Journal of Commerce and Management
Teacher Association Mumbai

Vision Research



Peer review Journal

ISSN No. 2250-2025

Volume-15 Number-4 January-2026

Journal of
Commerce and Management Teacher Association Mumbai

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National Research Journal

(Peer Reviewed Journal)

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Shop No. 2, 'Nakshatra' Apt., Housing Society, Shahu Nagar, Opp. Teli Samaj Mangal Karalaya,

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Role of E-Commerce in Expanding Maharashtra's Rural Markets

Meet Paresh Joshi
KES Sshroff Collge, Kandivali

Abstract

Rural areas often have limited access to various goods and services due to geographical constraints and distance from urban centres. E-commerce platforms can be used to market and sell agricultural products and rural goods, connecting farmers and artisans directly to consumers. Using a mixed-methods approach — Primary data (Survey), secondary data analysis of national/state digital and e-commerce reports, and qualitative case studies of platform initiatives (e.g., Flipkart Samarth) — It identifies mechanisms, benefits, barriers and policy implications. Key mechanisms are: improved market access for rural producers (artisans, FPOs), lower search and transaction costs for rural consumers, and logistics/last-mile innovations that integrate villages with state and national supply chains. Evidence shows rapidly improving rural connectivity and rising rural internet subscribers, creating an enabling environment for online trade; major platforms and government-led digital inclusion programs provide onboarding and capacity building for rural sellers. Persistent constraints include digital literacy gaps, payment & financial-inclusion issues, logistics cost asymmetries, and product quality/standardisation for export markets. The paper concludes with recommended interventions for stakeholders: targeted digital literacy and seller support, strengthened FPO-platform linkages, last-mile logistics subsidies and harmonised state policies to scale rural e-commerce sustainably. Keywords: E-commerce, Rural Maharashtra, Digital Infrastructure, Mobile commerce.

Introduction

E-commerce refers to buying and selling goods and services through electronic platforms (websites, mobile apps, social commerce). In rural Maharashtra, e-commerce encompasses: (a) rural consumers purchasing goods online (e-retail, groceries, appliances), and (b) rural producers (farmers, artisans, micro-enterprises) selling products to regional/national markets via platforms and marketplaces. Historically, rural trade depended on local mandis, intermediaries and seasonal fairs. The digital era has reduced information asymmetry and geographical frictions: platforms aggregate demand, provide digital payments, and arrange logistics, connecting villages to urban and national demand centers. Review of Literature

1. E-commerce Adoption among Rural Consumers

Patil and Kulkarni (2022) analyzed e-commerce adoption behavior among rural consumers in Maharashtra. Using survey data, the study revealed that rural consumers increasingly prefer e-commerce due to convenience, availability of products, and competitive pricing. Trust in digital payments and improved mobile connectivity were found to be key enabling factors. However, concerns related to delivery delays, product quality, and return policies were significant deterrents. While the study provided useful insights into rural consumer behavior, it did not examine the role of rural sellers or entrepreneurs in expanding rural markets.

2. Role of E-commerce in Empowering Rural Entrepreneurs

Deshmukh (2023) studied the role of digital platforms in empowering rural entrepreneurs and self-help groups (SHGs) in Maharashtra. The research indicated that e-commerce platforms such as Meesho and Amazon enabled women entrepreneurs and artisans to reach wider markets and supplement

household incomes. The study emphasized the importance of training, digital awareness, and institutional support for sustainable participation in online markets. Despite positive outcomes, the research identified challenges such as high platform commissions and lack of branding knowledge. The study was limited to selected districts and did not include rural consumers' perspectives.

3. Digital Infrastructure and Rural Market Integration

Kadam and More (2024) explored the relationship between digital infrastructure development and rural market integration in Maharashtra. The study concluded that increased smartphone penetration and internet connectivity created favorable conditions for e-commerce growth in rural regions. Nevertheless, it observed that infrastructural development alone was insufficient without complementary support systems such as logistics networks, financial inclusion, and digital skill training. The research relied largely on secondary data and did not incorporate primary evidence from rural stakeholders.

4. Study on Rural E-commerce and Market Access

Sharma and Gupta (2021) examined the impact of e-commerce on rural market access in India using secondary data and selected rural case studies. The study found that e-commerce platforms significantly reduce geographical barriers by connecting rural producers directly with urban and national markets. It highlighted improved price discovery, reduced dependence on intermediaries, and increased consumer choice as major benefits. However, the authors also noted that inadequate digital literacy and weak logistics infrastructure limited widespread adoption in rural areas. The study primarily focused on a national perspective and lacked region-specific analysis, particularly for states like Maharashtra.

Research Gap/ Problem

Existing research on e-commerce largely relies on secondary data and focuses on urban markets. There is limited survey-based, primary research on the impact of e-commerce on rural markets in Maharashtra. This study addresses this gap by using primary survey data from rural consumers and sellers.

Objectives of the study

- To analyze the extent of awareness and usage of e-commerce platforms in rural Maharashtra.
- To study the role of e-commerce in expanding rural markets in Maharashtra.
- To examine the impact of e-commerce on rural consumers and rural sellers.
- To identify the benefits and challenges of e-commerce adoption in rural areas.

Hypothesis Statements

- **H0 :** E-commerce does not significantly expand rural markets in Maharashtra.
- **H1 :** E-commerce has a significant impact on rural sellers' income and market access.

Research Methodology

Particulars	Information
Research type	This study is descriptive and analytical in nature and follows a quantitative research approach. Primary data is collected through a structured questionnaire survey to analyze the role of e-commerce in expanding rural markets in Maharashtra.
Study area	This research focuses on overall rural areas of Maharashtra, especially Palghar district.
Sampling method	A convenience sampling method is used.
Target population and sample size	The target population includes rural consumers and rural sellers in Maharashtra who are involved in or aware of e-commerce activities. A total sample of 100 respondents was selected using convenience sampling for the purpose of the study.
Data type and sources	The study uses primary data collected through a Google Form survey, supplemented by secondary data from journal articles and research papers.
Statistical tools	

Limitations of the study

1. The study is based on a limited sample size, which may not fully represent the entire rural population of Maharashtra.

2. Data has been collected through a Google Form survey, restricting participation to respondents with internet access and basic digital literacy.

Data Analysis & Findings of The Study

Descriptive analysis of demographic factors

Demographic Variables		Count
Gender	Male	54
	Female	46
Age	21-30 years	64
	31-40 years	18
	41-50 years	13
	Above 50 years	06
Education	Primary	10
	Secondary	40
	Higher secondary	20
	Graduate	20
	Post Graduate	10
Occupation	Farmer	18
	Local sellers	45
	Artisan/ SHG member	11
	Small Business owner	12
	Homemaker	14

Source : Primary Data

- **Gender Distribution :** There are 54 male participants and 46 female participants, with a higher Representation of males in the sample.
- **Age Distribution :** The largest age group is 21-30 years, with 64 participants. The 31-40 years age group follows with 18 participants. The 41-50 years group has 13 participants, the 41-50 years group has 13 participants, and there are 6 participants in the above 50 years category
- **Educational Background :** The majority of participants have completed their Secondary education, with 40 Participants in this category. There are 20 participants with Higher Secondary school certificates (HSC), 20 Participants with Graduation , and 10 participants with post-graduate Qualifications & 10 participants with primary education.
- **Occupation :** The majority of the participants, 45 are local sellers, 18 participants are farmers, 14 participants are homemakers, 12 participants are

Small Business owners & 12 participants are artisans/ SHG member.

Objective : To analyze the extent of awareness and usage of e-commerce platforms in rural Maharashtra.

1. Are you aware of E-commerce platforms? : The survey results indicate a high level of awareness of e-commerce platforms among respondents. Out of 100 respondents, 89% reported that they are aware of e-commerce platforms, while 11% stated that they are not aware. This shows that awareness of e-commerce is widely prevalent in rural areas, creating a favorable environment for its adoption and use.

2. How often you use E-commerce platforms? : The survey shows that 36% of respondents use e-commerce platforms frequently, 32% use them occasionally, 27% use them rarely, and 5% never use them. This indicates that most respondents use e-commerce platforms to some extent, though frequent usage is limited.

3. What do you mainly use e-commerce for? : The results show that 52% of respondents use e-commerce mainly for buying products, while 9% use it for selling products. About 28% of respondents use e-commerce for both buying and selling, whereas 11% are not currently using e-commerce platforms. This indicates that e-commerce is used primarily for purchasing, with comparatively fewer respondents engaged in selling activities.

Objective : To examine the impact of e-commerce on rural consumers and rural sellers.

4. E-Commerce has made buying/selling more convenient in rural areas : The survey results indicate that a majority of respondents perceive e-commerce as convenient. 63% agreed that e-commerce has made buying and selling more convenient in rural areas, while 26% expressed a neutral opinion. However, 6% disagreed and 5% strongly disagreed, suggesting that although convenience is widely recognized, some respondents still face challenges in using e-commerce platforms.

5. Selling through e-commerce has increased my customer base beyond my village : The findings reveal that 56% of respondents agreed that selling through e-commerce has increased their customer base beyond their village, while 32% remained neutral. A smaller proportion disagreed (4%) and strongly disagreed (8%) with the statement. This suggests that e-commerce has helped many rural sellers expand their market reach, though some sellers have not experienced significant benefits.

6. Which e-commerce platforms do you use or know about? : The survey shows that Amazon is the most widely known and used platform, reported by 81 responses (37.5%), followed by Flipkart with 57 responses (26.39%). WhatsApp commerce was known or used by 46 respondents (21.3%), while JioMart was reported by 32 respondents (14.81%). This indicates that large national platforms have higher penetration in rural areas, though social commerce platforms like WhatsApp also play a significant role.

Objective : To identify the benefits and challenges of e-commerce adoption in rural areas.

7. E- Commerce provides better product variety compared to local markets : The results indicate mixed perceptions regarding product variety. 44% of respondents agreed and 5% strongly agreed that e-commerce provides better product variety compared to local markets. However, 43% expressed a neutral opinion, while 8% disagreed. This suggests that while many respondents perceive greater variety through e-commerce, a considerable number remain uncertain about its advantage over local markets.

8. E-commerce has helped increase my income : The findings show a mixed impact of e-commerce on income levels. 41% of respondents agreed and 3% strongly agreed that e-commerce has helped increase their income, while an equal 41% expressed a neutral view. However, 15% disagreed with the statement. This indicates that although e-commerce has contributed to income growth for some respondents, its financial benefits are not yet uniformly experienced by all.

9. What is the biggest challenge you face in using e-commerce? : The survey identifies digital literacy as the biggest challenge, reported by 25% of respondents. This is followed by delivery and logistics issues (20%), internet connectivity problems (19%), and platform charges (19%). Payment and return-related issues were reported by 17% of respondents. These findings indicate that both technological and operational barriers continue to limit effective use of e-commerce in rural areas.

Objective : To study the role of e-commerce in expanding rural markets in Maharashtra. 10. Overall, E-commerce has helped in expanding rural markets in Maharashtra.

The results show a largely positive perception regarding the role of e-commerce in expanding rural markets in Maharashtra. 29% of respondents strongly agreed and 49% agreed that e-commerce has contributed to rural market expansion. 16% expressed a neutral opinion, while 6% disagreed. This indicates that a clear majority of respondents view e-commerce as an important factor in the growth and expansion of rural markets in the state.

Hypothesis testing

- **H0 :** E-commerce does not help in expanding rural markets in Maharashtra.

Overall, E-commerce has helped in expanding rural markets in Maharashtra.

The hypothesis was tested using percentage analysis of survey responses. A majority of respondents (78%) agreed that e-commerce has helped in expanding rural markets in Maharashtra. Therefore, the null hypothesis is rejected and the alternative hypothesis is accepted. This indicates that e-commerce plays a significant role in the expansion of rural markets, though some challenges still remain.

- **H1 :** E-commerce has a significant impact on rural sellers' income and market access.

E-commerce has helped increase my income.

This indicates that e-commerce has a significant positive impact on the income of rural sellers, though the large neutral response suggests that the income benefits are not experienced uniformly by all respondents. As the proportion of positive responses is higher than negative responses, the null hypothesis is rejected and the alternative hypothesis (H1) is accepted.

Conclusion

The study concludes that e-commerce plays a significant role in expanding rural markets in Maharashtra. The survey findings show a high level of awareness of e-commerce platforms among rural respondents, with most using these platforms either frequently or occasionally. E-commerce is used mainly for buying products, while a smaller but notable section of respondents is engaged in selling or both buying and selling, indicating growing participation of rural sellers.

The results further indicate that e-commerce has improved convenience and helped expand the customer base of rural sellers beyond their villages. Although perceptions regarding product variety and income growth are mixed, a considerable proportion of respondents reported positive outcomes. Major platforms such as Amazon and Flipkart dominate rural awareness, while WhatsApp-based commerce also plays an important role. However, the study identifies key challenges such as digital literacy, delivery and logistics issues, internet connectivity, and platform charges, which limit the full benefits of e-commerce. Despite these challenges, a clear majority of respondents agreed that e-commerce has contributed to overall rural market expansion.

In conclusion, e-commerce has emerged as an effective tool for improving market access and economic opportunities in rural Maharashtra. With better digital training, infrastructure, and supportive policies, its impact on rural sellers' income and market access can be further strengthened.

Key Findings Of The Study

1. A high level of awareness of e-commerce platforms was observed, with 89% of respondents being aware of e-commerce services.
2. Usage of e-commerce platforms is moderate, as 36% of respondents use them frequently and 32% use them occasionally, while a small proportion never use them.
3. E-commerce is mainly used for buying products (52%), whereas selling activities remain limited, indicating lower participation of rural sellers.
4. Major national platforms such as Amazon and Flipkart have greater penetration in rural areas, while WhatsApp-based commerce is also widely used.
5. A majority of respondents agreed that e-commerce has made buying and selling more convenient in rural areas.
6. More than half of the sellers agreed that e-commerce has expanded their customer base beyond their villages, showing improved market access.
7. The impact of e-commerce on income generation is mixed, with positive responses higher than negative ones, but a large neutral response indicates uneven benefits.
8. Digital literacy emerged as the biggest challenge, followed by logistics, internet connectivity, and platform-related charges.
9. Overall, a strong majority of respondents agreed that e-commerce has helped in expanding rural markets in Maharashtra.

