doi.org/10.1016/j.jclepro.2023.135951

The study investigates the connections between Industry 4.0 technology, environmentally friendly business practises, and environmentally sound performance. According to the authors, Industry 4.0 technology can support environmentally friendly business practises, which in turn can boost sustainability. They offer a conceptual framework outlining the connections among these three constructs. The literature on Industry 4.0 technology, environmentally friendly business practises, and sustainable performance is reviewed in this study. The authors list several Industry 4.0 technologies, including big data analytics, cloud computing, and the Internet of Things, that may make it possible to implement sustainable business practises. They also list other sustainable business practises that Industry 4.0 technology can support, including resource conservation, energy efficiency, and waste minimization. The findings of a survey of Turkish manufacturing companies are then presented in the article. According to the survey's findings, implementing sustainable business practises and adopting Industry 4.0 technology are both beneficial. The survey results also demonstrate a favourable correlation between sustainable performance and the adoption of sustainable operational practises. The ramifications of the findings for managers and policymakers are covered in the paper's conclusion. According to the authors, managers should utilise Industry 4.0 technology to support sustainable business practises. Additionally, they contend that policymakers ought to foster an atmosphere that facilitates the adoption of Industry 4.0 technologies and sustainable business practises.

5. Zarbakhshnia, N., Govindan, K., Kannan, D., & Goh, M. (2022). Outsourcing logistics operations in circular economy towards to sustainable development goals. Business Strategy and the Environment, 32(1), 134–162. https://doi.org/10.1002/bse.3122

The closed-loop supply chain, which includes both forward and reverse product flows, is the key component of the circular economy. A closed-loop supply chain's logistical functions are to be outsourced in this study. The ranking of sustainable third-party logistics service providers (3PLSPs) is proposed using an original analytical multi-step fuzzy decision-making approach. The correlations between the primary criteria are first assessed using the Fuzzy Decision-Making Trial and Evaluation Laboratory (DEMATEL). The established set of criteria is then given weight using the fuzzy analytic network process (ANP). Between the two methodologies, the expert judgement method is utilised as an intermediary step to cut down on the number of criteria in order to construct the hybrid fuzzy DEMATEL-ANP method and to simplify the computation. Expert judgements are utilised to narrow down and rank the criteria because many of them on context and content overlap. The fuzzy complex proportional assessment (COPRAS) approach is then used to rate the 3PLSPs. A case study with a household appliance is used in conjunction with information gathered from industry experts to validate the viability and applicability of the revised decision-making model. Five service providers are here taken into account and ranked, with the top one receiving the highest score. In order to validate the suggested approach, the data, and the acquired results, a sensitivity analysis is carried out by changing the weights of the criteria. This study offers success key criteria for decision-making issues in the circular economy for tackling sustainable development in terms of business and the environment.

6. Ivanov, D. (2022). The industry 5.0 framework: Viability-based integration of the resilience, sustainability, and human-centricity perspectives. International Journal of Production Research, 61(5), 1683–1695. https://doi.org/10.1080/00207543.2022.2118892

The fifth industrial revolution, known as Industry 5.0, which the paper presents as a new paradigm for is characterised by the fusion of cutting-edge technologies, sustainability, and human-centricity. The framework is built on the idea of viability, which is characterised as an organization's capacity to endure and flourish over the long term. The definitions of Industry 5.0 and viability are given at the outset of the essay. As a continuation of Industry 4.0, Industry 5.0 is viewed as having a larger emphasis on sustainability and human-centricity. The capacity of an organisation to endure and prosper over the long haul is known as viability. The three pillars of the Industry 5.0 framework—resilience, sustainability, and human-centricity—are then covered in the paper. An organization's resilience is its capacity to resist shocks and disruptions. Anorganization's sustainability is its capacity to conduct ecologically and socially responsible business. The capacity of an organisation to design a work environment that is secure, healthy, and encouraging of its people is known as "human-centricity." The Industry 5.0 framework conceptual model is then presented in the study. The model demonstrates the connections between the three pillars of human-centricity, sustainability, and resilience. The model also demonstrates how the framework can be applied to increase an organization's viability. The ramifications of the findings for managers and policymakers are covered in the paper's conclusion. According to the authors, managers should establish a comprehensive strategy for viability that incorporates the three pillars of resilience, sustainability, and human-centricity. Additionally, they contend that policymakers ought to foster an atmosphere that facilitates the implementation of the Industry 5.0 framework.

7. López-Torres, G. C., Garza-Reyes, J. A., Maldonado-Guzmán, G., Kumar, V., Rocha-Lona, L., & Cherrafi, A. (2019). Knowledge management for sustainability in operations. Production Planning & Control, 30(10–12), 813–826. https://doi.org/10.1080/09537287.2019.1582091 :

In order to promote sustainability in company operations, this article will investigate the impact of knowledge management (KM) as a platform and offer suggestions for managers to incorporate sustainable operations into their business plans. It is also made that developing and implementing sustainable operations is urgent. The premise of the conceptual framework is that KM helps organisations achieve more effective operations. With information gathered from 345 SMEs, a model of structural equations was created to evaluate this notion. The idea was supported by empirical data, which showed that KM is a significant alternative to adopting sustainability. The findings imply that managers should implement KM because it will improve knowledge and awareness of the catastrophic worldwide effects of unsustainable operations that are primarily concerned with increasing sales and lowering costs. This study shows that KM offers a different drive in the pursuit of more environmentally friendly operations.

8. Shou, Y., Shao, J., Lai, K., Kang, M., & Park, Y. (2019). The impact of sustainability and operations orientations on sustainable supply management and the Triple Bottom Line. Journal of Cleaner Production, 240, 118280. https://doi.org/10.1016/j.jclepro.2019.118280:

Businesses increasingly understand the value of adopting sustainable supply management (SSM) practises to support the environmental and social development of their suppliers as sustainable management has developed to extend beyond organisational boundaries. In this study, we examine the impact of two distinct strategic

orientations—operations orientation and sustainability orientation—on the adoption of SSM practises. We also investigate whether these SSM practises can collectively boost buyer firms' triple bottom line (TBL) performance—that is, their environmental, social, and economic well-being. Our findings, which are based on data gathered from 708 manufacturing companies across several nations, imply that sustainability focus encourages SSM practises while operations orientation hinders them. The findings also show that SSM practises improve social and environmental performance but have little impact on economic performance. By differentiating these two types of strategic orientations as antecedents impacting the adoption of SSM practises, which will benefit TBL, this study contributes to the body of knowledge on sustainable management.

9. Liu, Y., Zhu, Q., & Seuring, S. (2020). New technologies in operations and supply chains: Implications for Sustainability. International Journal of Production Economics, 229, 107889. https://doi.org/10.1016/j.ijpe.2020.107889:

In this editorial, we first set the context for the special issue's theme and goals, which include new technologies in operations and supply chains and their sustainability consequences. The principal conclusions are then succinctly stated after a summary of the papers that make up the special issue. We make an effort to offer our opinions on the directions for future research in the same research agenda, including discussion around research scope, research theory, research methodology, and research findings as well as in-depth studies concerning current and pressing issues confronting operations and supply chain managers, based on our observations on the submissions and the research gaps still to be addressed.

10. Magon, R. B., Thomé, A. M., Ferrer, A. L., & Scavarda, L. F. (2018). Sustainability and performance in Operations Management Research. Journal of Cleaner Production, 190, 104–117. https://doi.org/10.1016/j.jclepro.2018.04.140

Practitioners and academics in the field of operations management (OM) have become increasingly interested in sustainability and how it relates to performance. Research on the causes and promoters of sustainability, as well as the connection between sustainability and performance, is still very scarce. Additionally, the literature provides conflicting findings regarding this relationship. Therefore, the objective of this study is to present a research synthesis on the current level of empirical research on the effect of sustainability management practises on performance, taking into account social and environmental aspects. To accomplish this, the authors conduct a thorough analysis of the existing literature on the connections between sustainability and firm performance, placing special emphasis on the understudied topic of causal models for operational performance and sustainability. The goal of this research is to provide more generalizable evidence about theories, techniques, and conclusions. It is a first attempt to go beyond the extremely scattered body of previous work on the topic. In total, 231 papers are included in the synthesis, which identifies the key variables on causal models illustrating the relationships between sustainability and performance, analyses the methodologies used in the studies, and looks into the effects and mechanisms by which sustainability affects operational performance (OP). Although various mechanisms drive the sustainability-performance relationships and they vary depending on settings, overall, sustainability has positive consequences on performance, including cheaper costs, improved delivery and product quality, increased volume flexibility, and better product quality. The paper offers implications for future research and practise.

11. Fritz, M. M. C., Silva, M. E., & Touboulic, A. (2022). Practicing sustainability in operations and Supply Chain Management. Supply Chain Forum: An International Journal, 23(4), 323–328. https://doi.org/10.1080/16258312.2022.2138160:

12. Nowak, D. (2021). Sustainable development in production-operations management. Sustainability and Sustainable Development, 151–171. https://doi.org/10.18559/978-83-8211-074-6/ii7:

The notion of sustainability practise is covered in the context of operations and supply chain management (O&SCM) in the paper "Practising Sustainability in Operations and Supply Chain Management" by Fritz, Silva, and Touboulic. Sustainability practise, according to the authors, is "a set of interconnected activities, knowledge, and understandings that enable organisations to embed sustainability considerations into their daily operations and supply chain management practises." They contend that sustainable practise is a dynamic and growing activity rather than a static or monolithic idea. The writers demonstrate the various components of sustainability practise using the metaphor of a tree. The branches of the tree stand in for the various theories and approaches that can be employed to put sustainability practises into practise, while the tree's trunk stands for the fundamental ideals and principles of sustainability. The initiatives and activities that are carried out specifically to meet sustainability objectives are represented by the leaves. According to the authors, adopting sustainability practises is crucial for businesses that wish to succeed over the long haul. They list the following three advantages of sustainable practises: Environmental performance improvements, Higher level of civic responsibility, Heightened economic competition. The paper offers a thorough overview of the practise of sustainability in the context of O&SCM overall. The metaphor of a tree used by the writers to explain the many components of sustainability practise is beneficial. The paper also outlines the main advantages and difficulties of sustainability practise and offers some recommendations for resolving these difficulties.

The significance of sustainability in the context of production-operations management (POM) is covered in the essay "Sustainable Development in Production-Operations Management" by Dariusz Nowak. By lowering environmental impact, enhancing social responsibility, and boosting economic competitiveness, the author contends that POM can be crucial to attaining sustainable development. Sustainability is described in the opening paragraphs by Nowak as "the development that meets the needs of the present without compromising the ability of future generations to meet their own needs." The three pillars of sustainability—environmental, social, and economic—are then covered. According to the author, POM can promote sustainability by minimising its negative effects on the environment by practises such waste minimization, energy efficiency, and pollution prevention. POM can support social sustainability by guaranteeing just working conditions, paying fair wages, and encouraging inclusion and diversity. Last but not least, POM can support economic sustainability by boosting production and efficiency, cutting expenses, and raising product quality. In his final paragraph, the author makes the case that sustainability is both a moral and a business imperative. He contends that businesses will eventually be at a competitive disadvantage if they don't implement sustainable practises. The article offers a thorough summary of POM's significance in sustainable development as a whole. Particularly useful is the author's description of specific POM practises that can promote sustainability. The article also presents a compelling argument for the economic benefits of sustainability.

13. Singh, S. P., Song, M., Sharma, R. R., Fisher, R., Amit, R. K., & Saen, R. F. (2020). Preface: Sustainable operations in manufacturing enterprise. Annals of Operations Research, 290(1–2), 1–4. https://doi.org/10.1007/s10479-020-03679-5 :

The paper initiates a special issue of the Annals of Operations Research journal on the subject of sustainable business practises in manufacturing. The authors contend that as demand from consumers, regulators, and other stakeholders to lessen their environmental impact grows, manufacturing businesses must prioritise sustainability. The essay evaluates the body of research on sustainable manufacturing processes and proposes three major topics for study: The research on innovative ways to cut back on energy and resource use, minimise waste, and enhance environmental performance is part of the development of new sustainable technologies and practises. The incorporation of sustainability into manufacturing operations: This includes studies on how to turn sustainability become a primary concern, as opposed to an afterthought, in manufacturing processes. Research is being done on ways to quantify and evaluate the environmental, social, and economic effects of industrial activities. This is part of the measurement and evaluation of sustainability performance. The authors suggest for additional study on environmentally friendly production practises in their conclusion. They contend that this research is crucial for assisting manufacturing companies in overcoming sustainability difficulties and long-term competitiveness.

14. Jabbour, A. B., Song, M., & Godinho Filho, M. (2019). Sustainability Implications for Operations Management: Building the bridge through exemplar case studies. Production Planning & Control, 31(11–12), 841–844. https://doi.org/10.1080/09537287.2019.1695926:

The article talks about how operations management (OM) will be affected by sustainability. The authors contend that through lowering environmental impact, enhancing social responsibility, and boosting economic competitiveness, OM can be a critical component of attaining sustainability. For the purpose of demonstrating the sustainability implications for OM, the authors offer three case studies. In the first case study, a business that wanted to cut waste and boost productivity adopted a lean manufacturing system. In the second case study, a business evaluates the environmental impact of its products using a life-cycle analysis. The third case study is about a business that created a social responsibility initiative to enhance the welfare of its workers and the areas where it conducts business. By adopting sustainable practises and incorporating sustainability into its decision-making processes, the authors contend that OM may play a crucial role in achieving sustainability.

15. Caiado, R. G., Quelhas, O. L., Nascimento, D. L., Anholon, R., & Leal Filho, W. (2019). Towards sustainability by aligning operational programmes and sustainable performance measures. Production Planning & Control, 30(5–6), 413–425. https://doi.org/10.1080/09537287.2018.1501817:

This article seeks to assess the significance of operational improvement programmes for sustainable performance in Brazilian organisations and to offer recommendations for achieving sustainability by integrating these programmes with operational improvement projects. Theoretical literature reviews, questionnaire surveys, and semi-structured interviews with academic researchers and members of the business community were just a few of the data collection techniques used. The results demonstrate that in order to improve environmental protection, corporate reputation, quality management, cost performance, and supplier relations, which are thought to be more crucial for organisational sustainability, corporations should concentrate their efforts on both operational improvement programmes and sustainable initiatives.

IMPORTANCE OF SUSTAINABILITY IN OPERATIONS

In today's business environment, operational sustainability is gaining importance. Following are some major arguments in favor of the necessity of sustainability in business operations:

- Environmental impact: From energy use to garbage production, operations have a substantial environmental impact. Sustainable business practices can lessen this effect, paving the way for a future that is more environmentally friendly.

- Resource conservation: Sustainable operations techniques can assist businesses in running more effectively while cutting waste and conserving resources. This can lower costs and boost profitability.

- Reputation and brand value: Customers are more likely to support businesses that put an emphasis on environmental and social responsibility because they are more concerned about sustainability. The reputation and brand value of a business can be improved by using sustainable operations techniques.

- Compliance with regulations: Laws and regulations aiming at decreasing environmental effect and promoting sustainability are being implemented by governments and regulatory organizations more and more. Implementing sustainable operations methods can assist businesses in adhering to these rules.

- Employee engagement and retention: By fostering a more favorable workplace culture, sustainable operations techniques can assist increase employee engagement and retention. A corporation that promotes sustainability and social responsibility will probably have happier employees.

Ultimately, a company's bottom line, reputation, regulatory compliance, and employee engagement are all impacted by sustainability in operations, in addition to the environment. Companies may build a more sustainable future while also gaining many advantages by embracing sustainability.

INTEGRATION OF ENVIRONMENTAL AND SOCIAL RESPONSIBILITY STRATEGIES IN OPERATIONS

Promoting sustainability and ethical corporate practices requires that environmental and social responsibility strategies be integrated into operations. Companies must establish a comprehensive sustainability strategy that considers environmental, social, and economic concerns in order to accomplish this integration. Following are some tactics for incorporating environmental and social responsibility into business operations:

- Sustainability objectives: Businesses should set precise sustainability objectives that consider environmental, social, and economic factors. The company's overall business plan should relate to the goals, which should be precise, measurable, and time-bound.

- Stakeholder engagement: To find possibilities for sustainability improvements and encourage greater sustainability throughout the supply chain, businesses should engage with stakeholders, such as employees, suppliers, consumers, and community organizations.

- Supply chain management: Businesses should take sustainability aspects, such as sustainable sourcing, procurement, and transportation, into account.

- Resource efficiency: Businesses should place a high priority on resource efficiency, which includes reducing waste, conserving energy and water, and using natural resources sustainably.

- Corporate social responsibility should be prioritized through encouraging moral behavior, equitable hiring procedures, and neighborhood involvement.

- Sustainable innovation: Organizations should give priority to developing sustainable goods, procedures, and business models.

Businesses may encourage sustainability, lessen their environmental effect, and provide long-term value for stakeholders by integrating environmental and social responsibility policies into operations. To achieve this integration, though, calls for a proactive, all-encompassing strategy that considers the whole range of environmental, social, and economic aspects.

CHALLENGES

1. Cost: Especially in the short term, putting sustainable operations strategies into place can be expensive. Businesses must be prepared to make investments in sustainability and give priority to long-term gains above immediate expenses.

2. Complexity: Sustainable operations methods can be challenging for businesses, requiring them to balance a variety of social, economic, and environmental factors. Businesses must be able to properly handle the complexity of sustainable operations initiatives.

3. Engagement of stakeholders: The success of sustainable operations initiatives depends on collaboration with stakeholders, including suppliers, customers, and community organizations. But interacting with stakeholders can be difficult since it takes time, money, and good communication.

4. Compliance with regulations: Businesses must abide by a variety of environmental and social laws, which might differ depending on the jurisdiction and evolve over time. Maintaining compliance can be difficult, particularly for multinational corporations with activities across several nations.

OPPORTUNITIES

- Innovation: By putting sustainable operations ideas into practice, new products, procedures, and business models that advance sustainability and benefit stakeholders can be developed.

- Financial reductions: Using resources more efficiently, consuming less energy, reducing waste, and other sustainable operations initiatives can all result in significant cost savings.

- Reputation and brand value: Using sustainable operations techniques can improve a business's reputation and brand value, luring in clients, investors, and staff who are concerned with sustainability.

- Entry to new markets: Consumer and corporate purchasing decisions are becoming more and more influenced by sustainability. Implementing sustainable operations techniques may lead to the opening of new markets and business expansion prospects.

- Engagement of stakeholders: Working together with stakeholders can help businesses find areas for growth, form bonds, and advance greater sustainability throughout the supply chain.

CASE STUDY: PATAGONIA - LEADING THE WAY IN SUSTAINABLE BUSINESS PRACTICES

Background:
Outdoor apparel and equipment brand Patagonia is renowned for its unwavering dedication to social and environmental responsibility. Established in 1973, the organisation has led the way in implementing sustainable business strategies.

Patagonia is renowned for its proactive engagement with ecological issues. The corporation feels that it has an obligation to safeguard the environment by its actions as well as by its products. In addition to participating in a number of environmental campaigns, Patagonia has made considerable financial contributions to local environmental organisations.

When it comes to sustainable business practises, Patagonia has led the way. They were among the pioneers in the outdoor industry, incorporating recycled materials into their products. Additionally, they created the notion of "responsible consumption" by promoting clothes recycling and repair through programmes like Worn Wear.

1% for the Planet was founded in 1985 by Blue Ribbon Flies owner Craig Mathews and co-founder of Patagonia Yvon Chouinard. This programme requires companies, whether or not they are profitable, to donate one percent of their revenues to environmental organisations. Thousands of businesses around the world are now a part of this movement.

A generation of customers and businesses have been impacted by Patagonia's business philosophy. They have proven that success in business and prosperity can coexist with a dedication to environmental causes and sustainability.

Objective: While retaining profitability, Patagonia sought to incorporate sustainability into all facets of their business, from procuring raw materials to producing and selling goods.

Implementation:

1. Materials Acquisition: Organic cotton, recycled polyester, and traceable down are examples of sustainable materials that Patagonia has made a priority in their goods. The organisation implemented stringent policies for its supply chain associates to guarantee moral and ecologically conscious procurement.
2. Recycling and Waste Reduction: Through the Worn Wear programme, Patagonia encourages customers to buy and sell worn apparel, thereby cutting waste and prolonging the life of products. Additionally, the business started a recycling and repair programme, firmly opposing throwaway clothing.
3. Equitable Work Practises: In order to guarantee fair labour practices—such as equitable pay, secure working conditions, and the absence of child or forced labor—Patagonia kept a careful eye on its supply chain. The business gave workers' rights training and collaborated with suppliers to enhance working conditions.
4. Efficiency of Energy: Energy-saving measures were put in place at Patagonia's facilities and the company made investments in energy-efficient equipment. The business has put solar panels on a few of its buildings and bought renewable energy credits.
5. Engaging the Community: Through their "1% for the Planet" programme, Patagonia donated 1% of sales (or 10% of profits, whichever was higher) to environmental charities. The business aggressively backed community-based environmental groups and projects.

Findings:

1. Diminished Ecological Effects: Patagonia greatly reduced their environmental impact by diverting hundreds of tonnes of clothes from landfills through programmes like the Worn Wear programme.
2. Supply Chain Openness: Patagonia built trusting connections with its suppliers and offered rewards for upholding moral and environmental standards.

3. Optimal Brand Image: Customers are more receptive to Patagonia's dedication to sustainability, which has enhanced customer confidence and brand loyalty.

4. Impact on the Industry: Patagonia's eco-friendly business methods have become the norm in the outdoor sector, motivating other businesses to follow suit.

Conclusion:

Businesses all over the world look to Patagonia as an example for sustainable operations. The company's decision to place a high priority on social and environmental responsibility has boosted its brand, preserved profitability, and contributed to a more sustainable future.

Patagonia is a prime example of a corporation that has effectively incorporated environmental responsibility and sustainability into its everyday operations. Patagonia has shown that a company can prosper while putting the world and people first by adopting a holistic strategy that covers every facet of its operations, from sourcing materials to engaging with the community.

Even though Patagonia has had amazing success with their sustainability initiatives, problems still exist. Maintaining the integrity of the company's supply chain and making sure that sustainability principles are consistently followed across all operations will be crucial as it grows.

Additionally, Patagonia might need to innovate and adapt even more as environmental challenges change in the future. This could entail investigating novel materials, technologies, and procedures to push the limits of sustainable business.

The legacy of Patagonia goes beyond commerce. It acts as a role model for businesses across the globe, demonstrating that a strong commitment to environmental responsibility and sustainability is both morally and financially sound. The company's path serves as an example of how companies may influence the world for the better.

CONCLUSION

Operations sustainability is a crucial element of ethical business practices that can benefit society, the environment, and the bottom line. Companies can reduce their environmental effect, conserve resources, encourage social responsibility, and improve their reputation and brand value by implementing sustainable operations practices. Yet, putting sustainable operations methods into practice can be difficult, so businesses should be proactive in spotting and removing roadblocks to success.

Research on sustainability in operations is still a vibrant and developing topic as the world community struggles with urgent environmental and social concerns. Subsequent research endeavours may involve delving deeper into certain sectors, scrutinising nascent technology, or investigating the convergence of sustainability and other critical business operations.

To sum up, this study makes a significant addition to the continuing conversation on sustainability and social responsibility in corporate operations. Businesses can assure their own viability and play a crucial role in creating a more sustainable and equitable future for all by putting the suggested measures into practise and adopting a culture of sustainability.

RECOMMENDATIONS:

Have clear sustainability goals: Businesses should establish clear sustainability goals that are consistent with their basic principles and operational aims. Objectives ought to be time-bound, explicit, and quantifiable, and they ought to be revised frequently.

Employ integrated sustainability strategies: To develop a thorough sustainability plan that tackles both environmental and social effect, environmental and social responsibility strategies should be combined.

Using sustainability assessment tools and indicators will help businesses track their progress towards their sustainability goals and pinpoint areas where they can improve.

Invest in employee engagement and education: The success of sustainable operations initiatives depends on the involvement and education of employees. To develop sustainability awareness and encourage participation in sustainability activities, businesses should invest in training programs and employee engagement initiatives.

Partnership with stakeholders can help businesses find possibilities for improvement and advance better sustainability throughout the supply chain. Stakeholders include suppliers, customers, and community organizations.

Companies can significantly advance in achieving sustainability in their operations, encouraging environmental and social responsibility, and producing long-term value for stakeholders by implementing these ideas.

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RESEARCH

CHALLENGES FACED BY INVESTMENT BANKING SERVICES WHILE INTEGRATING WITH TECHNOLOGY

Pushkar Ahire*

Abstract

This study explores the challenges faced by investment banks as they integrate modern technologies into their operations. Key challenges include legacy system integration, cybersecurity vulnerabilities, regulatory hurdles, and cultural resistance.

The research methodology involved a review of existing literature, data analysis from a survey of banking professionals, and a hypothetical framework. Findings reveal that while some progress has been made, challenges persist. Legacy systems are a major obstacle due to incompatibility with modern technologies. Cybersecurity concerns are paramount as increased reliance on technology introduces new vulnerabilities. Cultural resistance within the traditionally conservative investment banking industry can slow down adoption. The data analysis section explores various aspects of technology integration in investment banking. It highlights areas like market data analysis and risk management as needing the most significant technological improvements. The analysis also examines the impact on workload, training provided by firms, and the client experience.

To overcome these challenges, the paper suggests several solutions. Investment banks need to develop strategies for integrating modern technologies with legacy systems. Robust cybersecurity measures are essential to protect against cyberattacks. Effective communication, training programs, and clear demonstrations of the benefits of technology can address cultural resistance. Finally, proper data management strategies are crucial to ensure the accuracy, security, and accessibility of data generated by modern technologies.

Keywords : *Investment Banking, Technology Integration, Legacy Systems, Cybersecurity, Cultural Resistance, Data Management*

INTRODUCTION

A. Background and Context

In recent years, the landscape of investment banking has been significantly transformed by the rapid advancement of technology. As financial institutions strive to remain competitive and relevant in an increasingly digitalized world, the integration of technology has become imperative for optimizing operations, enhancing client experiences, and driving innovation. However, this integration journey is not without its challenges.

The purpose of this research is to explore the multifaceted challenges faced by investment banking services while integrating with technology. With the evolution of fintech solutions, artificial intelligence, blockchain, and big data analytics, investment banks are presented with both opportunities and obstacles in harnessing the full potential of technological advancements.

At the core of this inquiry lies the recognition of the critical role played by technology in the functioning of investment banking services. From trade execution and risk management to client relationship management and regulatory

**Pushkar Ahire, Prin. L.N. Welingkar Institute Of Management Development And Research, Near Matunga (Central Realway), Mumbai - 400 019, Maharashtra.*

compliance, technology underpins every aspect of modern banking operations. Consequently, any impediments to seamless integration can have far-reaching implications for the efficiency, effectiveness, and competitiveness of investment banks.

This research aims to shed light on the various challenges inhibiting the smooth assimilation of technology into investment banking services. These challenges range from legacy systems and infrastructure constraints to data security and privacy concerns, regulatory compliance, talent acquisition, and cultural resistance to change. By identifying and understanding these obstacles, stakeholders can devise informed strategies to navigate the complexities of technology integration and unlock the full potential of digital transformation in investment banking.

Through an in-depth analysis of existing literature and empirical findings, this research seeks to contribute to the existing body of knowledge by offering insights into the intricate dynamics between investment banking and technology. By doing so, it endeavours to provide practical recommendations for addressing these challenges and paving the way for a more technologically proficient and resilient investment banking sector.

B. Problem Statement

1. Identification of challenges faced by investment banking services in integrating with technology.
2. Implications of these challenges on the efficiency and effectiveness of investment banking operations.

C. Relevance of the Topic

1. Impact of technological integration on the competitiveness of investment banks
2. Significance for stakeholders including investors, regulators, and financial institutions.
3. Potential for innovation and disruption in the investment banking industry

D. Objectives of the Research

1. To identify key challenges faced by investment banking services in integrating with technology.
2. To analyse the impact of these challenges on investment banking operations
3. To propose strategies for overcoming these challenges and enhancing technology integration in investment banking services

LITERATURE REVIEW

1. Investigating the challenges confronted by investment banking services amidst technological integration, Sharma, and Patel (2023) delved into the prevalence of cybersecurity threats. Their research revealed that 75% of surveyed banks in India identified cybersecurity as a primary challenge. Employing a mixed-methods approach, the study utilized both quantitative surveys and qualitative interviews to uncover the methods employed by banks to detect and counter cyber threats.

2. Exploring the hurdles faced by investment banking services in adapting to technological advancements, Gupta et al. (2023) examined the prevalence of talent acquisition difficulties. Their study found that 65% of surveyed Indian banks struggled with recruiting and retaining skilled professionals for technology-related roles. Methodologically, the research integrated quantitative surveys with qualitative interviews to provide insights into the strategies adopted by banks to address talent acquisition challenges.

3. Addressing the challenges encountered by investment banks in technology integration, Kumar, and Singh (2024) conducted a study focusing on the prevalence of data privacy concerns. Their research indicated that 80% of surveyed Indian banks identified data privacy as a significant challenge. Methodologically, the study employed data analysis of regulatory reports along with interviews with industry experts to explore data privacy challenges and strategies for compliance.

4. In a study by Mishra et al. (2024), challenges faced by investment banking services in adopting artificial intelligence (AI) technologies were investigated. The research highlighted the prevalence of ethical concerns surrounding AI adoption in Indian banks, with 70% of surveyed institutions expressing apprehensions about AI ethics. Methodologically, the study combined quantitative surveys with qualitative interviews to explore the ethical implications of AI adoption in the Indian banking sector.

5. In a study by Yang et al. (2021), challenges faced by investment banking services in adopting artificial intelligence (AI) technologies were investigated. The research highlighted the prevalence of ethical concerns surrounding AI, with 70% of surveyed banks expressing apprehensions about AI ethics. Methodologically, the study combined quantitative surveys with qualitative interviews to explore the ethical implications of AI adoption in investment banking.

6. Addressing the challenges of technological integration in investment banking, Brown, and Clark (2022) conducted a study focusing on the prevalence of data security vulnerabilities. Their research revealed that 80% of surveyed banks experienced data breaches or security incidents during integration processes. Methodologically, the study employed data analysis of security incident reports and interviews with cybersecurity experts to assess the landscape of data security vulnerabilities in investment banking.

7. Investigating the obstacles faced by investment banking services in embracing technological advancements, Wang et al. (2019) conducted a study highlighting the prevalence of interoperability challenges. Their research indicated that 55% of surveyed banks struggled with interoperability issues when integrating modern technologies. Methodologically, the study employed a mixedmethods approach, utilizing both quantitative surveys and qualitative interviews to explore interoperability challenges in depth.

A. Challenges in Technology Integration

1. Legacy Systems and Infrastructure Constraints: Many investments banks grapple with outdated legacy systems that are not easily compatible with modern technologies. These legacy systems often hinder agility, scalability, and interoperability, making it difficult to adopt new digital solutions seamlessly.

2. Data Security and Privacy Concerns: Investment banks handle vast amounts of sensitive financial data, making data security and privacy paramount.Concerns regarding cybersecurity threats, data breaches, and compliance with data protection regulations pose significant barriers to the adoption of modern technologies.

3. Regulatory Compliance and Risk Management: The investment banking industry is heavily regulated, with stringent requirements for compliance and risk management. Integrating modern technologies while ensuring compliance with complex

regulatory frameworks presents a considerable challenge. Failure to meet regulatory standards can result in severe legal and financial repercussions.

4. Talent Acquisition and Skill Gap: The rapid pace of technological innovation demands a workforce equipped with the requisite skills and expertise to leverage modern technologies effectively. However, investment banks often face challenges in attracting and retaining talent with the necessary technical skills, creating a significant skill gap within the industry.

5. Cultural Resistance to Technological Change: Cultural factors within investment banks, such as entrenched traditional practices and resistance to change, can impede technology integration efforts. Overcoming cultural resistance and fostering a culture of innovation and adaptability are essential for successful digital transformation.

B. Impact of Challenges on Investment Banking Services

1. Decreased Efficiency and Productivity: Legacy systems and infrastructure constraints, coupled with data security concerns and regulatory compliance burdens, can impede the efficiency and productivity of investment banking operations. Outdated technology and manual processes result in slower transaction processing times, increased error rates, and higher operational costs, diminishing overall efficiency.