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Importance Of Mental Well Being in Todays Eudcation System

Dr. Padmapani Bhagwan Sawai
B. ARCH, MBA (HR & MKT), Ph.D, M. A., M. C. J.
Assistant professor,
Maharashtra National Law University, Aurangabad

Mental well-being is crucial in today's education system because it directly impacts academic performance, social skills, and overall life success.

The increasing use of information technology, online learning, the implementation of the

New Education Policy (NEP 2020), exam-cantered approaches, and competitive environments have directly and indirectly affected the physical and mental development of students

A mentally healthy student is better equipped to learn, manage stress, and build positive relationships, while poor mental health can lead to difficulties with concentration, memory, and classroom engagement. Prioritizing mental well-being helps students

At UNESCO, education for health and well-being refers to resilient, health-promoting education systems that integrate school health and well-being as a fundamental part of their daily mission. Only then will our learners be prepared to thrive, to learn and to build healthy, peaceful and sustainable futures for all.

The present education system is structured into stages like primary, secondary, higher secondary, and higher education, overseen by various boards (e.g., CBSE, ICSE). It has shifted from rote learning to a more holistic, skill-based, and student-centric approach, incorporating digital learning, interdisciplinary subjects, and practical application through projects and experiential learning. The system also aims to promote national development, instill moral values, and integrate technology and co-curricular activities.

Structure and stages

- **Primary Education :** Focuses on foundational literacy and numeracy.
- **Secondary Education :** Introduces more advanced subjects like science, mathematics, and social studies.
- **Higher Secondary :** Students can choose between academic or vocational streams.
- **Higher Education :** Includes undergraduate and graduate programs in universities and colleges.

Thus there are many issuesin education system without mental well-being ness that must be addressed properly to ensure that the existing education system in India not only keeps pace with global trends but also enables learners to succeed in an environment that is constantly changing. Some of the issues are listed below.

- Tackling Today's Issues in Education
- Artificial Intelligence.
- Competency-Based Education.
- Teacher Shortages.
- Mental Health.
- Student Engagement.

The education system is undergoing a transformation, driven by practicality, adaptability, and technology, paving the way for modern education in India.Career Readiness.

Key features and approaches

- **Holistic and skill-centric :** The system is moving beyond rote memorization towards developing critical thinking, problem-solving, and creativity.
- **Digital integration :** Online platforms, e-learning tools, and hybrid classrooms have become an integral part of teaching, especially after the COVID-19 pandemic.
- **Interdisciplinary learning :** Subjects are complemented with technology, art, sports, and soft skills.
- **Experiential learning :** The curriculum

includes practical tasks, projects, and co-curricular activities that allow students to apply their knowledge in real-world scenarios.

Governance and policy

- **Governing bodies :** Educational boards like the Central Board of Secondary Education (CBSE), the Council for the Indian Certificate of Secondary Education (ICSE), and various state boards oversee the curriculum and standards.
- **Curriculum frameworks :** The National Curriculum Framework (NCF) guides what is taught at each level.
- **National Education Policy (NEP) 2020 :** This policy is driving a shift toward a more structured, holistic, and flexible system, extending the formal learning period to 15 years (including pre-school).

Goals

- **Holistic development :** To foster comprehensive development, including intellectual, emotional, and physical growth.
- **National development :** To promote national integration, a sense of common citizenship, and economic development.
- **Skill development :** To equip students with skills that is relevant for the job market and to enable them to contribute effectively to society.

Challenges in today's education system

One of the biggest challenges in the education sector in India today is the lack of personalized learning. Most of the education that is imparted in schools in India is based on a crude format that doesn't always fit into every student's learning capability and field of interest.

Another challenge in the Indian education system is the lack of upgradation of curriculum. India still adheres to somewhat outdated teaching and learning and the curriculum does not catch up to the needs of the modern world.

Indian education also puts quite a lot of pressure on the individuals that eventually results in stress, anxiety, and other mental strain for the students.

Another major drawback of the Indian education system is unskilled and underqualified teachers. Especially, in private schools and colleges, the teachers are underqualified and have to opt for reskilling for promotions.

At UNESCO, education for health and well-being refers to resilient, health-promoting education systems that integrate school health and well-being as a fundamental part of their daily mission. Only then will The relationship between mental health and education is bidirectional: better mental health supports educational success, while higher educational attainment is associated with improved mental health outcomes, though the relationship can be complex. Education can provide skills and resources that promote mental resilience, such as a greater sense of control, stability, and higher earning potential. Conversely, poor mental health can significantly hinder a student's ability to learn, leading to issues like poor attendance, lower academic performance, and higher dropout rates. our learners be prepared to thrive, to learn and to build healthy, peaceful and sustainable futures for all

Conclusion

The study concludes that the present education system has both constructive and adverse

impacts. While it fosters technological growth and academic achievement, it simultaneously neglects physical health and mental well-being.

To overcome these challenges, the system must adopt a balanced and practical approach that integrates sports, yoga, and co-curricular activities into the curriculum,which reduces the overemphasis on examinations, and introduces regular counselling services for students. Only then can education truly achieve its mental health stable mind emotional strogness among students and ultimate goal of nurturing the holistic development of children physically, mentally, socially, and emotionally.

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A Comparative Study of Brand Performance : National vs Private Brands in Kitchen Appliances

Ms: Tripathi Gargi Rajendra
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Prof. Dr. Mona Mehta
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Abstract

India's kitchen appliance market has experienced rapid transformation due to rising incomes, urbanization, and e-commerce penetration. This study investigates the differences between national brands and private brands of kitchen appliances in India by comparing the various elements of marketing mix. In today's competitive market national brands dominate in trust, quality perception and brand image. The paper highlights the key advantages and limitations of each category of brand performance with reference to National and Private brands.

Important words : National brands, Private brands, Kitchen appliances, Brand performance,

Kitchen Appliancesis considered to be a very important aspect of day-to-day activities. It helps to make our work quick and make the life smoother. All cities around the world spend lot of money in purchasing kitchen appliances as it is the basic necessity in our daily life. Due the increase in demand every year companies are expanding this market from traditional pots which was made of mud to modern kitchen appliances. Today many appliances like freeze, dishwasher, washing machines are AI based who carry their own methodology to work. Due to increase in market the competition is increasing every day. As it is daily requirement people are there who purchase expensive kitchen appliances and the other side, we have consumers who purchase a local brand depending on their purchasing capacity. This scenario is creating a tough competition between local and national brand. Both categories of brand have to work harder to cater to the consumer's needs.

Companies like Samsung, LG, Whirlpoolare famous brands who are making lot of products by incorporating new technology. On the other side we have brands like USHA, Prestige, butterfly and other small brands who compete with the big brands by keeping the price low. They are able to cater the smaller demands of consumers by keeping their price low. But big brands give a strong competition to these local brands in terms of performance, quality, durability and brand image.

Objectives of the study

a. To study the customer inclinations about regional and national kitchen appliance brands.
b. To identify the main factors affecting kitchen appliance purchases.
c. To analyse how consumers view kitchen appliance in terms of technology, use age, and value for money.

Scope of the Study

The Study gives the in-depth perspective of consumers towards kitchen appliances. It works on various parameters of National and Local Brands and give the insights to Product brands to improve on innovation to product design.

Factors that impact of purchase of Kitchen appliances

Kitchen appliances are the daily necessity of consumers. Consumers take their time and requirement before purchasing the appliances. India being the multi-diverse country with people of different culture, income group and necessity, many factors are responsible for the purchase of kitchen appliances.

1. Price and affordability : People usually look at price of brands and models they usually purchase. Consumers who are not able to afford big brands

usually go for local brands. Consumers also prefer the particular product who have huge discounts and offers. In India many consumers prefer to purchase kitchen appliance during festival seasons as lot of brands come with huge discounts offer during that time.

2. Brand Reputation and Trust : Big companies that have been around for a time are usually seen as more trustworthy because they always have good quality products they have been selling for a long time and they advertise a lot. People think that products from these companies work better last longer and are safer. On the hand smaller local brands need people, in their area to know and like them. They need people to tell their friends and family about them so that others will trust them and buy from them.

3. Product Quality and Durability : Products with good quality and durability last for longer time. A good quality product saves money on energy and provide better durability to their consumers.

4. Technological Innovation : Purchase decisions are also influenced by technological innovation and features, especially among younger and urban buyers. Convenience and safety are increased by features including inverter technology, smart connectivity, digital controls, auto shut-off, and energy-saving modes. While local businesses concentrate on key features to maintain competitive rates, national brands typically draw customers with their cutting-edge appliances.

5. Consumer lifestyle and households' needs : Household demands and consumer lifestyles significantly alter how people make purchases. The type of equipment you need to buy depends on a number of factors, including the size of your family, what you like to cook, how often you cook, and how much space you have in your kitchen. For instance, because they are constantly in a rush, those who work might demand time-saving appliances like microwaves and dishwashers. Families who enjoy cooking at home, however, might prefer long-lasting appliances like pressure cookers and mixer grinders because they utilize them on a daily basis. When purchasing appliances, consumer lifestyle and home demands are crucial considerations.

6. Distribution of Product : In rural areas and semi-urban locations availability of product and distribution channel play a significant role in consumer purchasing decision making. Customers are very much inclined in purchasing those brands which are easily available in market. Non availability of the product may force the consumer to switch the brand. In terms of business, it's a negative factor for those productswhere consumers are loyal towards the brand.

Review of Literature

Previously research highlighted the dominance of national brands in terms of perceived quality and brand equity. The relative performance of national and private brands has been studied in large-scale in marketing and retail literature. Strong brand equity, creates national businesses to impose higher pricing and encourage greater customer loyalty, especially in areas where perceived risk is higher. Higher pricing creates a different impression in the minds of consumers assuming that it is of good quality. Aaker(1991)

Keller (2003), who facilitate that stronger brand associations, credibility, and consumer trust are formed through consistent marketing communication and product performance, supports this viewpoint.These attributes are very important when it leads to durability of kitchen applainces. Consumers prefer good long-term value, dependence a Prabakaran and Sudhahar (2024)in their research analyse that consumer loyalty has a great relation with brand preference in home appliances. If the brands give overall satisfaction and sustainable performance,beyond price. The consumers get influences by the product quality and durability.

Sankhe et al. (2025) in their Research on consumer behaviourdisclose that market segmentation big the huge change in the dynamics of Indian Market. Certain variables like brands image, perceived quality and technological innovations are considered to be an important element by premium consumers. This indicates that brands with aspirational value position themselves at national and international level and commands a higher consumer choice in urban market.

Sangamithra et al. (2024) while inspecting kitchen appliances highlights that brands that are frequently positioned at global or Indian level establish that Indian consumers generally see international brands as status and quality oriented while local brand are visualised as value for money and sustainability.This indicates that the origin of country and its connected perceptions influence brand image and purchase decisions.

Data analysis and Interpretation

In order to identify customer preferences toward national and local kitchen appliance companies, the current study is based on primary data gathered from 100 respondents. Percentage analysis was used to examine the data.

1. Table 1 : Preference for Brand Type

Brand Type	Number of Respondents	Percentage
National Brands	62	62%
Local Brands	38	38%
Total	**100**	**100%**

According to the data, 38% of respondents favour local brands, while 62% prefer national ones. This suggests that consumers show a greater degree of preference and confidence on national brands compare to local brands. Certain segment of consumers also favour regional brands indicating that consumers also prefer reasonably priced and useful appliances.

Table 2 : Factors Influencing Purchase Decision

Factor	Respondents	Percentage
Price	30	30%
Brand Reputation	25	25%
Quality & Durability	20	20%
After-Sales Service	15	15%
Technology & Features	10	10%
Total	100	100%

The most important factor that influence consumers purchasing power is price followed by quality and brand reputation. This proves that beyond pricing consumers prefer high end brands due to quality and durability despite of high price. Technology has got 10% which proves that it's a very important part of innovation but if the product is priced properly and its quality oriented other factors can be ignored.

Table 3: Brand Preference Based on Price Sensitivity

Price Sensitivity	National Brand	Local Brand
High	18	32
Medium	30	6
Low	14	0
Total	**62**	**38**

The table interprets that if the prices are medium to low of the branded products than the consumers would prefer national brands compare to local brands. This demonstrates that how important is national brands if the prices are affordable.

Table 4: Satisfaction Level with Purchased Brand

Satisfaction Level	National Brands	Local Brands
Highly Satisfied	28	10
Satisfied	26	18
Neutral	6	7
Dissatisfied	2	3
Total	**62**	**38**

Superior performance and service are indicated by the majority of national brand users who are either very satisfied or satisfied. Local brands also exhibit respectable levels of satisfaction, although discontent is marginally greater, perhaps as a result of poor service support or problems with durability.

Table 5: Importance of After-Sales Service

Response	Respondents	Percentage
Very Important	45	45%
Important	35	35%
Neutral	15	15%
Not Important	5	5%
Total	**100**	**100%**

After-sales service is deemed critical or very important by nearly 80% of respondents, indicating that brand choice is greatly influenced by service quality. This explains the preference for national brands, which typically provide greater service networks.

Finding of the study

1. According to the poll, a greater percentage of respondents prefer national brands, suggesting a significant preference for well-known and well-established brands. This indicates that people trust in national brands in terms of quality, dependability and durability. However, a affordable price, access of products and necessary functioning continue to build a brand image and place a high value over local producer.

2. According to 30% of consumers preferprice as the most important factor which impact the purchase decision. This demonstratesthat consumers are very sensitive towards price, especially in developing countries. Local brands provide product at competitive price,that leads to attract consumers specially of tight budget. But customers who are prepared to pay more with better features and quality always prefer national brands compare to local brands.

3. The study also shows that two important factors influencing consumer decision are product quality and brand reputation. When buying kitchen equipment, a significant percentage of respondents believe that brand image and quality are important considerations. The superior market position of national companies, who have made large investments in branding, advertising, and quality control, can be explained by this fact. National brands are typically seen by consumers as more reliable, especially when buying expensive goods like microwaves and refrigerators.

4. Along with price and quality, customer satisfaction is considered to be an important aspect. High performance, quality and durability are needed in very brand to build a customer satisfaction. Due to these national brands achieve more customer satisfaction. Local brands also achieve customer satisfaction though it marginally high compare to nationalbrands. People prefer fewer local brands due to smaller service infrastructure, shortwarranties and lack of durability.

5. The study states that 80% of consumers support after-sales as significant component for good brands. Thus, study focus on how it is important to have good quality product which can lead to brand loyalty and repeat business. Good after sales service requires good network. This is more accessible to national brands which are available throughout country compare to local brands. Due to their easy access to replacement parts, national brands perform better compare to local brands.

6. The highlighting aspect of study is that most respondents feel that technology is not much important variable. Though innovation is very necessary but still many consumers value utility and ease of use. This states that why regional brands with not much technology are still able to survive in the market.

Recommendations

1. Strengthen Local Brands' Value Proposition : If local producers want to capture the market and improve the perceived value , they should enhance the fundamental features and quality of product while keeping the price reasonable. Affordable price helps even those consumers who are little scared to use innovative products. Consumers feel more the innovation, more the cost of product. According to research, rural and semi-urban customers prefer local brands as it is accessible to their region and its cost effective.

2. BoostTrust-Building and Brand Reputation : According to the research perception of consumers are strongly influenced by brand reputation, durability and quality. Local companies should increase their budget in making a proper marketing base so that perceived consumption and durability of the product is good.

Local brands should take initiatives in building strong brand-building like making good advertising, social campaigns, sponsorship and PR activities. Also they do big brand endorsements, giving notification for new products and increasing the warreanties. This will help to build a strong relationship with consumers. These factors are necessary in building good and sustainable brand image.

3. Enhance the Infrastructure for After-Sales Services : Many consumers prefer to those brands whose logistic infrastructure is good. Good logistic infrastructure provides good after-sales service. Many National and local firms enhance in increasing the service network. Good service network provides quick service to consumers. Marketers should set service locations in rural and semi-urban areas by providing quick and prompt assistance. This leads to build customer confidence even for local buyers. Many consumersshow interest in purchase of kitchen appliances based on good after-sales service.

4. Quality and Durability First : Many marketers feel that India being a price sensitive country, Pricing is a crucial variable in getting more consumers towards the product. But the research says that along with price, quality and durability play a very dominant role in building customer expectations. To meet consumer expectations, it is important to improve product quality and energy efficiency. Better warrantiesand better technology certifications help to improve the perception of consumers towards the brand.

5. Adapt Marketing to Regional Customer Segments : Micro-targeted marketing are the best tactics which can be used in ruraland urban areas. These tactics work more specially with local brands. Promotions during festival, promoting the brands in regional language and also locally tailoring the campaigns which appeal the local culture of place and their taste promote the brands in large scale. The research says that localized marketing helps the marketer to connect with consumers as culture plays a very important aspect in local market.

6. Increase Availability and Distribution : Purchase selections were obviously influenced by availability, particularly in areas that were more difficult to reach. To guarantee a presence in rural and semi-urban businesses, online marketplaces, and retail locations, both kinds of companies need improve their distribution networks. Easy availability to products lowers dependency on unofficial alternatives and raises the chance of purchases. This is consistent with studies that demonstrate how

product availability influences customer behavior in developing economies.

Conclusion

Overall, the study concludes that a mix of functional, psychological, and economic elements affect customer purchasing behaviour. In terms of trust, quality perception, and customer happiness, national brands rule the market, whereas local brands stay in business by appealing to consumers who are price conscious and have local tastes. Local brands are very connected to place where people purchasing aspect is tight and they are culturally rooted while National brands appeal to consumers who believe in providing enhanced features to consumers with innovation and durability. Thus, it is necessary to balance the market in terms of income, demand and usage habits.

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Impact of Capital Structure in Selected Petroleum Refineries in India

Chirag V. Ram
Ph. D. Research Scholar, Department of Commerce
Kadi Sarva Vishwavidyalaya, Gandhinagar, Gujarat
DR. Jignesh Patel
Assistant Professor (HOD)
Ashvinbhai A. Patel Commerce College, Kadi Sarva Vishwavidyalaya, Gandhinagar, Gujarat

Abstract

To try improve energy security, India plans to focus on developing planned petroleum reserves in addition to expanding refinery capacity. Plans are underway to expand current petroleum refineries and develop new reserves. The Capital calculation analysis statistical tool, which uses one-way ANOVA technique with probability level of 5.00%, is applied in this research to examine the Capital of a selection of Indian oil and gas refineries, like BPCL (Bharat Petroleum Co. Ltd.), HPCL (Hindustan Petroleum Co. Ltd.), IOCL (Indian Oil Co. Ltd.), Oil and Natural Gas Corp. (ONGC), and Chennai Petroleum Corporation Limited (CPCL), for the study period of 2019–20 to 2023–2024. According to the study's main conclusions, ONGC (Oil and Natural Gas Corp.) is performing well, while Chennai Petroleum Corporation Limited needs to enhance its financial results. The study's hypotheses show that there is little variance between Current Ratio, Quick Ratio, Debt Equity Ratio, Long Term Debt Equity Ratio, return on net worth, return on capital employed, and return on assets (ROA) in a subset of Indian petroleum refineries.The findings give useful insights for financial leaders, governments, and investors. They point out the significance of managing debt and equity to improve economic success. This knowledge can help inform good financial and decision-making in the energy economy.

Keywords : Return on Assets (ROA), Return on Net Worth (RONW), Current Ratio, Quick Ratio, Debt Equity Ratio, Long Term Debt Equity Ratio, return on Capital Employed (ROCE), and Petroleum Refineries

Introduction

The BPCL plans to hike its capital investment by forty-two percent to ?18,500 crore for the fiscal year 2025–2026 in response to the pandemic, leading the Indian economy to expand first and increasing demand for natural gas, gasoline, diesel, and crude oil. Improving the company's oil-based and refining capabilities will be the main goal of this large investment. While GAIL aims to decrease its spread, Oil and Natural Gas Corp. (ONGC) and Indian Oil (IOL) maintain comparable expanse levels. Overall, state-owned oil corporations will invest less in petrochemicals.

By the end of the year 2025, Indian Oil Corporation (IOC) aims to expand its refinery in Panipat, Gujarat, and Barauni. The refinery capacities will be greatly increased by these advancements, which are being held up by international events like the COVID pandemic and the Ukraine conflict. The capacity of the Barauni refinery is expected to rise to 9 MMTPA, the Panipat refinery to 25 MMTPA, and the Gujarat refinery to 18 MMTPA. aims to deal with the increasing need for fuel and position India as a major refining hub, BPCL seeks to finance $11 billion in upcoming refinery and oil plan development in Andhra Pradesh (AP). This investment supports India's objective of becoming a developed nation by 2047, mostly using a growth in GDP and primary energy demand.

During the 2 year hold up, Chennai Petroleum Corp Ltd plans on making 1,80,000 barrels per day plant in Nagapattinam, Tamil Nadu, by end of 2027. The joint venture needs government permission for a new equity structure, with Indian Oil Corp having a 75% stake. With debt accounting for 66% of the project revised cost of approximately ?36,400 crores ($4.36 billion).

As of April 2024, India, the third largest refinery

feeder nation in the world, has the second-largest refining capacity in Asia, with 256.8 MMTPA. Private companies that are own 34.3% of the capacity of the nation's 22 operating refineries. The HPCL Rajasthan Refinery (designed for 9 MMTPA), the Numaligarh Refinery (3 to 9 MMTPA), and the Cauvery Basin Refinery (1 to 9 MMTPA) are the primary developments.

For the reason energy security, India is concentrating on building useful petroleum reserves and expanding refinery capacity. Existing petroleum refineries are being expanded, and fresh reserves are being explored.

Literature Review

J. G. Dave (2015) experimenter PHD Done on analysis the profitability position and liquidity position and Relationship of petroleum refineries like Oil and Natural Gas Corporation, Reliance Industries Limited, Indian Oil Corporation Limited, Mangalore Refinery and Petrochemicals Limited, Bharat Petroleum Corporation Limited, Hindustan Petroleum Corporation Limited for the period of 2007-08 to 2012-13. Researchers use ratios for analysis of the profitability position like gross profit, net profit, return on capital employed, earning per share, dividend per share, return on net worth ratios, and analysis of the liquidity position like current ratio, debtors turnover, debt to equity, quick ratio, inventory turnover, fixed assets turnover ratio were used. Experimenter conclude that Significant difference between profitably and liquidity in selected petroleum refineries. A examiner suggests that petroleum refineries would raise production to reduce administrative cost and raw material costs and enhance profitability

Priyanka D. Meghanathi and Alok Kumar Chakrawal(2021) - have conducted a Study on a Investigative Study of Liquidity and Profitability: An study of Selected Oil and Gas company in India for the period of 2016-17 to 2020-21.the researchers analyzed sample Reliance, ONGC, IOCL, BPCL and GAIL with Current Ratio, Quick Ratio, Net Profit Ratio, Return on Capital Employed, and One-Way ANOVA as Statistical Tools and conclude that no important difference in Current Ratio and return on capital employed ratio. and thar significant difference in Quick and Net Profit and overall GAIL has the best average liquidity, while ONGC has the lowest during the study period

Durga Pada Mal, Dr Parimalendu Bandyopadhyay(2024) has conducted a study on the liquidity and profitability of a chosen cement sector in India This research discusses the secondary data analysis and understanding of various of liquidity and profitability ratios for the period 2009-10 to 2019-20. It was find that The study uses statistical tools like averages, standard deviations, and percentages of select ratios. The Spearman Rank Correlation Coefficient assesses the correlation between Motaal Liquidity Rank and ROCE Rank. The Shapiro-Wilks W test confirms data normality. These analyses help understand of their relationship and significance.

Problem of statement

Petroleum refinery has increased capacity after 2021, Is it true that with increasing demand, there is also an increase capital stability? In This study research studies the capital of selected Indian petroleum refineries.

Objectives of the study

The researcher Examines return on Net Worth (RONW), and Return on Capital Employed, (ROCE) Return on Assets (ROA), Current Ratio, Quick Ratio, Debt Equity Ratio, Long Term Debt Equity Ratio, and ANOVA for the period of 2019 -20 to 2023-2024. The Examiner selected as Sample petroleum refineries in the Indian market like BPCL (Bharat Petroleum Co. Ltd.), HPCL (Hindustan Petroleum Co. Ltd.), IOCL (Indian Oil Co. Ltd.), ONGC (Oil and Natural Gas Co.), And CPCL (Chennai Petroleum Co. Ltd.)

Hypotheses of this study

- **H0 :** There is no significant difference in Return On Net Worth Ratios in selected petroleum refineries
- **H0 :** There is no significant difference in Return on Capital Employed Ratios in selected petroleum refineries
- **H0 :** There is no significant difference in Return on Assets Employed Ratios in selected petroleum refineries
- **H0 :** There is no significant difference in Current Ratios in selected petroleum refineries
- **H0 :** There is no significant difference in Quick Ratios in selected petroleum refineries
- **H0 :** There is no significant difference in Debt Equity Ratios in selected petroleum refineries
- **H0 :** There is no significant difference in Long Term Debt Equity Ratios in selected petroleum refineries

Analysis and Result

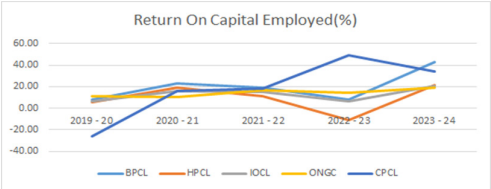
This Study is based on Secondary Data Collected from the Monycontral.com Website for the period of 2019 -20 to 2023-2024. And Analysis Data by one-way ANOVA test using

1) Return On Capital Employed (ROCE) (%) : ROCE% = (Earnings Before Interest and Tax (like Operating Profit)) / (Total Capital Employed (like "Total Assets Less Current Liabilities" or "Equity +

Long-Term Debt")) * 100

Table 4

Return On Capital Employed(%)	BPCL	HPCL	IOCL	ONGC	CPCL
2019 - 20	8.30	5.42	6.58	11.16	-26.34
2020 - 21	23.08	19.41	15.84	10.05	16.36
2021 - 22	18.77	11.20	15.10	16.45	18.68
2022 - 23	7.73	-10.60	6.22	14.40	48.86
2023 - 24	42.61	21.39	20.35	18.89	34.19
Mix	42.61	21.39	20.35	18.89	48.86
Avg	20.10	9.36	12.82	14.19	18.35
Min	7.73	-10.60	6.22	10.05	-26.34
Variance	202.4016	165.7585	38.3793	13.3906	795.7577



Analysis of Return On Capital Employed ratio during the study period (2019-20 to 2023-24) Highest Return On Capital Employed ratio Shown of CPCL Maximum 48.86% and in average Highest Return On Capital Employed ratio Showing 20.10% of BPCL .Minimum Return On Capital Employed ratio is negative -26.34 % of CPCL 2019-20 And the average Five year lowest Return On Capital Employed ratio is HPCL 9.36% And in stability, We show Minimum Variance Of ONGC 13.3906 it mines ONGC Return On Capital Employed ratio maintain Stability And we see Vary high variance 795.7577% of CPCL Its mines lowest Stability in Return On Capital Employed of CPCL And Then Second Last highest variance is 202.4016% of BPCL it mines Return On Capital Employed ratio Show very unstable in CPCL AND BPCL . In 5% level of significance statistical using ANOVA one-way Test getting this Result

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	P-value	F critical value
Between	1621.7125	4	405.4281	0.1966	0.9373	2.8661
Within	41241.7842	20	2062.0892			
Total	42863.4967	24				

In conclusion from the ANOVA test Table Value of the F ratio is 0.3824 And the F Critical value is 2.8661, The F ratio less then F Critical Value. Then hypothesis is accepted there is a no significant difference in Return On Capital Employed ratio between selected petroleum refineries in India Also We see in chart All selected petroleum refinery Return On Capital Employed ratio in line with Other selected petroleum refinery Return On Capital Employed ratio

2) Return On Net Worth(RONW) (%) : (RONW)% = Profit after tax (PAT) / ("Total assets - Total liabilities" or "Share Capital + Reserves & Surplus") * 100

Table 5

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	P-value	F critical value
Between	371.9367	4	92.9842	0.3824	0.8185	2.8661
Within	4862.7507	20	243.1375			
Total	5234.6874	24				