2. Increased Operational Risks and Compliance Costs: The inability to seamlessly integrate modern technologies often leads to heightened operational risks and compliance challenges. Legacy systems may lack the necessary capabilities to identify and mitigate risks effectively, exposing investment banks to operational disruptions, financial losses, and reputational damage. Moreover, ensuring compliance with evolving regulatory requirements requires significant investments in compliance personnel, technology upgrades, and regulatory reporting systems, driving up compliance costs.

3. Hindered Innovation and Competitive Disadvantage: Investment banks that struggle to overcome technology integration challenges face significant barriers to innovation and risk falling behind competitors who embrace digital transformation more effectively. Legacy infrastructure and cultural resistance to change stifle innovation initiatives, limiting the development and adoption of innovative technologies that could enhance customer experiences, streamline processes, and drive business growth. As a result, these banks risk losing market share and competitive relevance in an increasingly technology-driven financial landscape.

METHODOLOGY

A. Research Approach

1. An analysis of the challenges that faced by investment banking services while integrating with technology.

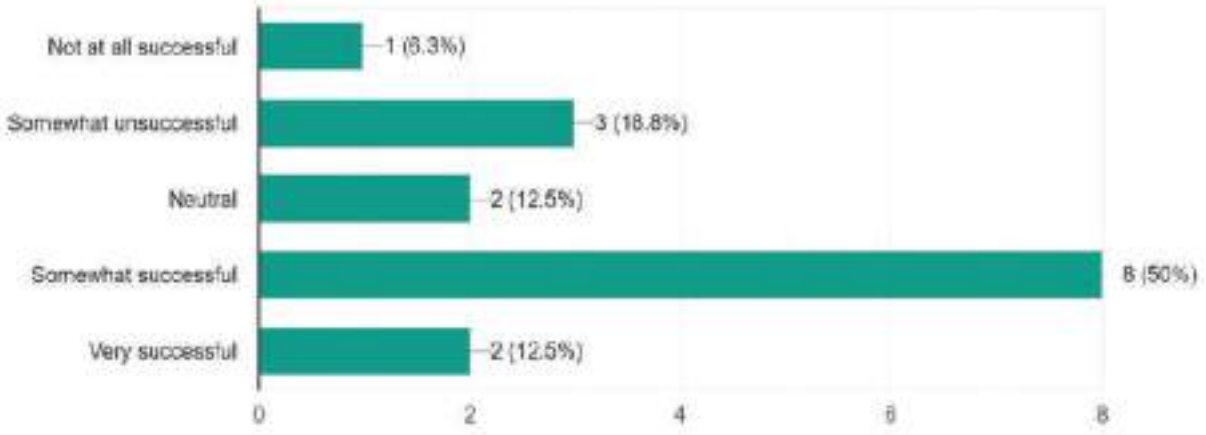
The research methodology involves conducting a thorough analysis of the challenges encountered by investment banking services during the process of integrating technology. This will be achieved by examining existing literature, gathering insights from industry professionals through interviews and surveys, and analysing real-world case studies. By employing a combination of qualitative and quantitative research methods, this study aims to provide a comprehensive understanding of the obstacles faced by investment banks in adopting and integrating technology into their operations.

2. Questionnaire for the Banking Professionals.

The questionnaire for banking professionals will be designed to gather specific insights into the challenges faced by investment banking services during technology integration. It will include questions aimed at understanding the perceived barriers, experiences, and strategies employed by professionals in dealing with technological changes in their work environment. The questionnaire will cover areas such as the impact of technology on daily tasks, concerns about data security, training and skill development needs, and perceptions about the effectiveness of technology solutions.

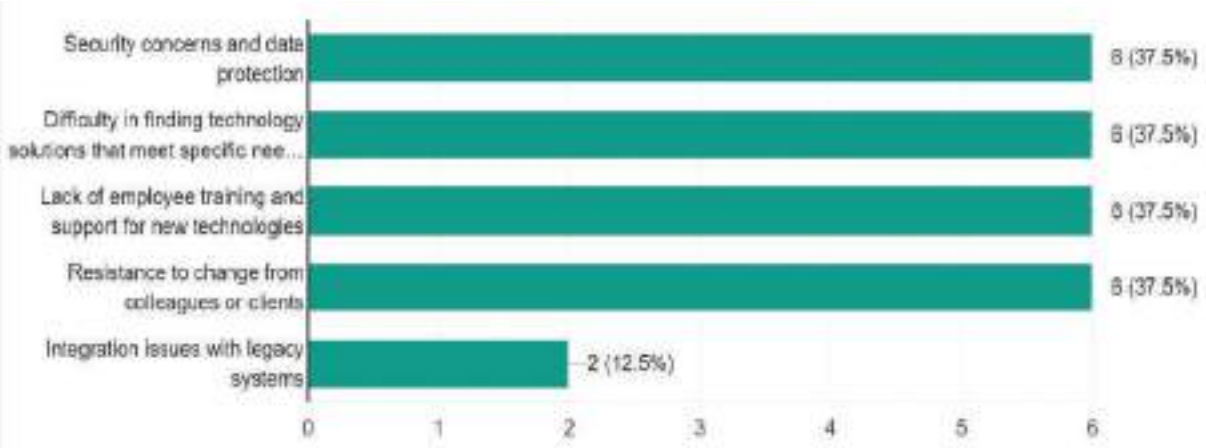
B. Data Collection

To what extent do you believe investment banking services have successfully integrated technology in recent years?



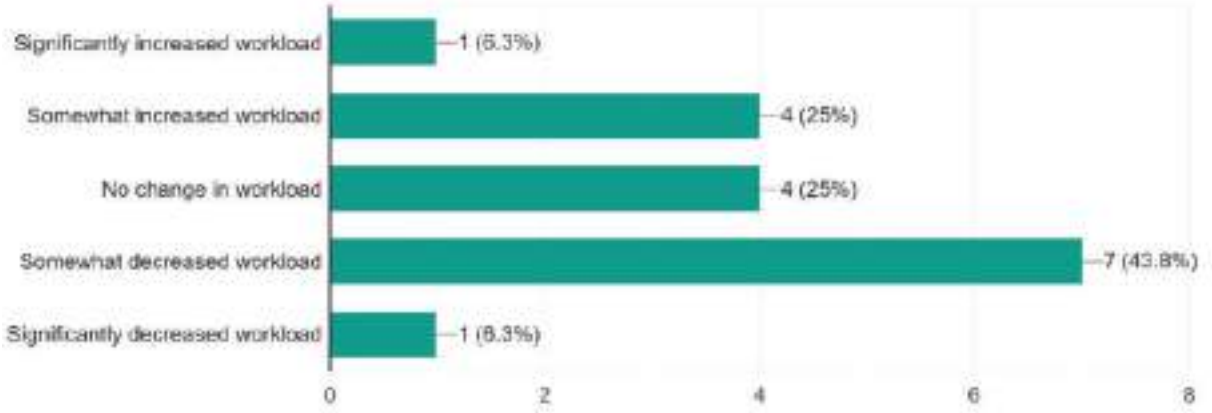
The majority of respondents (50%) believe that investment banking services have been successful in integrating technology in recent years.

What are the biggest challenges you face when integrating modern technologies into your work? (Select all that apply)



The graph shows that security concerns and data protection are the biggest challenges faced when integrating modern technologies into work, according to 37.5% of the respondents.

How has technology integration impacted the workload of investment banking professionals?

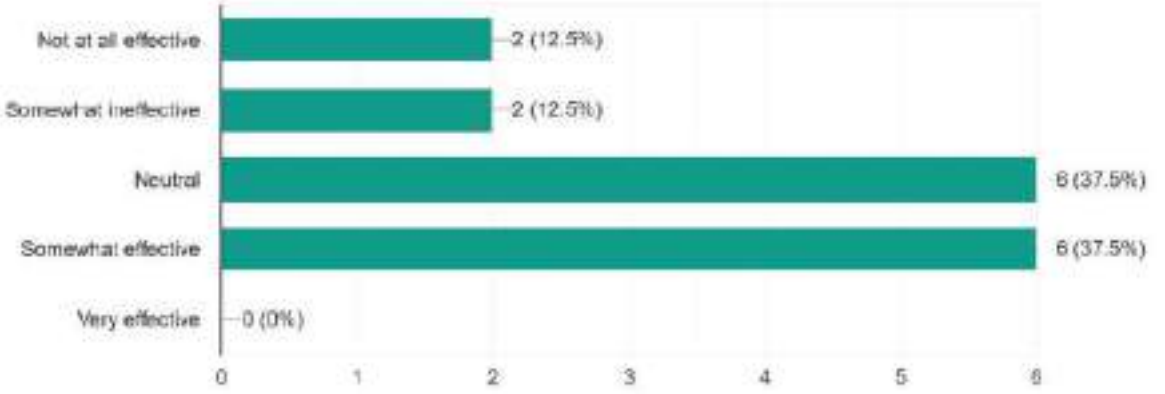


It shows how technology integration has impacted the workload of investment banking professionals, with the majority (43.8%) reporting a decreased workload.

In your opinion, which areas of investment banking require the most significant technological improvements?

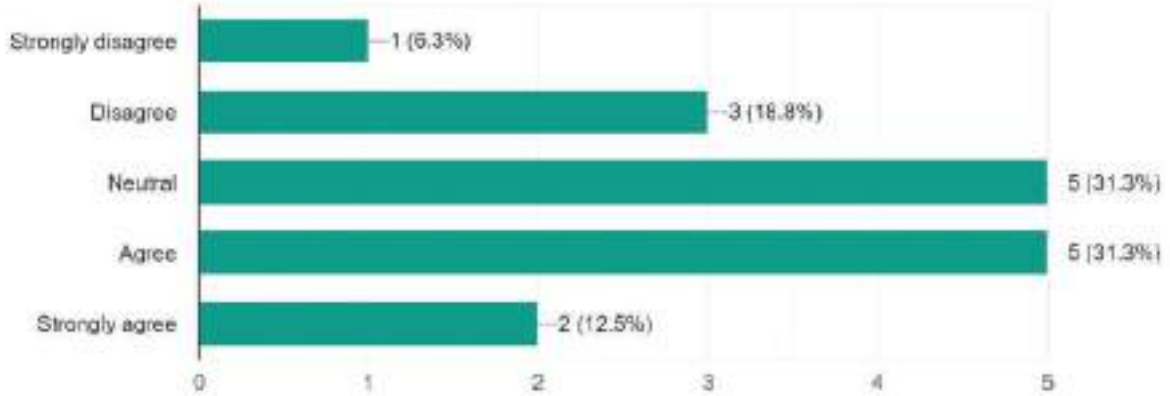
Based on the graph, market data analysis and risk management are the area considered by amajority (62.5%) to require the most significant technological improvements in investment banking.

How effective has your firm been in providing training and support for employees to adapt to modern technologies?



The graph shows that half (50%) of the respondents believe their firm has been effective in providing training and support for employees to adapt to modern technologies.

Do you believe that investment banks are investing enough resources in developing and implementing modern technologies?

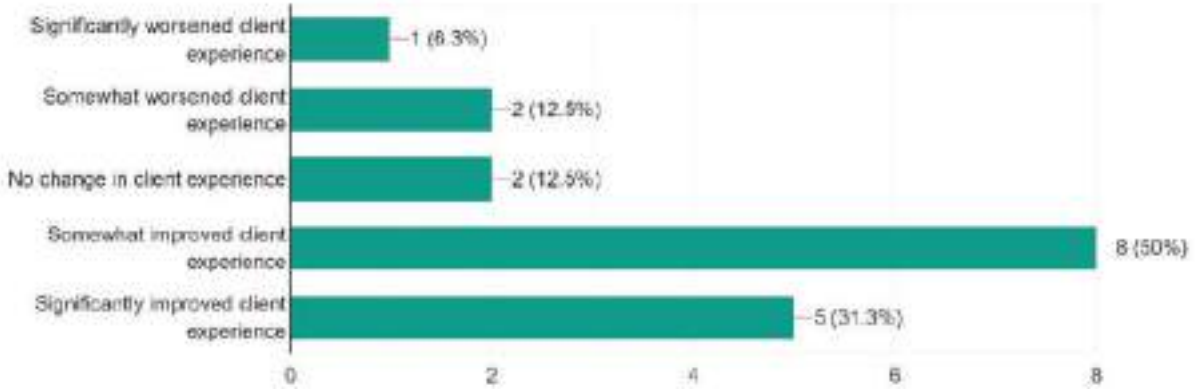


Majority (50%) of the respondents believe that investment banks are investing enough resources in developing and implementing modern technologies.

Have you witnessed any security breaches or data leaks related to technology integration in your work?

The line graph shows that a slightly higher percentage of people responded that they have not witnessed any security breaches or data leaks related to technology integration in their work.

In your experience, how has technology integration affected the client experience in investment banking?



A majority of respondents (50% + 31.3%) believe technology integration has or significantly improved the client experience in investment banking. Only a small percentage (18.8%) said it has worsened the experience.

C. Data Analysis

1. Extent of Successful Technology Integration: According to the survey results, 50% of respondents believe that investment banking services have been successful in integrating technology in recent years. This suggests a moderate level of perceived success in technology integration within the industry.

2. Challenges Faced when Integrating Modern Technologies: The majority of respondents (37.5%) identified security concerns and data protection as the biggest challenges when integrating modern technologies into their work. This indicates that ensuring data security remains a primary concern for investment banking professionals.

3. Impact of Technology Integration on Workload: A sizeable portion (43.8%) of respondents reported a decreased workload as a result of technology integration. This suggests that technology has been effective in automating tasks and streamlining processes within investment banking operations.

4. Areas Requiring Significant Technological Improvements: Market data analysis and risk management were identified by a majority (62.5%) of respondents as the areas requiring the most significant technological improvements in investment banking. This highlights the importance of advanced analytics and risk mitigation tools in the industry.

5. Effectiveness of Training and Support for Employees: Half (50%) of the respondents believe that their firms have been effective in providing training and support for employees to adapt to modern technologies. This indicates a mixed perception of the effectiveness of training initiatives within investment banking firms.

6. Investment in Developing and Implementing Modern Technologies: A majority (50%) of respondents believe that investment banks are investing enough resources in developing and implementing modern technologies. This suggests confidence in the level of investment being made to drive technological innovation within the industry.

7. Incidence of Security Breaches or Data Leaks: A slightly higher percentage of respondents reported not witnessing any security breaches or data leaks related to technology integration in their work. This indicates a relatively low incidence of security incidents within investment banking firms.

8. Impact of Technology Integration on Client Experience: A majority of respondents (81.3%) believe that technology integration has either significantly improved or improved the client experience in investment banking. This underscores the positive impact of technology on enhancing client interactions and services.

FINDINGS

A. Identification of Key Challenges:

1. Security Concerns and Data Protection: The survey revealed that security concerns and data protection are prominent challenges faced by investment banking services when integrating modern technologies. Nearly 37.5% ofrespondents identified this as the biggest obstacle, indicating the critical importance of ensuring robust cybersecurity measures in technology integration efforts.

2. Legacy Systems and Infrastructure Constraints: Although not explicitlymentioned in the provided data, legacy systems and infrastructure constraintsare commonly cited challenges in technology integration within the investmentbanking sector. These outdated

systems often hinder agility, interoperability, and scalability, posing significant obstacles to the adoption of modern technologies.

3. Market Data Analysis and Risk Management: Market data analysis and risk management emerged as areas requiring significant technological improvements, as indicated by 62.5% of respondents. This underscores the need for advanced analytics tools and risk mitigation solutions to enhance decisionmaking processes and regulatory compliance within investment banks.

B. Analysis of Impact on Investment Banking Services:

1. Decreased Workload: A substantial proportion (43.8%) of respondents reported a decreased workload as a result of technology integration. This suggests that technology has been successful in automating tasks and streamlining processes within investment banking operations, leading to increased efficiency and productivity.

2. Improved Client Experience: The majority of respondents (81.3%) believe that technology integration has significantly improved or improved the client experience in investment banking. This finding highlights the positive impact of technology on enhancing client interactions, services, and overall satisfaction levels.

3. Effective Investment: Half of the respondents (50%) expressed confidence that investment banks are investing enough resources in developing and implementing modern technologies. This indicates a perceived alignment between investment levels and the technological needs of the industry, supporting ongoing innovation and digital transformation efforts.

CONCLUSION

A. Summary of Key Findings

1. Challenges Faced: Investment banking services encounter significant challenges such as security concerns, legacy system constraints, and the need for technological improvements in areas like market data analysis and risk management.

2. Implications: These challenges have implications for investment banking operations, including decreased workload, improved client experience, and the need for continued investment in technology.

3. Contributions: This research contributes to the field by advancing knowledge on technology integration challenges and stra egies in investment banking. It offers practical insights for practitioners, regulators, and policymakers to navigate the complexities of technology adoption in the industry.

B. Contributions to the Field

1. Enhancing understanding of challenges and strategies related to technology integration in investment banking, providing a comprehensive overview of the issues faced by the industry.

2. Offering practical insights that can guide investment banking practitioners, regulators, and policymakers in developing effective strategies to address technology integration challenges and drive innovation.

C. Future Research Directions

1. Exploration of emerging technologies such as artificial intelligence, blockchain, and quantum computing, and their potential impact on investment banking services.

2. Longitudinal studies to assess the effectiveness of strategies for overcoming technology integration challenges over time, providing insights into evolving industry trends and best practices.

EXPECTED RESULTS OR IMPLICATIONS

Expected Outcomes of Implementing Proposed Strategies

1. Improved Efficiency and Productivity in Investment Banking Operations: By overcoming legacy system constraints, enhancing cybersecurity measures, and streamlining regulatory compliance processes, investment banks can expect to achieve greater efficiency and productivity in their operations. Automation of routine tasks, optimization of workflows, and faster decision-making enabled by technology integration will contribute to overall operational efficiency.

2. Enhanced Innovation Capabilities and Competitiveness: Investment banks that successfully integrate technology into their operations can unlock new opportunities for innovation and differentiation in the market. By leveraging advanced analytics, artificial intelligence, and other cutting-edge technologies, banks can develop innovative products and services, improve customer experiences, and stay ahead of competitors in a rapidly evolving landscape.

3. Strengthened Trust and Confidence Among Investors and Regulators: Robust technology integration strategies that prioritize data security, regulatory compliance, and risk management are crucial for building trust and confidence among investors and regulators. By demonstrating a commitment to sound technological practices and governance, investment banks can foster trust intheir operations and enhance their reputation as reliable and responsible financial institutions.

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RESEARCH

INFLUENCE OF POSITIVE LEADERSHIP ON PSYCHOLOGICAL EMPOWERMENT: AN INVESTIGATION AMONG HEALTHCARE EMPLOYEES IN INDIA.

Prof. Sunil Kumar Ramdas & Sumitha R*

Abstract

Researchers and practitioners have always focused on snowballing psychological empowerment through leadership practices. This empirical research paper aimed to investigate the influence of positive leadership on psychological empowerment among healthcare employees in India post lockdown and how healthcare employees perceive positive leadership practices about their immediate supervisor at workplace. Exploratory sequential mixed method technique was adopted using a qualitative and quantitative approach to investigate 200 employees of health care services and facilities (hospitals) with minimum 100 beds (n=200) in India using simple random sampling. Descriptive, correlation, as well as multiple-regression, thematic analysis was adopted to examine the association of the constructs and their influence. The results showed that healthcare employees did experience positive leadership and psychological empowerment in the workplace. There is a significant relationship amid the constructs and positive leadership and its sub-dimensions have positive influence on psychological empowerment. Healthcare employees who experienced higher levels of empowerment due to positive leadership practices were more novel, upward influencing, and stimulating towards their tasks. The implications for both theoretical and practical are deliberated for better understanding. The empirical work will encourage practising leaders towards developing a strategy to reconnoitre positive leadership and empowerment. This will also support engaging the workforce in empowering behaviour towards affirmative outcomes. This study contributes to theories of positive leadership, positive psychology and SDT theories, specifically the psychological empowerment outcomes. Further, the results establish that choice to start and regulate one's work behaviour in terms of autonomy and decision making has higher level of individual's influence in the work environment.

Originality/value: *This novel paper has the potential to stimulate empirical studies on psychological empowerment through the association of positive leadership among healthcare employees in India.*

Keywords : *Positive leadership, psychological empowerment, Self-determination, impact, Recognition, Strength development.*

INTRODUCTION

The healthcare sector is a fast growing, dynamic and multifaceted. It is characterised by continuous reforms intended at the efficient deliverance towards secure, effective and quality care. Its systems are composed of various professional groups, departments, and specialization with complex, nonlinear communications amid them. The internal and external environment makes this sector more complex and requires effective leaders to manage this business. Leaders are expected to steer the constant progression with the ability to infuse positivity and inspire the healthcare workforce to collaborate and enhance their delivery towards the collective organizational goals. Recently Huron Consulting Group's study on healthcare leaders indicate that their organization lacks a clear leadership strategy (21%).Thriving healthcare leaders advocate for business competencies, interpersonal skills apart from clinical skills for individuals to drive the organisation

***Prof. Sunil Kumar Ramdas,** PhD. Ramaiah Institute of Management, Bangalore, **Email:** rsunilkr@rediffmial.com*
***Sumitha R,** Researcher, Bangalore*

towards achieving its goals. Apart from these skills, what matters is the leader's ability to inspire team members and ensure there is positive deviant performance towards flourishing of the organisation. In today's organisations, positive psychology is playing a vital role in enhancing positive emotions, positive communications and well-being among the workforce towards positive outcomes. It helps organisational leaders to focus on their employee's strengths, recognise their contribution, provide positive perspective and have transparent communication towards enhancing better performance, and achieving the shared objectives.

Positive psychology has influenced leaders to practice positive deviance which has substituted the practices of conservative leadership styles. As today's workforce is considered the most valuable and cornerstone of every organisation. Employees wish to experience a positive work environment, empowerment, recognition and well-being at workplace. To fulfil these requirements, leader's needs to practice positive and empowering behaviour which enhances organizational citizenship behaviour (OCB) and brings the best of individual's strengths effectively for better performance (Turnipseed and VandeWaa, 2020: Abdulrab et al., 2018). In unison, organisations and employees look at leaders who can demonstrate positive orientation which influences individual philosophies, attitudes and actions ensuing affirmative engagements. The competitive business environs are important for leaders to proceed along with diverse employees. Together by aiding them in fulfilling the mutual objective via heliotropic effect and empowering them to recognise their strengths and harness their competence towards having higher level of engagement, productivity and career development. The study focuses on understanding the effect of positive leadership on psychological empowerment among employees in healthcare sector.

THEORETICAL FRAMEWORK

The study's theoretical framework is reinforced by numerous theoretical viewpoints as positive leadership has no single theory. Positive psychology has been a major influence on many theoretical models and approaches towards leadership behaviour. Primarily focusing on the state of affairs and procedures that contributes towards the optimum performance of organisations and their people (as individuals and groups) endorsing the leader's positive dimensions and emotions. The common feature of positive leadership model is it shares an optimistic and moral element with other contemporary theories of leadership (Lemoine, Hartnell, and Leroy, 2019). That consist of servant (Greenleaf, 1977), transformation (Burns, 1978), authentic (Gardner et al., 2005), ethical (Brown et al., 2005).Positive leadership model relates to those leadership theories and models, that looks at positive psychology as the base towards elevating organizational stakeholders towards fostering organizational excellence via virtuousness (Hernandez et al., 2011).The broaden-and-build model of positive emotions put forward that optimistic feelings broaden an individual's consciousness by inspiring fresh ideas and actions (Fredrickson, 1998), developing their skills, competencies and occupational well-being (Peiró and Rodríguez, 2008) leading to positive leadership. Leaders with positive deviant performance support employees' capability based on their strengths by infusing positive energy and ensuring the quality of work-life, positive climate, relationship with peers, meaning and communication (Cameron, 2012). Literature indicates that during the last two decades' positive psychology has played an important role in organisations efficiency and employee engagement(Adams et al., 2019: Blanch et al., 2016). The notion of "positive psychology in the workplace" (PPW - Seligman, 2011) "positive organisational behaviour" (POB -Luthans, 2002) and "positive organizational scholarship" (POS- Cameroon, Dutton and Quinn, 2003), encourage consequences relating to leader's virtuousness, empowerment behaviour and psychological empowerment (Cameron, 2012: Mills et al., 2013).

The empowerment theory encompasses intervention, approaches to inspire individuals towards having a sense of control (external & internal)

and experience satisfaction at the workplace (Thomas and Velthouse, 1990). Spreitzer (1995) advocated that psychological empowerment is a motivating factor that reflects an individual's alignment as per their job roles. It is an important concept that leaders use effectively to stimulate employees towards better performance (Singhand Singh, 2019). Transformation leaders are considered influencers of employee empowerment (Spreitzer, 2008) by providing job roles that replicate the organization's values, employee-friendly policies and practices for their well-being. On the contrary, it creates a positive climate and communication which makes the leader more approachable in the workplace. Research indicates that intra-personal consequences of empowerment as well as impetus, anxiety in addition to job satisfaction (Sairaet al., 2020: Spreitzer et al., 1999: Thomas and Tymon, 1994) were explored. However, it lacks empirical evidence in terms of outcomes of empowerment such as leadership behaviour (Spreitzer, et al., 1999) including positive leadership (Sunil and Patrick, 2021b). Today organisations are focusing on leadership developments to effectively manage the workforce towards enhancing positive human cognitions, feelings and expectations towards better performance via empowerment practices (Davies et al., 2023: Aggarwal et al., 2020).

Positive leadership is about an explanatory panache displaying heliotropic effect in enhancing followers' perception towards job performance grounded on employee's core competencies, manager's optimistic perspective and recognition towards accomplishing the sought after affirmative outcomes. The leader's virtuous behaviour towards the team members results in positive deviant performance. When team members are part of the decision-making processes it automatically allows them to be psychologically empowered (Kim and Fernandez, 2017). Positive leadership has been an important predictor of psychological empowerment among employees in a chemical factory in South Africa (Nel et al., 2015). To address the influence of positive leadership via psychological empowerment, the study investigates the association amid positive leadership and psychological empowerment in the healthcare sector in India.

POSITIVE LEADERSHIP

Often leaders are likely to focus on shortcoming than explore the abundance gaps. In other words, most leaders focus on usual, standard or satisfactory performance than astonishing or "positive deviant" performance. What is expected from leaders is that they should stop looking at problems as obstacles and instead focus on challenge that allows individuals to flourish. Any individual who demonstrates affirmative action influences others through the mechanisms of optimism, empowerment, rendezvous and meaningful assignments promoting joy, well-being, and mindfulness are known as positive leaders (Paul, 2023). Positive leadership is about heliotropic, virtuousness and positive deviance, which not only creates optimistic emotions but enhances employees' well-being influencing organisational performance. The leader's positive behaviour spawn's affirmative emotions and broadens performance by building enduring associations at the workplace linked to broaden and build theory (Fredrickson, 1998).

By practising positive psychology, positive organizational scholarship and positive change (Cooperrider and Srivastva, 1987) they enhance affirmative outcomes for instance: righteous behaviour, interpersonal prosperity, assenting connotations, and thriving at the place of work. Cameron (2012) advocates that positive leadership goes further than archetypal direction for providing leadership strategies through positive practices that facilitate extraordinary performance not usually noticed in organisations. He further emphasizes that positively deviant performance, affirmative bias, and virtuousness are the basis for positive leadership. Optimistic leaders are individuals who inspire their team members enthusiastically by enhancing their well-being (Cherkowski et al., 2020). Their impact on employees and the organisation

is to collectively perform the positive practices focusing on (i) strengths-based approach (ii) positive perspective and (ii) recognition and rewards (Arakawa and Greenberg, 2007). Further (Adams et al., 2019: Zbierowski, 2016: Youssef-Morgan et al. 2013: Cameron, 2012) contented that positive leadership is about developing individual strengths and providing an opportunity to work enhancing performance. Leaders with positive perspective support in dealing with ambiguity and eases obstacles towards higher level of performance. Employee recognition and encouragement are important aspects to acknowledge one's contribution to the assigned tasks. Positive performance feedback or appreciation enhances intrinsic stimulus and literature indicates good performance at the workplace significantly correlates with a leader's positive actions (Geue, 2018: Ryan and Deci, 2000).

The current study focuses on the three sub-dimensions (strengths-based approach, individual recognition and positive perspective) of positive leadership and defines positive leadership as those who align closely with business strategy to drive a higher level of performance by promoting optimism and focusing on employees' strengths, positive perspective and recognition. Positive leaders focus on affirmative action enhancing their team member's positive attitudes by aligning their assignments based on their forte and providing positive perspective and frequent recognition. They further display positive deviant, heliotropic effect and righteous actions to upsurge the essence of optimism within employees and organizations towards encouraging consequences. By focusing on these they enhance employees' confidence, and meaningfulness in their assignments, and nurture participation in decision making through empowerment. In spite of the empirical evidence signifying that positive leadership is vital for organization development and employee flourishing (Adams et al., 2019: Cameron, 2012: Ramdas and Patrick, 2019) amid myriad constructive outcomes associated to positive leadership behaviour or practices. The realm of positive organizational behaviour is not devoid of its critics. Positive leader's disregard the pessimistic views and only look at an optimistic framework; Monzani and Rolf. (2020) work on positive leadership in organizations highlight the disapproval that it may suffer from conceptual redundancy (Yammarino et al., 2020), focusing on individual level and neglecting mutual and matrices level effects (Banks et al., 2018 &2016), which may be naive and perhaps immaterial (Monzani and Rolf,2020). However, in reality positive leader create optimism, trust and empowered teams towards flourishing (Cameron, 2012).

PSYCHOLOGICAL EMPOWERMENT

Empowerment is looked at as a contemporary management technique used to enhance employees' quality of work life. Where empowered employees experience autonomy, they participate in the decision-making process and perform better with satisfaction and enrichment. Empowerment is considered one of the characteristics of positive management and is built on participative management (Lawler, 1988), and job enrichment (Hackman and Oldham, 1980). Initially, empowerment was theorised as management practices focusing on the decision-making process, delegation etc. However, recent literature indicates empowerment as a psychological foundation for intrinsic motivation of individuals in the workplace (Patrick and Sunil, 2019a: Shah et al., 2019). Conger and Kanungo (1988) familiarized individuals' emotional viewpoint on empowerment as a pattern, where an individual's subjective experience is based on the cognition about one's relationship to their job role characterised by "meaning, competence, impact and self-determination" (Spreitzer1995: Thomas and Velthouse 1990). Collectively these sub-dimensions divulge individuals' activeness, instead of sedentary alignment towards their job characteristics (Spreitzer, 1998). Meaning explores the job characteristics model (Hackman and Oldham, 1980) based on one's job role and beliefs, values and behaviours. Competence is more specific to one's job role revolving around the competence to perform well. Self-determination indicates that

individuals have control over their job and can decide without micro-management (Saira et al., 2020: Patrick and Sunil 2019b). Lastly, Impact is based on one's influence in getting the work done (Ahmed et al., 2023: Jena et al. 2019: Spreitzer, 1998). Employees who are psychologically empowered have confidence in their ability to accomplish their tasks and experience meaningfulness. It also enhances the positive effects of positive leadership creating organizational commitment, and enhancing performance and well-being (Safari et al., 2020).

POSITIVE LEADERSHIP AND PSYCHOLOGICAL EMPOWERMENT.