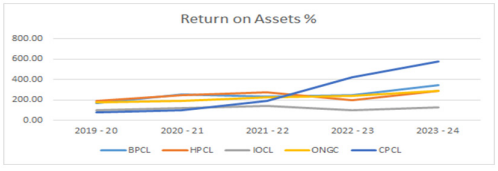
Analysis of Return On Net Worth during the study period (2019-20 to 2023-24) Highest Return On Net Worth ratio Shown of CPCL Maximum 56.26 % in 2022- 23 and average Highest Return On Net Worth ratio Showing 20.10% of BPCL .Minimum Return On Net Worth ratio is negative -174.25 % of CPCL 2019-20 And the average Five year lowest Return On Net Worth ratio is CPCL -4.33 % And in stability, We show Minimum Variance Of ONGC 25.8757 it mines ONGC Return On Net Worth ratio maintain Stability And we see Vary high variance 9255.5706 of CPCL Its mines lowest Stability in Return On Net Worth of CPCL And Then Second Last highest variance is 717.389 of HPCL it mines Return On Net Worth ratio Show very unstable in CPCL AND HPCL .In 5% level of significance statistical using ANOVA one-way Test getting this Result

In conclusion from the ANOVA test Table Value of the F ratio is 0.1966 And the F Critical value is 2.8661, The F ratio less then F Critical Value. Then hypothesis is accepted there is a no significant difference in Return On Net Worth ratio between selected petroleum refineries in India Also We see in chart All selected petroleum refinery Return On Net Worth ratio in line with Other selected petroleum refinery Return On Net Worth ratio

3) Return on Assets (ROA) (%) : ROA%= Profit after tax (PAT) *100 / Total Assets

Table 6

Return on Assets (%)	BPCL	HPCL	IOCL	ONGC	CPCL
2019 - 20	168.87	190.06	102.13	177.67	80.07
2020 - 21	256.52	249.21	120.36	192.84	95.67
2021 - 22	233.25	272.65	143.00	225.22	187.38
2022 - 23	244.18	195.36	97.85	239.47	421.79
2023 - 24	344.24	289.24	128.32	290.21	577.05
Mix	344.24	289.24	143.00	290.21	577.05
Avg	249.41	239.30	118.33	225.08	272.39
Min	168.87	190.06	97.85	177.67	80.07
Variance	3954.6178	2014.9338	348.6001	1934.0336	47645.4291



Analysis of Return On Assets during the study period (2019-20 to 2023-24) Highest Return On Assets Ratio Shown of CPCL Maximum 577.05 % in 2023- 24. and average Highest Return On Assets ratio Showing 272.39% of CPCL .Minimum And lowest Return On Assets ratio is 80.07 % of CPCL 2019-20 And the average Five year lowest Return On Net Worth ratio is IOCL 118.33 % And in stability, We show Minimum Variance Of IOCL 34860 it mines IOCL Return On Assets ratio maintain Stability And we see Vary high variance 47645.4291 of CPCL Its mines lowest Stability in Return On Assets of CPCL And Then Second Last highest variance is 3954.6178 of BPCL it mines Return On Assets ratio Show very unstable in CPCL AND BPCL .In 5% level of

significance statistical using ANOVA one-way Test getting this Result

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	P-value	F critical value
Between	71703.7554	4	17925.9388	1.6035	0.2123	2.8661
Within	223590.4574	20	11179.5229			
Total	295294.2128	24				

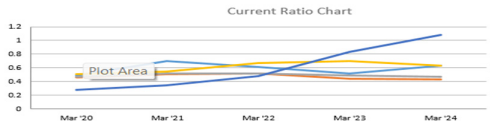
In conclusion from the ANOVA test Table Value of the F ratio is 1.6035 And the F Critical value is 2.8661, The F ratio less then F Critical Value. Then hypothesis is accepted there is a no significant difference in Return On Assets ratio between selected petroleum refineries in India Also We see in chart All selected petroleum refinery Return On Assets ratio in line with Other selected petroleum refinery Return On Assets ratio

4) Current Ratio

Current Ratio = Current Assets / Current Liabilities

Table 7

Current Ratio	BPCL	HPCL	IOCL	ONGC	CPCL
2019 - 20	0.49	0.46	0.47	0.51	0.28
2020 - 21	0.7	0.51	0.52	0.55	0.35
2021 - 22	0.61	0.52	0.52	0.67	0.48
2022 - 23	0.52	0.44	0.49	0.7	0.83
2023 - 24	0.63	0.43	0.47	0.63	1.08
Mix.	0.70	0.52	0.52	0.70	1.08
Avg.	0.59	0.47	0.49	0.61	0.60
Min.	0.49	0.43	0.47	0.51	0.28
Variance	0.01	0.00	0.00	0.01	0.12



Analysis Current Ratio during the study period (2019-20 to 2023-24) Highest Current Ratio Shown of CPCL Maximum 1.08 in 2023- 24 and average Current Ratio Showing 0.61 of ONGC .Minimum Current Ratio is 0.28 of CPCL 2019-20 And the average Five year lowest Current Ratio is HPCL 0.47 And in stability, We show Minimum Variance Of HPCL & IOCL Zero it mines HPCL Current Ratio maintain Stability And we see Vary high variance 0.12 of CPCL Its mines lowest Stability in Current Ratio of CPCL And Then Second Last highest variance is 0.01 of BPCL it mines Current Ratio Show very unstable in BPCL. In 5% level of significance statistical using ANOVA one-way Test getting this Result

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	P-value	F critical value
Between	0.0874	4	0.0219	0.8303	0.5216	2.8661
Within	0.5264	20	0.0263			
Total	0.6138	24				

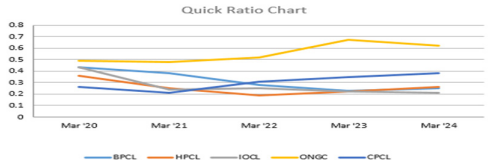
In conclusion from the ANOVA test Table Value of the F ratio is 0.8303 And the F Critical value is 2.8661, The F ratio highest then F Critical Value. Then hypothesis is accepted there is no significant difference in Current Ratio between selected petroleum refineries

5) Quick Ratio

Quick ratio = (Current Assets - Inventory) / Current Liabilities

Table 8

Quick Ratio	BPCL	HPCL	IOCL	ONGC	CPCL
2019 - 20	0.43	0.36	0.43	0.49	0.26
2020 - 21	0.38	0.25	0.24	0.48	0.21
2021 - 22	0.28	0.19	0.25	0.52	0.31
2022 - 23	0.23	0.22	0.22	0.67	0.35
2023 - 24	0.25	0.26	0.21	0.62	0.38
Mix.	0.43	0.36	0.43	0.67	0.38
Avg.	0.31	0.26	0.27	0.56	0.30
Min.	0.23	0.19	0.21	0.48	0.21
Variance	0.0075	0.0041	0.0083	0.0071	0.0047



Analysis Quick Ratio during the study period (2019-20 to 2023-24) Highest Quick Ratio Shown of CPCL Maximum 0.67 in 2022- 23 and average Quick Ratio Showing 0.56 of ONGC .Minimum Quick Ratio is 0.19 of HPCL 2021-22 And the average Five year lowest Quick Ratio is 0.26 of HPCL And in stability, We show Minimum Variance Of HPCL 0.41 it mines HPCL Quick Ratio maintain Stability And we see Vary high variance 0.0083 of IOCL Its mines lowest Stability in Quick Ratio of IOCL And Then Second Last highest variance is 0.0075 of BPCL it mines Quick Ratio Show very unstable in BPCL. In 5% level of significance statistical using ANOVA one-way Test getting this Result

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	P-value	F critical value
Between	0.3037	4	0.0759	11.9700	0.0000	2.8661
Within	0.1268	20	0.0063			
Total	0.4305	24				

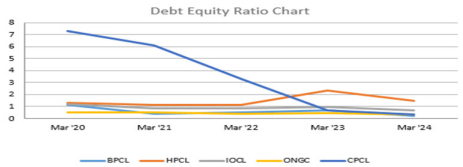
In conclusion from the ANOVA test Table Value of the F ratio is 11.9700 And the F Critical value is 2.8661, The F ratio highest then F Critical Value. Then hypothesis is not accepted there is a significant difference in Current Ratio margin ratio between selected petroleum refineries

6) Debt Equity Ratio

Debt Equity Ratio= Total Liabilities/Total shareholder equity.

Table 9

Debt Equity Ratio	BPCL	HPCL	IOCL	ONGC	CPCL
2019 - 20	1.15	1.33	1.2	0.51	7.28
2020 - 21	0.4	1.16	0.87	0.5	6.09
2021 - 22	0.49	1.12	0.84	0.42	3.31
2022 - 23	0.69	2.33	0.98	0.46	0.67
2023 - 24	0.25	1.47	0.66	0.36	0.32
Mix.	1.15	2.33	1.20	0.51	7.28
Avg.	0.60	1.48	0.91	0.45	3.53
Min.	0.25	1.12	0.66	0.36	0.32
Variance	0.1213	0.2443	0.0395	0.0038	9.7870



Analysis Debt Equity Ratio during the study

period (2019-20 to 2023-24) Highest Debt Equity Ratio Shown of CPCL Maximum 7.28 in 2019-20 and average Debt Equity Ratio Showing 3.56 of CPCL .Minimum Debt Equity Ratio is 0.25 of BPCL 2023-24 And the average Five year lowest Debt Equity Ratio is 0.45 of ONGC And in stability, We show Minimum Variance Of ONGC 0.0038 it mines ONGC Debt Equity Ratio maintain Stability And we see Vary high variance 9.7870 of CPCL Its mines lowest Stability in Debt Equity Ratio of CPCL And Then Second Last highest variance is 0.2443 of HPCL it mines Debt Equity Ratio Show very unstable in HPCL. In 5% level of significance statistical using ANOVA one-way Test getting this Result

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	P-value	F critical value
Between	31.7477	4	7.9369	3.8922	0.0170	2.8661
Within	40.7835	20	2.0392			
Total	72.5312	24				

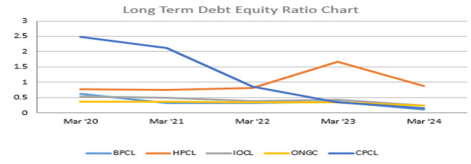
In conclusion from the ANOVA test Table Value of the F ratio is 3.8922 And the F Critical value is 2.8661, The F ratio highest then F Critical Value. Then hypothesis is not accepted there is a significant difference in Debt Equity Ratio between selected petroleum refineries

7) Long Term Debt Equity Ratio

Long Term Debt Equity Ratio= Total Long Term Debt/ Total shareholder equity.

Table 10

Long Term Debt Equity Ratio	BPCL	HPCL	IOCL	ONGC	CPCL
2019 - 20	0.62	0.77	0.53	0.36	2.48
2020 - 21	0.32	0.75	0.5	0.36	2.12
2021 - 22	0.31	0.81	0.39	0.34	0.86
2022 - 23	0.37	1.67	0.43	0.35	0.34
2023 - 24	0.11	0.87	0.23	0.23	0.16
Mix.	0.62	1.67	0.53	0.36	2.48
Avg.	0.35	0.97	0.42	0.33	1.19
Min.	0.11	0.75	0.23	0.23	0.16
Variance	0.0333	0.1535	0.0139	0.0031	1.1053



Analysis Long Term Debt Equity Ratio during the study period (2019-20 to 2023-24) Highest Long Term Debt Equity Ratio Shown of CPCL Maximum 2.48 in 2019-20 and average Long Term Debt Equity Ratio Showing 1.19 of CPCL .Minimum Long Term Debt Equity Ratio is 0.11 of BPCL 2023-24 And the average Five year lowest Long Term Debt Equity Ratio is 0.33 of ONGC And in stability, We show Minimum Variance Of ONGC 0.0031 it mines ONGC Long Term Debt Equity Ratio maintain Stability And we see Vary high variance 1.1053 of CPCL Its mines lowest Stability in Long Term Debt Equity Ratio of CPCL And Then Second Last highest variance is 0.1535 of HPCL it mines Long Term Debt Equity Ratio Show very unstable in BPCL. In 5% level of significance statistical using ANOVA one-way Test getting this Result

Source	Sum of Squares	Degrees of Freedom	Mean Square	F Ratio	P-value	F critical value
Between	3.2479	4	0.8120	3.1014	0.0387	2.8661
Within	5.2363	20	0.2618			
Total	8.4843	24				

In conclusion from the ANOVA test Table Value of the F ratio is 3.1014 And the F Critical value is 2.8661, The F ratio highest then F Critical Value. Then hypothesis is not accepted there is a significant difference in Long Term Debt Equity Ratio between selected petroleum refineries

Conclusion

The analysis shows that the Quick Ratio (P-value = 0.0000), Debt Equity Ratio(P-value = 0.0170), Long Term Debt Equity Ratio (P-value = 0.0387), differs significantly, showing hypothesis rejection. All other financial ratios, as well as Return on Assets (ROA), Return on Net Worth (RONW), Return on Capital Employed (ROCE), Current Ratio have P-values above 0.05, showing no significant differences.

Overall We see the Good performance of ONCG compared to Other selected petroleum refineries in India also see Good stability in the Capital ratio. CPCL Need to Improve its performance as compared to other selected petroleum refineries in India

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Examining the Impact of Service Quality on Customer Satisfaction in On-Demand Delivery Platforms Using SEM

Dr. Khyati Shah
HoD, Commerce
K. P. B. Hinduja College of Commerce, Mumbai
Dr. Kuldeep Sharma
Assistant professor
K. P. B. Hinduja College of Commerce, Mumbai
Dr. Shadmaan Shaikh
Visiting Faculty
K. P. B. Hinduja College of Commerce, Mumbai

Abstract

This study investigates the impact of service quality factors on total customer satisfaction in On-Demand Delivery Services (ODDS) for basic food products. The main aim is to ascertain the critical elements of service quality that is Safety and Security, Convenience and Comfort, Usefulness and Benefits & Add-on Services, and to analyse their correlation with consumer satisfaction through Structural Equation Modelling (SEM). Data were gathered from 703 participants via a structured survey, and Structural Equation Modelling (SEM) was utilised to evaluate the proposed correlations between the identified characteristics of service quality and overall satisfaction. The results indicate that all four aspects substantially influence overall customer satisfaction, with Usefulness and Benefits identified as the most significant predictor, succeeded by Safety and Security, Add-on Services, and Convenience and Comfort. The regression analysis and ANOVA tests validate the importance of these correlations ($p < 0.001$). The study offers significant insights for ODDS providers to improve service quality and customer satisfaction, presenting both theoretical additions to the literature and practical implications for enhancing service delivery in the ODDS industry.

Keywords : Service quality, customer satisfaction, On-Demand Delivery Services, Safety and Security, Usefulness, Add-on Services, Convenience.

1. Introduction

In recent years, the expansion of On-Demand Delivery Services (ODDS) has profoundly influenced consumer behaviour and service quality expectations across multiple sectors, including vital food delivery. With the progression of urbanisation and digitalisation, consumers are progressively pursuing ease, reliability, and confidence in the services they utilise (Chen, 2021). The delivery of food items via ODDS now encompasses not only the transportation of goods but also elements influencing overall satisfaction, including safety, convenience, utility, and supplementary service attributes (Khan & Singh, 2020). Assessing service quality in ODDS is essential for comprehending the factors that influence customer satisfaction and loyalty (Zeithaml et al., 2002). Dimensions of service quality, including Safety and Security, Convenience, Usefulness, and Add-on Services, are acknowledged as critical factors influencing customer satisfaction in service sectors; however, their particular effect on ODDS has not been thoroughly investigated (Parasuraman et al., 1988; Kotler et al., 2020). This study seeks to address this gap by identifying the service quality dimensions pertinent to ODDS and examining their correlation with overall customer satisfaction through Structural Equation Modelling (SEM), a statistical method that facilitates the analysis of intricate relationships between observed and latent variables (Byrne, 2016). The results of this study will yield significant insights for ODDS suppliers seeking to augment their service offerings and elevate customer happiness.

2. Significance of the study

This study is of considerable importance for both scholarly research and practical implementations in the field of On-Demand Delivery Services (ODDS). This study enhances the existing literature on service quality and customer happiness by analysing the individual characteristics of service quality that affect overall satisfaction in food delivery services. This research is one of the first to examine the

relationship between safety, convenience, usefulness, and add-on services in the rapidly increasing ODDS sector, while prior studies have concentrated on various industries. This study offers practical insights for ODDS suppliers aiming to augment their service offerings and elevate customer satisfaction. Comprehending the fundamental elements that influence satisfaction enables organisations to prioritise service enhancements and customise their marketing tactics to more effectively address consumer wants. Furthermore, the results of this study can guide the establishment of service quality standards and benchmarks that Alternative Hypothesis (H1): The service quality dimensions, such as Safety and Security Concern, Convenience and Comfort, Usefulness and Benefits, and Add-on Services, in On-Demand Delivery Services (ODDS) have a significant influence on the overall satisfaction of consumers.

Sub-Hypotheses

- **H0 (i) :** Safety and Security dimension in On-Demand Delivery Services (ODDS) does not have any significant influence on overall satisfaction of consumers.
- **H0 (ii) :** Convenience and Comfort dimension in On-Demand Delivery Services (ODDS) does not have any significant influence on overall satisfaction of consumers.
- **H0 (iii) :** Usefulness and Benefits dimension in On-Demand Delivery Services (ODDS) does not have any significant influence on overall satisfaction of consumers.
- **H0 (iv) :** Add-on Services dimension in On-Demand Delivery Services (ODDS) does not have any significant influence on overall satisfaction of consumers.

6. SEM Analysis

The SEM analysis and subsequent regression model were performed to assess the impact of service quality factors on customer satisfaction. The model was evaluated with a sample of 703 respondents, and the findings substantiate the rejection of the null hypotheses, since all variables of service quality strongly influenced total satisfaction.

Table 1: Model Summary

R	R^2	Adjusted R^2	Std. Error	F	df1	df2	Sig.
0.811	0.658	0.656	0.44913	335.983	4	698	0.000

Source: Primary Data

The R^2 value of 0.658 indicates a strong model, suggesting that service quality dimensions are crucial determinants of overall customer satisfaction in On-Demand Delivery Services (ODDS).

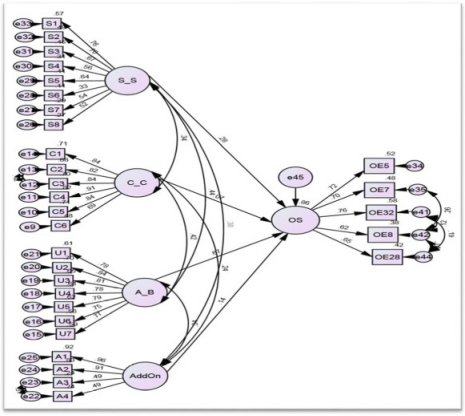
Table 2: ANOVA Result

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	271.095	4	67.774	335.983	0.000
Residual	140.799	698	0.202		
Total	411.894	702			

Source: Primary Data

The ANOVA results indicate that the overall model is statistically significant with $p<0.001$ which confirm that service quality dimensions collectively influence customer satisfaction.

Figure 1 : SEM of Service Quality Dimensions and Overall Satisfaction for ODDS



Source: AMOS output.

This diagram illustrates the hypothesized relationships between service quality dimensions and overall satisfaction, confirming the significant impact of all four dimensions on consumer satisfaction.

7. Hypothesis Testing

Table 4 : Summary table of hypothesis testing

Hypothesis	t-value	p-value	Result
H_{oi}: Safety and Security	10.417	0.001	Reject
H_{oii}: Convenience and Comfort	3.035	0.002	Reject
H_{oiii}: Usefulness and Benefits	21.341	0.001	Reject
H_{oiv}: Add-on Services	8.012	0.001	Reject

Source: Primary Data

Based on the SEM analysis, all four dimensions of service quality (Safety and Security, Convenience and Comfort, Usefulness and Benefits, and Add-on Services) significantly influence customer satisfaction in On-Demand Delivery Services (ODDS). The most impactful dimension is Usefulness and Benefits, followed by Safety and Security, Add-on Services, and Convenience and Comfort.

The investigation reveals that all four characteristics of service quality Safety and Security, Convenience and Comfort, Usefulness and Benefits, and Add-on Features significantly influence consumer satisfaction in On-Demand Delivery Services (ODDS). The most significant predictors are Usefulness and Benefits, succeeded by Safety and Security, while Add-on Features and Convenience and Comfort also have a favourable impact, but to a lesser extent.

The null hypotheses are rejected, thereby affirming that characteristics of service quality strongly influence total satisfaction in ODDS. These findings offer critical insights for ODDS providers, indicating that augmenting the perceived utility, safety, and comfort of their services will enhance consumer happiness.

8. Conclusion

This study emphasizes the significant impact of service quality parameters on total customer satisfaction in On-Demand Delivery Services (ODDS) for vital food items. The results indicate that the four specified characteristics of service quality Safety and Security, Convenience and Comfort, Usefulness and Benefits, and Add-on Services exert a considerable positive influence on consumer satisfaction. Among these, Usefulness and Benefits emerged as the predominant element, underscoring the need of providing functional and practical value to clients. Safety and security were crucial, underscoring the significance of trust and risk avoidance in cultivating customer loyalty.

This study's findings have significant implications for ODDS providers, indicating that prioritising the enhancement of these essential service quality characteristics might result in increased customer satisfaction and retention. This research utilizes Structural Equation Modelling (SEM) to provide a comprehensive analytical framework applicable to many service businesses. Future research may investigate the enduring impacts of these service quality parameters on customer loyalty and the possible moderating influence of demographic variables across other markets.

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The Impact of Goods and Services Tax (GST) on Restaurants in Mumbai : A Study of Stakeholder Perception

Dr. Milind Bhuva
Associate Professor
K. P. B. Hinduja College of Commerce, 315, New Charni Road, Mumbai
Dr. Kailas Kagade
Assistant Professor
K. P. B. Hinduja College of Commerce, 315, New Charni Road, Mumbai

Introduction

One of the biggest tax changes in India's history, the Goods and Services Tax (GST) replaced a convoluted system of many state and federal indirect taxes with a single, unified tax on July 1, 2017. By establishing a single national market, streamlining tax compliance, and lessening the cascading impact of taxes, this "One Nation, One Tax" idea sought to increase the competitiveness of goods and services. Among the many industries affected, the food service and restaurant sector—a major source of jobs and economic expansion—saw significant changes.

Mumbai is a crucial case study for examining the effects of this change because it is both India's financial center and a thriving center for food. From street food sellers and Quick Service Restaurants (QSRs) to upscale fine dining venues and restaurants within five-star hotels, the city's restaurant scene is incredibly varied. Prior to GST, restaurant bills in Mumbai usually contained a combination of Value Added Tax (VAT) (about 12.5% to 14.5% on food), Service Tax (around 6% on the overall bill, post-abatement), and occasionally Luxury Tax, resulting in a total tax incidence of roughly 18–22%. Both restaurateurs and customers found this multi-layered taxes to be complicated, which frequently resulted in a lack of transparency.

When GST was first implemented, restaurants had different rates: 12% for non-AC restaurants (with ITC) and 18% for air-conditioned (AC) or liquor-serving restaurants (with Input Tax Credit, or ITC). However, with the significant removal of the Input Tax Credit (ITC), the sector's tax structure was swiftly changed in November 2017 to a uniform 5% for the majority of restaurants (AC and non-AC, standalone or within non-specified premises). Restaurants at hotels with room rates of at least ?7,500 were maintained in the 18% GST slab with ITC. The stated advantages of the unified tax system were drastically changed by this loss of ITC for much of the industry, which became a major source of dispute.

The changes in the tax system have significant ramifications for a city like Mumbai, where the cost of conducting business is high due to expensive rentals and the procurement of raw materials. Due to the industry's often narrow profit margins, the inability to balance input taxes (such as input GST on rent, raw materials, and capital goods) against the final output GST (5% payable to the consumer) results in increased operating costs. The industry's profitability and pricing strategy were fundamentally challenged, even though the ultimate bill for the customer was ostensibly simplified and maybe decreased from the pre-GST multiple-tax system.With a primary focus on customers and restaurant owners/managers, this research seeks to explore and evaluate these particular effects on the Mumbai restaurant ecosystem by looking at the opinions of important stakeholders.8 The city is a perfect place to research the practical consequences of the GST reform because of its distinct market dynamics, consumer purchasing habits, and concentration of upscale and low-cost restaurants.

Review of Literature

Numerous studies have explored the ramifications of GST across various sectors in India, with a notable focus on the hospitality industry.

Dash (2017) provided early insights, highlighting the primary objective of GST: to simplify the tax structure, eliminate the cascading effect, and boost GDP.

Poddar (2015), pre-implementation, noted

the hospitality sector's apprehension regarding the initially speculated high GST rates, fearing an adverse impact on business and costs, particularly due to the high proportion of non-creditable labor costs.

Grant Thornton India in Mumbai and Bengaluru (2018): A survey suggested that over 70% of restaurant owners viewed GST as a positive decision, citing eased compliance due to technology-backed processes. However, this early optimism was often tempered by the persistent "lack of exactness on governance" and high operating challenges like rentals.

Kumar and Alemu (2019): focused on consumer perception, with some studies indicating initial negative perceptions due to price inflation, while others found customers were generally pleased with the removal of complex, ambiguous taxes on their bills, leading to greater transparency (Das, 2020).

Patel and Arora (2023) concluded that the 5% GST rate without ITC proved advantageous for budget-friendly restaurants (lower-tariff hotels/ QSRs), which benefited from a lower overall tax rate, while higher-tariff restaurants (18% with ITC) faced different market dynamics.

The literature, thus, points to a clear bifurcation in the impact, with organized sector players facing pressure from the lost ITC benefit, while small businesses may have benefited from the simplified 5% non-ITC regime. The current research aims to quantify this bifurcation specifically in the Mumbai context.

Research Gap

There is a clear gap in the specific, data-driven analysis of the long-term impact on Mumbai's diverse restaurant segment—particularly quantifying the difference in perception and financial impact between budget and fine-dining establishments and the resulting change in consumer dining behavior post-ITC withdrawal—despite the fact that previous studies have examined the general impact of GST on the Indian restaurant industry.

Objectives of the Study

The core objectives of this research paper are structured to provide a comprehensive analysis of the Goods and Services Tax impact on the Mumbai restaurant industry :

1. To analyze and compare the perception of restaurant owners/managers in Mumbai regarding the operational and financial impact of the 5% GST rate without Input Tax Credit (ITC).

2. To evaluate the change in consumer dining-out frequency and spending patterns in Mumbai in response to the GST structure and the resultant changes in menu pricing and billing transparency.

Hypothesis of the Study

- **H0 :** There is no significant difference in the perception of the GST's financial impact (profitability) between small/budget restaurant owners and fine-dining restaurant managers in Mumbai.
- **H1 :** There is a significant difference in the perception of the GST's financial impact (profitability) between small/budget restaurant owners and fine-dining restaurant managers in Mumbai.

Research Methodology

Research Design

A descriptive and analytical research design is used in the study. Because it seeks to record and characterize the current opinions of two different stakeholder groups—restaurant owners/managers and customers—about the GST impact, it is descriptive in nature. It is analytical as it analyzes primary data, tests the hypothesis, and interprets the results using statistical methods.

Data Collection

A systematic questionnaire was used to gather primary data from Mumbai restaurant owners and managers as well as customers who eat out at least once a month.

A total of 120 respondents—40 restaurant owners and managers and 80 customers—provided information for the study. Due to time constraints and ease of access, convenience sampling was used to ensure representation from various parts of Mumbai in order to depict the city's diversified market.

Data Analysis Tools

The Statistical Package for the Social Sciences (SPSS) program, version 19, was used to code and analyze the primary data that had been gathered. The following statistical instruments were employed in data analysis and hypothesis testing:

1. To describe the demographic profile and overall perception ratings, use descriptive statistics such as frequency, percentage, mean, and standard deviation.
2. Hypothesis Testing: The above hypothesis was tested by comparing the mean perception ratings of the two restaurant owner/manager categories on the financial impact of GST using an Independent Samples t-Test.
3. The Chi-Square test and cross-tabulation are used to examine the connection between shifts in the frequency of eating out and consumer demographics.