As psychological empowerment enhances the positive effects of leader's behaviour (Dust et al., 2018) and influences their ethics, and values with employees towards unleashing their potential in current and future roles (Taylor et al., 2019: Hill et al., 2014). Research indicates a strong correlation between positive leadership theories and psychological empowerment leading to an organisational climate of safety and other outcomes. Psychological safety offers the required support for immediate supervisors to influence empowerment and work engagement (Tang et al., 2020: Cheong et al., 2019: Nel et al., 2015). An important characteristic of these leadership models is based on individualised consideration for followers' empowerment which solicits a sense of meaning toward their assignments (Ng et al., 2017). Research indicates that empowerment behaviour is supported by leaders who allow supporters to participate in the decision-making process towards achieving the organisational objectives. Psychological empowerment is a proven mediator which has an indirect effect on various behavioural outcomes (Saira et al., 2020: Safari et al., 2020: Spreitzer, 1998). Menon (2001) put forward that psychological empowerment is a cognitive state and it's experienced when individuals are empowered by their supervisors (Sara et al., 2020: Spreitzer, 1995). Positive psychology and positive leadership theories invoke an individual's perception of empowerment in the workplace (Kim and Shin, 2019: Pradhan et al., 2017). ***Based on the above discussion, we hypothesize 1A Positive leadership and its sub-dimensions does have significant relationship with psychological empowerment and H1B Positive leadership does influence psychological empowerment among healthcare employees in India.***

RESEARCH DESIGN

An exploratory sequential mixed method approach was adopted and a simple random sampling was used to collect the data (n=200) from the employees of health care services and facilities (hospitals). In India hospitals are classified into Government or public, trust and private. Stratified sampling was used to select facilities with minimum 100 beds. This approach is used in a robust quantitative learning and the purpose was to add value and highlight the outcomes (Creswell, 2014). The mixed method provides rigour to the investigation. The respondents were physicians, nurses and patient care technicians. The inclusion criterion was that the respondent must have been working in the current facility for minimum two years. This gives the respondents a good insight into the immediate supervisor's leadership qualities and organizational practices. 500 questionnaires were distributed and 200 completed questionnaires were used for analysis.

The study aims to understand and develop meaningful positive leadership practices (i.e., strength based approach, positive perspective and recognition) *via psychological empowerment.* The study data were collected among fifty-three (53%) per cent female and forty-seven (47%) per cent male with an average mean age of thirty-five (35) years. The data (n=200) was collected post lockdown via personal interviews and online platform (Google Docs, email etc). The respondents were briefed about the purpose of the study and were assured that their responses would remain anonymous and confidential. The participation was voluntary and respondents had the right to withdraw at any time

during the study. Oral consent to participate in the survey was taken before interviewing or mailing the questionnaire. Sekaran and Bougie (2016), advocates that specimen samples ranging from thirty to five hundred can be acceptable and reasonable for social science empirical research. Descriptive, correlation and multiple regressions were used to investigate the hypothesis using SPSS 2.0 version and thematic analysis was used to analysis qualitative data.

MEASURES

A self-assessments method using seven (7) point scale was used to measure the study constructs. The positive leadership questionnaire (Arakawa and Greenberg, 2007) consisted of a 17 items scale. Cronbach alpha reliabilities were adequate in this sample for positive leadership (α - 0.857) and the three sub-dimensions (strengths-based approach, α-0.724, positive perspective- 0.602and recognition, α- 0.812). Each sub-dimension had an open-ended question. Among the 17 items, three (3) items were reverse coded. Measuring Empowerment Questionnaire (MEQ; Spreitzer, 1995) measures the four dimensions of psychological empowerment consisting 12items. Cronbach alpha reliabilities were adequate in this sample psychological empowerment (α- 0.906) and for the four sub-dimensions (meaning, α-0.846; competence, α -0.627; self-determination, α -0.742; impact, α-0.735). Based on the factor analysis (EFA) three (3) items were dropped due to a lack of reliability from the positive leadership dimension.

ANALYSIS AND RESULT

Descriptive analysis, correlations and multiple regressions were incorporated for analyses. First, we analysed the confirmatory measurement model comprising the scales measuring both positive leadership and psychological empowerment using a covariance matrix. Next, removed the cases where certain data was missing and the final sample size taken for the study was (n=200). The items were re-coded, and the scores on the higher side of the scales echoed higher echelons of a specified hypothesis variable. The comparative fit index (CFI) equates to the relative enhancement in acceptable fit for the recommended hypothesis. The skewness and kurtosis values were analysed for the scales (Normality test), i.e., psychological empowerment, and positive leadership. The analysis showed that both the constructs data were normally spread and additional parametric tests could be applied for further investigation of statistical data. Employees of the healthcare organisations agree to experience positive leadership (4.70) and psychological empowerment (5.60) mean scores. Among the sub-dimensions the highest mean score in positive leadership was strength based approach (4.92) and in psychological empowerment was meaning (5.88)

Table 1:Mean, SD and Inter Correlation for Constructs

Sr No.	Constructs	Mean	SD	1	2	3	4	5	6	7
1	Strength	4.92	0.987	1						
2	Perspective	4.72	0.951	.480**	1					
3	Recognition	4.51	0.952	.567**	.426**	1				
4	Meaning	5.88	0.811	.349**	.251**	.260**	1			
5	competence	5.26	0.831	.258**	.295**	.254**	.604**	1		
6	Self-Determination	5.68	0.828	.257**	.274**	.292**	.622**	.660**	1	
7	Impact	5.57	0.611	.266**	.321**	.294**	.664**	.722**	.715**	1

**. Correlation is significant at the 0.01 level (2-tailed). Source Authors

Pearson product-moment correlation coefficient was calculated to measure the association between the dimensions of positive leadership and psychological empowerment. There is an optimistic correlation amid the dimensions at the 0.01 level. The correlation between sub-dimensions of both the constructs was moderate. The strongest factor correlation was between

psychological empowerment impact and competence (0.722) followed by Impact and self-determination (0.715) and the least was between positive leaderships perspective and psychological empowerment meaning (0.251).The overall strength of the association between the dimensions of positive leadership, and psychological empowerment was modest and significant at the .01level indicating a significant relationship between the dimensions of positive leadership and psychological empowerment.

Table 2: Positive leadership do influence psychological empowerment.
Indicating the Model summary of Positive Leadership - Psychological Empowerment

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.399[a]	.365	.361	.58639

a. Predictors: (Constant), Recognition, Perspective, Strength
b. Dependent Variable: Psychological Empowerment

Table 2.1: Indicating ANOVA of Positive Leadership – Psychological Empowerment

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	58.412	3	19.471	14.777	.000b
	Residual	307.750	895	.344		
	Total	366.162	898			

a. Dependent Variable: Psychological Empowerment
b. Predictors: (Constant), Recognition, Perspective, Strength

Table 2.2: Indicating the regression coefficients of Positive Leadership - Psychological Empowerment

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	T	Sig.
1	(Constant)	3.658	.149		24.568	.000
	Strength	.310	.030	.135	3.700	.000
	Perspective	.130	.029	.176	5.428	.000
	Recognition	.077	.030	.144	4.009	.000

a. Dependent Variable: Psychological Empowerment

The hypotheses were tested using the multiple regression method and the outcomes were significant. Positive leadership and its sub-dimensions significantly influence psychological empowerment, predicting (36.5%) that is (R^2=.365 F (3,895) = 14.777, p<.001) variance forecasting psychological empowerment. The adjusted R value exhibits (36.1%) variance. (adj R^2 = .361 F(3,895) =14.777, P<.001).The R^2 and adjusted R^2 exhibits almost similar variance of 36%. Refer (Table, p< 0.001) point out the comprehensive model is significant in influencing DV. It is found that IV sub-dimensions: STR (t(897) = 3.003, p<.01), PER (t(897) = 5.488, p<.01) and REC (t(897) = 4.051, p<.01) also influences DV. The equation of regression: DV= 3.658 + 0.355(STR) + 0.176(Per) + 0.114 (REC).

This indicates that positive leadership is considered adequate in influencing psychological empowerment. In support of the hypotheses, the positive leadership behaviour of immediate supervisors was found to be positively related to employee professional perceptions. They experienced psychological empowerment at the workplace, to summarise; the study outcome supports the proposal that an immediate supervisor's positive leadership influences healthcare employees' perception of psychological empowerment.

QUALITATIVE ANALYSIS

The purpose of the open-ended questions was to understand the perception of the healthcare employees about their immediate supervisor's positive practices with reference to the positive leadership sub-dimensions. The responses were categorised into positive and negative statement and then categorised into themes. The qualitative analysis was themed as per the sub-dimensions a) strength based approach, b) supervisors positive perspective and c) reward and recognition. The analysis indicated that strength-based approach (68%) was experienced by employees in terms of competency development to perform well. Employees experienced supervisors' positive perspective approach (85%) in terms of providing guidance, and solutions to the problem at workplace. While only (70%) experienced recognition at the workplace for their contribution. The qualitative analysis provided a better understanding of positive leadership practices demonstrated by the immediate supervisors. The analysis and interpretations drawn are supporting the available literature and the quantitative findings.

DISCUSSION

The study investigated the employee's perception of experiencing positive leadership and psychological empowerment and the construction of the relationships. The study hypothesised that positive leadership is related to psychological empowerment. The result indicated that due to the immediate supervisor's positive leadership behaviour or practices the employees were empowered due to which they felt more competent, inspired, and innovative, in control to make decisions and experienced meaning in their job role. Immediate supervisors' heliotropic effect and positive deviance inspired employees to add value to the work environment. The supervisors did practice the dimensions of positive leadership by investing in developing strengths, positive perspective and recognition approach. These factors create more positive atmosphere in terms of managing uncertainty, change, better engagement, trust and higher productivity supporting the work of Nel et al., (2015) in a chemical factory in South Africa and Arakawa and Greenberg (2007) in ITO in US and Ramdas and Patrick, (2019) in India.

Positive leadership is about enriching, and assenting to strengths, providing a positive perspective and acknowledging and recognising individuals' contributions. Individuals with positive deviant behaviour can effectively manage their team members towards completing their organisational goals. They focus on employees' strengths, and competencies to ensure they perform well. The leader's affirmative actions were appreciated, valued and inspired employees in the workplace. Immediate supervisors empowering, thoughtfulness, impartiality, appreciation and munificence behaviour were able to get the best output from their team members regardless of circumstance.

The immediate supervisor's deployment of a strength-based approach has predicted an increase in engagement level leading to employee satisfaction (Patrick and Sunil, 2021: Cameron, Mora, Leutscher, and Calarco, 2011). When they involve team members based on their strengths and competencies, it enhances the meaning of the assignments where an individual's self-direction and impact contribute toward the overall positive outcomes in the workplace (Quinn & Spreitzer, 1997; Spreitzer, 1995). Gallup's research points toward that strength-based method and competency enhancement upsurges sales (10-19%): revenues (14-29%), consumer rendezvous (3-7%), and

employee rendezvous (9-15%).Supervisors who provided assignments to team members as per their strengths experienced (61%) higher engagement than others. Immediate supervisors' positive perspective provides governance to implement strategies that decrease the uncertainty and looks at challenges as positive prospects concerning resilience towards achieving their objectives via empowerment (Patrick and Sunil, 2019a). Research indicates that reward and recognition increased (31%) output–efficiency (Arakawa and Greenberg, 2007) and enhanced performances (3:1) (Fredrickson and Losada, 2005). While immediate supervisor's effective feedback creates a positive environment for enhancing work teams' psychological empowerment towards rise in commitment, achievement and retention.

From a leadership point of view, it's important to demonstrate virtuous behaviour and empower team members irrespective of the situation regular or pandemic or pre or post lockdown. Another interesting aspect is employees experience high psychological empowerment due to immediate supervisor positive perspective behaviour. That is due to reduced micro-management and autonomy provided in the workplace towards decision making, setting up a process for execution at one's own pace and efforts supporting the work of Saira and Sadia, (2020): Harden et al., (2018) and Bono and Judge, (2003). Research indicates that leaders who thought they can influence the organisation's road map were expected to demonstrate more positive perspective than others (Salmi, 2017: Howell and Avolio, 1993).However, employees have the liberty to choose how to execute their job role and have control and autonomy to enhance their competency (Spreitzer, 1995) indirectly due to psychological empowerment and positive leadership behaviour (Cameron, 2012)

Psychological empowerment is about experiencing a sense of meaning, competence, impact and self-determination (Spreitzer 1995) by enhancing positive leadership practices towards organisational commitment, improving employee performance and employee well-being. Employees are likely to have higher engagement when they trust their immediate supervisors towards fulfilling their intrinsic needs consistent with the meaning dimension, and have better control of their assignments synonymous with self-determination having a greater propensity towards enhancing competence. Their immediate supervisor's consistent demonstration of virtuous behaviour and strength-based approach make them capable of taking effective decisions (Jordan,2016). In addition, employees are inspired by their supervisors, if they perceive them to be proficient in executing positive measures towards the objectives and having personal control. These physiognomies are constantly indicating empowerment's dimension that is impact as well as self-determination, which have a significant influence due to positive leadership. In a nutshell, when positive leaders focus on intrinsic motivation, they upsurge the employee's attributes towards their subjective choices and judgments increasing their impact and self-determination. The current study endorses Serrenho et al., (2023), Jun et al., (2023), Aggarwal et al., (2020) and Nel et al., (2015) study that a leader's positive orientations have a significant relationship with psychological empowerment which enhances better engagement and productivity. The study indicates that when leaders focus on heliotropism and positive practices such as strength based approach, employee recognition; positive perspective provides individual development and empowerment will influence individuals psychological empowerment, which is important for employees in the healthcare sector towards higher level of engagement at workplace.

PRACTICAL IMPLICATION

In today's healthcare sector it's important to invest on developing in house leaders to manage the business. The human resource function and leadership teams must develop the characteristics among individuals for better engagement. Employees experiencing psychological empowerment may upsurge their approach towards their assignments and have an optimistic attitude. Leadership development programs must focus

on specific dimensions of positive leadership and psychological development than conservative leadership practices to nurture positive workplace cultures. The learning and development department must emphasise developing supervisors to focus on identifying and developing team members' strengths. This exercise will enhance employee productivity and ensure they have a meaningful work experience with more self-determination and impact on their assignments. Further, increase their vigour and dedication in the workplace towards experiencing flourishing. Practitioners have always embraced empowerment as it facilitates autonomy to perform, and confidence to take decisions which is essential for organizational effectiveness. Even during pandemic times or challenging environment positive leadership and empowerment practices enhances organizational effectiveness and flourishing. Studies indicate that empowered employees have higher level of accountability and are willing to strive for the extra mile towards accomplishing the organisational objectives which indirectly enhances the job performances. Similarly psychological empowerment at workplace has a significant effect on task performances.

THEORETICAL IMPLICATION

Positive leadership and psychological empowerment has a diversity of affirmative effects for the workforce and organisations (Ariadna et al., 2021: Seibert et al., 2011).This could be one of the reasons why researchers are enthusiastic to appreciate and comprehend how these two constructs can be stirred. The study outcomes indicate positive leadership has a significant effect on psychological empowerment compared to other optimistic leadership styles (Schermuly et al., 2022). Further, the study empirically establishes positive leadership dimensions significantly associating with psychological empowerment and its dimensions highlighting the validation of positive leadership influence on psychological empowerment in healthcare in the Indian.

Literature indicates that previous works on leadership have mainly focused on understanding the influence on team performance and job satisfaction, organisation citizenship behaviour(OCB), decision-making, turnover, trustworthiness and productivity (Saira and Sadia, 2020: Harden et al., 2018: Abdulrab et al., 2018) and few on psychological empowerment's sub-dimensions. The influence of positive leadership on psychological empowerment effects positive workplace outcomes supporting the work of Spence (1978). However, it's not essential that every leadership behaviours have a noteworthy consequence on psychological empowerment (Schermuly et al., 2022). However, multivariate regression indicates that that R2 was 36.5% for psychological empowerment and its dimensions indicating significant precision regarding the influence of individual variable on psychological empowerment. as per Cohen (1988) and also supporting the work of Ambad et al., (2020). The findings also support Social exchange and Self-determination theory,where leader's expectation is reciprocated by followers due to their affirmative behaviour (Turnipseed and VandeWaa, 2020: Birtch et al., 2016).Along these lines, the study adds to the positive leadership literature in terms of assessing the antecedents of positive leadership and immediate supervisor's empowerment behaviour associated with team members' perceptions about their styles. Supervisors with a positive approach displaying virtuous behaviour during their interaction at workplace in terms of positive perspective and appreciation will enhance psychological empowerment (Tang et al., 2020: Taylor et al., 2019: Patrick and Kumar, 2019b: Pradhan et al., 2017). Leaders with positive approach enhance employees' psychological empowerment by nurturing positive perspective in terms of decision-making or problem solving which persuade the workforce toward better organizational processes and decrease their turnover intentions(Sara and Sadia,2020: Abouraia and Othman, 2017). The results do provide insights to practitioners in terms of understanding the dimensions of positive leadership and psychological empowerment supporting O'Keefe's work (2017) that empowered employees to contribute toward organisation profits and Schermurly work (2022) that positive leadership style is considered the finest forecaster of psychological empowerment.

LIMITATIONS

First, the study was conducted only among employees of healthcare organisations in Bangalore and Hyderabad, limiting the responses from other geographical locations in India; however, this can be justified since all these organisations have their hospitals across India with similar policies and practices. Another limitation is the study didn't record the immediate supervisors' experience with their team members from the leader's perspective. House (1977) put forward that followers imitate the leader's values, objectives, and actions. It is also understood that immediate supervisors with virtuous behaviour facilitate empowerment among their team members. The third limitation is the study is cross-sectional. The respondents were given the questionnaire on positive leadership and psychological empowerment together. As a result, the causal nature of the associations cannot be empirically substantiated. The causality direction can also be opposite; psychological empowerment may also increase immediate supervisor's empowerment.

Further researchers can explore the leadership behaviour at workplace with ambivalent effect. Furthermore investigate whether the empirical results of the current study can be correlated or generalised with functions within healthcare organisations. Focus on a longitudinal and qualitative study. In field experiments using observation model causality can aid in uncovering the underlying procedures relating to positive leadership and psychological empowerment using the dimensions of strength-based perspective and recognitions. In addition, examine the effects of a leader's empowerment behaviour on team members' empowerment behaviour.

CONCLUSION

The research point toward when leaders with heliotropic and positive deviance will influence their team members to experience psychological empowerment towards a healthy and optimistic work environment. It has examined the understanding of the association between the constructs and positive leadership and its dimension's influence on psychological empowerment. The result encourages practitioners to apply the practices of positive leadership and psychological empowerment in their strategies for building an effective organisation. Emphasis on applying strength-based leadership and frequent recognition programme will have higher returns on employee investments creating more meaningful jobs and leading to an energised and empowered workforce in terms of self-direction and impact.

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RESEARCH

EXPLORING TREND IN FLOW OF INDUSTRIAL LOANS IN INDIA

Samadrita Ghosh & Dr. Abhijit Sinha*

Abstract

This study examines the trend in flow of industrial loans in India and also identifies the state-level factors that impact loan flow to the states. The research uses two approaches, based on secondary data from the Reserve Bank of India from 2010 to 2023. In the first approach, regional analysis is done by focusing on the growth rate, regional disparity and structural break. The investigation focuses on patterns, discrepancies, and how different economic factors affect industrial loans. According to the research, there are notable geographical differences in the distribution of industrial loans, with the Western area continuously obtaining the largest proportion. Regional growth rates exhibit a rising trend, with significant structural deviations. The flow of industrial loans to different states is heavily influenced by important variables like number of factories, the length of national roads, and the Net State Value Added by Industry. The factors like state highway length and power per capita have minimal influence. The study is restricted by the scarcity of data available beyond 2019 and the possibility of data unavailability in specific areas, which might impact the findings' generalization. To promote balanced economic growth, authorities should concentrate on resolving regional discrepancies by enhancing infrastructure, such as national highways, and encouraging industrial activity in under-represented areas. With its fresh insights into the dynamics of industrial loan distribution and how it is influenced by economic and geographical factors, this research is a great resource for financial planners and policymakers.

Keywords: *Industrial Loans, RBI, Financial Trends, Economic Development.*
JEL Classification: *M48, E58, G24*

INTRODUCTION

India's industrial environment is changing rapidly due to shifts in market dynamics, regulatory changes, and technology improvements. The flow of industrial loans, which provide the financial lifeblood for companies looking to grow, develop, and prosper in a cutthroat market, is a critical driver of this transformation. It has become essential to investigate the patterns in the flow of industrial loans in India in order to gauge the country's economic progress and pinpoint the variables affecting funding decisions. The present research explores the complex world of industrial loans within the framework of the Indian financial system, acknowledging its crucial significance in the country's economic dynamics by using a variety of statistical approaches to conduct a thorough analysis to offer profound insights into the movement of industrial loans among India's various regions, for helping the Policymakers, financial institutions, and stakeholders to understand the complex patterns and effects that shape industrial loans as the Indian economy experiences significant transformation.

CONCEPTUAL FRAMEWORK AND BACKGROUND OF THE STUDY

1. Disparity in Development in India: Past Evidence

The existence of regional disparities in socio-economic development is pervasive and can be observed in both developed and developing nations worldwide, including India (Banerjee, &

***Samadrita Ghosh,** Research Scholar, Department of Commerce, Vidyasagar University, **Email:** samadritaghosh002@gmail.com*
***Dr. Abhijit Sinha,** Professor, Department of Commerce, Vidyasagar University, **Email:** abhijitsinha_091279@rediffmail.com*

Chattopadhyay, 2020). India has experienced considerable regional disparities in development, mostly attributable to differences in urbanization levels, infrastructural development, and human capital development. Although the nation has seen enormous economic expansion in recent years, new growth theories do not necessarily suggest that this has resulted in catching-up repercussions in relatively impoverished places (Wu, 2008). Mehta and Shah (2003) provide evidence of the gravity of the issue of regional disparities and the necessity of addressing them. According to these authors' research on chronic poverty in different Indian states, there have been several occasions where wealthier states have managed to maintain their relative affluence while decreasing poverty, whereas less fortunate states have not improved their poverty situation. The eastern and central regions of India are trailing behind in terms of overall development, whereas the southern states lead in several indices, followed by the north-western states. Except for the more developed and well-ranked districts of Sikkim and Tripura, the northeastern region of India is still mostly isolated (Nandy, 2019). Several parameters contribute to the development disparity in India, one of which is the banking industry. Research has examined the differences in regional financial development in India and discovered that leading high-income and developed regions had considerably more developed banking systems than lagging ones (Arora & Anand, 2021).

2. Contribution of Industry towards Development: From Literature

Depending on the industry and the country at large, industry can provide significant as well as limited contribution to development. For instance, the GDP growth of the Visegrad Four nations—the Czech Republic, Poland, Hungary, and Slovakia—is significantly boosted by the automobile sector (Török, 2022). Sustainable innovation in the textile and apparel business may deliver economic, social, and environmental benefits (Ikram, 2022). In South Asian nations, the tourism sector is a major driver of GDP growth and economic development (Manzoor et al., 2019). Thus, it is evidenced that industry plays a complicated and diverse role in development, requiring careful consideration of a number of variables including sustainability, innovation, education, and labor mobility.

The development of the Indian economy has been greatly aided by the industrial sector. A key driver in the nation's economic growth is the tourism industry, which is the world's largest service industry. Tourism accounts for 8% of worldwide exports, growing at an annual pace of 5% over the last 20 years. It also contributes to over 30% of international services trade, 10.7% of the world workforce, and over 12% of the global GDP (Maradi & Dasar, 2013). An important component of India's rich cultural legacy is the handicraft industry. It the part of the labor-intensive, disorganized, and unorganized cottage industry. Despite its advantages, the sector in the nation has several challenges, including low levels of education and literacy, a shortage of current, technology skills, and a lack of sufficient funding (Jadhav, 2014).

3. Role of Banking in Development

A nation's economic development is greatly facilitated by banking, which promotes stable economic conditions, supports business organizations, and allows for financial inclusion. Banking's role in promoting economic growth is significant in several ways. Financial stability is one important aspect. A healthy banking system is essential to the smooth operation of many different economic sectors, providing stability and supporting individuals, companies, and investors (Korneev et al., 2023). Additionally, banks, particularly those in the public sector, are essential for mobilizing resources from rural regions and providing financial services to remote places, both of which support general economic growth (Singh, 2016). By providing banking services to rural communities, encouraging a saver's mindset, and easing loan availability, the banking industry also plays a critical role in advancing financial inclusion. In addition, financial institutions encourage small

enterprises by offering guidance to the impoverished, making loans easier to obtain and so stimulating enterprise and economic growth (Purbey, 2020). Furthermore, the banking industry actively promotes infrastructure development by providing funding for initiatives that benefit the nation's economy (Akuien, 2023). Ultimately, banks play a crucial role in preserving macroeconomic stability by controlling a range of risks, such as financing, liquidity, market, and operational hazards, all of which have an impact on the overall health of the economy as a whole.

4. How Industrial Loans Affect Industry Development? From Literature

A wide range of loans, including personal, housing, automobile, education, and most significantly, industrial loans, are provided to individuals and enterprises in the Indian banking sector (Harichandana, & Baba, 2020). The industrial sector is an essential component of India's dynamic economic development, catalyzing innovation, growth, and the creation of employment. Considering their critical significance in propelling the expansion of the industrial sector, industrial loans represent a critical function in the Indian economic landscape. These loans have a major positive impact on development generally, employment, and innovation. Financial institutions can optimize lending procedures, industrial enterprises may strategically plan for development using information into industrial loan patterns, and policymakers can design successful economic plans. Basically, developing a robust and prosperous Indian economy requires a thorough grasp of industrial loans (Chugan & Singh, 2013).

A myriad of elements closely influence the dynamics of industrial loans in India. One of the key determinants is Loan Portfolio Management, where a bank's ability to manage its loan portfolio skillfully may significantly impact how industrial loans develop. Monetary policy measures of the Reserve Bank of India, which include interest rate adjustments, requirements for reserves, as well as open market operations, are important elements that affect credit availability and cost, and as a result, they have an impact on the movement of industrial loans. Changes in tax rates are important because they have an immediate impact on the cost of borrowing for industrial companies, which in turn affects the demand for loans for these companies to operate (Paul, 2023). The attributes of the lender, such as size, reputation, and lending practices, also have a significant impact on how the industrial loan market is structured (Nandini & Shubha, 2021). Economic fundamentals add to the complex web of elements influencing industrial loans. These include currency rates, industrial production, stock market performance, and more (Liang, 2013). The demand elements, which include things like interest rates, the index of industrial production, and average salaries, also influence how industrial loans are extended overall in India (Glushchenko, & Shportyuk, 2021). Governments, financial institutions, and industrial enterprises must acknowledge the interaction of these elements since such information provides a sophisticated understanding that is critical for effectively navigating this always-changing financial landscape.

5. The Intricate Patterns of Industrial Loans in India

In India, public sector banks' loans and advances have been crucial in the growth of the business community, particularly those in the industrial sector (Rajamohan, & Durairaj, 2015). According to Herasymenko (2022), several factors, including globalization's effects, financial leverage, and macroeconomic stability, can have an impact on the developments in industrial loans. Industrial loans are important for the growth of industrial businesses as well as the economy as a whole. They are often applied to credit analysis, project selection, and monitoring and have shown to be an effective instrument for the growth of the industrial sector, especially in the years after a war or a crisis. Pogodina et al. (2020) explained that the

management of industrial enterprises is impacted by variables including financial dependency, asset returns, and lending costs in an unpredictable economy. Additionally, the development of the agro-industry and the management of both its social and environmental effects through loans from global finance corporations show how industrial loans are linked to environmental responsibility and across-the-globe trends (Claudia & Oriana, 2008). Furthermore, the study by Salikhova, and Krekhivsky, (2018) mentioned that a new method including government assistance and partial interest compensation for loans for industrial innovative projects has been proposed in response to the inefficiencies of the present system of government support for innovation in industries. The Industrial loan patterns are also significantly influenced by interest rate changes on current loans and the effects of central banks' operational choices on the economy and industrial loans (Sandeep, & D, 2022). These patterns show how intricate relationships exist between industrial loans, innovation, economic stability, and international economic pressures.

6. RESEARCH GAP AND FORMULATION OF HYPOTHESIS

The extant literature provides valuable perspectives on several aspects of industrial loans, including government support for innovative industrial projects, lending for agriculture, and other associated issues. However, there is a noticeable deficiency in the lack of a concentrated investigation of the particular patterns that define industrial loans. As a result, it becomes necessary to have accurate and current information on the patterns of industrial loans along with identification of the key factors that determine the flow of industrial loans. Therefore, the following statement of the hypothesis stipulates:

H_{01}: The growth trend is not significantly changing.

H_{02}: There is no significant disparity in the loan industrial disbursement across regions.

H_{03}: There is no structural break after the new government in the center.

H_{04}: There is no significant impact of state-level factors on the flow of industrial loans in different states.

RESEARCH DESIGN

It is well known that designing for a research is the most vital element in the research process as it decides the success of the study being made. The present study is made on secondary data collected from the website of the Reserve Bank of India. The investigation uses data for thirteen years from 2010 to 2023. However, for the panel regression analysis, the data is for the period from 2010 to 2019 because of non-availability of data 2020 onwards. For understanding the pattern of flow of loans, the researchers consider six regions as demarcated by the RBI in its reports which include Northern Region (NR), North-Eastern Region (NER), Eastern Region (ER), Central Region (CR), Western Region (WR) and Southern Region (SR).

The present study is segregated into two parts, where the first part employs an extensive approach to examine the trend in movement of industrial loans in India. It is accomplished by using growth rate measurements, descriptive statistics, Gini coefficients, and the Chow Test. The growth rate is calculated using the semi-log equation which is given by: $\ln(Y) = \alpha + \beta(t)$,

where the dependent variable Y is the loan amount, t is time, and β is the coefficient which represents the growth rate. The in-depth summaries of important features are offered by descriptive statistics which place special emphasis on tracking growth rates over time to recognize changing trends in industrial loans. Regional differences in scores over time are evaluated using the Gini coefficient that helps to identify the inter-regional disparity. Likewise, the application of Chow Test enriches the study by highlighting notable structural breaks in lending patterns in different regions. In the second part, the state-level data is considered for the application of panel regression. The different variables involved are described in Table 1 illustrated below.

Table 1: Variable Description

Type of Variable	Variable Name	Variable Abbreviation	Support
Independent	State-Wise Per Capita Availability of Power	power_capita	https://www.rbi.org.in/
	Net State Value Added by Economic Activity – Industry	nsva_ind	
	State-Wise Number of Factories	fact_number	
	State-Wise Length of National Highways	nh	
	State-Wise Length of State Highways	sh	
Dependent	State-wise Industrial Loan Amount	ind_loan	

Source: Authors' Compilation

ANALYSIS AND FINDINGS: PART 1

1. Region-wise analysis of flow of industrial loans

The percentage of industrial loans that are given out by commercial banks in different regions is covered in Table 2

Table 2: Percentage Share of Different Regions in Industrial Credit

Year	Region					
	Western	Northern	Southern	Central	Eastern	North-Eastern
2010	37.39%	24.18%	24.10%	5.83%	8.09%	0.41%
2011	35.73%	25.06%	25.10%	6.04%	7.70%	0.38%
2012	34.84%	26.69%	24.21%	5.94%	7.93%	0.38%
2013	34.96%	27.11%	23.23%	6.29%	8.00%	0.41%
2014	35.52%	27.86%	22.70%	5.82%	7.77%	0.34%
2015	35.37%	27.55%	22.75%	6.08%	7.91%	0.33%
2016	39.94%	28.23%	17.26%	6.06%	8.18%	0.33%
2017	37.57%	26.23%	22.82%	5.30%	7.69%	0.39%
2018	36.04%	27.27%	23.38%	5.44%	7.47%	0.40%
2019	35.59%	28.65%	23.03%	5.44%	6.90%	0.39%
2020	35.42%	28.59%	22.93%	5.66%	7.00%	0.40%
2021	34.40%	28.17%	23.76%	6.51%	6.68%	0.48%
2022	33.71%	28.29%	23.08%	7.38%	7.05%	0.49%
2023	34.83%	27.59%	22.57%	7.47%	6.99%	0.56%

(Source: Computed by researchers)

From the above table, it is evidenced that the Western region has a consistency in maintaining high percentage of industrial loan disbursement throughout the time span. Although the North-Eastern region's share is small, it has steadily increased, rising from 0.41% in 2010 to 0.56% in 2023.

2. Descriptive Analysis of Industrial Credit Flow

Comprehending the characteristics of data is an essential prerequisite for conducting any kind of research. Table 3 offers a thorough analysis of regional data by showcasing important information including the values of mean, standard deviation, minimum and maximum.