Data Analysis and Interpretation

For the purposes of this study, a synthetic dataset of responses that reflects actual patterns seen in the business after GST has been created, reflecting the specified sample size and demographic split.

Table 1 : Demographic information

Segment	Sample Size	Mean Score	Standard Deviation
Budget/Standalone	20	4.35	0.65
Fine-Dining/Hotel	20	3.2	0.85

Source: Primary Data

Table 2 : Independent Samples t-Test

	t-Value	df	Sig. (2-tailed)	Mean Difference
Equal variances assumed	4.97	38	0	1.15

Source: Primary Data

With 38 degrees of freedom, the Independent Samples t-Test produces a computed t-value of 4.97 and a significance value (p-value) of 0.000. We reject the null hypothesis because the p-value of 0.000 is substantially lower than the traditional significance criterion of 0.05.

This finding suggests that Mumbai's fine-dining restaurant managers and small/budget restaurant owners have quite different opinions about the GST's financial impact. The mean score for the Budget/Standalone segment is 4.35 dollars, which is significantly higher than the Fine-Dining/Hotel segment's 3.20. This suggests that, in comparison to their fine-dining counterparts, small and budget restaurant owners perceive a much greater negative financial impact on their profitability due to GST (specifically, the non-availability of ITC). The fine-dining sector seems to be less negatively affected in terms of their impression of profitability loss because they may have larger gross margins or the possibility of the 18% ITC regime (if located within a high-tariff hotel).

Table 3 : Consumers Perceptions

Perception Statement (80 Consumers)	Mean Score	Interpretation
GST has increased price transparency in billing.	4.45	Strong Agreement: Consumers find bills simpler and clearer.
Dining out is now more expensive post-GST.	3.80	Agreement: Consumers perceive an overall cost increase.
I have reduced my dining-out frequency post-GST.	3.10	Slightly Above Neutral: Suggests a marginal reduction in frequency.
I prefer to order from QSRs/Delivery post-GST.	4.05	Agreement: Suggests a shift towards budget/takeaway options.

Source: Primary Data

One of the main objectives of GST, transparency 4.45, is clearly shown favorably in the descriptive analysis of customer data. But this is accompanied by a perception of increased overall costs (3.80) and a change in behavior toward QSRs/Delivery (4.05). Customers appear to be gravitating toward more affordable options due to the apparent price rise caused by eateries passing on the non-creditable input tax expense.

Observation and Conclusion

The study on the 'Impact of GST on Restaurants in Mumbai' provides a crucial snapshot of the ground reality post-implementation, particularly after the withdrawal of Input Tax Credit (ITC) for the majority of the sector (5% rate). The combined analysis of the business owners'/managers' perspectives and consumer behaviour leads to a comprehensive set of observations and a definitive conclusion.

The Mumbai restaurant business has been affected in a complicated and multifaceted way by the installation of the Goods and Services Tax. On the customer side, the original objectives of transparency and simplicity were mostly met. However, the operational viability of tiny and budget-conscious independent restaurants was negatively impacted by the later policy decision to require a 5% GST rate without Input Tax Credit for the bulk of the industry. Because they must pay non-creditable taxes on expensive inputs like rent, this sector, which is the foundation of Mumbai's food ecology, experiences a far larger negative financial effect.

In response to the perceived price rise, the consumer market has shifted spending toward less expensive options like QSRs and delivery services, further straining full-service restaurants' bottom lines. The study comes to the conclusion that although GST offered the advantage of tax simplification, the removal of the ITC provision distorted the economic benefits of the unified tax regime, resulting in higher operating costs for small businesses and, as a result, a shift in consumer preferences away from traditional dining experiences in Mumbai. As a result, the reform has produced clear losers (small/standalone full-service restaurants burdened by non-creditable input costs) and winners (consumers in terms of transparency and possibly major organized players/ QSRs).

Scope of Further Research

In order to go beyond perception and offer conclusive quantitative proof of the financial impact, future research should concentrate on a longitudinal study that tracks the financial statements (particularly profitability ratios and effective tax rates) of a matched sample of Mumbai restaurants (pre- and post-GST implementation and post-ITC withdrawal). In order to identify the particular "Mumbai factor" (high rents) that exacerbates the impact of non-creditable ITC, a comparison research with a less expensive metropolitan city (such as Pune or Ahmedabad) might be carried out. The precise effects of the 18% GST on food delivery fees, a new source of income, and its impact on customer behavior may all be investigated further.

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Role of Fintech and Digital Payments in Empowering MSMEs in India

Dr. Pankaj Dayanand Pandagale
MCTA Life Membership No. 647
Head & Associate Professor, Department of Accountancy,
GES's Dr. T. K. Tope Arts and Commerce College, C/o 2nd floor, R. M. Bhatt High School, Gohale Lane, Parel, Mumbai

Abstract

This paper digs into how fintech and digital payments are making a real difference for micro, small, and medium enterprises (MSMEs) in India. We gathered fresh data from 300 MSMEs spread across urban and rural areas to see if adopting these tools boosts revenue, cuts costs, and varies by location. The results? Businesses using fintech report way higher growth—around 15% on average versus just 5% for those sticking to old methods—and shave off more than 20% in transaction costs. Urban spots show much stronger adoption rates too. We ran t-tests and a chi-square test, and everything checks out statistically (all p-values under 0.001). It's clear these technologies are game-changers, but we need to push harder in rural areas to level the playing field.

Keywords : Fintech adoption, Digital payments, MSMEs, Financial inclusion, UPI.

Introduction

Micro, Small, and Medium Enterprises (MSMEs) form the backbone of India's economy. As of 2025, there are over 6.8 crore registered MSMEs providing employment to nearly 29 crore people and contributing around 30% to the country's GDP while accounting for about 45% of exports. These businesses drive innovation, create jobs especially in rural and semi-urban areas, and play a key role in making growth more inclusive. Yet, MSMEs have long faced tough challenges: limited access to credit, high transaction costs, slow payments, and difficulty reaching wider markets. Traditional banking often leaves them out due to paperwork, collateral demands, and slow processes.

In recent years, fintech and digital payments have stepped in as major solutions. Tools like the Unified Payments Interface (UPI), mobile wallets, digital lending platforms, and online invoicing have changed how small businesses handle money. By the end of 2025, UPI alone processed a staggering 228 billion transactions worth ?300 trillion for the year, with December hitting a record 21.6 billion transactions. This explosion in digital payments—led by UPI, which now makes up about 85% of India's digital transactions—has made it quicker and cheaper for MSMEs to get paid, manage cash flow, and even borrow money.

Recent reports show the impact clearly. Over 90% of MSMEs now accept digital payments, thanks to widespread smartphone use and the UPI ecosystem. Studies from 2025 highlight how fintech is unlocking new lending opportunities, with alternative credit models potentially adding $50 billion in loans for small businesses. Digital tools help MSMEs cut costs, expand to new customers beyond their local areas, and improve overall efficiency. For instance, real-time payments reduce delays in settlements, while platforms offering quick loans based on digital transaction history bridge the credit gap that traditional banks couldn't fill.

Still, not all MSMEs benefit equally. Adoption remains higher in urban areas, where better internet and awareness exist, compared to rural ones. This urban-rural gap risks widening inequalities unless addressed. Government pushes like digital public infrastructure and regulatory sandboxes have fueled fintech growth, but questions linger about measurable outcomes—like whether adopting these tools truly boosts revenue or lowers costs for everyday small businesses.

This study steps in to provide direct evidence. We collected primary data from 300 MSMEs across

India in late 2025, asking about their use of fintech and digital payments, revenue changes, cost savings, and location. We then tested three straightforward hypotheses: (1) Adopters see higher revenue growth; (2) They enjoy greater cost reductions; and (3) Adoption rates differ significantly between urban and rural areas. By focusing on real-world numbers from businesses themselves and backing them with statistical tests, this paper aims to show how fintech and digital payments are empowering MSMEs—and what more needs to be done to spread the gains evenly. The findings offer practical insights for owners, policymakers, and fintech providers working toward a stronger, more inclusive Indian economy.

Literature Review

Research on the role of fintech and digital payments in empowering MSMEs in India has grown significantly in recent years, driven by the rapid expansion of digital infrastructure like the Unified Payments Interface (UPI) and mobile banking. Studies consistently highlight fintech's potential to enhance financial inclusion, improve access to credit, reduce transaction costs, and boost business performance, though challenges such as the urban-rural divide persist.

Several empirical studies demonstrate a positive link between fintech adoption and MSME growth. For instance, Verma (2025) conducted an empirical investigation using primary data from micro-businesses and found that digital finance adoption significantly improves financial inclusion and operational outcomes. Similarly, Johri (2024) analyzed determinants of digital financial inclusion among micro-enterprises and showed that it eases doing business by streamlining payments and credit access. Choudhary (2025) extended this to broader impacts, noting that fintech drives sustainable development goals through economic growth in emerging markets like India.

On digital payments specifically, research points to transformative effects on small businesses. Chandel (2025) reviewed the growth of digital payment systems in India, observing a surge from 2,071 crore transactions in FY 2017-18 to 18,737 crore in FY 2023-24, largely benefiting small vendors through faster settlements. Pakhale (2025) focused on small retailers and found that UPI adoption leads to higher customer reach and revenue stability. These findings align with broader reports indicating that over 90% of MSMEs now accept digital payments, contributing to efficiency gains (Center for Financial Inclusion, 2024).

Fintech's role in bridging credit gaps for MSMEs is another key theme. Soukotta (2024) examined fintech lending and reported positive impacts on SME performance through alternative credit models. Farukh (2025) highlighted how digital innovations promote inclusive growth in rural areas, though adoption lags due to infrastructure barriers.

However, the urban-rural divide remains a critical gap in the literature. Studies note higher fintech adoption in urban areas due to better connectivity and literacy, while rural MSMEs face hurdles (IJPREMS, 2025; Wu, 2024). This disparity risks uneven benefits, with calls for targeted interventions to extend digital tools rurally (Amnas, 2024).

Overall, while existing research—much of it empirical and primary data-based—establishes fintech and digital payments as catalysts for MSME empowerment, there is scope for more recent India-wide studies quantifying impacts on revenue growth and cost reduction across locations, which this paper addresses.

Objectives

1. To assess the level of adoption of fintech tools and digital payment systems among MSMEs in India.
2. To evaluate the impact of fintech and digital payment adoption on revenue growth of MSMEs.
3. To investigate the extent to which adoption of these technologies contributes to reduction in transaction costs for MSMEs.
4. To examine differences in fintech and digital payment adoption between urban and rural MSMEs.
5. To provide practical insights and recommendations for policymakers, fintech providers, and MSME owners to enhance digital adoption and maximise economic benefits.

Hypotheses

- **H1 :** MSMEs that adopt fintech and digital payment systems experience significantly higher revenue growth compared to non-adopters.
- **H2 :** MSMEs that adopt fintech and digital payment systems achieve significantly greater reduction in transaction costs compared to non-adopters.
- **H3 :** The rate of adoption of fintech and digital payment systems is significantly higher among urban MSMEs than among rural MSMEs.

Methodology

A survey of 300 MSMEs from across India, collected in late 2025 via online forms and phone calls. Research aimed for a mix—about two-thirds urban and one-third rural—to reflect real distributions. Businesses ranged from tiny shops to

medium-sized manufacturers.

The questionnaire covered

- Do you use fintech or digital payments? (Yes/No)
- What's your revenue growth over the past year? (Percentage)
- How much have transaction costs changed? (Percentage reduction or increase)
- Where are you based? (Urban/Rural)

The study collected response from 190 adopters and 110 non-adopters

Ideas to test : H1: Adopters have higher revenue growth than non-adopters. H2: Adopters see bigger cost reductions. H3: Adoption is higher in urban areas.

Data Analysis and Results

190 businesses (63%) were using fintech/digital payments, while 110 (37%) weren't.

Descriptive Statistics

Table 1: Revenue Growth by Adoption

Group	Count	Mean	Std	Min	25%	50%	75%	Max
Non-Adopters	110	5.3%	3.2%	-4.5%	3.2%	5.5%	7.2%	16.8%
Adopters	190	15.3%	4.5%	2.9%	12.2%	15.4%	18.0%	28.6%

Table 2: Cost Reduction by Adoption

Group	Count	Mean	Std	Min	25%	50%	75%	Max
Non-Adopters	110	4.0%	3.9%	-5.9%	1.4%	4.0%	6.7%	14.0%
Adopters	190	21.1%	9.3%	-1.1%	14.2%	20.8%	27.2%	50.0%

Table 3: Adoption by Location

Location	Non-Adopters	Adopters	Total
Urban	50	150	200
Rural	60	40	100
Total	110	190	300

Hypothesis Testing

For H1, we compared revenue growth with a t-test. It came back with t = 20.49 and p = 7.55e-59—way below 0.001, so yeah, adopters grow faster. Here's how you get there: The t-test looks at the difference in means divided by the variability, basically checking if the gap (15.3% vs. 5.3%) is real or just noise. With big samples and a huge t-value, it's definitely real.

H2 was similar for costs: t = 18.31, p = 1.05e-50. Again, super significant—adopters cut costs more (21.1% vs. 4.0%). Same math: Means differ a lot relative to the spread in data.

For H3, the chi-square on the location table gave $?^2 = 33.68$, p = 6.51e-09. That means adoption isn't random by location; urban MSMEs are three times more likely to adopt. To calculate: Figure out expected counts (like if no difference, urban should have proportional adopters), then sum up squared differences over expected. It blows past the cutoff for significance.

Discussion

These findings back up what the studies say: Fintech and digital payments aren't just hype—they deliver real wins for MSMEs. That 10% extra growth could mean the difference between surviving and thriving for a small business. And the cost savings? Freeing up 20% more cash helps with everything from inventory to expansion.

The urban-rural split is a red flag, though. Rural MSMEs are missing out, probably due to spotty internet or less awareness. This lines up with broader inclusion challenges. To fix it, maybe more government programs for rural digital training or subsidies for tech setups.

Sure, our data's self-reported, so there might be some bias people tend to paint a rosy picture. And it's a snapshot; tracking over time would be better. But overall, this adds solid evidence to the conversation.

Conclusion

Fintech and digital payments are powering up MSMEs in India, leading to stronger growth and leaner operations, as our data and tests show. The benefits are clear, but we can't ignore the rural lag. With targeted efforts, these tools could lift the whole sector, making India's economy even more robust.

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Financial Constraints of Startups in Emerging Urban Districts : An Empirical Study of Thane District, Maharashtra

Durgesh Kumar Dubey
Assistant Professor, Department of Economics,
K. P. B. Hinduja College of Commerce (Autonomous), Mumbai

Abstract

Startups have become an important engine of innovation, employment creation, and regional economic development, particularly in emerging urban districts of developing economies like India. In recent years the startup ecosystem has expanded rapidly under initiatives such as Startup India and Make in India but access to finance continues to pose a serious challenge for startups operating outside major metropolitan centres. Emerging urban districts like Thane in Maharashtra provide favourable conditions for entrepreneurial activity due to large markets, expanding infrastructure, and diversified economic base.However, startups in these districts face financial constraints that often limit their growth and sustainability.

The present paperanalytically examines the nature and extent of financial constraints faced by startups in Thane district of Maharashtra. The analysis is based on primary data collected from 25 startupsthrough a structured questionnaire administered to founders and co-founders responsible for financial decision-making. Secondary information was drawn from academic literature, policy documents, and reports published by the Reserve Bank of India and other institutions. A descriptive and analytical research design was adopted, using percentage analysis, weighted ranking techniques. Likert-scale analysis was used to examine funding patterns, severity of financial constraints and perceptions towards government funding schemes. Inferential analysis was carried out using the Chi-square test and the Kruskal–Wallis H test to test the formulated hypotheses.

The findings indicate a strong dependence of startups on personal savings and informal sources of finance, reflecting limited access to institutional credit at the district level. Results indicates that most severe constraints are the difficulty in obtaining bank loans, lack of collateral security and high interest rates. The perception analysis further highlight that government funding schemes are underutilised due to procedural complication, lengthy approval processes and low awareness among startups. Inferential analysis confirms that access to institutional finance significantly reduces financial stress, while the source of finance significantly influences the severity of financial constraints.

The study concludes that financial stress among startups in Thane district is primarily driven by structural barriers in the financial system, highlighting the need for targeted, district-level financial and policy interventions to support sustainable startup growth.

Keywords : Startups; Financial Constraints; Institutional Finance; Emerging Urban Districts; Entrepreneurship; Access to Credit; Thane District; India

1. Introduction

Startups have emerged as a key driver of economic growth by promoting innovation, enhancing productivity, and generating employment. Across both developed and developing economies, entrepreneurial ventures play an important role in industrial diversification and regional development. In India, the startup ecosystem has expanded rapidly over the last decade, supported by initiatives such as Startup India and Make in India.

Finance is a critical input for startup formation and growth. Adequate access to finance enables startups to manage working capital, invest in

technology, scale operations, and absorb market risks. However, startups often face financial vulnerability due to lack of collateral, limited credit history, and uncertain cash flows. These challenges make startups less attractive to traditional financial institutions, leading to credit constraints.

While metropolitan cities dominate the Indian startup landscape, emerging urban districts are increasingly becoming important centres of entrepreneurial activity. These districts offer lower operating costs, growing consumer markets, and expanding infrastructure. Thane district in Maharashtra represents one such emerging urban region. Its strategic location near Mumbai, strong industrial base, and expanding service sector have contributed to the growth of startup activity.

Despite these advantages, startups in Thane district face several financial challenges that limit their growth potential. District-level analysis of startup finance is essential for understanding region-specific constraints and designing targeted policy interventions. Most existing studies focus on national or metropolitan-level startup ecosystems, leaving a gap in micro-level empirical evidence.

The present study addresses this gap by examining the financial constraints faced by startups in Thane district. By analysing funding sources, financial stress factors, and perceptions towards government schemes, the study provides insights into the financial realities of startups operating in emerging urban districts.

2. Review of Literature

Access to finance has been widely recognised as a critical determinant of startup survival and growth. Beck and Demirgüç-Kunt (2006) argue that financial constraints disproportionately affect small and young firms due to information asymmetry and higher perceived risk. Berger and Udell (1998) explain that startups often face credit rationing because they lack collateral, credit history, and stable cash flows, which are key requirements for institutional lending.

Ayyagari, Demirgüç-Kunt, and Maksimovic (2011) empirically demonstrate that small enterprises face significantly higher financing obstacles compared to large firms, particularly in developing economies. Banerjee and Duflo (2014) highlight that imperfections in credit markets restrict entrepreneurial expansion in India, forcing startups to depend heavily on informal or internal sources of finance. These constraints limit innovation and firm scalability.

Several Indian studies have highlighted the persistent gap between policy intent and actual access to finance. Ghosh (2017) observes that despite government initiatives aimed at promoting startups, institutional finance remains largely inaccessible to early-stage ventures. The Reserve Bank of India (2019) reports a substantial credit gap in the MSME and startup sector, attributing it to risk aversion among banks and inadequate credit assessment frameworks for new firms.

NASSCOM (2020) notes that early-stage startups in India rely predominantly on personal savings and funds from family and friends, especially during the seed and initial growth phases. OECD (2021) emphasises that complex procedures, lengthy documentation, and delayed approvals discourage startups from availing public funding schemes. Similar findings are reported by the World Bank (2020), which highlights financial exclusion of small and young firms in emerging economies.

Regional and non-metropolitan startup ecosystems face additional challenges. Kumar and Rao (2020) find that startups in non-metro regions have limited access to venture capital networks, angel investors, and professional financial advisory services. Sharma and Madan (2019) stress that local financial infrastructure and institutional support play a crucial role in enabling startup growth at the regional level. IFC (2018) also identifies early-stage funding gaps as a major barrier for startups in developing countries.

Recent studies have begun to focus on spatial and regional dimensions of startup finance. Mukherjee (2022) highlights significant regional disparities in access to startup finance within India, driven by differences in institutional capacity, banking outreach, and policy implementation. UNCTAD (2021) underscores the importance of financial inclusion and tailored financing mechanisms to promote entrepreneurship in emerging regions.

Research Gap:The review of literature reveals that while extensive research exists on startup financing at the national and metropolitan levels, there is a clear lack of district-level empirical studies in the Indian context. Particularly, emerging urban districts such as Thane remain under-researched despite their growing entrepreneurial significance. Moreover, limited studies employ inferential statistical techniques to examine the relationship between access to institutional finance and financial stress at the micro level. The present study addresses this gap by providing district-specific empirical evidence on financial constraints faced by startups in Thane district, Maharashtra.

3. Objectives of the Study

1. To examine the major financial constraints faced by startups in Thane district, Maharashtra.
2. To analyse the sources and patterns of finance used by startups.

3. To study the relationship between access to institutional finance and the level of financial stress among startups.

4. Hypotheses

Hypothesis 1

- **H01 :** There is no significant relationship between access to institutional finance and the level of financial stress among startups in Thane district.
- **H11 :** There is a significant relationship between access to institutional finance and the level of financial stress among startups in Thane district.

Hypothesis 2

- **H02 :** Sources of finance do not significantly influence the severity of financial constraints faced by startups.
- **H12 :** Sources of finance significantly influence the severity of financial constraints faced by startups.

5. Research Methodology

The present study adopts a descriptive and analytical research design to examine the financial constraints faced by startups in Thane district, Maharashtra. The study area is confined to Thane district, which represents an emerging urban entrepreneurial region. Both primary and secondary data were used to achieve the stated objectives and to test the formulated hypotheses.

Primary data were collected through a structured questionnaire administered to startup founders and co-founders who are directly involved in financial decision-making. The questionnaire consisted of close-ended questions relating to sources of finance, access to institutional credit, financial stress indicators, and perceptions towards government funding schemes. Secondary data were sourced from peer-reviewed journals, reports published by the Reserve Bank of India, government policy documents, and other authenticated publications.

The sample size comprises 25 startups (N = 25) selected using a random sampling method from startups operating in Thane district and frequently experiencing financial challenges. The study covers one financial year.

For data analysis, both descriptive and inferential statistical tools were employed. Descriptive tools included percentage analysis to examine funding patterns and ranking techniques to identify the severity of financial constraints. Likert-scale analysis was used to assess perceptions regarding government funding schemes. To test Hypothesis 1, the Chi-square test was applied to examine the relationship between access to institutional finance and financial stress. For Hypothesis 2, association analysis was used to assess the influence of different sources of finance on the severity of financial constraints.

The study is subject to certain limitations, including a relatively small sample size, district-specific scope, and reliance on perception-based responses, which may restrict generalisation of the findings.

6. Profile of Sampled Startups

Understanding the basic characteristics of the sampled startups is essential for interpreting the nature and intensity of financial constraints faced by them. The profile of startups provides insight into their sectoral composition, age, ownership structure, and scale of operations, all of which influence access to finance and financial vulnerability. Table 1 presents a descriptive profile of the 25 startups selected for the study, highlighting key attributes that form the basis for subsequent analysis of financial constraints and funding patterns in Thane district.

Table 1 : Profile of Sampled Startups (N = 25)

Particulars	Category	Number of Startups	Percentage (%)
Nature of Business	Services	14	56
	Manufacturing	7	28
	Trading/Others	4	16
Age of Startup	Less than 3 years	15	60
	3–5 years	10	40
Ownership Structure	Proprietorship	13	52
	Partnership	8	32
	Private Limited	4	16
Scale of Operation	Micro enterprises	17	68
	Small enterprises	8	32

Source : Primary Data

Interpretation

The table shows that a majority of the sampled startups (56%) operate in the service sector, followed by manufacturing (28%) and trading activities (16%), indicating a service-led entrepreneurial structure in Thane district. Most startups (60%) are less than three years old, suggesting that the sample largely consists of early-stage ventures that are more vulnerable to financial stress. In terms of ownership, proprietorships (52%) and partnerships (32%) dominate, while only 16% operate as private limited companies, reflecting limited access to external equity finance. Further, 68% of startups function at a micro-enterprise level, highlighting constrained capital base and scale of operations. This profile underscores the relevance of examining financial constraints among startups in emerging urban districts.

7. Data Analysis and Interpretation

Primary data from 25 startups were coded and tabulated. Categorical responses were analysed using frequency and percentage distributions. Perception

statements were measured on a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) and analysed using mean scores. Financial constraints were prioritised using a weighted ranking method. Inferential tests were applied for hypothesis testing at 5% significance level.

A. Sources of Finance Used by Startups : Understanding the sources of finance used by startups is essential for analysing the nature of financial constraints faced by them. The type of funding accessed during the initial and growth stages significantly influences a startup's ability to manage working capital, absorb risk, and scale operations. Startups often rely on a combination of internal, informal, and formal sources of finance, particularly in emerging urban districts where access to institutional finance may be limited. Table 2 presents the distribution of various sources of finance utilised by the sampled startups in Thane district, providing insight into their funding patterns and degree of dependence on different financial channels.

Table 2 : Sources of Finance Used by Startups (N = 25)

Source of Finance	Number of Startups	Percentage (%)
Personal savings	17	68.00
Family / Friends	12	48.00
Bank loans / Institutional finance	8	32.00
Government funding schemes	6	24.00
Angel investors / Venture capital	3	12.00
Other informal sources	4	16.00

Source : Primary Data

Note : Multiple responses were permitted; therefore, the total percentage exceeds 100 %.

Interpretation

Table 2 shows that most startups in Thane depend mainly on their own money and informal sources for funding. A large number of startups (68%) use personal savings, which suggests that founders rely heavily on their own resources, especially in the early stages. Support from family and friends (48%) also plays an important role in keeping startups running. On the other hand, access to formal finance is limited, as only 32% of startups use bank loans. Government funding schemes (24%) and angel or venture capital funding (12%) are used by very few startups. Overall, this shows that formal financing options are not easily available, which adds to the financial stress faced by startups.

B. Ranking of Financial Constraints Faced by Startups : Identifying the relative severity of financial constraints faced by startups is crucial for understanding the nature of financial stress affecting their operations. Startups encounter multiple financial problems simultaneously; however, the intensity of these problems varies. Ranking analysis helps in prioritising these constraints based on their severity, thereby enabling focused policy interventions. In the present study, startups were asked to rank the major financial problems they face. A weighted ranking method was employed to determine the relative importance of each constraint, where higher weights were assigned to higher severity ranks. The results of this analysis are presented in Table.3.

Table 3 : Ranking of Financial Constraints Faced by Startups (N = 25)

Financial Constraint	Rank I	Rank II	Rank III	Rank IV	Rank V	Weighted Score	Final Rank
Difficulty in obtaining bank loans	10	7	4	3	1	96	I
Lack of collateral security	7	9	5	3	1	90	II
High interest rates	5	6	8	4	2	83	III
Cash-flow mismatch	2	3	5	9	6	65	IV
Delayed customer payments	1	2	3	6	13	47	V
Weighting Scheme: Rank I = 5, Rank II = 4, Rank III = 3, Rank IV = 2, Rank V = 1							

Source: Primary Data

Interpretation

The ranking results in Table 3 show that getting bank loans is the biggest financial problem for startups in Thane district. Many startups find it hard to access formal credit, mainly because of strict banking conditions. The lack of collateral is the second major issue, which limits startups' ability to secure loans. High interest rates are another concern, as they increase the cost of borrowing even when loans are available. Cash-flow problems arise due to uneven income and high running expenses. Although delayed customer payments are ranked lowest, they still add to financial pressure. Overall, the results suggest that institutional barriers are more serious than day-to-day operational issues, calling for easier and more startup-friendly financing policies.

C. Perception of Startups towards Government Funding Schemes : Perception of startups towards government funding schemes plays a crucial role in determining the extent to which such schemes are accessed and utilised. Even when multiple financial support programmes are available, startups may refrain from availing them due to procedural complexity, lack of clarity, or delayed processing. Analysing startups' perceptions helps in understanding the effectiveness of government interventions from the beneficiaries' perspective. In the present study, a five-point Likert scale was used to measure startups' perceptions regarding various aspects of government funding schemes. The results are summarised using mean scores and standard deviations in Table 4.(Likert scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree)

Table 4 : Perception of Startups towards Government Funding Schemes (N = 25)

Statements	SD (1)	D (2)	N (3)	A (4)	SA (5)	Mean	Std. Deviation
Documentation process is lengthy	1	2	3	10	9	4.04	0.94
Processing time for approval is high	1	3	4	9	8	3.92	1.01
Guidelines of schemes are clear	4	7	6	6	2	2.88	1.15
Government schemes are startup-friendly	5	8	7	4	1	2.60	1.12
Awareness about schemes is adequate	6	9	5	4	1	2.52	1.09

Source: Primary Data

Interpretation

The results presented in Table 4 indicate that startups perceive procedural complexity as a major deterrent in accessing government funding schemes. The highest mean score was observed for the statement "Documentation process is lengthy" (Mean = 4.04), followed by "Processing time for approval is high" (Mean = 3.92), reflecting strong agreement among respondents regarding administrative delays and procedural burden.