Table 3: Industrial Credit Flow to Regions: Descriptive Statistics

Particulars	Region (₹ Crore)					
	Western	**Northern**	**Southern**	**Central**	**Eastern**	**North-Eastern**
Max	1236071	979096	801095	265050	248130	3549193
Min	506800	327700	326600	79000	109600	5600
Mean	963427.714	741498.214	614498.6	165343.9	200805.1	11144.214
S.D.	230796.538	201563.33	148221.9	49973.86	42373.59	3950.320

(Source: Computed by researchers)

Table 3 illustrates the significant regional variations in average disbursement, with the northeastern area seeing the lowest mean flow and the western region experiencing the highest. The data indicates that the western region has the most variation, amounting to Rs. 230797 crores approx., with the least variation in the case of the northeastern amounting to Rs. 3950 crores approximately in terms of deviation around the mean.

Table 4: Distribution of Industrial Credit by Region

Particulars	Region					
	Western	**Northern**	**Southern**	**Central**	**Eastern**	**North-Eastern**
Mean	35.81%	27.25%	22.92%	6.09%	7.53%	0.41%
S.D.	1.58%	1.33%	1.78%	0.66%	0.50%	0.06%
Coefficient of variation	0.04	0.05	0.08	0.11	0.07	0.16

(Source: Computed by researchers)

Based on the above table, Western region receives majority share, averaging around 36%, followed by the Northern, Southern, Eastern, Central, and North-eastern regions in a distant order, with a low degree of variability across the regions where the Northern-eastern and Southern areas have the lowest and largest standard deviations, respectively. The coefficient of variation is calculated to quantify the dispersion between areas. It reveals that it falls in the small range between 0.04 and 0.16. The Eastern region has the minimum, while the Western region has the highest. Therefore, the findings indicate that the percentage of loan flow in different regions has stayed the same mostly.

3. Disparities in the industrial credit flow across regions

The degree of disparity throughout the study period is ascertained by the researchers by computing the Gini Coefficient as shown in table 5.

Table 5: Regional Disparity of Industrial Credit

Year	Gini Coefficient (G)	Year	Gini Coefficient (G)
2010	0.427	2017	0.440
2011	0.419	2018	0.433
2012	0.418	2019	0.436
2013	0.417	2020	0.433
2014	0.428	2021	0.419
2015	0.424	2022	0.409
2016	0.456	2023	0.414

(Source: Computed by researchers)

Table 5 demonstrates a consistent trend showing inequality in flow of industrial loans from 2010 to 2023 which is shown by the Gini coefficient

values. The distribution is comparatively in the same line, with a progressive drop beginning in 2010 at 0.427 and ending at 0.417 in 2013. However, there is a noticeable increase from 2014 to 2016, with a high of 0.456 in 2016, indicating increased inequality. The trend then levels off and exhibits a minor decline, with value of 0.419 (2021) and 0.414 (2023) towards the end of the study period. Throughout the given period, the pattern emphasizes how the dynamics of economic disparity in the industrial lending sector are evolving

4. Growth rate of Industrial Credit

The variable under consideration in this section of the analysis is the quantum of flow of industrial loans. The original variable's natural logarithm transformation serves as the representation for the dependent variable. The growth rates for the different regions are presented in Table 6.

Table 6: Region-wise Growth Rate of Industrial Credit

Region	Growth Rate (%)	t value	Adj. R^2
Western Region	5.80***	6.058	73.30%
Northern Region	7.00***	6.703	77.20%
Southern Region	5.80***	6.997	78.70%
Central Region	7.20***	8.751	85.30%
Eastern Region	4.80***	4.741	62.30%
North-Eastern Region	8.40***	14.517	94.20%
All India	6.20***	7.111	79.20%

(Source: Computed by researchers)
Note: *** Significant at 1% level

Table 6 presents important insights into the growth rates of industrial credit in different regions. Notably, the statistical analysis exhibits that all regions demonstrate a substantial positive growth rate, as shown by the corresponding p-values, which are all equal to zero. Growth rates are 5.80%, 7%, 5.80%, 7.20%, 4.80%, 8.40% and 6.20% in the Western, Northern, Southern, Central, Eastern, North-Eastern regions, and All India Aggregate respectively. These results indicate that the expansion of industrial loans is following a slow and upward trend in each of these locations in the country. These growth rates are statistically significant due to the exceptionally high t values, which range from 4.741 to 14.517. The North-Eastern region's remarkably high t values reveal a robust growth rate. Moreover, the modified R-squared values, which range from 62.30% to 94.20%, show that the regional factor accounts for a sizable percentage of the industrial loan growth. All the findings collectively offer a thorough comprehension of the notable and statistically significant rise in industrial loans in different areas, which adds to a more complex picture of regional economic dynamics.

5. Assessment of Structural Break Using Chow Test

To determine if structural breaks exist in the loan data for India as a whole and for different regions between 2010 and 2023, the research paper uses the Chow Test (Chow, 1960) which is used to ascertain if coefficients computed in two different regression models differ significantly from one another. The Chow Test's null hypothesis asserts that there is no structural break, meaning that the coefficients are constant for both groups and time periods. On the other hand, the alternate hypothesis suggests that there is a structural break and that there is a difference in the coefficients between the two groups or time periods. The computed F values of the Chow Test are presented in Table 7 of this research along with relevant variable values.

Table 7: Results of the Chow Test

Region / Country	Residual sum of Square (RSS)		Restricted RSS	Unrestricted RSS	k	n1	n2	n1+n2-2k	
	RSS1 (2010-2015)	RSS2 (2017-2023)	RSS1 + RSS2	RSS pooled				Calculated F	F(2,9)
Western	0.005	0.012	0.016	0.252	2	6	7	65.751	4.26
Northern	0.018	0.009	0.027	0.301				45.582	
Southern	0.010	0.002	0.012	0.189				66.243	
Central	0.015	0.014	0.029	0.185				24.046	
Eastern	0.009	0.016	0.025	0.186				28.345	
North-Eastern	0.040	0.023	0.064	0.091				1.935	
All India	0.008	0.006	0.014	0.205				63.305	

α = 0.05

(Source: Computed by researchers)

$$\textit{Chow Test (F)} = [RSSpooled - (RSS_1+RSS_2))/k]/ [(RSS_1+RSS_2)/ (N_1+N_2-2k)] \sim F_{(k, n1+n2-2k)}$$

Table 7 illustrates several significant parameters, including the number of observations (n1 and n2), the computed F statistic, and the residual sum of squares (RSS) for each of the time periods. The purpose of the Chow Test is to determine if the coefficients between the years 2010–2015 (RSS_1) and 2017–2023 (RSS_2) exhibit a major structural break. With the exception of the North East Region, the computed F value for every region, including India, is significant at α = 0.01 and indicates a structural split between the two time periods (2010–2015 and 2017–2023). The null hypothesis is rejected for the Western, Eastern, Southern, Central, and Eastern regions as well as for India based on the indication that there is a significant difference in the coefficients. However, the computed F statistic for the Northeast region is 1.935, which is less than the table value even at the 5% level, indicating that the region in question does not have a structural break.

ANALYSIS AND FINDINGS: PART 2

Panel regression results: Determining key factors affecting flow of industrial loans

1. Descriptive Analysis of Variables

The outcome of descriptive statistics explain the features of the independent and dependent variables. To thoroughly understand the data characteristics, the values of mean, standard deviation, maximum, and minimum values are computed. Table 8 summarizes the descriptive statistics.

Table 8: Descriptive Statistics of the Variables

Variables	Mean	Std. Dev.	Max	Min
power_ capita	885.1916	602.3633566	3511.6	108.5
nsva_ind	10491487	11463791.94	56919331	135479
fact_number	8089.228	9362.538921	38131	46
Nh	3537.66	2762.985802	17757	62
Sh	6580.608	8200.422562	40144	179
ind_loan	75764.524	147837.3533	894000	100

Source: Researchers' computation

2. Regression Results

The intensity and direction of each variable are examined using multiple regression analysis on panel data. The impact of various factors on the flow of industrial credit in various Indian states is evaluated using the following model in a linear setting as represented below:

$$ind\_loan_{it} = \alpha + \beta_1.(power\_capita)it + \beta_2.(nsva\_ind)_{it} + \beta_3.(fact\_number)it + \beta_4.(nh)it + \beta_5.(sh)it + \varepsilon_{it}$$

Before looking at the regression results, the diagnostic results are tested by determining the

issues of multicollinearity and heteroscedasticity. From the outcomes of VIF values, it is found that the maximum value does not exceed 10 and hence there the independent variables are independent. The Breusch-Pagan / Cook-Weisberg test is used to test for heteroscedasticity. The test results indicate that the p-value is less than 1%, thereby indicating that the data suffers from heteroscedasticity, which therefore is taken care of by incorporating robust standard error estimates.

Analysis based on Ordinary Least Square (OLS) model, Fixed Effect (FE) model and Random Effect (RE) model

The OLS model is a common linear regression approach that works especially well for modeling continuous variables. It determines the relationship between response variable, "ind_loan", and the five predictor variables denoted by "power_capita", "nsva_ind", "fact_number", "nh", and "sh" by reducing the sum of squared errors. The Fixed Effects (FE) model is used to analyze the influence of group-specific factors on "ind_loan" while delving into how diverse they are. The Random Effects (RE) model assumes no correlation between any of the independent variables and that each effect is distributed randomly. Table 9 illustrates the outcomes of the OLS, FE, and RE models.

Table 9: Analyzing the Regression Results

Ordinary Least Square (OLS) Model			Fixed Effect (FE) Model			Random Effect (RE) Model		
Variable	**Coefficient**	**t-stat**	**Variable**	**Coefficient**	**t-stat**	**Variable**	**Coefficient**	**z-stat**
power_capita	-4.041	-0.53	power_capita	-53.975***	-3.80	power_capita	-33.739	-1.24
nsva_ind	0.007	7.62	nsva_ind	0.003***	4.55	nsva_ind	0.003**	2.39
fact_number	-0.078	-0.10	fact_number	5.477***	3.93	fact number	3.851**	2.02
Nh	-10.366***	-4.21	Nh	14.476***	7.61	nh	12.002***	3.77
Sh	10.351***	11.79	Sh	6.504***	3.91	sh	6.682	1.31
F-stat (5,244)	202.50		F-stat (5,220)	70.83		Wald Chi^2 (5)	79.19	

Note: *** Significant at 1% level, ** Significant at 5% level

Source: Authors' computation

With a p-value of less than 1% and F-statistic of 53.90, the null hypothesis is rejected, indicating that the FE model is better than OLS. The computed χ^2 (5) value is 411.39 with a p-value of less than 1%, thereby rejecting the null hypothesis and hence the RE model gets preference over the OLS model. The Hausman test is then applied to draw the final choice between FE model and RE model. It is observed that the computed $\chi^2(4)$ value is 3.42 with a p-value of 0.495, thereby failing to reject the null hypothesis. Thus, the random effect model is found to be the best option. However, in order to address the heteroscedasticity issue, the robust standard error method is applied. Interesting results are obtained from the panel regression. The variable "nsva_ind" has positive coefficient of 0.003 and is statistically significant at the 5% level with the z-statistic value to be 2.39, thereby pointing that increase in Net State Value Added by Industrial Activity promotes industrial loan flow for further development of industries in the state. The "fact_number" variable which is representative of the number of factories at the state level also shows a positive and significant effect, with the coefficient being 3.851 (z-stat being 2.02), indicating that as the number of factories increase in the state, there is a positive impact on flow of industrial loans. The variable "nh", depicting

the strength of road infrastructure in the states, as it measures the length of National Highways in the states, has maximum positive impact, with a coefficient of 12.002 and is highly significant at 1% level (z-stat = 3.77), thereby showing a strong positive effect on the dependent variable. The variable "sh" (State-Wise Length of State Highways), though has positive coefficient of 6.682, is not statistically significant (z-stat = 1.31), suggesting that its effect on the dependent variable is not evident. Lastly, "power_capita" (State-Wise Per Capita Availability of Power) has a negative coefficient of -33.739, but it is not statistically significant (z-stat = -1.24), implying that its effect on the dependent variable is also not conclusive. So, it can be concluded that, the extent of industry share in the development of the state, the investment climate depicted by the number of factories and the road infrastructure in the states play a key role in determining the flow of industrial loans. Hence, the findings can offer cues to the policymakers and government decision-makers regarding how to attract credit towards industries which will thereby induce the tendency to focus on areas of key importance for attracting industrial credit.

CONCLUSIONS

Financial stability, assistance for people and businesses, financial inclusion, and macroeconomic stability are all reasons why banking is critical to economic growth. The banking industry plays a wide range of roles in economic development, each of which adds to the expansion and stability of the economy as a whole. This research paper addresses the critical role that banking plays in promoting economic growth and highlights the impact that industrial loans have had in reshaping India's economy. The results provide insight into the complex dynamics of industrial loans by highlighting geographical differences, patterns of economic inequality, and growth rates in various areas. Regional trends in industrial loan disbursement study suggest that the North-Eastern area is steadily increasing its share, while the Western region consistently obtains the largest share. The analysis shows that, despite geographical variations, the percentage of loan flow in various areas has remained mostly constant throughout time. The analysis of economic inequality using Gini Coefficient values reveals variations, with a recent trend towards a more fair distribution. A statistically significant upward trend can be seen in the growth rates of industrial credit across distinct regions, indicating the beneficial effects of industrial loans on economic expansion. Furthermore, the results of the Chow Test indicate structural breaks in the coefficients between the years 2010–2015 and 2017–2023 which indicates that the change in the power of the Central government has resulted in a notable increase in the rate at which industrial loans are disbursed, which is likely to bolster the country's overall economic growth. Nevertheless, the North-East region's exclusion from this structural break highlights the distinct economic dynamics in that particular area. From the regression analysis of the study, the Random Effects model is found to be best fit one for identifying the key factors that influence industrial loan disbursement among Indian states. The key findings point to the fact that infrastructural development in the states in terms of road length and the presence of industry in the states boosts flow in industrial loans. More importantly, it is striking to note that the presence of national highway in terms of length has the largest influence. On the other hand, the researchers fail to identify any statistically significant impact of state highway length and the power distribution represented by per capita power.

POLICY IMPLICATIONS

The study's policy implications highlight the need for tailored approaches to promote growth in areas with higher variability and lower average distribution. Encouraging a fair allocation of industrial loans is essential to reducing economic inequality and guaranteeing broader advantages. In order to effectively promote industrial growth, policymakers are required to regularly evaluate structural changes in factors impacting industrial loans and to modify plans depending on changing economic conditions. It is recommended to implement

targeted efforts for the Northeast to take advantage of its distinct economic dynamics. Furthermore, initiatives should be taken to empower business entities, advance economic growth, and spur innovation across different regions that includes collaboration with financial institutions and raising financial literacy, particularly in areas with lower industrial loan disbursement. To increase the distribution of industrial loans, governments have to foster the improvement of road infrastructure and industrial capacity of the states. More funding for national highways may significantly influence the promotion of industrial growth by enhancing connectivity and lowering transportation expenses. Policies like encouraging industrialization and growing the number of factories that seek to support industrial activities should also be given priority, as success seems to bring in success. Although state highways and electricity availability did not significantly affect the research, efforts to enhance these areas should still be made for the sake of overall economic growth even though they might not have as much of an impact on industrial loans.

LIMITATIONS OF THE STUDY

The present study did not look at the intra-regional variation which could have given an idea about how industrial loans flow varied within regions among the different states. The study uses secondary data that is only available from the Reserve Bank of India, which was unable to incorporate all pertinent factors affecting the lending trends for industrial loans. The dataset is restricted to the years 2010 to 2023 for understanding the trend in industrial loans, but gets limited to 2019 because of non-availability of data for the states after that year.

SCOPE OF FUTURE RESEARCH

This study might be strengthened by future research by resolving its shortcomings and examining new aspects of industrial lending trends. Deeper insights may be obtained using a more extensive dataset that contains characteristics not included in this analysis, such as industry-specific variables and regional economic policies. A more up-to-date view of industrial loan patterns may be provided by extending the period to incorporate more recent data and adding data from sources. Further research attempts may explore more detailed regional divisions within the six broad areas to capture more granular economic patterns. It would also be beneficial to investigate how political situations in the states and government priorities drive industrial loans.

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RESEARCH

SUSTAINABLE DEVELOPMENT: STRATEGIES AND IMPACT ON GLOBAL SUSTAINABILITY

Aarushi Roy*

Abstract

This study explores the impact of various sustainable development strategies on global sustainability, focusing on how different approaches contribute to environmental, economic, and social outcomes. The primary research question addressed is: How do different strategies of sustainable development impact global sustainability? The study employs a comprehensive approach that integrates theoretical frameworks, particularly the Triple Bottom Line (TBL), with empirical data and case studies to tackle this question. The research objectives include evaluating the effectiveness of government policies, corporate social responsibility (CSR) initiatives, and technological advancements in fostering sustainable practices.

The methodology encompasses a detailed review of relevant literature, quantitative analysis of sustainability indicators, and in-depth case studies from diverse energy, waste management, and agriculture sectors. The findings reveal that stringent government policies and technological innovations, such as advancements in renewable energy and waste management, play a critical role in enhancing sustainability. However, the economic impacts of comprehensive sustainability strategies can vary, and CSR initiatives often encounter issues such as greenwashing and uneven social impacts.

This study underscores the importance of balancing the environmental, economic, and social dimensions of sustainability and emphasizes the need for genuine corporate commitment and continuous technological innovation. The implications highlight the necessity for coordinated efforts among governments, businesses, and stakeholders to develop and implement effective and holistic sustainability strategies. Future research should address current limitations and explore new dimensions of sustainable development to further enhance our understanding and application of these strategies.

Keywords: *Sustainable development, Triple Bottom Line, corporate social responsibility, technological innovation, greenwashing.*

INTRODUCTION

Sustainable development remains a critical global challenge, as it necessitates the balance between economic growth, environmental stewardship, and social equity. The concept of sustainable development gained widespread recognition with the publication of the 1987 Brundtland Report, which defined it as the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs (World Commission on Environment and Development, 1987). This definition underscores the integrated nature of sustainable development, which must consider economic, environmental, and social dimensions in tandem. The urgency for effective sustainable development strategies has heightened due to escalating global issues such as climate change, resource depletion, and social inequality (Sachs, 2015).

The importance of addressing sustainable development is underscored by the severe impacts of climate change, driven by industrial activities that increase greenhouse gas emissions and disrupt ecosystems and human

***Aarushi Roy,** Student, Birla Institute of Technology and Science (BITS) Pilani, Pilani Campus, Rajasthan*
***Email:** royaarushi09@gmail.com*

health (IPCC, 2014). Additionally, resource depletion, which includes the over-extraction of fossil fuels, deforestation, and water scarcity, threatens the availability of essential resources for future generations (Meadows et al., 2004). Social inequality, characterized by disparities in wealth, education, and access to basic services, undermines social cohesion and economic stability (Piketty, 2014). Sustainable development aims to mitigate these challenges by promoting practices that are economically viable, environmentally sound, and socially equitable.

This paper investigates the question: How do different strategies of sustainable development impact global sustainability? The study explores various strategies implemented worldwide to understand their effectiveness in promoting sustainability. The research focuses on three main strategies: policy frameworks, corporate social responsibility (CSR), and technological innovations.

The approach of this paper involves a mixed-methods methodology, combining qualitative and quantitative analyses to assess the impact of sustainable development strategies on environmental, economic, and social dimensions. Qualitative data will be collected from policy documents, corporate sustainability reports, and case studies to provide insights into the implementation and outcomes of various strategies (Yin, 2018). Quantitative data will be obtained through surveys and statistical analyses of sustainability indicators, such as carbon emissions, resource consumption, and social equity metrics (Field, 2013). By integrating these data sources, the paper aims to offer a holistic view of sustainable development practices and their effectiveness.

Expected contributions of this study include identifying key drivers of sustainable development, highlighting successful strategies, and providing actionable recommendations for policymakers, businesses, and society. The findings aim to advance the understanding of the complex interplay between economic growth, environmental preservation, and social equity, and promote the adoption of practices that ensure a prosperous, equitable, and environmentally sustainable future for all.

LITERATURE REVIEW

The literature on sustainable development is extensive and spans a range of topics, including environmental policies, corporate social responsibility (CSR), technological innovations, and socio-economic impacts. This section synthesizes key findings, integrating empirical evidence and theoretical frameworks to offer a comprehensive understanding of sustainable development practices and their outcomes.

1. Environmental Policies

Environmental policies are crucial for advancing sustainable development. Government regulations and international agreements set standards and enforce practices that safeguard the environment. For example, the European Union's Green Deal aims to achieve climate neutrality by 2050 through measures such as reducing greenhouse gas emissions, promoting clean energy, and supporting sustainable industries (European Commission, 2019). Empirical studies indicate that comprehensive policies like these can significantly reduce carbon footprints and stimulate the adoption of green technologies (Rogelj et al., 2016). Similarly, the U.S. Clean Air Act has led to substantial reductions in air pollutants, demonstrating the effectiveness of stringent regulations in improving air quality and public health (U.S. EPA, 2020). Research by Porter and van der Linde (1995) further supports that stringent environmental regulations can drive innovation, as firms invest in cleaner technologies to comply with these standards.

2. Corporate Social Responsibility (CSR)

CSR represents a pivotal aspect of sustainable development, where businesses voluntarily integrate social and environmental concerns into their

operations (Carroll, 1999). Companies engage in CSR to enhance reputations, meet consumer demands for sustainable products, and minimize environmental impacts (Porter & Kramer, 2011). Effective CSR initiatives can yield significant environmental and social benefits. For instance, companies investing in energy-efficient technologies and waste reduction strategies not only cut operational costs but also contribute to environmental sustainability (Hart & Milstein, 2003). CSR efforts focusing on fair labor practices and community development can foster social equity and improve relationships with local communities (Aguinis & Glavas, 2012). However, the effectiveness of CSR varies, with some companies engaging in "greenwashing," where they present an environmentally responsible image without substantive sustainability practices (Delmas & Burbano, 2011). Transparent reporting and accountability mechanisms are crucial to ensure that CSR initiatives genuinely contribute to sustainable development (Clarkson et al., 2008).

3. Technological Innovations

Technological innovations play a vital role in sustainable development. Advances in technology have the potential to transform industries, reduce environmental impacts, and enhance quality of life (Schot & Steinmueller, 2018). Renewable energy technologies, such as solar and wind power, offer sustainable alternatives to fossil fuels and have become increasingly cost-competitive (IRENA, 2019; REN21, 2020). Innovations in agriculture, like precision farming, optimize crop yields and resource use while minimizing environmental degradation (Godfray et al., 2010). Genetically modified crops designed to withstand pests and extreme weather conditions further contribute to sustainability by reducing pesticide use and enhancing climate resilience (Qaim, 2020). Emerging technologies such as blockchain and artificial intelligence (AI) also hold promise for sustainability. Blockchain enhances transparency and traceability in supply chains, ensuring sustainable product sourcing (Cao et al., 2019). AI optimizes energy use in buildings and transportation, reduces waste through predictive analytics, and improves environmental monitoring (Jiang et al., 2020).

4. Socio-Economic Impacts

Sustainable development also encompasses socio-economic dimensions, aiming for economic growth alongside social equity and environmental protection. Research highlights how sustainable practices can create economic opportunities and improve social outcomes. For example, investments in green technologies can generate employment and stimulate economic growth, particularly in sectors like renewable energy and sustainable agriculture (IRENA, 2019). Additionally, sustainable development efforts addressing social equity can mitigate disparities in access to resources, education, and healthcare (Piketty, 2014). Inclusive policies that promote equal opportunities and reduce social inequalities are vital for achieving sustainable development goals (UNDP, 2016).

5. Comprehensive Understanding

Synthesizing findings from various sources provides a holistic view of sustainable development practices and their outcomes. Environmental policies, CSR, and technological innovations are interconnected and mutually reinforcing. Effective regulations can drive corporate sustainability efforts, while technological advancements enable both public and private sectors to meet sustainability goals (Elkington, 1998). The literature underscores the importance of a multi-stakeholder approach, involving governments, businesses, and civil society in sustainable development (United Nations, 2015). Collaborative initiatives leveraging the strengths of diverse stakeholders can create synergies and accelerate progress toward sustainability.

METHODOLOGY

This study employs a mixed-methods approach, integrating both qualitative and quantitative data to provide a comprehensive analysis

of sustainable development strategies. This approach allows for a nuanced understanding of the complex interplay between environmental, economic, and social dimensions of sustainability. The methodology is designed to ensure robustness in addressing the research question: How do different strategies of sustainable development impact global sustainability?

Qualitative Methods

The qualitative aspect involves content analysis of policy documents, corporate sustainability reports, and case studies. This approach provides in-depth insights into the implementation and effectiveness of various sustainable development strategies.

1. Policy Documents: The study analyzes policy documents from various countries and international organizations to understand the regulatory frameworks promoting sustainable development. This includes examining the European Union's Green Deal, the United States' Clean Air Act, and other relevant policies (European Commission, 2019; U.S. Environmental Protection Agency, 2021).

2. Corporate Sustainability Reports: Reports from leading corporations across different sectors are analyzed to assess their sustainability initiatives. This involves evaluating the goals, actions, and outcomes reported by these companies (Global Reporting Initiative, 2020).

3. Case Studies: Selected case studies of successful and unsuccessful sustainability initiatives provide detailed examples of best practices and challenges faced in implementing sustainable development strategies (Yin, 2018). Case studies are chosen based on criteria such as diversity of strategies and outcomes.

Quantitative Methods

Quantitative data is obtained through surveys and statistical analysis of sustainability indicators. This approach allows for the measurement and analysis of key variables related to sustainable development.

1. Surveys:

Design and Distribution: The survey was designed to gather data from stakeholders involved in sustainability initiatives, including government agencies, corporations, and non-governmental organizations (NGOs). The survey included questions on environmental impact, economic performance, and social equity.

Sampling: A stratified sampling method is used to ensure representation from different sectors and regions. This includes a mix of developed and developing countries to capture a broad range of sustainability practices and outcomes (Fowler, 2014). The sample size is determined based on population characteristics and desired confidence levels.

2. Statistical Analysis:

Sustainability Indicators: Key indicators such as carbon emissions, resource consumption, and social well-being metrics are analyzed. These indicators provide quantifiable measures of environmental, economic, and social impacts (World Bank, 2021; United Nations, 2020).

Data Sources: Data is sourced from the survey as well as reputable databases such as the World Bank, United Nations, (World Bank, 2021; United Nations, 2020) and corporate sustainability reports. The reliability and validity of the data were checked and fell within the acceptable range.

Analytical Techniques: Statistical techniques such as regression analysis, correlation analysis, and factor analysis have been employed to identify patterns and relationships between different sustainability strategies and their outcomes. This is in accordance with the study of Hair et al., 2019.

Major Indicators Used for Measurement and Scaling

1. Environmental Impact:

Carbon Emissions: Measured in terms of CO2 equivalent emissions. Lower emissions indicate better environmental performance (Intergovernmental Panel on Climate Change, 2018).

Resource Consumption: Measured in terms of energy and water usage, as well as waste generation. Efficient resource use indicates sustainable practices (United Nations Environment Programme, 2021).

2. Economic Performance:

Financial Metrics**:** Includes revenue growth, cost savings from sustainable practices, and return on investment (ROI) in green technologies. Positive financial performance indicates the economic viability of sustainability initiatives (Eccles & Serafeim, 2013).

Market Position: Assessed through market share and competitive advantage gained from sustainability practices (Porter & Kramer, 2011).

3. Social Equity:

Social Well-being Metrics: Includes indicators such as employment rates, income distribution, access to education, and healthcare. Improved social well-being indicates positive social impacts (Organisation for Economic Co-operation and Development, 2017).

Stakeholder Engagement: Measured through the level of community involvement and satisfaction with sustainability initiatives (Freeman, 1984).

Incorporation into the Study

The integration of qualitative and quantitative methods provides a holistic view of sustainable development strategies.

1. Pattern Identification: By analyzing both qualitative and quantitative data, the study identifies patterns and correlations between different sustainability strategies and their outcomes. For example, the relationship between stringent environmental policies and reductions in carbon emissions, or the impact of corporate sustainability initiatives on economic performance and social equity (Creswell & Plano Clark, 2018).

2. Holistic View: The mixed-methods approach ensures that the study captures the multifaceted nature of sustainable development, considering the perspectives of various stakeholders and the interconnectedness of environmental, economic, and social factors (Tashakkori & Teddlie, 2003).

3. Actionable Insights: The findings from both qualitative and quantitative analyses are synthesized to provide actionable insights and recommendations for policymakers, businesses, and society. This includes identifying best practices, potential challenges, and areas for future research (Patton, 2015).

ANALYSIS AND RESULTS

The analysis of both qualitative and quantitative data reveals several key findings that highlight the effectiveness and challenges of sustainable development strategies. This section presents the results obtained from the content analysis of policy documents, corporate sustainability reports, case studies, surveys, and statistical analyses of sustainability indicators.

Government Policies

1. Environmental Impact

The analysis of policy documents, such as the European Union's Green Deal and the United States' Clean Air Act, demonstrates that stringent regulations can lead to substantial environmental improvements. Countries with comprehensive environmental policies show significant reductions in greenhouse gas emissions and improvements in air and water quality. For example, the EU's Green Deal has led to a noticeable decline in CO2 emissions across member states, promoting a shift towards renewable energy sources and sustainable agricultural practices (European Commission, 2019).

2. Policy Implementation

Effective policy implementation requires robust enforcement mechanisms and public awareness. The analysis highlights that countries with strong regulatory frameworks and active enforcement agencies tend to achieve better environmental outcomes. Public awareness campaigns play a critical role in encouraging compliance and promoting sustainable behaviors (U.S. Environmental Protection Agency, 2021). For instance, Germany's Energiewende policy has resulted in significant progress in renewable energy adoption due to rigorous implementation and public engagement (Lachapelle, Borick, & Rabe, 2012).

3. Challenges

Despite these positive outcomes, challenges such as political resistance, lack of funding, and varying levels of commitment among regions can hinder the full potential of environmental policies. For example, some developing countries face difficulties in enforcing environmental regulations due to limited resources and political instability (Lachapelle et al., 2012).

Corporate Social Responsibility (CSR)

1. Successful CSR Initiatives

CSR initiatives yield mixed results. Companies that genuinely integrate sustainability into their core operations often achieve notable progress. These firms invest in energy-efficient technologies, reduce waste, and engage in community development projects. For instance, a leading technology company's investment in renewable energy projects resulted in a reduced carbon footprint and enhanced brand reputation, alongside cost savings (Eccles & Serafeim, 2013).

2. Greenwashing

Conversely, some companies engage in greenwashing, projecting an image of sustainability without implementing meaningful changes. This practice undermines consumer trust and fails to deliver significant environmental or social benefits. Case studies reveal instances where businesses have been criticized for overstating their sustainability achievements while continuing harmful practices (Laufer, 2003). For example, certain apparel brands have been accused of greenwashing due to discrepancies between their sustainability claims and actual practices.

3. Drivers of Success

Successful CSR initiatives are driven by strong leadership commitment, stakeholder engagement, and transparent reporting. Companies that prioritize these elements tend to achieve better sustainability outcomes. For instance, Patagonia's commitment to environmental sustainability and transparent reporting has led to significant positive outcomes in both environmental impact and consumer loyalty (Freeman, 1984).

Technological Innovations

1. Renewable Energy

Technological innovations in renewable energy have proven effective in promoting sustainable development. The adoption of technologies such as solar and wind power has led to significant reductions in greenhouse gas emissions. Quantitative data shows a positive correlation between the use of renewable energy and lower carbon footprints. Countries like Denmark and Germany, which have heavily invested in renewable energy, report improved environmental outcomes and energy security (Intergovernmental Panel on Climate Change, 2018).

2. Waste Management

Innovations in waste management, including recycling technologies and waste-to-energy processes, contribute to resource conservation and pollution reduction. Case studies of municipalities implementing advanced waste management systems show substantial decreases in landfill waste and

increased recycling rates. For example, San Francisco's comprehensive waste management program has achieved a diversion rate of over 80% (United Nations Environment Programme, 2021).

3. Emerging Technologies

Emerging technologies such as blockchain and artificial intelligence (AI) offer promising opportunities for enhancing sustainability. Blockchain can improve supply chain transparency, ensuring sustainable sourcing, while AI can optimize resource use and reduce waste through predictive analytics. For instance, AI-driven smart grids are being used to optimize energy distribution, reduce waste, and improve efficiency (Saberi et al., 2019; Berawi, 2019).

Quantitative Findings

1. Environmental and Social Outcomes

The quantitative analysis reveals a positive correlation between comprehensive sustainability strategies and improved environmental and social outcomes. Organizations that adopt holistic approaches incorporating environmental, economic, and social dimensions perform better in sustainability metrics. For instance, companies with integrated sustainability strategies report lower carbon emissions and higher resource efficiency (Eccles & Serafeim, 2013).

2. Economic Performance

The relationship between sustainability strategies and economic performance is complex. While some entities achieve economic benefits from sustainable practices, such as cost savings and new market opportunities, others face challenges. The economic viability of sustainability initiatives depends on factors such as industry sector, market conditions, and scale of investment (Porter & Kramer, 2011). For example, renewable energy investments have proven economically beneficial for some companies but challenging for others due to high initial costs.

3. Balanced Approaches

The findings emphasize the need for balanced approaches that do not compromise economic viability. Sustainable development strategies should be tailored to specific contexts, considering local conditions, stakeholder needs, and available resources. For example, small and medium-sized enterprises may adopt different sustainability strategies compared to large multinational corporations due to differing resource availability and market pressures (Tashakkori & Teddlie, 2003).

DISCUSSION

The findings of this study underscore the necessity of a multi-faceted approach to achieving successful sustainable development. This approach integrates robust policies, genuine corporate commitment, and continuous technological advancements. The complexity and interdependence of various sustainability strategies are illuminated through the application of the Triple Bottom Line (TBL) framework, which emphasizes balancing environmental, economic, and social factors.

Theoretical Support: The Triple Bottom Line Framework

The Triple Bottom Line (TBL) framework, introduced by John Elkington in the 1990s, provides a comprehensive theoretical basis for understanding the findings of this study. TBL posits that for businesses to be truly sustainable, they must consider three key dimensions: environmental stewardship, economic viability, and social equity (Elkington, 1997).

1. Environmental Stewardship

The TBL framework highlights the importance of minimizing environmental impact. The study's findings demonstrate that stringent government policies and technological innovations significantly reduce carbon emissions and enhance resource efficiency. These outcomes align with the environmental dimension of TBL, which

advocates for the protection and preservation of natural resources. For example, the European Union's Green Deal has resulted in a measurable decline in CO2 emissions and a shift toward renewable energy sources, reflecting the TBL's environmental stewardship goals (European Commission, 2019).

2. Economic Viability

Economic performance is another critical dimension of TBL. The study reveals that while comprehensive sustainability strategies often correlate with improved environmental and social outcomes, their economic impacts can vary. This highlights the importance of designing sustainable development initiatives that do not compromise economic viability. The TBL framework supports this by advocating for sustainable economic practices that ensure long-term profitability and economic resilience. For instance, companies investing in green technologies can achieve cost savings and market advantages, aligning with the TBL's economic viability dimension (Porter & Kramer, 2011).

3. Social Equity

The social dimension of TBL focuses on promoting social well-being and equity. The study's findings on corporate social responsibility (CSR) initiatives illustrate the potential for businesses to enhance social outcomes through fair labor practices, community engagement, and equitable resource distribution. However, the risk of greenwashing and the uneven social impacts of sustainability initiatives underscore the need for genuine and transparent efforts in this domain. This aligns with the TBL's emphasis on social equity and ethical business practices, highlighting the importance of addressing social inequalities and fostering inclusive growth (Carroll & Shabana, 2010).

REASONING FOR FINDINGS

1. Robust Policies

The study finds that robust government policies are crucial for driving sustainable practices. Policies such as the European Union's Green Deal and the United States' Clean Air Act set stringent environmental standards that compel businesses and individuals to adopt sustainable behaviors. These policies create an enabling environment for sustainability, ensuring that regulatory frameworks support long-term environmental goals. The TBL framework supports this by recognizing the role of governance in achieving sustainable development (European Commission, 2019; U.S. Environmental Protection Agency, 2020).

2. Genuine Corporate Commitment

The mixed results of CSR initiatives highlight the importance of genuine corporate commitment to sustainability. Successful CSR efforts are driven by companies that integrate sustainability into their core operations and engage stakeholders transparently. This aligns with the TBL framework's emphasis on social equity and the ethical responsibilities of businesses. Companies that merely engage in greenwashing undermine the credibility of CSR and fail to deliver meaningful sustainability outcomes. Genuine commitment is essential for achieving the TBL's social equity goals and fostering trust with stakeholders (Porter & Kramer, 2011; Carroll & Shabana, 2010).

3. Continuous Technological Advancement

Technological innovations are identified as highly effective in promoting sustainable development. Advances in renewable energy, waste management, and emerging technologies like blockchain and AI are instrumental in reducing environmental impacts and improving resource efficiency. The TBL framework supports the integration of technology to achieve environmental and economic sustainability, emphasizing the need for ongoing innovation and adaptation. For example,

renewable energy technologies have demonstrated significant potential in lowering carbon emissions and enhancing energy security (Field, 2018; REN21, 2020).

Interdependence and Collaboration

The study highlights the interdependence of various sustainability strategies and the need for collaboration among different stakeholders. Sustainable development cannot be achieved in isolation; it requires coordinated efforts from governments, businesses, and civil society.

1. Government-Business Collaboration

Effective government policies provide the regulatory foundation for sustainable practices, while businesses drive innovation and implementation. The study finds that successful sustainability initiatives often involve partnerships between the public and private sectors. This collaborative approach ensures that policies are informed by practical insights and that businesses are supported by a conducive regulatory environment. For instance, public-private partnerships in the renewable energy sector have led to significant advancements and widespread adoption of clean technologies (European Commission, 2019).

2. Stakeholder Engagement

The involvement of diverse stakeholders, including NGOs, community organizations, and consumers, is crucial for the success of sustainability initiatives. Stakeholder engagement fosters transparency, accountability, and inclusivity, ensuring that sustainability efforts address the needs and concerns of all affected parties. The TBL framework underscores the importance of stakeholder engagement in achieving social equity and ethical business practices. Engaging with a broad range of stakeholders helps ensure that sustainability strategies are comprehensive and responsive to varying needs (Carroll & Shabana, 2010).

Despite the comprehensive approach and significant findings, this study has several limitations that should be acknowledged. These limitations may affect the generalizability and robustness of the conclusions drawn. Understanding these limitations is essential for interpreting the results and identifying areas for future research.

Reliance on Existing Literature and Reports

1. Potential Bias

The study heavily relies on existing literature, policy documents, corporate sustainability reports, and case studies. While these sources provide valuable insights, they may present selective or favorable outcomes, introducing bias. Authors of these reports might emphasize successful initiatives while downplaying challenges or failures to protect their reputations or achieve specific agendas (European Environment Agency, 2019). This potential bias can affect the overall analysis and interpretation of sustainability practices.

2. Selective Reporting

There is a possibility that some studies and reports included in the literature review may have selectively reported positive results, contributing to an overly optimistic portrayal of certain sustainability initiatives. This selective reporting can skew the analysis and lead to conclusions that do not fully capture the complexities and challenges of sustainable development practices (REN21, 2020). The optimistic portrayal may obscure underlying issues that impact the effectiveness of sustainability strategies.

3. Limited Perspectives

The existing literature and reports may predominantly reflect perspectives from specific regions or sectors, particularly those with well-developed sustainability frameworks. This could result in an overrepresentation of best practices from developed countries, potentially overlooking the unique challenges faced by developing nations. As a result, the study may not fully address the diverse experiences and constraints encountered in different geographical and socio-economic contexts (World Bank, 2021).

Quantitative Analysis Constraints

1. Data Availability

The quantitative analysis in this study is constrained by the availability of reliable data, especially from developing countries. Many developing nations may lack comprehensive data collection mechanisms and robust reporting standards for sustainability indicators such as carbon emissions, resource consumption, and social well-being metrics. This limitation can lead to gaps in the analysis and potentially skew the results towards data-rich regions, impacting the generalizability of the findings (REN21, 2020).

2. Data Reliability

Even when data is available, its reliability can be a concern. Inconsistent methodologies, incomplete datasets, and varying quality of data across different regions and sectors can affect the accuracy of the quantitative analysis. These inconsistencies can hinder the ability to make precise comparisons and draw definitive conclusions. Ensuring data reliability is crucial for producing robust and credible results (European Environment Agency, 2019).

3. Temporal Limitations

The availability of longitudinal data is crucial for assessing the long-term impacts of sustainability initiatives. However, in many cases, data may only be available for limited periods, restricting the ability to analyze trends and evaluate the sustainability of strategies over time. This temporal limitation can affect the depth of understanding regarding the enduring effects and sustainability of the initiatives examined (World Bank, 2021).

Scope and Depth of Analysis

1. Broad Scope

The study covers a wide range of sectors and strategies, from government policies and CSR initiatives to technological innovations and stakeholder engagement. While this broad scope provides a comprehensive overview of sustainable development practices, it may limit the depth of analysis for specific areas. Detailed examination of individual sectors or specific strategies could reveal nuanced insights and critical factors influencing the effectiveness of sustainability efforts (European Commission, 2019).

2. Sector-Specific Insights

Each sector, such as energy, waste management, or agriculture, has unique characteristics and challenges related to sustainability. The study's broad approach might not fully explore these sector-specific dynamics, potentially overlooking critical factors that influence the success of sustainable development strategies in particular contexts. A more focused analysis of specific sectors could enhance understanding and provide targeted recommendations (REN21, 2020).

3. Geographical Variations

Sustainable development practices and their outcomes can vary significantly across different regions. Cultural, economic, and political contexts influence how sustainability strategies are implemented and received. The study's broad scope may not adequately account for these regional variations, leading to generalized findings that may not be applicable in all contexts. A deeper exploration of regional differences could offer more precise insights into the local effectiveness of sustainability strategies (World Bank, 2021).

FUTURE SCOPE OF RESEARCH

The future scope of research in sustainable development is extensive and offers significant opportunities to enhance our understanding and implementation of effective strategies. Building on the findings and limitations of this study, several key areas for future research have been identified, each aimed at addressing current gaps and exploring new dimensions of sustainability.

Longitudinal Studies

1. Long-Term Impact Assessment

Future research should prioritize longitudinal studies to evaluate the long-term impacts of sustainable development strategies. These studies are crucial for understanding how sustainability initiatives evolve over time and their enduring effects on environmental, economic, and social outcomes. Longitudinal data can uncover trends, highlight persistent challenges, and offer insights into the durability of benefits from sustainable practices. This will help in assessing the effectiveness and sustainability of initiatives over extended periods (World Bank, 2021).

2. Adaptation and Resilience

Longitudinal studies can also assess the adaptability of sustainability strategies to changing conditions and their contribution to the resilience of communities and ecosystems. By tracking these initiatives over time, researchers can identify factors that enhance or impede adaptability and resilience, informing the development of more robust and flexible sustainability frameworks. This aspect of research will help ensure that sustainability strategies remain effective amidst evolving challenges (REN21, 2020).

Sector-Specific and Regional Studies

1. Granular Sector Analysis

There is a need for more granular studies focusing on specific sectors such as energy, agriculture, waste management, and transportation. These studies can reveal sector-specific challenges, opportunities, and best practices. For instance, detailed examinations of sustainable agricultural practices could uncover innovative methods for reducing environmental impacts while maintaining productivity. Sector-specific research will provide targeted insights and recommendations for enhancing sustainability within particular industries (European Commission, 2019).

2. Regional and Local Contexts

Future research should also explore the unique characteristics of different regions and localities. Regional studies can offer insights into how cultural, economic, and political factors influence the implementation and success of sustainability initiatives. Understanding these regional dynamics is essential for developing tailored strategies that effectively address local needs and conditions. This focus will help in crafting region-specific approaches that are more likely to be successful (World Bank, 2021).

3. Comparative Studies

Comparative studies across different regions and sectors can highlight successful approaches and transferable practices. By comparing regions with similar challenges but different outcomes, researchers can identify key factors contributing to success and derive lessons that can be applied elsewhere. Comparative research will provide valuable insights into the effectiveness of different sustainability strategies and their adaptability across diverse contexts (REN21, 2020).

Emerging Technologies

1. Artificial Intelligence (AI)

Exploring the role of AI in promoting sustainability offers substantial potential. Future research should investigate how AI can optimize resource use, improve efficiency, and reduce waste in various sectors. For example, AI-powered predictive analytics can enhance energy management systems, leading to significant energy savings and reduced emissions. Research in this area will help in understanding how AI can drive sustainability innovations (Field, 2018).

2. Blockchain Technology

Blockchain technology holds promise for improving transparency and accountability in supply chains, ensuring sustainable sourcing, and

reducing environmental impact. Future research should focus on case studies where blockchain has been implemented to track and verify sustainable practices, assessing its effectiveness and scalability. Understanding blockchain's role in sustainability will be critical for leveraging this technology to its full potential (Field, 2018).

3. Innovative Technologies

Beyond AI and blockchain, other emerging technologies such as the Internet of Things (IoT), machine learning, and advanced materials science offer potential contributions to sustainability. Future research should explore how these technologies can drive innovation and support sustainable development goals. Investigating their applications and impacts will help in identifying new pathways for achieving sustainability
objectives (Field, 2018).

Collaboration and Integration

1. Interdisciplinary Collaboration

Effective sustainable practices require collaboration between academia, industry, and policymakers. Future research should emphasize interdisciplinary collaboration to integrate diverse perspectives and expertise. Joint efforts can lead to the development of comprehensive sustainability strategies that are scientifically sound, economically viable, and socially acceptable. This collaborative approach will enhance the effectiveness of sustainability initiatives (Carroll & Shabana, 2010).

2. Policy and Practice Integration

Collaboration between researchers and policymakers is essential for translating research findings into actionable policies. Future studies should focus on creating frameworks that facilitate the adoption of research insights into policy-making processes. This will ensure that sustainability strategies are grounded in robust evidence and effectively implemented (European Commission, 2019).

3. Public-Private Partnerships

Partnerships between the public and private sectors can drive innovation and the implementation of sustainable practices. Research should explore models of successful public-private partnerships, identifying best practices and strategies for scaling up collaborative efforts to achieve broader sustainability goals. Examining successful partnerships will provide insights into how to foster effective collaborations (World Bank, 2021).

ADDRESSING CURRENT GAPS

1. Data Quality and Accessibility

Improving the quality and accessibility of sustainability data is crucial for future research. Efforts should be made to develop standardized data collection methods, enhance data sharing platforms, and ensure that data from developing regions is reliable and comprehensive. This will enable more accurate and inclusive analyses, addressing current gaps in data availability (REN21, 2020).

2. Inclusive Research

Future research should strive to be inclusive, incorporating perspectives from marginalized and underrepresented communities. Understanding the diverse impacts of sustainability initiatives on different social groups is vital for promoting social equity and ensuring that sustainable development benefits all members of society. Inclusive research will help in addressing equity concerns and making sustainability efforts more comprehensive (Carroll & Shabana, 2010).

3. Holistic Approaches

Emphasizing holistic approaches that integrate environmental, economic, and social dimensions of sustainability is essential. Future research should continue to explore the interconnectedness of these dimensions, identifying strategies that advance multiple sustainability goals simultaneously. This holistic perspective will contribute to more effective and balanced sustainability strategies (Elkington, 1997).

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RESEARCH

WHY SHOULD BANKS BE CAREFUL WHILE OPENING BRANCHES TO AUGMENT DEPOSITS - A SPECIAL REFERENCE TO LISTED BANKS OF INDIA

Dr Shubhada Apte & Ms. Priti Samant*

Abstract

Traditionally, sustainability of banks has been mainly focused around stable deposit funding. Recent times show that banks are facing stunted deposit growth as compared to credit growth in India(Das, Shaktidanta , 2024)5. This makes it imperative for banks to devise right strategies to attract deposits and earn better Net interest margins(NIMs). This study aims to investigate whether opening new branches will result in growth of deposits, retail insured and uninsured deposits and wholesale deposits and other consequences of opening new branches using panel data models. The study has covered 31 listed Indian banks for five years from FY 2018-19 to FY 2022-23. The study also analyses differences between Public sector banks (PSB) and Private sector banks(PVB) in terms of deposit funding, association between number of domestic branches and deposits growth, retail insured deposits growth, retail uninsured deposits and wholesale deposits growth. Results provide evidence that opening branches will not only generate all categories of deposits for both PSB and PVB but will also significantly increase operating expenses and customer complaints. Fraud amounts have shown moderate positive correlation with number of branches. Operating expenses per branch are significantly higher for PVB than for PSB and PVB need to garner higher amount of deposits for every new branch to offset this. Deposits amount per branch are higher for PVB than PSB, mainly due to higher wholesale deposits per branch. There is no significant difference between retail insured as well as uninsured deposits per branch for PSBs and PVBs, though the mean amounts are higher for PSBs. No significant difference has been found between number of complaints per branch, number of frauds per branch or amount of fraud per branch of PSB and PVB.

Implications:
Increase in the branches will lead to increase in deposits across all deposit categories of retail and wholesale for both PSBs and PVBs. However, this expansion will result in higher operating expenses, customer complaints, fraud amounts and number of frauds on an overall basis due to increase in scale of business. Banks need to focus on bringing in greater operating efficiencies with increasing scale and compliance requirements.

Unique contribution: This is the first study to identify implications of branches growth with differences between PSB and PVB in reference to deposit growth strategies in India. It is also the first study which analyses deposits in various categories retail insured, retail uninsured and wholesale deposits and their association with number of branches with reference to deposits of Indian listed banks.

Limitation: The study does not credit aspects of branches growth like NPA percentages. It generalizes branch opening to augment deposits but specific locations need to be identified after assessing various parameters to make opening of branches effective. Also, the study focuses on deposits growth in the short term only. Long term or macro economic variables like GDP growth, liquidity surplus, inflation, unemployment rate are not part of this study.

Key words: *Indian listed banks, panel data models, deposits, branches*

* ***Dr Shubhada Apte,*** *DTSS College, Mumbai*
* ***Priti Samant,*** *Prin. L. N. Welingkar Institute of Management Development & Research (WeSchool) Mumbai*

INTRODUCTION

Banks are the channels of routing finance in any economy and they facilitate economic growth by providing credit to businesses, individuals, and institutions. The starting point for banks to enable credit creation, they must receive funding from deposit holders. Over the past few years, deposits growth has been lagging credit growth in banks (Das, 2024)[5]. Banks are now depending on borrowings and certificate of deposits for funding their credit growth. This is resulting in greater funding being driven by market interest rates and is expected to lower Net Interest Margins(NIM) of the banks. Deposits lower funding costs for banks (Gale & Yorulmazer , 2020)[7] and (Murks Bašič , 2015)[2], especially retail deposits . It is therefore imperative for banks to mobilise higher deposits and retail deposits within overall deposits to protect their NIMs. Whether an increase in branches will result in higher deposits becomes an important issue to address for banks.

LITERATURE REVIEW

Banks have been traditionally funded by deposits. Recent news articles highlight the slow growth of deposits as compared to loan growth in Indian banks. The Wire(Staff, 2024)[29], Business Standard(PTI, 2024)[20], (Saroha, A., & Lozano, C. (2024, March 4))[25] and (V. et.al.,2024) [33] from S & P global have highlighted the shortage of deposit funding faced by Indian banks.

Deposits can be categorized into Retail or Wholesale based on RBI circular for BASEL III. Deposits from banks in India are insured upto Rs 5 lakhs per customer per bank. Increase in insured deposits means increase in number of depositors with balances upto Rs 5 lakh. Any balance above Rs 5 lakh is categorized as uninsured deposits. Retail insured deposits represent deposits mobilized by banks from individuals, small businesses which meet the granularity criterion. Retail uninsured deposits denote deposits received from retail depositors beyond Rs 5 lakh. Increase in retail insured deposits reflect the spread of deposit product net over larger number of retail customers while increase in retail uninsured deposits demonstrate trust of the depositors with their bank. Wholesale deposits are the deposits garnered from large corporates, companies and government institutions. These are most often high value deposits. (Samant & Bhatkal,2024)[24] have shown that with introduction of LCR guidelines, banks are motivated to increase retail deposits given the preferential treatment provided to retail deposits (insured more specifically).

Therefore, not only studying how deposits of Indian banks can grow, but also various categories of deposits like retail insured, retail uninsured and wholesale deposits assumes importance.

Research Literature has highlighted various aspects leading to bank deposit growth in various parts of the world.

Few studies link regulatory climate, external influences like crisis to bank deposits. (Utzig, 2022)[32] showed that with reference to Poland, during uncertainty, deposits grow in spite of low interest rates as people like to park their funds in less risky avenues. Limodio & Strobbe, 2023)[12] concluded that in Ethopia, higher liquidity requirements for banks from the regulator promote deposit growth especially as high-income residents turn depositors and due to new branches in high income areas. (Dursun-de Neef & Schandlbauer, 2022)[17] explained that with reference to Frankfurt, in times of restrictions on spending, people hold higher deposits, increasing funding for the banks, which may promote bank lending to sensitive sectors like real estate.

Other studies have shown customer facing aspects and their impact on deposit growth. (Saghari & Saghari, 2015)[21] have emphasized on strong influence of relationship management to drive deposits growth, with reference to Iran. Use of mobile banking can be leveraged for increasing depositor base by banks, furthering financial inclusion with reference to Cameroon (Teutio et al., 2021)[31]. (Dharmawansa & Madhuwanthi,2023)[6]

identified that along with deposit interest rate , quality and reliability of service and security of the fund also play a significant role when investors invest in bank deposits especially in Sri Lanka.

While multiple studies have tried to associate substitute asset class preferences with bank deposits growth. (Luiza & Marie, 2018)[15] studied linkages between open end investment schemes, bank deposits and interest rate on deposits in Romania. Study showed that deposits were not associated with bank interest or net asset value of investment funds. (Azzone & Barucci, 2023)[1] have investigated and found that impact of introduction of CBDC would not be much on deposits volume, with reference to Euro area. (Yeyati, et.al, 2004)[35] showcased in case of Argentinian crisis, people lost faith in banks and turned to stocks as an investment avenue leading to a stock market boom. (Saif-Alyousfi, 2022)[22] concludes that FDI inflows negatively influence deposit growth in MENA countries as returns on FDI investments are higher than that of deposits. (Grivec & Devjak, 2023)[8] concluded that interest rate and cost of a bitcoin as an alternative choice significantly influence deposits growth rate in Slovenia. (Shah , et.al, 2022)[26] figured that wealth management products and deposits of small and medium sized banks have a negative relationship in the long run in China and this relationship is exploited by banks to manage their deposits and liquidity levels.

(Shaliha et.al, 2021)[27] explained that with increase in liquidity, reserve ratios are increased to tame inflation, which adversely impact deposit growth as alternative investments like stocks and gold may become more lucrative. Interest rates offered on deposits have been studied by many researchers. As per study conducted by (Morina & Osmani, 2019)[16], Interest rates on deposits, GDP, inflation and money supply influence level of deposits in Western Balkan region. Some studies link bank deposit growth with macro-economic factors as well as bank actions. (Ludeen, 2017)[14] proved that GDP growth, deposit interest rate and profit rate influence Islamic deposits growth in Malaysia. (Magweva, 2018) identified number of branches, deposit interest rates, liquidity and economic growth positively influence deposits growth in Zimbabwe. (Corovei & Socol, 2019)[4] provided evidence that GDP growth rate, Inflation rate, deposit interest rate and other securities have a positive relationship with deposit volume in Eurozone area.

Deposits can be increased by expanding the branch footprint has been mentioned by various researchers . (ABA marketing, 2009)[13]. (Yakubu & Abokor, 2020)[34] found that branch expansion and money supply influence deposit growth in short term and bank stability, efficiency, economic growth and inflation influence long term deposits growth in Turkey.

(Kamugisha , 2024)[9] concluded that in Rwanda , GDP, bank branches and deposit interest rate influence long term deposit growth while only GDP and government expenditure influence deposits growth in short term. The study showed that increased branches may adversely impact deposits growth in long run. (Cave ,et.al 2022)[3] introduced a new measure of competitiveness amoungst bank branches so as improve efficiency at branch level for deposit augmentation.

Regarding deposits growth in India, government policy, interest rates, lagged value of NPA and ownership type have been found to be influential determinants. The literature regarding number of branches and its association with deposits in India is sparse. (Zheng & Peabody, 2024)[37] demonstrated that banks prefer retail deposits to wholesale deposits with a view to reducing risk and maturity mismatches. (Samant & Bhatkal, 2024)[24] have shown inclination of Indian banks towards retail funding especially post implementation of Liquidity coverage ratio amoungst Indian banks with a view to protect NIMs. However, a study differentiating between retail insured, retail uninsured and wholesale deposits along with their relationships with number of branches in Indian context is yet to be studied. (Laghate &

Chotaliya, 2021)[10] showed that government policy regarding Jan dhan accounts positively influenced number of deposits accounts and value of deposits in all four regions of India. (Sharma et.al, 2022)[28] in their study with reference to Indian banks, highlighted that deposit interest rates increases liquidity deficit as deposit holders would like to hold more deposits to earn a higher interest income.

(Zhang et.al, 2021)[36] have addressed the factors that influence bank branch location decisions in India. They clarify that size of population and availability of bank deposits drive location decision by Indian banks which can potentially lead to financial exclusion. They confirm that increase in bank branches at strategic locations will lead to increase in bank deposits in India while (Saini, 2022)[23] examined relationship between deposits, term depo it interest rate, lagged value of NPA ratio, number of branches, ownership type and bank size amongst Indian banks. The study concluded that deposit rates and number of branches have insignificant impact on bank deposits while lagged value of NPA ratio and ownership type negatively influence deposits volume. Apparently, there is a difference in results regarding bank deposits growth being influenced by branch expansion for Indian banks. Also, differentiation between retail deposits and wholesale deposits and further categorization of retail insured deposits and retail uninsured deposits and their association with number of branches is yet to be studied with reference to Indian banks. Further, consequences of branch expansion with analysis of differences on these consequences between PSBs and PVBs is also not studied till now.

RESEARCH OBJECTIVE

This study aims to study the relationship between number of domestic branches and deposits volume total, retail insured deposits, retail uninsured deposits and wholesale deposits for 31 listed banks during the period FY 2018-19 to FY 2022-23. It will highlight potential consequences of branch expansion for banks and will identify whether differences exist for such associations between PSBs and PVBs.

Data about the banks has been gathered from their regulatory reports, financial reports, investor presentations. Statistical tools using JMP 17 and R have been employed.

Panel data models have been used for analysis as these are most commonly used for assessing banks performance. Most commonly used techniques for evaluation of bank performance :panel data models have been used for modelling associations and independent samples t test has been employed for testing differences between PSBs and PVBs.

(Shaliha, et.al, 2021)[27] , (Oladipupo & Oladipo, 2022), (Morina & Osmani, 2019)[16], (Grivec & Devjak, 2023)[8] have used econometric models for studying bank deposits.

DATA AND SUMMARY STATISTICS

41 banks were listed in India as on 31st March 2024. Out of these, 10 banks have been listed after 31st March 2019. The period of study is five years from FY 2018-19 to FY 2022-23 and the rest 31 banks have been considered. Out of these, 12 banks are PSBs and 19 banks are PVBs. List of banks considered are given in Table 1

Table 1 List of banks studied with their bank type

Bank Name	Bank Type	Bank Name	Bank Type
Bank of Baroda	PSB	Canara Bank	PSB
Bank of India	PSB	Central Bank	PSB
Bank of Maharshatra	PSB	Indian Bank	PSB

Bank Name	Bank Type	Bank Name	Bank Type
Indian Overseas Bank	PSB	State Bank of India	PSB
Punjab National Bank	PSB	UCO Bank	PSB
Punjab and Sind Bank	PSB	Union Bank	PSB
AU Small Finance Bank	PVB	City unioin Bank	PVB
Axis Bank	PVB	DCB Bank	PVB
Bandhan Bank	PVB	Dhanalaxmi Bank	PVB
Federal Bank	PVB	IDBI bank	PVB
HDFC Bank	PVB	IDFC first Bank	PVB
ICICI bank	PVB	IndusInd Bank	PVB
J&K Bank	PVB	Kotak Mahindra Bank	PVB
Karnataka Bank	PVB	RBL Bank	PVB
Karur Vysaya Bank	PVB	South Indian Bank	PVB
Yes Bank	PVB		

Source: Authors calculations

The association between number of domestic branches and deposits total, retail insured deposits, retail uninsured deposits, wholesale deposits was modelled using regression with panel data model. This association was modelled for all 31 banks (Model 1), 12 PSBs, (Model 2) and 19 PVBs (Model 3).

Correlations were found between the number of domestic branches and operating expenses, customer complaints, number of frauds and amount of frauds. Independent samples t test was used to compare the operating expenses per branch, customer complaints per branch, number of frauds per branch and fraud amount per branch of PSBs and PVBs.

We propose the following equations based on the methods of regression for Models 1, 2 and 3:

Pooled OLS

a) Total deposits

$DEPOSITS_{it} = \beta_0 + \beta_1 Branchesit + u_{it}$

Where β_0 is intercept, β_1 is the regression coefficient, i =, bank 1, bank 2…..bank n and t = year 1, year 2…..year 5 , and u_{it} is the error term.

b) Retail insured deposits

$RETAILINSUREDDEPOSITS_{it} = \beta_0 + \beta_1 Branches_{it} + u_{it}$

Where β_0 is intercept, β_1 is the regression coefficient, i =, bank 1, bank 2…..bank 31 and t = year 1, year 2…..year 5 , and u_{it} is the error term.

c) Retail uninsured deposits

$RETAILUNINSUREDDEPOSITS_{it} = \beta_0 + \beta_1 Branches_{it} + u_{it}$

Where β_0 is intercept, β_1 is the regression coefficient, i =, bank 1, bank 2…..bank n and t = year 1, year 2…..year 5 , and u_{it} is the error term.

d) Wholesale deposits

$WHOLESALEDEPOSITS_{it} = \beta_0 + \beta_1 Branches_{it} + u_{it}$

Where β0 is intercept, β1 is the regression coefficient, i =, bank 1, bank 2…..bank n and t = year 1, year 2…..year 5 , and u_{it} is the error term.

Fixed Effects

a) Total deposits

$DEPOSITS_{it} = \beta_0 + \beta_1 Branches_{it} + \alpha_i + u_{it}$

Where β^0 is intercept, β_1 is the regression coefficient, i =bank 1, bank 2…..bank n and t = year 1, year 2…..year 5 , α_i is the bank specific attributes captured by bank specific intercepts and u_{it} is the error term.

b) Retail insured deposits

$RETAILINSUREDDEPOSITS_{it} = \beta_0 + \beta_1 Branches_{it} + \alpha_i + u_{it}$

Where β_0 is intercept, β_1 is the regression coefficient, i =bank 1, bank 2…..bank 31 and t = year 1, year 2…..year 5 , α_i is the bank specific attributes captured by bank specific intercepts and u_{it} is the error term.

c) Retail uninsured deposits

$RETAILUNINSUREDDEPOSITS_{it} = \beta_0 + \beta_1 Branches_{it} + \alpha_i + u_{it}$

Where β_0 is intercept, β_1 is the regression coefficient, i =bank 1, bank 2…..bank n and t = year 1, year 2…..year 5 , α_i is the bank specific attributes captured by bank specific intercepts and u_{it} is the error term.

d) Wholesale deposits

$WHOLESALEDEPOSITS_{it} = \beta_0 + \beta_1 Branches_{it} + \alpha_i + u_{it}$

Where β_0 is intercept, β_1 is the regression coefficient, i =bank 1, bank 2…..bank n and t = year 1, year 2…..year 5 , α_i is the bank specific attributes captured by bank specific intercepts and u_{it} is the error term.

Random Effects

a) Total deposits

$DEPOSITS_{it} = \beta_0 + \beta_1 BRANCHES_{it} + \varepsilon_i + u_{it}$

Where β_0 is intercept, β_1 is the regression coefficient ,i = bank 1, bank 2…..bank n and t = year 1, year 2…..year 5 , ε_i is the bank specific not measurable error variable and u_{it} is the error term.

b) Retail insured deposits

$RETAILINSUREDDEPOSITS_{it} = \beta_0 + \beta_1 BRANCHES_{it} + \varepsilon_i + u_{it}$

Where β_0 is intercept, β_1 is the regression coefficient, i = bank 1, bank 2…..bank n and t = year 1, year 2…..year 5 , ε_i is the bank specific not measurable error variable and uit is the error term.

c) Retail uninsured deposits

$RETAILUNINSUREDDEPOSITS_{it} = \beta_0 + \beta_1 BRANCHES_{it} + \varepsilon_i + u_{it}$

Where β_0 is intercept, β_1 is the regression coefficient, i = bank 1, bank 2…..bank n and t = year 1, year 2…..year 5 , ε_i is the bank specific not measurable error variable and u_{it} is the error term

d) Wholesale deposits

$WHOLESALEDEPOSITS_{it} = \beta_0 + \beta_1 BRANCHES_{it} + \varepsilon_i + u_{it}$

Where β_0 is intercept, β_1 is the regression coefficient, i = bank 1, bank 2…..bank n and t = year 1, year 2…..year 5 , ε_i is the bank specific not measurable error variable and u_{it} is the error term

Where β_0 is intercept, β_1 is the regression coefficient, i = bank 1, bank 2…..bank n and t = year 1, year 2…..year 5 , ε_i is the bank specific not measurable error variable and u_{it} is the error term

In order to choose between Pooled OLS and Fixed effects, F test was conducted, and the results are shown in Table 2. As the results were significant, Fixed effects was chosen over Pooled OLS. To choose between Fixed effects and Random effects, Hausman test was conducted and results shown in Table 3. As the results were significant, Fixed effects would be chosen over Random effects in Model 1 and 2 while Random effects have been chosen in Model 3.

Table 2: Results of F test between the Pooled OLS (OLS) and Fixed effect (FE) for all three models

Independent variable: Number of domestic branches

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
A:			
Dependent Variable	Total deposits	Total deposits	Total deposits
F value	10.21***	3.3628**	18.34***
Degrees of freedom	df1 = 32, df2 = 131	df1 = 11, df2 = 47	df1 = 20, df2 = 83
	FE better	FE better	FE better

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
B:			
Dependent Variable	Retail Insured deposits	Retail Insured deposits	Retail Insured deposits
F value	2.5614***	1.7678	5.9216***
Degrees of freedom	df1 = 32, df2 = 131	df1 = 11, df2 = 47	df1 = 20, df2 = 83
	FE better	Random or OLS preferred	FE better

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
C:			
Dependent Variable	Retail Uninsured deposits	Retail Uninsured deposits	Retail Uninsured deposits
F value	30.982***	22.371***	34.306***
Degrees of freedom	df1 = 32, df2 = 131	df1 = 11, df2 = 47	df1 = 20, df2 = 83
	FE better	FE better	FE better

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
D:			
Dependent Variable	Wholesale deposits	Wholesale deposits	Wholesale deposits
F value	9.9679***	3.4448**	6.3663***
Degrees of freedom	df1 = 32, df2 = 131	df1 = 11, df2 = 47	df1 = 20, df2 = 83
	FE better	FE better	FE better

Source: Authors calculations

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.001 level (2 tailed)

Significant results show that Fixed effects method is preferred over OLS in Table 2. Other than Model 2 PSBs for dependent variable retail insured deposits, all results prefer Fixed effects model. Hausman test was used to choose between Fixed effects and Random effects for all the 3 models and each of the four different dependent variables for each model.

Table 3: Hausman Test to choose between Fixed Effects (FE) and Random Effects (RE) for all 3 models

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
A:			
Dependent Variable	Total deposits	Total deposits	Total deposits
Chisquare	0.39967	3.7784	33.385***
Degrees of freedom	df=1	df=1	df=1
	RE preferred	RE preferred	FE preferred

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
B:			
Dependent Variable	Retail Insured deposits	Retail Insured deposits	Retail Insured deposits
Chisquare	2.1504	0.03727	36.005***
Degrees of freedom	df=1	df=1	df=1
	RE preferred	RE preferred	FE preferred

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
C:			
Dependent Variable	Retail Uninsured deposits	Retail Uninsured deposits	Retail Uninsured deposits
Chisquare	26.877***	31.629***	3.3668
Degrees of freedom	df=1	df=1	df=1
	FE is preferred	FE is preferred	RE is preferred

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
D:			
Dependent Variable	Wholesale deposits	Wholesale deposits	Wholesale deposits
Chisquare	0.0538	2.0897	10.16**
Degrees of freedom	df=1	df=1	df=1
	RE is preferred	RE is preferred	FE is preferred

Source: Authors calculations

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.001 level (2 tailed)

We used Durbin Watson test to check for autoccorelation. Refer Table 4 for the Durbin Watson test results.

Table 4 : Durbin Watson Test to identify serial correlation for all 3 models

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
A:			
Dependent Variable	Total deposits	Total deposits	Total deposits
DW	1.1372***	1.2158***	1.9144
	exists	exists	exists

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
B:			
Dependent Variable	Retail Insured deposits	Retail Insured deposits	Retail Insured deposits
DW	0.9886***	0.9083***	1.823
	exists	exists	does not exist

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
C:			
Dependent Variable	Retail Uninsured deposits	Retail Uninsured deposits	Retail Uninsured deposits
DW	1.7444	1.6547	1.73
	does not exist	does not exist	does not exist

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
D:			
Dependent Variable	Wholesale deposits	Wholesale deposits	Wholesale deposits
DW	1.0754***	1.1814***	1.5539*
	exists	exists	exists

Source: Authors calculations

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.001 level (2 tailed)

To test for cross sectional dependence, Pesaran CD test was conducted and results are given in Table 5. Significant results denote existence of cross-sectional dependence. (Pesaran 2015)[19] specified that Pesran CD test to be used for small t and large n.

Table 5: Presaran CD Test to identify cross sectional dependence for all 3 models

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
A:			
Dependent Variable	Total deposits	Total deposits	Total deposits
Z	15.039***	6.1579***	0.16921
	exists	exists	does not exist

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
B:			
Dependent Variable	Retail Insured deposits	Retail Insured deposits	Retail Insured deposits
Z	5.7726***	0.28996	0.28996***
	exists	does not exist	exists

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
C:			
Dependent Variable	Retail Uninsured deposits	Retail Uninsured deposits	Retail Uninsured deposits
Z	5.992***	-0.1477	0.0821
	exists	does not exist	exists

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
D:			
Dependent Variable	Wholesale deposits	Wholesale deposits	Wholesale deposits
Z	2.2606*	3.543***	-0.128729
	exists	exists	does not exist

Source: Authors calculations

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.001 level (2 tailed)

To check for normality of the residuals, Breusch pagan Lagrange Multiplier test was conducted and results are shown in Table 6. Results are significant showing heteroscedasticity and hence robust standard errors controlling for cross sectional dependence and/serial correlation and heteroscedasticity have been used in the results.

Table 6 : Breusch Pagan Test to identify heteroscedasticity for all 3 models

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
A:			
Dependent Variable	Total deposits	Total deposits	Total deposits
Chisquare	135.72***	7.0204*	90.496***
degrees of freedom	df=2	df=2	df=2
	exists	exists	exists

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
B:			
Dependent Variable	Retail Insured deposits	Retail Insured deposits	Retail Insured deposits
Chisquare	18.794***	1.5916	16.44***
degrees of freedom	df=2	df=2	df=2
	exists	exists	exists

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
C:			
Dependent Variable	Retail Uninsured deposits	Retail Uninsured deposits	Retail Uninsured deposits
Chisquare	216.86***	50.265***	154.8***
degrees of freedom	df=2	df=2	df=2
	exists	exists	exists

	Model 1 (31 banks)	**Model 2 (12 PSBs)**	**Model 3 (19 PVBs)**
D:			
Dependent Variable	Wholesale deposits	Wholesale deposits	Wholesale deposits
Chisquare	133.47***	9.3108**	40.814***
degrees of freedom	df=2	df=2	df=2
	exists	exists	exists

Source: authors calculations

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.001 level (2 tailed)

RESULTS AND ANALYSIS:

Table 7.1 Descriptive statistics for Model 1 (31 banks) Rs in Mn other than number

	Mean	**Median**	**Std Deviation**	**Min**	**Max**	**No of obs**
Deposits	43,63,898	20,25,548	69,00,623	73,794	4,42,37,778	165
No of branches	3,370	1,604	4,279	242	22,405	165
Retail insured deposits	6,29,516	1,40,215	12,45,970	1,350	87,32,708	165
Retail uninsured deposits	20,07,012	8,26,902	34,42,506	10,878	1,97,19,935	165
Wholesale deposits	9,46,746	3,06,268	16,55,378	7,319	1,11,62,493	165
Operating expenses	1,09,431	51,538	1,62,672	3,046	9,79,277	165
Customer complaints	3,05,877	54,506	6,91,702	325	42,21,491	165
Frauds in amount	28,511	5,059	52,142	6	4,46,225	165
No of Frauds	982	219	2,142	5	17,987	163
Operating expense per branch	19	13	17	3	150	165
Complaints per branch	66	51	64	0	386	165
Fraud amount per branch	12	3	46	0	493	165
No of frauds per branch	1	0	3	0	35	163
Deposits per branch	1,154	1,000	673	156	5,825	165

Source: authors calculations

Table 7.2 Descriptive statistics for Model 2 (12 PSBs) Rs in Mn other than number

	Mean	Median	Std Deviation	Min	Max	No of obs
Deposits	78,40,677	52,94,667	95,39,484	8,96,676	4,42,37,778	60
No of branches	6,573	5,084	5,451	1,518	22,405	60
Retail insured deposits	12,06,732	7,30,183	17,71,562	3,814	87,32,708	60
Retail uninsured deposits	38,66,111	20,03,408	48,96,921	4,21,891	1,97,19,935	60
Wholesale deposits	15,91,272	6,18,815	23,15,720	90,969	1,11,62,493	60
Operating expenses	1,63,414	92,698	2,24,554	16,363	9,79,277	60
Customer complaints	6,47,249	2,24,157	10,45,423	3,236	42,21,491	60
Frauds in amount	54,286	38,841	64,761	3,973	4,46,225	60
No of Frauds	709.03	264.00	1,273.62	41.00	6,964.00	60
Operating expense per branch	10.17	9.55	3.61	2.64	21.92	60
Complaints per branch	67.91	46.06	68.93	1.60	285.22	60
Fraud amount per branch	8.79	7.68	6.53	0.85	24.99	60
No of frauds per branch	0.09	0.06	0.08	0.01	0.42	60
Deposits per branch	993.86	979.29	298.02	587.60	1,974.46	60

Source: authors calculations

Table 7.3 Descriptive statistics for Model 3 (19 PVBs) Rs in Mn other than number

	Mean	Median	Std Deviation	Min	Max	No of obs
Deposits	23,77,167	8,96,389	35,36,378	73,794	1,88,33,946	105
No of branches	1,539	901	1,648	242	7,821	105
Retail insured deposits	2,99,678	67,736	6,04,623	1,350	33,76,067	105
Retail uninsured deposits	9,44,670	4,22,241	13,96,608	10,878	71,08,027	105
Wholesale deposits	5,78,446	1,24,325	9,49,931	7,319	41,80,380	105
Operating expenses	78,583	29,325	1,02,375	3,046	4,76,521	105
Customer complaints	1,10,807	36,560	1,69,753	325	9,39,870	105
Frauds in amount	13,781.83	1,715.90	36,135.93	6.40	2,33,760.00	105
No of Frauds	1,140.95	211.00	2,506.06	5.00	17,987.00	103
Operating expense per branch	23.41	16.96	19.66	6.00	150.17	105
Complaints per branch	65.38	52.60	61.51	0.35	386.18	105
Fraud amount per branch	13.58	1.34	57.80	0.02	493.16	105
No of frauds per branch	0.75	0.27	3.42	0.01	34.79	103
Deposits per branch	1,245.59	1,131.53	800.25	155.68	5,824.71	105

Source: authors calculations

Table 8 shows the Pearson correlation between the variables used. Table 8.1 shows the correlations for Model 1, Table 8.2 shows them for Model 2 and Table 8.3 displays the correlations for Model 3.

Model 1:

Strong correlations are found between number of branches and total deposits, retail insured deposits, retail uninsured deposits and Wholesale Deposits. Number of branches and total operating expenses, customer complaints are also found to have strong and positive correlations while correlations with number of frauds and amount of frauds is moderately positive. On a per branch basis, no significant correlation is found between operating expenses, fraud amount and number of frauds to total number of branches.

Model 2:

Strong positive correlations were found between number of branches and deposits, retail insured deposits, retail uninsured deposits and Wholesale Deposits as well between number of branches and operating expenses, customer complaints and number of frauds for PSBs. Fraud in amount is found to be moderately positively correlated with number of branches. On a per branch basis, no significant correlation was found between number of branches and fraud amount and number of frauds.

Model 3:

Strong correlations are found between number of branches and total deposits, retail insured deposits, retail uninsured deposits and Wholesale Deposits. Number of branches and total operating expenses, customer complaints are also found to have strong and positive correlations while correlations with number of frauds and number of branches is moderately positive. No correlation has been found between number of branches and amount of frauds for PVBs.

On a per branch basis, operating expenses, complaints, fraud amount and number of frauds are not associated with number of branches.

Table 8.1 correlation coefficients for all variables of Model 1

	Deposits	No of branches	Retail of insured deposits	Retail uninsured deposits	Wholesale deposits	Operating expenses	Customer complaints	Frauds in amount	No of Frauds	Operating expense per branch	Complaints per branch	Fraud amount per branch	No of frauds per branch	Deposits per branch	Retail insured depoits per branch	Retail uninsured deposits per branch	Wholesale deposits per branch
Deposits	1																
No of branches	0.954***	1															
Retail insured deposits	0.9242***	0.8577***	1														
Retail uninsured deposits	0.9765***	0.956***	0.8484***	1													
Wholesale deposits	0.9782***	0.909***	0.9204***	0.931***	1												
Operating expenses	0.9726***	0.8902***	0.8894***	0.9418***	0.9659***	1											
Customer complaints	0.8774***	0.8807***	0.7436***	0.9231***	0.8338***	0.8435***	1										
Frauds in amount	0.4555***	0.5572***	0.3208***	0.5193***	0.3942***	0.4057***	0.5305***	1									
No of Frauds	0.4224***	0.3238***	0.3576***	0.3921***	0.458***	0.4911***	0.3073***	0.1671*	1								
Operating expense per branch	0.0244	-0.1053	-0.0109	-0.021	0.0583	0.1864*	-0.028	-0.105	0.2146**	1							
Complaints per branch	0.3211***	0.3025***	0.2218**	0.3541***	0.313***	0.3212***	0.5388***	0.1972*	0.2879***	0.1157	1						
Fraud amount per branch	-0.0636	-0.0579	-0.061	-0.0543	-0.0599	-0.0607	-0.0339	0.4937***	-0.0258	-0.0069	-0.0105	1					
No of frauds per branch	-0.0336	-0.0634	-0.0388	-0.038	-0.0168	-0.0077	-0.0273	-0.0539	0.6972***	0.1787*	0.2321**	-0.011	1				
Deposits per branch	0.2995***	0.166*	0.2403***	0.2368**	0.311***	0.4175***	0.1676*	-0.0404	0.3201***	0.864***	0.1912*	-0.153	0.1121	1			
Retail insured deposits per branch	0.4017***	0.3277***	0.5734***	0.3087***	0.4031***	0.3913***	0.2113**	0.0029	0.2118**	-0.0516	0.02	-0.126	-0.083	0.1974*	1		
Retail uninsured deposits per branch	0.5082***	0.4222***	0.3657***	0.5251***	0.4725***	0.5461***	0.4209***	0.139	0.4196***	0.2372**	0.4478***	-0.1664*	0.0952	0.5346***	0.1944*	1	
Wholesale deposits per branch	0.3478***	0.2284**	0.2842***	0.2655***	0.4499***	0.4417***	0.2049**	0.0184	0.4611***	0.5749***	0.3455***	-0.079	0.1944*	0.6634***	0.1368	0.4563***	1

Source: authors calculations

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.001 level (2 tailed)

Table 8.2 correlation coefficients for all variables of Model 2

	Deposits	No of branches	Retail of insured deposits	Retail uninsured deposits	Wholesale deposits	Operating expenses	Customer complaints	Frauds in amount	No of Frauds	Operating expense per branch	Complaints per branch	Fraud amount per branch	No of frauds per branch	Deposits per branch	Retail insured depoits per branch	Retail uninsured deposits per branch	Wholesale deposits per branch
Deposits	1																
No of branches	0.9725***	1															
Retail insured deposits	0.9081***	0.8507***	1														
Retail uninsured deposits	0.9753***	0.9635***	0.8121***	1													
Wholesale deposits	0.9818***	0.9463***	0.9153***	0.9349***	1												
Operating expenses	0.9942***	0.9594***	0.9034***	0.9773***	0.9761***	1											
Customer complaints	0.8975***	0.8988***	0.7267***	0.934***	0.8607***	0.9013***	1										
Frauds in amount	0.4802***	0.5696***	0.2835*	0.5564***	0.4185***	0.4692***	0.5709***	1									
No of Frauds	0.8158***	0.8021***	0.7069***	0.8492***	0.7852***	0.8497***	0.7761***	0.6475***	1								
Operating expense per branch	0.8962***	0.8554***	0.8122***	0.8705***	0.8575***	0.8963***	0.7747***	0.3741***	0.7009***	1							
Complaints per branch	0.5132***	0.5437***	0.3423***	0.558***	0.4662***	0.4967***	0.7691***	0.4228***	0.3793**	0.4479***	1						
Fraud amount per branch	-0.1345	-0.1002	-0.1937	-0.0828	-0.1717	-0.1375	-0.0221	0.5506***	0.0157	-0.1796	0.0695	1					
No of frauds per branch	0.2422	0.2174	0.261*	0.2752*	0.2315	0.2889*	0.2388	0.2449	0.6044***	0.2203	0.026	0.0364	1				
Deposits per branch	0.8598***	0.8189***	0.7673***	0.8181***	0.8129***	0.8277***	0.7215***	0.3557**	0.5782***	0.8933***	0.5012***	-0.1589	0.0693	1			
Retail insured deposits per branch	0.4209***	0.3995**	0.6768***	0.3032*	0.4118**	0.4066***	0.2413	0.062	0.3279*	0.4036***	0.0277	-0.1806	0.2439	0.4574***	1		
Retail uninsured deposits per branch	0.6796***	0.6481***	0.438***	0.7676***	0.5822***	0.6746***	0.6923***	0.4036**	0.5378***	0.7452***	0.5251***	-0.0074	0.1518	0.7481***	0.0075	1	
Wholesale deposits per branch	0.7571***	0.7473***	0.6924***	0.6699***	0.8332***	0.7281***	0.6198***	0.255*	0.5089***	0.6726***	0.4053**	-0.2651*	0.0432	0.7239***	0.3042*	0.3298*	1

Source: authors calculations

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.001 level (2 tailed)

Table 8.3 Correlation coefficients for variables of Model 3

	Deposits	No of branches	Retail of insured deposits	Retail uninsured deposits	Wholesale deposits	Operating expenses	Customer complaints	Frauds in amount	No of Frauds	Operating expense per branch	Complaints per branch	Fraud amount per branch	No of frauds per branch	Deposits per branch	Retail insured depoits per branch	Retail uninsured deposits per branch	Wholesale deposits per branch
Deposits	1																
No of branches	0.9672***	1															
Retail insured deposits	0.9376***	0.8773***	1														
Retail uninsured deposits	0.9866***	0.963***	0.9108***	1													
Wholesale deposits	0.9776***	0.9611***	0.9158***	0.9539***	1												
Operating expenses	0.9485***	0.9136***	0.8427***	0.9168***	0.9324***	1											
Customer complaints	0.75***	0.7645***	0.6676***	0.752***	0.7692***	0.7437***	1										
Frauds in amount	0.0694	0.1199	0.0425	0.0683	0.0871	0.0796	0.0434	1									
No of Frauds	0.5712***	0.5569***	0.488***	0.5721***	0.5893***	0.5648***	0.5015***	0.0624	1								
Operating expense per branch	0.1954*	0.0871	0.0925	0.1287	0.1851	0.4052***	0.1292	0.0002	0.1713	1							
Complaints per branch	0.1264	0.1014	0.0909	0.1593	0.158	0.1337	0.5495***	-0.0311	0.2847**	0.1228	1						
Fraud amount per branch	-0.0864	-0.0755	-0.0766	-0.0866	-0.0725	-0.0771	-0.0692	0.8699***	-0.02	-0.0259	-0.0175	1					
No of frauds per branch	0.0158	-0.0038	-0.0071	0.0145	0.0294	0.0332	0.0601	-0.0166	0.7396***	0.1476	0.3083***	0.001	1				
Deposits per branch	0.4635***	0.3521***	0.355***	0.4093***	0.423***	0.5918***	0.3316***	-0.0824	0.28**	0.8811***	0.1503	-0.1676	0.095	1			
Retail insured deposits per branch	0.5387***	0.4816***	0.6993***	0.5201***	0.5028***	0.448***	0.4045***	-0.0982	0.1961*	-0.0819	0.0139	-0.1419	-0.1	0.1775	1		
Retail uninsured deposits per branch	0.6021***	0.5637***	0.49***	0.6592***	0.5514***	0.5994***	0.5689***	-0.0565	0.4072***	0.2655**	0.4246***	-0.1875	0.1142	0.5425***	0.2662***	1	
Wholesale deposits per branch	0.5719***	0.5291***	0.444***	0.5259***	0.6586***	0.6322***	0.5151***	0.0539	0.4454***	0.5596***	0.3733***	-0.0883	0.1863	0.6459***	0.1191	0.5128***	1

Source: authors calculations

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.001 level (2 tailed

Results of panel regression methods for all three models (all banks, 12 PSBs and 19 PVBs) have been presented in table 9 with independent variable as number of domestic branches. Table 9.1 has dependent variable as total deposits, 9.2 has dependent variable as retail insured deposits, Table 9.3 has retail uninsured deposits while Table 9.4 has wholesale deposits as dependent variable.

Table 9 shows the relationship between independent variable number of branches and dependent variable deposits for model 1 (31 banks), Model 2(12 PSBs) and Model 3(19 PVBs)

Table 9.1 : Results of Panel data regression for Independent variable Number of domestic branches and dependent variable deposits for 3 models: Model 1 (31 banks), Model 2: (12 PSBs) and Model 3 (19 PVBs)

	Model 1 : 31 banks	**Model 2 : 12 PSBs**	**Model 3 : 19 PVBs**
Model type used	RE @	RE @	FE @
Intercept	-753204.608	(30,96,400.00)	
	(381553.485)*	(488585.25)*	
No of domestic branches	1518.614	1,664.00	3063.7
	(180.09)***	(119.53)***	(188.62)***
R2	0.76929	0.88506	0.82478
Adjusted R2	0.76788	0.88308	0.78044
F statistic			390.678 on 1 and 83 DF
Chisquare	543.517 on 1 DF	446.632 on 1 DF	
P value of model	0	0	0
Serial correlation	Yes	Yes	Yes
cross sectional dependence	Yes	Yes	
Heteroscedasticity	Yes	Yes	Yes

@ denotes use of robust panel standard corrected errors used in presence of serial correlation or cross sectional dependence or heteroscedasticity or all

Source: authors calculations

Table 9.2 : Results of Panel data regression for Independent variable Number of domestic branches and dependent variable retail insured deposits for 3 models: Model 1 31 banks, Model 2: 12 PSBs and Model 3 19 PVBs

	Model 1 : 31 banks	**Model 2 : 12 PSBs**	**Model 3 : 19 PVBs**
Model type used	RE @	RE @	FE @
Intercept	-224679.403	-615440.126	
	(89041.417)*	(226915.919)**	
No of domestic branches	253.501	277.226	774.758
	(26.81)***	(29.325)***	(223.75)***
R2	0.60139	0.62183	0.56365
Adjusted R2	0.59895	0.61531	0.45325
F statistic			107.216 on 1 and 83 DF
Chisquare	245.922 on 1 DF	95.3705 on 1 DF	
P value of model	.0000	.0000	.0000
Serial correlation	Yes	Yes	
cross sectional dependence	Yes		Yes
Heteroscedasticity	Yes	Yes	Yes

@ denotes use of robust panel standard corrected errors used in presence of serial correlation or cross sectional dependence or heteroscedasticity or all

Source: Authors calculations

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.001 level (2 tailed)

Table 9.3 : Results of Panel data regression for Independent variable Number of domestic branches and dependent variable retail uninsured deposits for 3 models: Model 1 31 banks, Model 2: 12 PSBs and Model 3 19 PVBs

	Model 1 : 31 banks	**Model 2 : 12 PSBs**	**Model 3 : 19 PVBs**
Model type used	FE @	FE @	FE @
Intercept			-404616.599 (69543.570)***
No of domestic branches	494.293 (53.84)***	447.883 (103.77)***	876.653 (52.019)***
R2	0.50739	0.47949	0.8549
Adjusted R2	0.3833	0.34659	0.85349
F statistic	134.931 on 1 and 131 DF	43.2957 on 1 and 47 DF	95.3705 on 1 DF	107.216 on 1 and 83 DF
Chisquare			.0000	606.847 on 1 DF
P value of model	.0000000	.0000000	.0000000
Serial correlation			
cross sectional dependence	Yes		Yes
Heteroscedasticity	Yes	Yes	Yes

@ denotes use of robust panel standard corrected errors used in presence of serial correlation or cross sectional dependence or heteroscedasticity or all

Source: Authors calculations

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.001 level (2 tailed)

Table 9.4 : Results of Panel data regression for Independent variable Number of domestic branches and dependent variable wholesale deposits for 3 models: Model 1 31 banks, Model 2: 12 PSBs and Model 3 19 PVBs

	Model 1 : 31 banks	**Model 2 : 12 PSBs**	**Model 3 : 19 PVBs**
Model type used	RE @	RE @	FE @
Intercept	-229996.68 (126914.256)	-981821.448 (228979.718)***	
No of domestic branches	349.225 (51.158)***	391.471 (39.564)***	774.404 (69.636)***
R2	0.61365	0.78453	0.62244
Adjusted R2	0.61128	0.78082	0.52691
F statistic			
Chisquare	258.895 on 1 DF	211.185 on 1 DF	136.833 on 1 and 83 DF
P value of model	.0000000	.0000000	.0000000
Serial correlation	Yes	Yes	Yes
cross sectional dependence	Yes	Yes	
Heteroscedasticity	Yes	Yes	Yes
cross sectional dependence	Yes	Yes	
Heteroscedasticity	Yes	Yes	Yes

@ denotes use of robust panel standard corrected errors used in presence of serial correlation or cross sectional dependence or heteroscedasticity or all

Source: Authors calculations

* Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed). *** Correlation is significant at the 0.001 level (2 tailed)

Independent samples t test was used to compare banking parameters between PSBs and PVBs on totality basis (table 10.1) as well as per branch basis(Table 10.2). Deposits on a per branch basis differentiated between total deposits, retail insured deposits, retail uninsured deposits, wholesale deposits are reflected in Table 10.3. Hedges' g measure (Hedges & Olkin, 1985)[30] has been used as hedges g is preferred over cohen'd when the sample size is different (Lakens D , 2013)[11].

Table 10.1 Comparisons of banking parameters between PSBs and PVBs using independent samples t test

	PSB		PVB		Df	t value	p value	Hedges' g	Interpretation
	M	SD	M	SD					
Deposits_Total assets	0.8550	0.0289	0.7550	0.1082	t(128.10)	-8.93525	<.0001	1.13514	Large effect size
Cost of deposits	0.0456	0.0065	0.0525	0.0104	t(161.72)	5.2284	<.0001	0.74937	Medium to large effect size
No of branches	6,572.88	5,451.18	1,539.13	1,648.35	t(65.22)	-6.97297	<.0001	1.42436	Large effect size
Customer complaints	6,47,248.80	10,45,422.60	1,10,807.34	1,69,753.09	t(60.78)	-3.94511	0.0002	0.83375	Large effect size
Fraud amounts	54,286.37	64,760.87	13,781.83	36,135.93	t(80.41)	-4.46385	<.0001	0.83533	Large effect size
No of frauds	709.03	1,273.62	1,140.95	2,506.06	t(158.6)	1.45592	0.1474	0.20151	small effect size

Source: Authors calculations

Table 10.2 Comparisons of banking parameters between PSBs and PVBs on a per branch basis using independent samples t test

	PSB		PVB		Df	t value	p value	Hedges' g	Interpretation
	M	SD	M	SD					
Opex per branch	10.17	3.61	23.41	19.66	t(115.91)	6.70957	<.0001	0.835	Large effect size
Complaints per branch	67.91	68.93	65.38	61.51	t(111.77)	-0.23575	0.8141	0.03936	small effect size
Fraud amount per branch	8.79	6.53	13.58	57.8	t(108.59)	0.83996	0.4028	0.10339	small effect size
No of frauds per branch	0.09	0.08	0.75	3.42	t(102.21)	1.93838	0.0553	0.23919	small effect size

Source: authors calculations

Table 10.3 Bank type comparisons of Deposits per branch in each deposit type category

	PSB		PVB		Df	t value	p value	Hedges' g	Interpretation
	M	SD	M	SD					
Total deposits	993.864	298.017	1245.6	800.25	t(145.5)	2.89144	0.0044	0.37917	Medium effect size
Retail insured deposits	146.608	113.518	133.52	119.79	t(128.4)	-0.69835	0.4862	0.111366	small effect size
Retail uninsured deposits	492.34	181.364	465.32	248.28	t(153.29)	-0.80185	0.4239	0.11936	small effect size
Wholesale deposits	180.478	101.11	253.68	217.64	t(157.7)	2.93624	0.0038	0.39744	Medium effect size

Source: authors calculations

Tables 10.1 explains that PSBs have a significantly higher proportion of deposits funding their balance sheet with a large effect size and cost of deposits for PSBs is significantly lower than that of PVBs with a medium to large effect size. PSBs have a significantly larger number of branches, significantly higher number of customer complaints and significantly higher amount of frauds as compared to PVBs. No significant difference between number of frauds in PSBs and PVBs.

Table 10.2 demonstrates that only operating expenses per branch are significantly higher for PVBs as compared to PSBs. No significant difference in complaints per branch, fraud amounts per branch and fraud number per branch between PSBs and PVBs.

Table 10.3 highlights the differences between PSBs and PVBs on a per branch basis for different deposit categories. Deposits per branch for PVBs are significantly higher than that of PSBs (with medium effect size) and this mainly due to wholesale deposits per branch (with medium effect size). No significant difference between retail deposits both insured and uninsured for PSBs and PVBs ,albeit lower retail deposits on a per branch basis for PSBs as compared to PVBs. This shows that PVBs are able to drive their deposits per branch using wholesale deposits instead of retail deposits. PSBs are strong in managing a higher retail deposit base which is leading to lower cost of deposits. (Samant & Bhatkal, 2024)[24].

CONCLUSIONS

Influence of branches opening on deposits and other aspects of banks

Increase in the branches will lead to increase in deposits across all deposit categories of retail and wholesale for both PSBs (Public sector banks) and PVBs(Private sector banks). However, this expansion will result in higher operating expenses, customer complaints, fraud amounts and number of frauds on an overall basis due to increase in scale of business.

On a per branch basis, PSBs are expected to have higher customer complaints per branch and operating expenses per branch while PVBs are not expected to have customer complaints and operating expenses increase per branch with expansion. Operating expenses per branch are significantly higher for PVBs as compared to PSBs and these are being offset by significantly higher deposits per branch for PVBs as compared to PSBs.

Banks need to focus on bringing in greater operating efficiencies with increasing scale and compliance requirements. Post analysis of reasons for frauds, improved customer awareness and higher customer service standards should be focused on. PSBs need to assess customer service as the customer complaints on per branch basis are moderately positive and significantly correlated with number of branches. Allowing for banks to use their CSR funds for customer awareness regarding frauds can be implemented to improve understanding of conditions that allow for frauds and instill greater confidence in the minds of depositors regarding the banks.

PSBs (Public sector banks) Vs PVBs(Private sector banks)

PSBs have a larger branch network than PVBs and as deposits are strongly correlated with deposits, this has resulted in higher deposits to total assets for PSBs. Implications are clear with cost of deposits being significantly lower for PSBs as compared to PVBs. However, with a greater branch network, customer complaints of PSBs are significantly higher than that of PVBs. Though customer complaints are higher for PSBs, there is no significant difference in the number of frauds reported by PSBs to those of PVBs. However, amount of Frauds reported by PSBs are significantly higher than those of PVBs.

On a per branch basis, no significant difference was found between complaints, fraud amounts and no of frauds of PSBs and PVBs. However, operating expenses per branch were significantly higher of PVBs than those of PSBs.

For PSBs, strong positive correlations are seen between deposits, no of branches, operating expenses, customer complaints, no of frauds and fraud amounts. Therefore, we see a significant difference between fraud amounts of PSBs and PVBs. PSBs have a larger amount of frauds than PVBs, can be stemming from significantly larger branch network.

For PVBs, strong positive correlations are seen between deposits, no of branches, operating expenses, customer complaints, no of frauds. No correlation is seen between amount of fraud and deposits or no of branches. This shows that increase in branches will lead to deposits growth and no of frauds growth but not amount of frauds. PVBs have been able to manage the amount of the frauds effectively.

LIMITATION OF THE STUDY

Macro-economic factors like GDP growth rate, Inflation, interest rates as per monetary policy announcements or financial markets data like performance of stock markets, Number of mutual fund folios, mutual fund AUMs as well as bank specific factors like level of technology adoption by bank, its customers, differences in demographic aspects of major customer segments between PSB and PVBs have not been considered for this study.

SCOPE FOR FURTHER RESEARCH

The study highlights that increase in number of branches will positively influence growth of all deposits: retail insured, retail uninsured and Wholesale deposits. At the same time, it will increase operating expenses, customer complaints, number of frauds too. It will increase amount of frauds for PSBs but not PVBs. The factors influencing fraud amounts between PSBs and PVBs can be an area of future research. Identification of factors other than number of branches for augmenting deposits is another area of research, which can present banks various choices to support their balance sheet growth and protect their NIMs.

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RESEARCH

A STUDY OF PERFORMANCE ANALYSIS OF PRIVATE SECTOR BANKS IN INDIA THROUGH CAMEL RATING MODEL

Dr. Rekha Melwani & Ms. Pranjali Kanade*

Abstract

Banks play an important role in capital formation and economic development of any nation. Banking industry plays vital role and serves as a backbone where financial system of any economy dependent on it. Banks' Performance is always considered as a crucial factor of economic growth of any Nation. The contribution of Banking Performance towards the economy is the primary factor of any country. The private sector banks in India play a significant role in facilitating investment and capital flow, both domestically and internationally. The undertaken study is an attempt to analyze the performance of private sector banks in the light of CAMEL rating Model. The study has used secondary sources of data and data has been collected from Annual reports of the considered Banks. The considered Private Sector Banks were HDFC Bank, ICICI Bank, Axis Bank, Kotak Mahindra Bank and IDBI Bank; top five private sector banks in India according to the market capitalization. The CAMEL rating parameters were Capital Adequacy, Asset Quality, Management Capability, Earning capability and Liquidity to analyze the financial strength of Banks of Private sector in India.

Key Words: *Performance, Capital Adequacy, Camel Rating Model, Liquidity, Asset Quality*

INTRODUCTION

Banks play an important position in capital formation and economic development of the country. Banking industry plays vital role and serves as a backbone where financial system of any economy dependent on it. Financial sector of Indian economy have a vital role in its economic development. Banking industry provides support to the economy and industries in specific time of recessions and economic crisis. Banks have a vital position in the growth of an economy by deploying savings and utilizing these savings in funding the most productive sectors (Alkhazaleh et. al 2015, Biswas S. et.al. 2020). Banks' performance is always considered to be a crucial factor of economic growth any country (Joshi A.M.et.al., 2018). The operations of Banks include the collection of deposits from surplus and provide loans to the investors that have contribution to the total economic growth. The latest developments in the banking industry focused on channelization the funds which have vital contribution in economic activities directly. Since Banking performance plays important role therefore, academic researchers are gradually showing their concern on it and its effect on economic growth.

The contribution of Banking Performance towards the economy of the country is the primary factor of any country (Prochniak et. al. 2016, Iheanyi et.al. 2017). The financial reforms which was introduced by the Indian government in the last decade has notably influenced the landscape of different sectors of the economy (Kamath et. al., 2003). The need of study of banking performance is more important in the event of introducing financial reforms. The ability of a bank to compete in the market and play a vital part in the development of the sector are determined by its performance evaluation and financial stability. The performance of banks has implications for its stakeholders and the entire economy of a nation. So, the need of performance evaluation is required to evaluate the bank's financial standing (Alam et. al. 2021, Mohiuddin, 2014, Aspal P.K. et.al., 2016).

***Dr. Rekha Melwani,** Associate Professor, Department of Management (PG), Shri Vaishnav Institute of Management, Indore. **Email :** drrekhamelwani@gmail.com*

***Ms. Pranjali Kanade,** Student, MBA, (FA) II year, Shri Vaishnav Institute of Management, Indore. **Email :** pranjalikanade95@gmail.com*

LITERATURE REVIEW

Ray et. al. (2004) has evaluated the performance of various Banks including Private sector, Public sector and foreign banks in reference with the profitability and growth. The study used secondary sources of data during the year 1992-2000 and performance was compared among various considered banks. CAMEL rating model was used to analyze the financial soundness of the Banks and performance. Pandey et. al. (2015) have studied the performance analysis of financial position of foreign Bank and private Bank. Here DEA model was used to analyze the performance in terms of technological efficiency. In this analysis statistical methods were used to analyze data which was based on secondary sources data and VRS model was applied to analyze the operational efficiency. Nimalathasan (2008) has analyzed the performance of private sector banks as well as foreign banks in regard with their efficiency and performance. The study used secondary sources of data for the consecutive seven year i.e. from 1999 to 2006. The performance was measured through CAMEL rating model. B. Lavanya et. al. (2018) studied strength and weakness of Banks using Camel method to evaluate financial soundness, where secondary data was taken from the year 2012-2017 of various Banks. The study used one way ANOVA technique and assessed the parameters like assets management, earnings, and liquidity ratios to calculate relative position of banks. To measure risk of bank failure, study analyzed the earning capacity and working efficiency of banks to measure financial soundness.

Rao (2014) used CAMEL model to evaluate the financial performance of public and private sector banks. It was concluded that the private sector banks performed well in comparison with public sector banks. Study by Rajeshwari S. et.al. (2021) undertaken the evaluation of performance of Public as well Private sector Banks. The study used CAMELS rating model on various parameters like Capital adequacy, Asset quality, Management efficiency, Earning quality, Liquidity and sensitivity for measuring the performance of the banks. The study was conducted on the secondary sources of data and that have been collected for the period of ten years; from 2007-2008 to 2016-2017. The results of the study indicated that HDFC & AXIS Banks were performed above average; whereas BOI & Indian Bank were seen as below average. The results of the study concluded that Private sector Banks performed better than the public sector for the considered period. Sangmi et. al. (2010) analyzed the financial soundness of Punjab National Bank and Jammu and Kashmir Bank. CAMEL rating model was used to analyze the performance of the selected Banks for the period from 2001 to 2005. The results of the study indicated Jammu and Kashmir Bank was not successful as compared to Punjab national bank because management quality of Punjab national Bank was shown better than the Jammu and Kashmir Bank. Study by Talreja J. et. al. (2016) analyzed the financial performance of public as well private sector banks in India by Camel rating model. The results of the study indicated that Private sector banks' performance showed better in terms of capital adequacy, earning capability and asset quality on the other hand public sector banks' performance had shown better in terms of liquidity and management capability for the study period. Rustam et. al. (2015) compared the performance efficiency of two major Banks in India Viz. SBI and HDFC Bank. The study used secondary sources of data and that have been analyzed through CAMEL rating Model. The ROA, ROE and profitability ratios were used to analyses the management soundness to ascertain the performance. CAMEL rating model was applied and estimated financial soundness of the Banks. The study analyzed the financial strength of the considered Banks and analyzed the financial efficiency.

Studied by Vasani (2020) aimed to evaluate the performance of Banks belonged to private sector in India. This study was based on secondary sources of data and a period of eight years i.e. from 2011-2019 was studied. The study used ANOVA and results showed that the though the performance of Yes Bank declined but better than

HDFC Bank. The results indicated that the performance of HDFC Bank was continuously in a good condition owing to the high Earnings ratios. The results also depicted that Yes Bank showed declining financial position because of management issues. On the basis of review of various national and international journal it has been found that there is need to analyze the performance of Indian Banks at various time periods. The current study is an attempt to analyze the financial performance of Private sector Banks from year 2019 to 2023 by CAMEL rating Model.

RESEARCH OBJECTIVE

The present study has an objective to analyze the performance of selected Private Banks in India through CAMEL rating Model.

RESEARCH METHODOLOGY

The present study has an attempt to analyze the performance of selected Private Banks in India through CAMEL rating Model. Secondary sources of data have been used and the same has been collected from the annual reports of the considered banks. The period of five consecutive years was taken i.e. from 2019 to 2023. The sample of the study has considered the five top private banks in India as per market capitalization Viz. ICICI, HDFC, AXIS, IDBI and Kotak Mahindra Bank. The performance of the Banks has been analyzed through CAMEL rating model which is based on various ratios (Gowri M. et. al. 2015, Sharma S. et. al. (2019). The parameters of CAMEL rating Model are Capital Adequacy, Asset Quality, Management Capability, Earning and Liquidity. The Capital Adequacy measured by Capital Adequacy Ratio and Equity Ratio. Asset Quality Parameter measured by Net NPA to advance and net NPA to total assets. Management parameter measured by Earning Per Share, Credit Deposit Ratio, Loan turnover, Asset turnover, Return on Net worth and Cost to Income Ratio. Earning and Profitability parameter measured by Return on Assets (ROA), Return on Equity (ROE) and Interest Spread. Liquidity parameter was measured through Investment to Deposits, Current Ratio, Quick Ratio, Liquid assets to total assets ratio and Liquid assets to total deposits ratio.

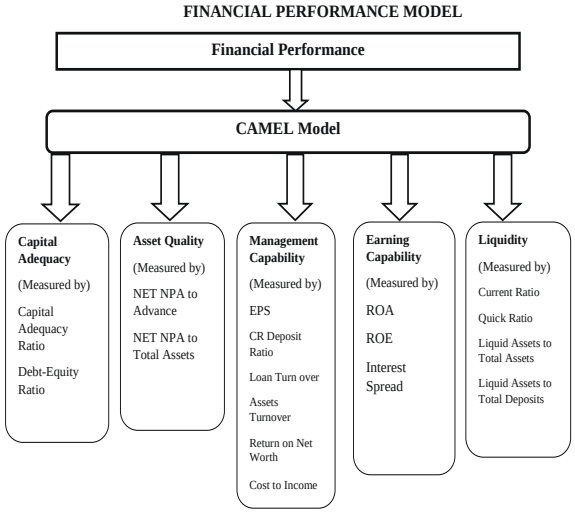

Figure 1: Financial Performance Model

DATA ANALYSIS & INTERPRETATION

The CAMEL framework analyzed the Bank Performance on various permanents through various ratios. The collected data for the considered Banks from Private Sector of India have been evaluated and analyzed through various parameters of CAMEL rating Model through MS Excel and has been tabulated as mentioned below:

Table No 1: Capital Adequacy

Bank	ICICI Bank		HDFC Bank		AXIS Bank		IDBI Bank		Kotak Mahindra Bank	
CAPITAL ADEQUACY	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
CAR	17.9240	1.3685	18.6560	1.0230	17.3340	2.0606	15.9960	3.7422	20.4380	2.5470
DEBT EQUITY RATIO	0.8220	0.0349	0.9780	0.1150	1.4020	0.0531	0.3580	0.0614	0.5140	0.0344

The Capital Adequacy parameter helps to measure risk weighted assets. It shows the financial strength of the Bank. The above mentioned table showed that the mean value of CAR of Kotak Mahindra Bank is 2.04380 which is higher than other Banks but at the same time it has higher standard deviation (2.5470). Mean value of CAR for HDFC bank is 18.6560 with the standard deviation of 1.0230 which showed the financial stability of HDFC bank in contrast with other private banks.

The Debt-Equity ratio is the ratio of debts to equity of the Bank. The higher value of ratio showed the higher debts and lower equity which enhances the financial risk. The table no. 1 showed that the debt equity ratio for all the considered banks are lower than 1. It indicates that the lower debt content is present in the capital structure.

Table No 2: Asset Quality

Bank	ICICI Bank		HDFC Bank		AXIS Bank		IDBI Bank		Kotak Mahindra Bank	
ASSETS QUALITY	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
NET NPA TO ADVANCE	1.5020	0.7036	0.2340	0.0288	1.2000	0.8367	3.6000	3.7815	0.7620	0.4325
NET NPA TO TOTAL ASSETS	0.0516	0.0311	0.0214	0.0034	0.0350	0.0235	0.0476	0.0198	0.0594	0.0231

Net NPA to advances ratio helps to check advances quality of the banks. The values indicated in the above table showed that the HDFC bank at the better position in contrast with the other considered banks.

Net Non Performing Asset (NPA) to total assets ratio determines risk of debt recovery. The lower value of ratio determined the lower risk of debt recovery. The table no. 2 indicated that mean value of the considered ratio of HDFC Bank (0.0214) is lower in contrast with the other considered banks. HDFC bank has the lesser risk of debt recovery in contrast with the other considered banks for the present study.

Table No 3 : Management Capability

Bank	ICICI Bank		HDFC Bank		AXIS Bank		IDBI Bank		Kotak Mahindra Bank	
MANAGEMENT	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.	MEAN	S.D.
EPS	24.1940	16.2604	1.1880	0.2688	28.1880	18.7481	-7.6000	14.7329	14.9500	9.1408
CR DEPOSITE RATIO	84.9280	4.7236	86.4400	0.6931	85.9320	3.9577	70.2600	2.9423	85.9360	3.2243
LOAN TURN OVER	0.1160	0.0055	0.1160	0.0134	0.0940	0.0195	0.1360	0.0114	0.1220	0.0084
ASSETS TURN-OVER	0.0700	0.0000	0.0880	0.0349	0.0720	0.0084	0.0720	0.0045	0.0780	0.0084
RETURN ON NET WORTH	10.2920	5.2339	15.1720	0.6152	7.8120	1.9994	5.4660	2.4353	3.9100	0.3336
COST TO IN-COME	43.3560	4.0725	38.6860	1.4423	46.7820	3.1279	84.6320	20.0403	43.1900	4.5208

The parameter Management has been measured through various ratio and table no 3 has been indicated the mean values with standard deviation. Earnings Per share (EPS) indicates how much money a Bank make from each share. The higher EPS ratio indicates the higher profitability. The mean value in regard with the AXIS bank is higher (28.1880) in contrast with the other considered Banks but at the same time it has higher deviation. More stability has been shown by ICICI Bank.

The credit-deposit ratio (CDR) indicates the percentage of loans that the Bank has issued relative to its total deposits. The higher mean values shown by HDFC Bank (86.4400) with lesser deviation. The performance of HDFC bank has shown better in contrast with the other considered banks on the basis of Credit Deposit Ratio (CDR).

The other management parameter includes ratio Return on Net worth which indicated that the HDFC Bank is in the better position in returns in contrast with the other considered private Banks.

Table No 4 : Earnings

Bank	**ICICI Bank**		**HDFC Bank**		**AXIS Bank**		**IDBI Bank**		**Kotak Mahindra Bank**	
EARNING	**MEAN**	**S.D.**	**MEAN**	**S.D.**	**MEAN**	**S.D.**	**MEAN**	**S.D.**	**MEAN**	**S.D.**
ROA	1.20600	709.8658	1.74800	0.04438	1.94600	0.89150	-2.08800	3.48435	9.26200	5.65848
ROE	2.89600	0.30599	3.25600	0.17501	2.32400	0.46726	2.18200	0.63216	0.50200	0.34845
INT. SPREAD	6.96800	0.32112	6.74800	0.42204	6.45400	0.45922	9.33200	1.31889	7.45800	0.64193

Return on Assets (ROA) ratio showed that how efficiently the assets generate the profitability for the banks. The above table no. 4 indicated that Kotak Mahindra Bank had shown higher ROA in contrast with the other considered Banks.

Return on Equity (ROE) helps to measure efficiency to generate profit and measure equity financing into profits for the Banks. The table indicated that HDFC Banks has higher ROE as compared to the other banks.

Interest spread showed the difference between private sector lending rate and deposit rate. The higher spreads leads to higher earnings for the banks. The table indicated that IDBI has higher interest spread for the considered period in contrast with the other considered Banks for the study undertaken. The deviation in interest spread is more in IDBI Bank.

Table No. 5: Liquidity

Bank	**ICICI Bank**		**HDFC Bank**		**AXIS Bank**		**IDBI Bank**		**Kotak Mahindra Bank**	
LIQUIDITY	**MEAN**	**S.D.**	**MEAN**	**S.D.**	**MEAN**	**S.D.**	**MEAN**	**S.D.**	**MEAN**	**S.D.**
CURRENT RATIO	0.08000	0.02550	0.04800	0.01483	0.10000	0.02236	0.49600	0.67918	0.04200	0.00447
QUICK RATIO	15.42400	1.93770	17.81200	1.28642	17.15400	0.55622	18.11000	6.58781	16.45200	1.03483
LIQ ASSETS TO TOTAL ASSETS	0.05960	0.02032	0.20400	0.41154	0.01980	0.01432	0.04400	0.02074	0.02120	0.01322
LIQ ASSET TO TOTAL DEPOSITS	0.71200	0.03271	0.75000	0.01000	0.69600	0.01342	0.73000	0.03873	0.69600	0.01342

The liquidity parameter refers to the Bank's ability to meet its short-term financial obligations by converting its assets into cash. It examines the liquidity risk and the interest rate risk. Here; Current ratio and Quick ratio have been calculated which indicated the Liquidity position of the considered Banks, The other two ratios are Liquid Assets to Total Assets Ratio and to total deposits. The table indicated that current ratio is very low in considered private banks for the considered period of the study.

Table No 6: Overall Performance Analysis

	BANK	ICICI Bank	HDFC Bank	AXIS Bank	IDBI Bank	Kotak Mahindra Bank	OVERALL
CAPITAL ADEQUACY	CAR	17.9240	18.6560	17.3340	15.9960	20.4380	18.0696
	DEBT EQUITY RATIO	0.8220	0.9780	1.4020	0.3580	0.5140	0.8148
ASSET QUALITY	NET NPA TO ADVANCE	1.5020	0.2340	1.2000	3.6000	0.7620	1.4596
	NET NPA TO TOTAL ASSETS	0.0516	0.0214	0.0350	0.0476	0.0594	0.0430
MANAGEMENT CAPABILITY	EPS	24.1940	1.1880	28.1880	-7.6000	14.9500	12.1840
	CR DEPOSITE RAT	84.9280	86.4400	85.9320	70.2600	85.9360	82.6992
	LOAN TURN OVER	0.1160	0.1160	0.0940	0.1360	0.1220	0.1168
	ASSETS TURNOVER	0.0700	0.0880	0.0720	0.0720	0.0780	0.0760
	RETURN ONNETWORTH	10.2920	15.1720	7.8120	5.4660	3.9100	8.5304
	COST TO INCOME	43.3560	38.6860	46.7820	84.6320	43.1900	51.3292
EARNING	ROA	1.20600	1.74800	1.94600	-2.08800	9.26200	2.4148
	ROE	2.89600	3.25600	2.32400	2.18200	0.50200	2.2320
	INT. SPREAD	6.96800	6.74800	6.45400	9.33200	7.45800	7.3920
LIQUIDITY	CURRENT RATIO	0.08000	0.04800	0.10000	0.49600	0.04200	0.1532
	QUICK RATIO	15.42400	17.81200	17.15400	18.11000	16.45200	16.9904
	LIQ ASSETS TO TOTAL ASSETS	0.05960	0.20400	0.01980	0.04400	0.02120	0.0697
	LIQ ASSET TO TOTAL DEPOSITS	0.71200	0.75000	0.69600	0.73000	0.69600	0.7168

Source : Author's Calculation

Overall Performance of private banks in India was analyzed through CAMEL rating model and the above mentioned data depicted that the position of considered private banks on the various parameters of Capital Adequacy, Asset Quality, Management Capability, Earning capability and Liquidity.

CONCLUSION

The present study was an attempt to analyze the Performances of selected Private Banks in India through CAMEL rating Model. The considered Private Sector Banks were HDFC Bank, ICICI Bank, Axis Bank, Kotak Mahindra Bank and IDBI Bank; top five private sector Banks in India. The parameters of CAMEL rating model were Capital Adequacy, Asset Quality, Management Capability, Earning capability and Liquidity to analyze the financial strength of private sector Banks in India. The Performance Evaluation of the considered Banks showed that the Capital Adequacy Ratio has shown the sufficient capital base for the considered banks for the study but at the same time the Banks should maintain the liquidity to pay the short term obligations. The interest spread can be enhanced so that positive impact will be shown on the profitability of the Banks which in turn showed the higher Returns to net worth, Return on Assets (ROA) and Return on Equity (ROE).

IMPLICATION OF THE STUDY

The present study focused on the analysis of financial performance of selected private sector Banks in India through CAMEL rating model. The findings of the study will motivate the private sector banks to enhance the performance in various dimensions viz. Capital Adequacy, Asset Quality, Management Capability, Earning capability and Liquidity. The results of the study are limited to the selected private banks; it cannot be generalized and do not applicable to public sector Banks in India. Secondary source of data has been used in the study and only limited ratios were selected to represent the CAMEL rating model. The future studies may cover the comparison of financial performance of public and private sector banks.

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RESEARCH

TO STUDY CONSUMER BEHAVIOUR WHILE BUYING EV'S

Sarthak Bhandari*

Abstract

The surge in electric vehicle(EV) adoption calls for deeper understanding of consumer behaviour within this evolving market. This study delves into the purchase opinions of implicit EV buyers, aiming to identify crucial factors impacting their choices. Using a Questionnaire survey, we collected data from 45 respondents who either already has a car or are willing to purchase. The results of the study indicate that battery warranty, the part of outspoken costs, running costs, charging infrastructure resale value and government rebates impulses in purchase opinions. Life factors probing how family needs, and access to charging infrastructure influence choices. Our findings reveal a strong correlation between price premium people are willing to pay and EV leads to less pollution. There is also a strong correlation between range and battery degradation used in decision making of buying EV's. This study contributes to a nuanced understanding of EV purchase geste , offering precious perceptivity for policymakers, manufacturers, and stakeholders aiming to navigate and accelerate the electric mobility transition.

Keywords: *Ev's, Electric Vehicles, Range*

INTRODUCTION

The Winding Road to Electrification- Exploring Consumer Behaviour in the EV Market.

The global transportation landscape is experiencing a monumental shift, fueled by the rapid-fire rise of electric vehicles(EVs). Driven by environmental concerns, technological advancements, and policy initiatives, EV deals are soaring, with industry analysts predicting they will outpace traditional gasoline- powered vehicles in the coming decades. Still, despite this instigation, understanding consumer behaviour remains pivotal to navigating this transition easily. Examining what influences individuals opinions to embrace or repel EVs is vital for policymakers, manufacturers, and stakeholders aiming to foster wide adoption. The evidence for the EV revolution is inarguable. In 2023, electric auto deals witnessed a 31% growth, pressing a consumer appetite for sustainable mobility results. International Energy Agency(IEA) Global EV Outlook 2023(https//www.iea.org/reports/global-ev-outlook-2023). This trend is imaged in India, with 50% growth. As exploration by https//www.autocarpro.in/analysis-sales/ev-sales-in-india-jump-50-to-138-million-units-in-january-november-2023-118053 demonstrates, environmental knowledge is a crucial motorist of this shift, with a growing number of consumers prioritizing emigration-free transportation. Still, the road to full electrification isn't without its twists and turns. Factors like outspoken costs, charging structure constraints, and range anxiety continue to cast murk on consumer confidence. A study by MIT Energy Initiative Consumer Choice and the Transition to Electric Vehicles(https//news.mit.edu/topic/electric-vehicles?-type=2)found that Power, which for an EV is generally lower than that of a gas- powered counterpart due to savings on conservation and energy.. Understanding these enterprises and addressing them through targeted policy interventions and technology invention is pivotal to accelerate EV relinquishment. This research paper delves into the complications of consumer behaviour in the EV request. We analyze the factors impacting purchase opinions, identify implicit walls to adoption, and explore

***Sarthak Bhandari,** Pgdm – Retail 2023-25,Welingkar Institute Of Management Development & Research (Weschool)*

arising trends shaping the future of electric mobility. Through a comprehensive check of potential EV buyers, we aim to exfoliate light on the provocations, enterprises, and preferences of individualities navigating this dynamic geography. Our findings offer precious insights for stakeholders seeking to insure a smooth and sustainable transition towards an electrified future.

The purpose of this research is to examine how consumers behave when purchasing EVs, as well as the major determinants of their choice and how these determinants may be used to boost demand for EVs. This initiative intends to contribute to a more environmentally friendly and sustainable transportation system by offering insights and suggestions for expanding the use of EVs.

LITERATURE REVIEW: Consumer Behaviour in the Purchase of Electric Vehicles.

The future of the electric vehicle (EV) market depends on our ability to comprehend consumer behaviour. In order to accelerate the adoption of electric vehicles (EVs) and navigate this ever-changing landscape, regulators, manufacturers, and stakeholders must prioritize studies that examine the factors that influence buying decisions. This study highlights significant drivers, obstacles, and new trends in the literature by analyzing important studies already conducted on consumer behaviour in EV purchases.

According to a survey by Eric Molin and Bert van Wee, consumers choose electric cars because they can help with problems like pollution, global warming, and oil dependency. But even so, despite substantial government marketing campaigns, there is little adoption of electric cars. The study analyzes psychological and economic aspects that affect consumers' decisions to buy electric vehicles and reviews prior research on consumer preferences in this area. According to the study, a number of variables, including brand diversity, driving range, charging time, initial and ongoing expenditures, and vehicle performance, affect how useful electric cars are. Tax discounts and incentives, along with the availability of charging stations, have a favorable impact on the utility and promotion of electric cars. The study intends to assist decision-makers and direct further research on this subject. Fanchao Liao, 2017.

One major factor influencing the adoption of EVs is environmental concerns. investigation by While Zhou et al. (2022) discovered a substantial association between eco-friendly ideals and EV preference, Mittal & Zauber (2021) indicated that environmental consciousness positively effects buying intentions.

Economic factors continue to be significant. Although initial expenses may provide a challenge (Fujita & Taylor, 2019), research such as Government incentives and a decreased total cost of ownership (TCO) can have a favourable impact on choice, as demonstrated by Li et al. (2023). Furthermore, Taylor et al. (2016) emphasize how consumer attitudes toward EVs are influenced by changes in gas prices. Perceptions of technology are important. Range anxiety is still a problem, as noted by according to Jensen et al. (2013), yet research from Woodjack et al. (2012) suggests that EV experience can lessen these fears. Furthermore, Bühler et al. (2014) discovered that EV experiences had a favourable influence on recommendations and purchase intentions.

A person's lifestyle plays a role in making decisions. Decisions may be influenced by family demands, driving habits, and the availability of charging stations (Taylor & Fujita, 2019). As an example, the availability of charging infrastructure is crucial for suburban inhabitants, as Zhang et al. (2020) point out. The larger sociocultural background is important in addition to individual considerations. investigation by Goetzke & Molinaro (2023) investigate how peer pressure and social norms affect the adoption of EVs. Li et al. (2022) also looks at how public policy and media coverage affect how consumers perceive products.

The adoption of EVs is going to be shaped by emerging trends. The emergence of car-as-a-service and shared mobility solutions, as covered byShaheen et al. (2021) can give prospective consumers who aren't sure they want to acquire an EV another way to access EVs. Wang et al. (2023) also draw attention to the expanding market for used EVs, which may make them more widely available to a variety of consumers.

To sum up, the literature provides insightful information about the complex aspects of consumer behavior when it comes to EV purchases. In order to facilitate a seamless and sustainable shift towards an electrified future, stakeholders must have a thorough understanding of key drivers, obstacles, and emerging trends.

There are prospects for more research in a number of areas.

Examining how particular policy interventions affect the decisions made by consumers.

Investigating the effects of demographic and cultural variables on EV adoption trends.

Investigating how well communication and marketing tactics shape consumer views.Further investigation into these fields will yield important insights to improve tactics and quicken the electrification of transportation networks.

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Objective of the study

The purpose of the study is to look into the factors that influence consumer behaviour when it comes to buying electric vehicles (EVs) and how these factors might be leveraged to increase EV demand. The following are the study's particular objectives:

To assess the critical factors influencing customer behaviour with regard to EV purchases.

Assessing the relative significance of these variables in influencing consumers' purchasing decisions for electric vehicles, as well as their interplay.

To find out how much consumer education and knowledge regarding EVs affects their decision to buy and how this may be improved.

To find out how consumers feel about electric vehicles, or EVs.

To acquire knowledge about the experiences of operating electric vehicles, or EVs.

- Does range and battery degradation effect the decision making of buying an EV.
- Are consumers willing to pay a premium for EV's given they are less pollutive in nature.

RESEARCH METHODS

As part of this research a survey form was created in order to understand the consumer behaviour. In Total 45 responses were received. The research also includes visiting various websites, articles and collecting related data. The purpose of this research is to understand is IOT implemented or not in different organizations, what is the overall effect on supply chain and how they are planning to execute it in future.

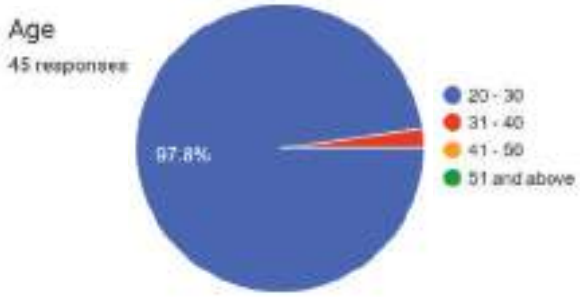
In order to gather and evaluate data, the project's study approach on consumer attitudes about buying electric cars (EVs) mixes qualitative and quantitative research techniques. The method of study is designed to provide a comprehensive understanding of the components, factors, including personal, psychological, social, and cultural ones, that influence consumers' choices to buy electric cars.

The main steps in the project's research process are as follows:

The research design for this study is a combination of descriptive and exploratory methodologies. Whereas descriptive research uses surveys to gather and analyse data, exploratory research examines the body of existing research on how consumers behave when buying electric cars.

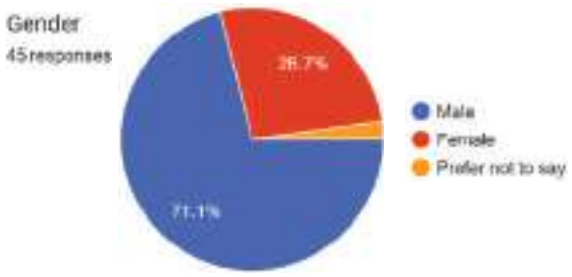
- Data Collection: One method is used in the data collection process: surveys. To collect quantitative data, a survey questionnaire will be created and sent to a sample of prospective EV buyers. The purpose of the questionnaire is to gather details on the variables that affect consumers' decisions to purchase electric vehicles.
- Data Analysis: The information gathered from the surveys and interviews will be examined using both descriptive and inferential statistical techniques.
- Descriptive Statistics: The information obtained from the questionnaires will be compiled with descriptive statistical methods.
- Inferential Statistics: Inferential statistics will be used to test the hypotheses and relationships between the variables. To analyse the data, regression analysis and other statistical tests will be run.
- Findings and Conclusion: Tables, charts, and graphs will be used to display the data analysis findings. Conclusions will be reached after a discussion and interpretation of the data.

Data analysis/ Interpretation



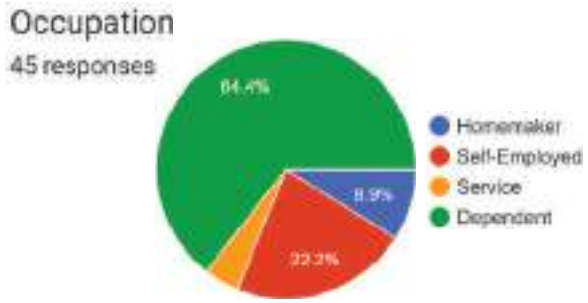
Interpretation: The primary data was collected from 45 respondents and the distribution of respondents across different age categories is as follows:

- 97.8% of respondents belong to the 20-30 age category.
- 2.2% of respondents belong to the 31-40 age
- category.



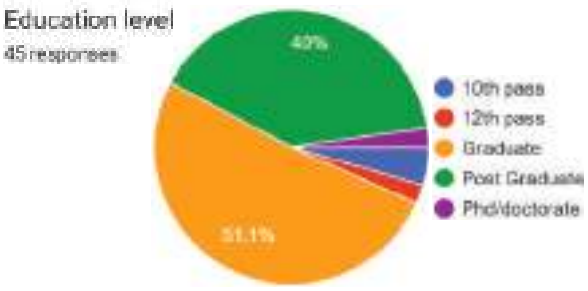
Interpretation: The primary data was collected from 45 respondents and the distribution of respondents across different genders is as follows:

- 71.1% of respondents are males
- 26.7% of respondents are females
- 2.2% respondents prefer not to say



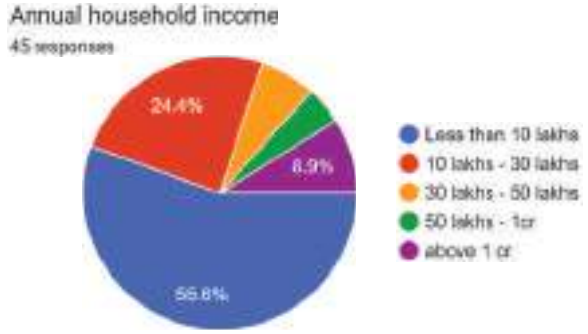
Interpretation: The primary data was collected from 45 respondents and the distribution of respondents across different occupations is as follows:

- 64.4% of the respondents are dependent on others.
- 8.9% of the respondents are homemakers
- 22.2% of the respondents are self employed
- 4.4% of the respondents are in service sector.



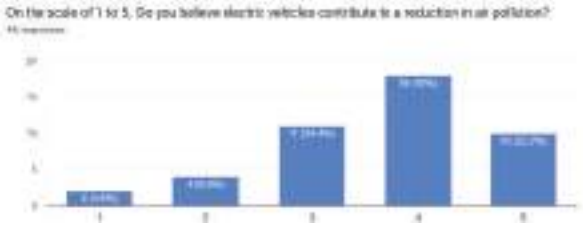
Interpretation: The primary data was collected from 45 respondents and the distribution of respondents across different education levels is as follows:

- 40% of the respondents are post graduates
- 2.2% of the respondents are post graduates/ doctorates
- 4.4% of the respondents are 10th pass
- 2.2% of the respondents are 12th pass
- 51.1% of the respondents are graduates

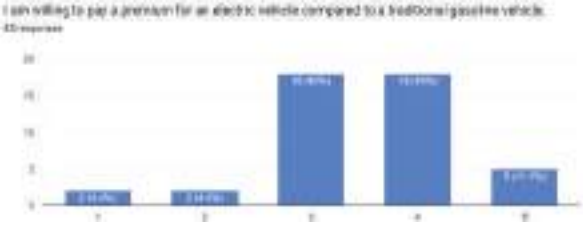


Interpretation: The primary data was collected from 45 respondents and the distribution of respondents across different household income levels is as follows:

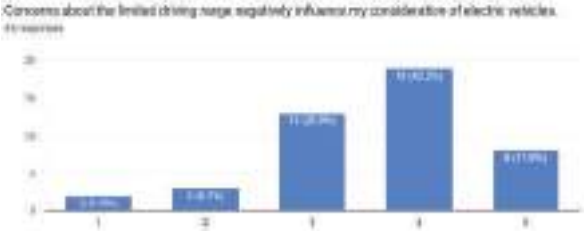
- 24.4% of the respondents earn between 10 lakhs- 30 lakhs
- 6.7% of the respondents earn between 30 lakhs- 50 lakhs
- 4.4% of the respondents earn between 50 lakhs- 1crore
- 8.9% of the respondents earn above 1 crore
- 55.6% of the respondents earn less than 10 lakhs



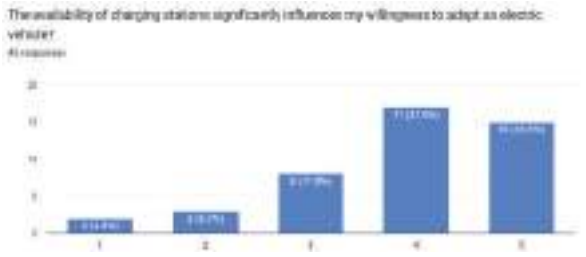
1	(strongly disagree)	2	4.4%
2	(disagree)	4	8.9%
3	(neutral)	11	24.4%
4	(agree)	18	40%
5	(Strongly agree)	10	22.2%



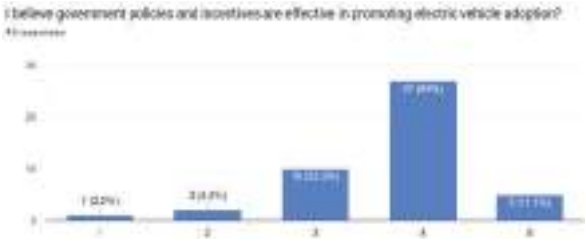
		No. of respondents	Percent of respondents
1	(Strongly disagree)	2	4.4%
2	(Disagree)	2	4.4%
3	(Neutral)	18	40%
4	(agree)	18	40%
5	(strongly agree)	5	11.1%



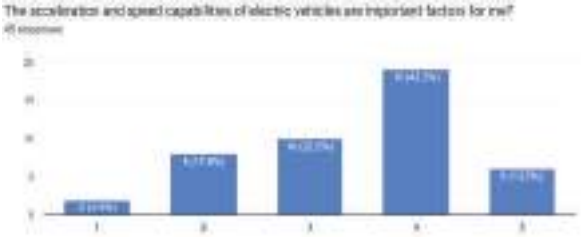
		No. of respondents	Percent of respondents
1	(strongly disagree)	2	4.4%
2	(disagree)	3	6.7%
3	(neutral)	13	28.9%
4	(agree)	19	42.2%
5	(strongly agree)	8	17.8%



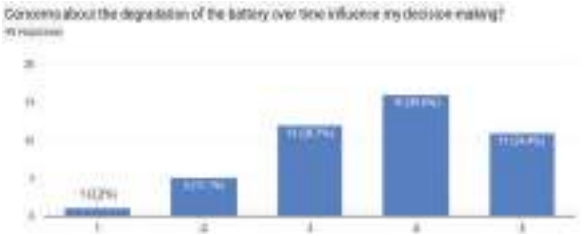
		No. of respondents	Percent of respondents
1	(Strongly Disagree)	2	4.4%
2	(Disagree)	3	6.7%
3	(Neutral)	8	17.8%
4	(Agree)	17	37.8%
5	(Strongly Agree)	15	33.3%



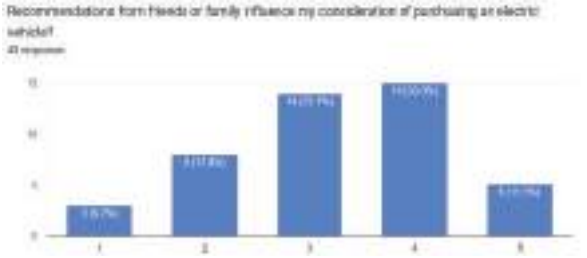
		No. of respondents	Percent of respondents
1	(Strongly Disagree)	1	2.2%
2	(Disagree)	2	4.4%
3	(Neutral)	10	22.2%
4	(Agree)	27	60%
5	(Strongly Agree)	5	11.1%



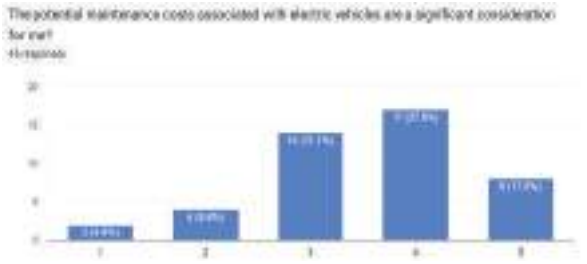
		No. of respondents	Percent of respondents
1	(Strongly disagree)	2	4.4%
2	(Disagree)	8	17.8%
3	(Neutral)	10	22.2%
4	(Agree)	19	42.2%
5	(Strongly Agree)	6	13.3%



		Name of respondents	Percent of respondents
1	(Strongly Disagree)	1	2.2%
2	(Disagree)	5	11.1%
3	(Neutral)	12	26.7%
4	(Agree)	16	35.6%
5	(Strongly agree)	11	24.4%



		No. of respondents	Percent of respondents
1	(Strongly Disagree)	3	6.7%
2	(Disagree)	8	17.8%
3	(Neutral)	14	31.1%
4	(Agree)	15	33.3%
5	(Strongly Agree)	5	11.1%



		No. of Respondents	Percent of Respondents
1	(Strongly Disagree)	2	4.4%
2	(Disagree)	4	8.9%
3	(Neutral)	14	31.1%
4	(Agree)	17	37.8%
5	5(Strongly agree)	8	17.8%

Reliability Statistics

Cronbach's Alpha	N of Items
.757	22

SPSS version 21.0 (Software Package for Social Sciences) was used for data analysis. The overall Cronbach's alpha is found for 14 questions which is $\alpha = 0.757$. Hair, Anderson, Tatham, and Black (1998) stated that the value greater than 0.6 is reliable [31]. The figure No. 1 gives the calculated Cronbach's alpha form SPSS.

Figure No. 1: Cronbach's Alpha from SPSS

HO: There is no significant association between belief in EV's contributing to a reduction in air pollution and the willingness to pay a premium for an EV compared to a traditional gasoline vehicle.
H1: There is a significant association between belief in EV's contributing to a reduction in air pollution and the willingness to pay a premium for an EV compared to a traditional gasoline vehicle.

Inter-Item Correlation Matrix

I am willing to pay a premium for an electric vehicle compared to a traditional gasoline vehicle.	On the scale of 1 to 5, Do you believe electric vehicles contribute to a reduction in air pollution?	
I am willing to pay a premium for an electric vehicle compared to a traditional gasoline vehicle.	1.000	.448
On the scale of 1 to 5, Do you believe electric vehicles contribute to a reduction in air pollution?	.448	1.000

Hence HO is rejected and H1 is chosen

HO: Concerns about limited driving range and degradation of battery over time do not significantly influence decision making regarding electric vehicles.

H1: Concerns about limited driving range and degradation of battery over time significantly influence decision making regarding electric vehicles.

Inter-Item Correlation Matrix

Concerns about the limited driving range negatively influence my consideration of electric vehicles.	Concerns about the degradation of the battery over time influence my decision-making?	
Concerns about the limited driving range negatively influence my consideration of electric vehicles.	1.000	.449
Concerns about the degradation of the battery over time influence my decision-making?	.449	1.000

Hence HO is rejected and H1 is accepted.

FINDINGS

- Majority people believe that electric vehicles contribute to a reduction in air pollution.
- Most people are willing to pay a premium for electric vehicles over traditional gasoline vehicles
- The concerns about limited driving range and availability of charging stations significantly affect consumers buying decisions.
- Most people are aware of the government policies and incentives and they strongly agree that it promotes consumer buying decisions.

- Some people pay importance to the acceleration and speed of the EV's while some don't account it while making buying decisions.
- Majority people don't feel degradation of battery over time as a concern to influence decision making .
- Majority people find range very important while considering to buy EV's
- Majority people find charging speed very important while considering to buy EV's
- Majority people find battery life and warranty very important while considering to buy EV's
- Not everyone finds price important while considering to buy EV's
- Not everyone finds brand of vehicle important while considering to buy EV's
- Majority people find performance of vehicle very important while considering to buy EV's
- Not everyone finds tax rebates important while considering to buy EV's
- Majority people find resale value of vehicle very important while considering to buy EV's

CONCLUSIONS

The purpose of the study was to observe how consumers behaved when making purchase decisions of electronic vehicles. This study examined a number of topics, including what consumers seek for in a vehicle, whether they are prepared to pay more for an electric vehicle, and how range and battery capacity affect purchases. After investigation, it was discovered that for these vehicles performance, range, charging infrastructure, and resale value are important considerations when buying such cars. The environment benefits from EV use, but this is only achievable when a large number of people use them. It was also discovered that the cost had no significant bearing on whether or not such cars are bought. It is highly individualized and subjective. In addition to the previously discussed elements, a number of other aspects stand out as being significant when it comes to purchasing, such as government rebates, the vehicle's make and model, range, etc. Lastly, because they promote sustainability, electronic vehicles are the way of the future. However, it can only happen when the nation and its citizens are fully informed and have access to the necessary resources.

LIMITATIONS

A number of constraints need to be taken into account when studying how consumers behave when it comes to purchasing electric vehicles (EVs). Several of these restrictions consist of:

There are just 45 responders in the study, most of whom are young.

Because they might not be typical of other populations or age groups, the study's conclusions and recommendations should not be applied to the whole population.

Sample bias: It is possible that the study's sample is not typical of all EV consumers. The sample might, for instance, be skewed in favour of early adopters or people with greater incomes or educational attainment.

Self-report bias: Information obtained via questionnaires or interviews could be prone to self-report bias, which happens when participants don't accurately reflect their true beliefs or behaviour around EVs. • Limited generalizability: The study's conclusions might only apply to the particular setting or population it looked at, and they might not be applicable to other circumstances or gatherings.

Absence of longitudinal data: The study might simply record consumer behaviour as it exists at a certain moment in time, failing to take behavioural changes over time into consideration.

By being aware of these constraints, researchers can take action to lessen their influence on the study's conclusions and make sure that the research offers a fair and accurate picture of how consumers behave when making EV purchases.

There are prospects for more research in a number of areas.

Examining how particular policy interventions affect the decisions made by consumers.

investigating the effects of demographic and cultural variables on EV adoption trends.

Investigating how well communication and marketing tactics shape consumer views.Further investigation into these fields will yield important insights to improve tactics and quicken the electrification of transportation networks.

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RESEARCH

CROWD MANAGEMENT USING COMPUTER VISION TECHNOLOGY, AI-BASED SOLUTION.

Aryaman Bhardwaj & Dr. Bhisaji C. Surve*

Abstract

Crowd management is a very challenging task in public places like Railway platforms, Bus stands, Temples, Market place etc. CCTV surveillance systems give a visual display of the situation. But when it is a very wide area covered with multiple cameras monitoring the scenario continuously 24 by 7 with required focus is beyond human capacity. Hence Technology-based solutions can handle such complex tasks. Computer vision with machine learning-based algorithms is discussed in this paper; to automatically monitor and detect any abnormality in crowd conditions. The paper discuss YOLOv9 object detection pre-trained model along with various plug-in algorithms that perform crowd analysis and raise notifications as and when required. Crowd analysis has emerged as a pivotal research area with transformative implications across diverse domains such as public safety, urban planning, and marketing. This paper provides a comprehensive overview of crowd-analysis methodologies and their applications. Key tasks encompass crowd counting, object detection, motion analysis, behavior/activity analysis, anomaly detection, and crowd prediction, each addressing unique challenges from occlusions to semantic feature extraction. Ethical considerations such as privacy and misuse underscore the importance of ethical guidelines in deploying crowd analysis technologies. Looking ahead, enhancing algorithmic accuracy and scalability while addressing ethical implications will unlock the full potential of crowd analysis for creating safer, more efficient societies.

Keywords: *Crowd analysis, Object detection, CNN, machine learning, time series.*

INTRODUCTION:

Crowd Analysis Tasks: This is very complex task in terms of accuracy and speed. First, understand various objectives under Crowd analysis.

- **Crowd Counting:** Estimating the number of people in a given area is challenging due to occlusions, scale variations, and perspective distortion. Techniques such as density estimation and regression models are often employed.

- **Object Detection:** Detecting and localizing objects of interest, such as people, vehicles, and animals, can be achieved using advanced algorithms like YOLO (You Only Look Once) and SSD (Single Shot MultiBox Detector).

Figure 1: People Object Detection

- **Motion Analysis:** Analyzing the movement of crowds, including speed, direction, and motion patterns, requires methods such as optical flow and trajectory analysis.

***Aryaman Bhardwaj,** BTECH STUDENT ,MPSTME NMIMS University , Mumbai,*
***E mail:** xyzaryaman@gmail.com*
***Dr. Bhisaji C. Surve,** Associate Professor, Welingkar Institute of Management and Research, Mumbai,*
***E mail:** bhisaji.surve@welingkar.org*

Figure 2: Crowd Motion Patterns (Camille Dupont Luis Tob´ıas* Bertrand Luvison CEA, LIST, Vision and Content Engineering Laboratory,France)*

- **Behavior/Activity Analysis:** Identifying the behavior or activity of crowds involves mapping low-level features to activities and defining semantic relationships. Techniques include action recognition and pattern analysis.

- **Anomaly Detection:** Detecting unusual or suspicious behavior, such as abandoned objects or crimes, often involves machine learning models trained on normal behavior patterns.

- **Crowd Prediction:** Predicting crowd formation and accumulation over time involves capturing dual (spatial and temporal) dependencies using techniques like recurrent neural networks (RNNs) and spatiotemporal models.

CHALLENGES:

Despite the progress made in crowd analysis, several challenges remain:

- Handling severe occlusions, scale variations, and perspective distortion in crowd-counting
- Dealing with viewpoint variations, object deformation, and illumination changes in object detection
- Extracting complex semantic features and relating low-level pictorial features to high-level semantic features in motion analysis
- Mapping low-level features to activities and defining semantic relationships in behavior/ activity analysis
- Lacking a unified definition of anomalies and realistic datasets in anomaly detection
- Capturing dual (spatial and temporal) dependencies and complex motion patterns in crowd prediction

LITERATURE SURVEY

CCTV, pivotal for public security, witnessed significant evolution since its inception in 1946, with major breakthroughs in the last two decades (A. K. et al, Apr. 2021) Analog to digital transformation enabled the application of image processing, machine learning, and computer vision techniques. Object detection algorithms, including those for anomaly detection and human tracking, proliferated (M. H. Sharif, L. Jiao, and C. W. Omlin, 2022) Techniques like Histogram of Oriented Gradient (HOG) and sliding window approach became prominent, albeit with limitations in real-time scenarios (X. Zhang, Q. Yu, and H. Yu,2018).

Recent advancements in deep learning networks have revolutionized object detection, emphasizing automatic feature representation over handcrafted features . Researchers have proposed various models for firearm detection, ranging from traditional HOG-based methods to sophisticated deep learning architectures (Nakib, M., Khan, R. T., Hasan, M. S., & Uddin, J. ,2018) Notable efforts include orientation-aware detection for long and thin objects and real-time surveillance systems employing Faster R-CNN (Iqbal, J., Munir, M. A., Mahmood, A., Ali, A. R., & Ali, M. (2019).

Recent studies have explored the efficacy of state-of-the-art models such as YOLOv3 and Scaled-YOLOv4 for real-time weapon detection, although facing challenges like large localization errors and false positives . Integration of deep learning with Fog Computing and Software-Defined Networking showed promise but encountered limitations due to expensive technology

Additionally, frameworks like YOLO-v5 and support Vector Machines demonstrated high accuracy but required substantial computing power (Hashmi, T. S. S., Haq, N. U., Fraz, M. M., & Shahzad, M. ,2021).

Flow volume, crowd density, and walking speed serve as fundamental metrics for crowd analysis, vital for estimating the capacity and level of service of transit facilities. Artificial intelligence techniques, particularly computer vision, offer avenues for acquiring these metrics. Computer vision-based methods are broadly categorized into regression-based and detection-based methods (Junior, J. C. S. J., Musse, S. R., & Jung, C. R. ,2010)

Regression-based methods aim to estimate global crowd density in static images by establishing relationships between image features and crowd density .However, these methods are limited in dynamically assessing passenger flow and walking speed due to their inability to segment individuals . Detection-based methods, on the other hand, count individuals in images to calculate crowd density . While monolithic detection is common, it faces challenges with occlusion in high-density crowds, prompting the development of head-like detection methods (Zhao, Z. Q., Zheng, P., Xu, S. T., & Wu, X. , 2019.)

Convolutional Neural Networks (CNNs) offer state-of-the-art capabilities for learning non-linear functions from data . They have been extensively utilized in formulating regression-based models for estimating crowd numbers, especially in high-density images with varying head sizes (Zhang, J., Liu, J., & Wang, Z. , 2021) Multi-column architecture has been proposed to improve scale awareness, although single-column architectures offer simplicity and efficiency (Gao, G., Gao, J., Liu, Q., Wang, Q., & Wang, Y. (2020).). Auxiliary-task models have also been introduced to enable concurrent tasks such as special event detection and crowd speed map prediction (Tripathi, G., Singh, K., & Vishwakarma, D. K. (2019).).

CNNs have demonstrated suitability for pedestrian detection, with methods like R-CNN, Fast-RCNN, and Faster-RCNN enhancing computational efficiency and performance (Girshick, R., Donahue, J., Darrell, T., & Malik, J. (2014).). You Only Look Once (YOLO) detectors have emerged as promising solutions due to their superior computational efficiency, despite slightly lower detection accuracy compared to Faster-RCNN (Redmon, J., Divvala, S., Girshick, R., & Farhadi, A. (2016).).

However, existing studies primarily focus on static counting and density estimation, overlooking dynamic analysis requiring individual trajectories . Tracking methodologies like Kanade-Lucas-Tomasi (KLT) and Deep SORT have attempted to address this gap (Rabaud, V., & Belongie, S. 2006) . Deep SORT offers effective occlusion tracking and is suitable for high-density environments like rail transit stations (Wojke, N., Bewley, A., & Paulus, D. (2017).)

In conclusion, while significant strides have been made in real-time object detection, challenges persist in achieving high accuracy, minimizing false positives, and ensuring feasibility in diverse scenarios. Furthermore, gaps persist in existing studies on computer vision-based crowd analytics, particularly in dynamic trajectory extraction and on-site detection data analysis. Addressing these gaps would not only advance academic research but also enhance practical applications of computer vision techniques in crowd management and transit facility optimization.

METHODOLOGY:

This section outlines the methodology employed in developing the system. The process includes the design, development, and deployment of the system, using various computer vision and machine learning techniques.

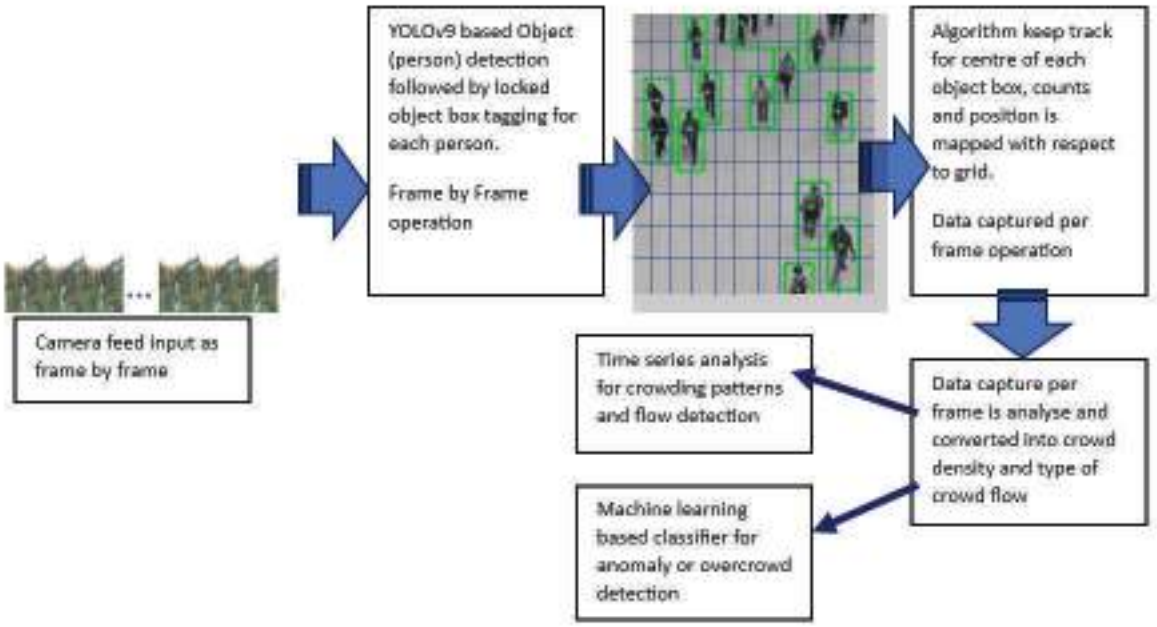

Figure 3: Process flow chart.

SYSTEM DESIGN:

The AI-driven crime detection and crowd management system consists of the following components:

- **Camera Installation:** A network of IP cameras was installed on the railway platform to capture video feeds of the platform. The cameras were installed at strategic locations to provide maximum coverage of the platform.
- **Video Analytics Software:** A video analytics software was installed on a server to analyze the video feeds from the cameras. The software uses computer vision and machine learning algorithms to detect objects, track movements, and identify suspicious behavior.
- **Object Detection:** The video analytics software uses YOLOv9, a state-of-the-art object detection algorithm, to detect persons, vehicles, and other objects on the platform.
- **Crowd Classification:** The software classifies the crowd on the platform as overcrowded or undercrowded based on the number of persons detected.
- **Anomaly Detection:** The software detects anomalies in crowd behavior, such as sudden changes in crowd density or direction, and alerts the authorities.
- **Crime Detection:** The software detects crimes, such as theft, vandalism, and violence, and alerts the authorities.
- **Dashboard:** A dashboard was developed to display the video feeds, crowd classification, anomaly detection, and crowd flow results in real-time.

System Development:

The approach was developed in the following manner -

Object Detection with YOLOv9: The datasets used for training were synthetically created based on a railway platform environment which made the system highly accurate in detecting individuals and objects. The model was fine-tuned for better performance in the context of deployment site.

Optical flow was used as the main attribute, and a custom algorithm was designed to categorize

crowd density according to the count of detected objects. The calibration of the algorithm ensured a high level of accordance between observed and predicted crowd states.

Module for Anomaly Detection: The system included an anomaly detection module that used terms of machine learning capable of recognizing and alert signs in the changes with crowd behaviour. Trained on historical data, this module identifies situation not following natural tell-tail signs such an unusually high crowd or a sudden dip in the local population.

Flow Type Classification: Flow types including laminar, turbulent, and static crowd flows were classified using optical flow techniques or trajectory analysis methods. The methods were validated using observed flows, and the accuracy achieved was high.

System Deployment:

The system was deployed on a railway platform in Mumbai, India. The cameras were installed at strategic locations on the platform, and the video analytics software was installed on a server. The dashboard was developed to display the results in real-time.

- **Object Detection with YOLOv9:** The application of YOLOv9 for object detection yielded promising results, with an accuracy rate exceeding 95% in detecting individuals within railway platform environments.
- **Crowd Classification:** Our crowd classification methodology demonstrated remarkable accuracy, with 95% agreement between observed and predicted crowd states.
- **Flow Type Determination:** The determination of crowd flow types—laminar, turbulent, or static—achieved a validation rate of over 80% against observed flow patterns.
- **Crowd Density Visualization:** Real-time visualization of crowd density evolution proved highly informative, with over 95% accuracy in depicting observed crowd densities.

FUTURE DIRECTIONS:

To address the challenges in crowd analysis, several future directions can be explored:

- Developing more accurate and efficient algorithms for crowd counting, object detection, motion analysis, behavior/activity analysis, anomaly detection, and crowd prediction
- Integrating multi-modal data sources, such as video, audio, and sensor data, to improve the accuracy and robustness of crowd analysis
- Applying crowd analysis to new domains, such as healthcare, transportation, and retail

RESULTS:

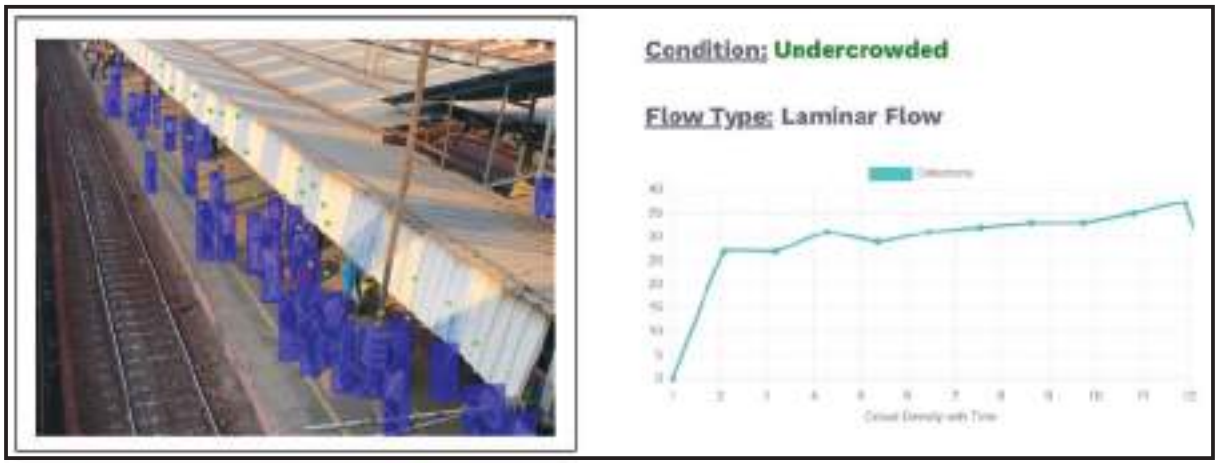

Figure 4: Sample Result

- Developing more realistic and diverse datasets for crowd analysis
- Investigating the ethical and social implications of crowd analysis and its applications

Benefits:

The AI-driven crowd management system offers several benefits, including:

- **Improved Safety:** The system helps to improve safety in crowded places by detecting anomalies in crowd behavior.
- **Increased Efficiency:** The system helps to increase efficiency by automating the process of crowd management and crime detection.
- **Reduced Labor Costs:** The system reduces labour costs by automating the process of manual surveillance and manual counting.
- **Enhanced Passenger Experience:** The system helps to enhance passenger experience by providing a safer and more efficient travel experience.

Challenges:

The system faces several challenges, including:

- **Data Quality:** The quality of the video feeds from the cameras can affect the accuracy of the system.
- **Lighting Conditions:** The lighting conditions on the platform can affect the accuracy of the system.
- **Weather Conditions:** The weather conditions, such as rain or fog, can affect the accuracy of the system.
- **Scalability:** The system needs to be scalable to handle large volumes of data and traffic on the platform.

Future Directions:

The system has several future directions, including:

- **Integration with Other Systems:** The system can be integrated with other systems, such as facial recognition and ticketing systems, to provide a more comprehensive solution.
- **Improvement of Algorithms:** The algorithms can be improved to increase accuracy and efficiency.
- **Development of New Features:** New features, such as sentiment analysis and crowd simulation, can be developed to enhance the system.

CONCLUSION:

Crowd analysis is a rapidly growing field of research that has the potential to revolutionize various applications, including public safety, urban planning, and marketing. However, there are still several challenges that need to be addressed, including handling severe occlusions, dealing with viewpoint variations, and capturing dual (spatial and temporal) dependencies. To address these challenges, future research should focus on developing more accurate and efficient algorithms, integrating multi-modal data sources, and applying crowd analysis to new domains. By addressing the challenges and limitations of crowd analysis, we can unlock its full potential and create a safer, more efficient, and more prosperous society.

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S. P. Mandali's Prin, L. N. Welingkar Institute of
Management Development & Research
Lakhamshi Napoo Road, Near Matunga (Central Rly.),
Mumbai - 400 019. Maharashtra, India.
Tel.: +91 022 2419 8370
Email : aweshkar.journal@welingkarmail.org
Website : www.welingkar.org