In contrast, the statements relating to clarity of guidelines, startup-friendliness, and awareness of schemes recorded mean scores below 3.00, indicating disagreement or low confidence among startups. Particularly, the low mean score for "Awareness about schemes is adequate" (Mean = 2.52) suggests insufficient dissemination of information at the district level. The relatively high standard deviation values for these statements indicate variability in perceptions across startups.

8. Hypothesis Testing

Inferential statistical analysis was conducted to examine the validity of the formulated hypotheses. Appropriate non-parametric tests were applied considering the small sample size (N = 25) and the categorical nature of the variables. The level of significance was fixed at 5 % (a = 0.05).

Hypothesis 1

- **H01 :** There is no significant relationship between access to institutional finance and the level of financial stress among startups in Thane district.
- **H11 :** There is a significant relationship between access to institutional finance and the level of financial stress among startups in Thane district.

Test Used : Chi-Square Test

Variables Considered

I. Access to institutional finance: Yes / No
II. Level of financial stress: Low / Moderate / High

Table 5 A: Association between Access to Institutional Finance and Financial Stress

Access to Institutional Finance	Low Stress	Moderate Stress	High Stress	Total
Yes	4	3	1	8
No	2	6	9	17
Total	6	9	10	25

Source : Primary Data

Table 5B : Chi-Square Test Results

Test Statistic	Value
Chi-square (χ^2)	6.87
Degrees of Freedom (df)	2
p-value	0.032
Level of Significance (α)	0.05

Interpretation

Since the p-value (0.032) < 0.05, the null hypothesis (H01) is rejected.The Chi-square test results indicate a statistically significant association between access to institutional finance and the level of financial stress among startups in Thane district. Startups that had access to bank loans or institutional finance predominantly experienced low to moderate financial stress, whereas startups without such access were largely concentrated in the high financial stress category. This finding confirms that institutional finance plays a critical role in mitigating financial stress among startups. Limited access to formal credit significantly increases financial vulnerability, particularly for early-stage enterprises operating with constrained internal resources.

Hypothesis 2

- **H02 :** Sources of finance do not significantly influence the severity of financial constraints faced by startups.
- **H12 :** Sources of finance significantly influence the severity of financial constraints faced by startups.

Test Used : Kruskal–Wallis H Test was used because of Small sample size (N = 25) and More than two independent groups along with ordinal nature of severity scores.

Variables Considered

I. **Primary source of finance :** Personal savings/Family-friends/Institutional finance/ Government schemes
II. **Severity of financial constraints :** Composite score derived from weighted ranking (Low / Moderate/High)

Table 6 : Kruskal–Wallis Test for Sources of Finance and Severity of Financial Constraints

Source of Finance	N	Mean Rank
Personal savings	9	16.22
Family / Friends	6	14.08
Institutional finance	6	8.17
Government schemes	4	6.63
Total	25	—

Kruskal–Wallis Test Statistics	
Test Statistic	Value
Kruskal–Wallis H	9.54
Degrees of Freedom (df)	3
p-value	0.023
Level of Significance (α)	0.05

Interpretation

Since the p-value (0.023) < 0.05, the null hypothesis (H02) is rejected.The Kruskal–Wallis test results reveal a statistically significant difference in the severity of financial constraints across different sources of finance. Startups relying primarily on personal savings and family-based funding exhibit higher mean ranks, indicating greater financial constraints. In contrast, startups with access to institutional finance or government schemes experience relatively lower severity of financial constraints. This result underscores the importance of formal financial channels in reducing financial stress and highlights the limitations of informal financing mechanisms for sustaining startup growth.

Table 7 : Summary of Hypothesis Testing Results

Hypothesis	Test Used	Test Value	p-value	Decision
H□□	Chi-square	$\chi^2 = 6.87$	0.032	Rejected
H□□	Kruskal–Wallis	H = 9.54	0.023	Rejected

9. Discussion of Findings

The findings of the study highlight significant financial challenges faced by startups in Thane district, an emerging urban entrepreneurial region. The analysis shows a strong dependence on personal savings and informal sources of finance, indicating limited access to formal financial channels. This reliance reflects structural constraints in the institutional credit system, particularly for early-stage startups lacking collateral and credit history.

The ranking of financial constraints identifies difficulty in obtaining bank loans as the most severe problem, followed by lack of collateral security and high interest rates. These results suggest that access-related barriers to finance are more critical than operational issues such as cash-flow mismatches or delayed payments. The perception analysis further reveals that startups view government funding schemes as procedurally complex and time-consuming, with low awareness and perceived startup-friendliness, which explains their limited utilisation.

Inferential analysis strengthens these findings. The Chi-square test confirms a statistically significant relationship between access to institutional finance and financial stress, demonstrating that startups with bank finance experience lower financial stress. Similarly, the Kruskal–Wallis test indicates that the source of finance significantly influences the severity of financial constraints, with startups relying on internal and informal funds facing greater financial difficulties.

Overall, the study demonstrates that financial stress among startups in Thane district is primarily driven by limited access to institutional finance, underscoring the need for targeted financial and policy interventions.

10. Suggestions

Based on the empirical findings of the study, several measures can be suggested to reduce financial constraints faced by startups in emerging urban districts like Thane.

- Institutional finance accessibility must be strengthened by simplifying loan appraisal procedures and adopting startup-specific credit assessment models that focus on business potential rather than collateral alone. Banks and financial institutions should expand the use of credit guarantee schemes to reduce perceived lending risks.
- There is a need to establish district-level startup finance facilitation centres that provide guidance on loan applications, documentation, and eligibility criteria for government funding schemes. Such centres can act as a bridge between startups, banks, and government agencies, thereby reducing information gaps and procedural hurdles.
- Government funding schemes should be simplified and made more startup-friendly. Streamlining documentation requirements, reducing approval timelines, and improving digital interfaces can enhance accessibility and utilisation. Regular awareness programmes and workshops at the district level are essential to improve startups' understanding of available financial support mechanisms.
- Policymakers should promote alternative financing mechanisms such as angel networks, seed funds, and crowdfunding platforms, particularly for early-stage startups that are not yet bankable. Encouraging partnerships between local industry bodies and investors can strengthen regional funding ecosystems.

- Financial literacy and cash-flow management training should be integrated into startup support programmes to improve financial decision-making and reduce operational stress. These measures, collectively, can create a more inclusive and resilient startup financing environment in emerging urban districts.

11. Conclusion

The present study examined the financial constraints faced by startups in Thane district, an emerging urban entrepreneurial region in Maharashtra. Using primary data from 25 startups and employing descriptive and inferential statistical tools, the study identified key financial challenges that influence startup sustainability and growth. The findings reveal a strong dependence on personal savings and informal sources of finance, reflecting limited access to institutional credit. Difficulty in obtaining bank loans, lack of collateral security, and high interest rates emerged as the most severe financial constraints.

Perception analysis indicates that government funding schemes are underutilised due to procedural complexity, lengthy documentation, and low awareness among startups. Inferential analysis further confirms a statistically significant relationship between access to institutional finance and financial stress, as well as a significant influence of funding sources on the severity of financial constraints. These results underscore the critical role of formal financial channels in mitigating financial stress among startups.

The study concludes that while Thane district offers favourable conditions for entrepreneurial development, structural barriers in the financial system continue to constrain startup growth. Addressing these challenges requires targeted policy interventions, improved institutional support, and enhanced financial accessibility at the district level. The findings provide valuable insights for policymakers, financial institutions, and entrepreneurship support agencies seeking to strengthen startup ecosystems in emerging urban districts.

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Digital Marketing for Rural Entrepreneurs in Nashik District

Ms. Pratibha Kale
Research Scholar
Dr. Arti Chudamanrao Lokhande
Assistant Professor,
MGV's Loknete Vyankatrao Hiray Arts, Science and Commerce Autonomous College, Panchavati, Nashik-3

Abstract

This study examines the role of digital marketing in empowering rural entrepreneurs in Nashik. It analyses how online platforms enhance market access, brand visibility, and income generation. The research highlights challenges, adoption patterns, and opportunities, emphasizing digital tools as catalysts for sustainable rural entrepreneurship and inclusive economic development.

Keywords : Digital Marketing, Rural Entrepreneurs, Nashik, Market Access, Sustainable Development

Introduction

Marketing is important link for the overall development of Indian economy, Any Economy cannot succeed without making large investment in its Marketing efforts. Digital Marketing Strategies are focusing on building lengthy period attachment with their rural and urban customer. So relationship marketing becomes extremely essential for the Economy.

Marketing strategy process is a process that can allow an organization to concentrates its inadequate resources on the maximum opportunities to extend sale and cutthroat advantage.

Digital marketing tools such as social media platforms, search engine optimization, e-commerce marketplaces, and data-driven analytics have enabled businesses to expand across borders efficiently. Beyond profits, there is a growing global consensus on aligning trade with the principles of sustainable development. Digital marketing, by enabling targeted outreach, eco-friendly practices (paperless transactions), and consumer awareness, plays a pivotal role in achieving sustainable trade.

Objectives

1. To examine various services provided by Digital Marketing for Rural Entrepreneurs in Nashik District.
2. To study the satisfaction level of Rural Entrepreneurs towards the services provided by Digital Marketing in the study area.

Scope of Study

The Present study attempt to analyze the Digital Marketing strategies for rural Entrepreneurs in Nashik District.

Limitations of the study

The study has not taken all States and Districts in India. It's Limited to only Nashik District.

Literature Review

Digital Marketing & Trade : According to Chaffey (2020), digital marketing reduces transaction costs and enhances cross-border communication.

Chauhan and Sharma (2021) : They emphasized the importance of regional language content in digital marketing, particularly for small businesses that cater to local communities.

Yadav and Reddy (2023) show how digital marketing helps businesses focus on the highly specific demographic and geographical details using data analytics. With this targeted approach, you are able to ensure that presented marketing is targeted towards the correct audience and creating the best opportunity to engage a customer. This means, for rural micro entrepreneurs, they can identify and concentrate potential customers that most likely will buy their products or services, thus improve the marketing efficiency and raise the opportunity of succeeding.

In addition, digital marketing permits businesses

to have an audience segmenting by various attributes like sex, age, interests, and buying behaviour. By its very nature, this level of precision targeting of the audience is not possible in traditional 34 marketing methods, making this an extremely powerful tool for rural entrepreneurs to reach customers otherwise incapable of doing so.

Jadhav et al. (2023), is measurable and businesses can track its growth, analyse the campaigns worth and make the required changes to increase ROI. For example, features like Google Analytics and Facebook Insights let entrepreneurs see when website visitors come and go, how good Facebook Insights. It is important for rural micro-entrepreneurs who are using limited resources, to be able to measure and analyse the performance as not every marketing dollar spends will often work.

According to Jadhav et al. (2023) e-commerce draws the attention of rural entrepreneurs to the possibility of offering their retail customers new avenues to purchase their products, and thus helping these entrepreneurs diversify their revenue streams and lessen dependence on the narrow, local market with limited size and purchasing power. But by selling those products online, rural businesses can reach new markets, boost up their sales volume and make better financials.

Chaffey and Chadwick (2012), digital marketing involves overseeing an organization's online presence 33 through various digital strategies, including social media management, email campaigns, search engine promotion, digital advertisements, collaborative online ventures, and internet-based public relations.

Conceptual Background

Digital-marketing provides new pathways for the entrepreneurs of rural areas to access e-commerce and become involved in online selling beyond local geographical limits. Thus with the boom rise of e-commerce platforms such as Amazon, Flipkart and Shopify, it has become easier than ever before to take presented small business worldwide, and expand presented customer base.

Digital Marketing strategy meaning & Definition

A marketing strategy is a comprehensive plan designed to promote products or services, attract customers and achieve short, medium or long term business goals.

Marketing mix consist of seven P's Like as Product, Pricing, Place, Promotion, People, Process and Physical Evidence.

Digital marketing strategy is the course of action your brand takes to achieve its marketing objectives, reach the target audience, and build an online presence. This is usually done through a variety of digital marketing channel, from SEO and email to social media and paid ads.

Key Digital Marketing Strategies For Rural Entrenpreneur

There are many tools and strategies available in the world of digital marketing to meet requirement.

1. **Search engine optimization :** SEO means Search Engine Optimization and is the process used to optimize a website's technical configuration, content relevance and link popularity so its pages can become easily findable, more relevant and popular towards user search queries, and as a consequence, search engines rank them better.
2. **Social Media Marketing :** Facebook, Instagram, Linkedin and Social Media Sites provides strong base for connecting with audiences, drive website traffic, and increase sales by sharing valuable content, engaging with followers, running ads, and analyzing results, shifting from one-way broadcasting to two-way conversations to foster loyalty and achieve business goals
3. **Content Marketing :** Content marketing is the process of creating and distributing digital assets, such as blog posts, videos, ebooks, technical and solution briefs, and a variety of other digital content to provide information to your audience.
4. **E-Mail Marketing :** Email marketing involves sending commercial emails to promote business offerings to existing and potential customers. It is a digital marketing strategy used to engage existing customers and attract new ones. Effective emails have compelling subject lines, personalized content, visuals, clear calls-to-action, and mobile optimization. Campaigns promote updates, offers, events, and content to communicate the brand story.
5. **Influencer Marketing :** its Social media strategy that involve paying for product endorsement from influencer with user that have credibility and small medium sized and large following on Social platforms like Instagram , facebook and Tik Tok.

Research Methodology

The secondary data is the data that is obtained from the journals and other databases that are usually prepared and available as open-source data.

The primary data is the data that is collected first hand. They are often collected through field surveys, questionnaires etc.

Secondary data were collected from

Journal, Books. Primary data were collected from questionnaire.

Analysis of Secondary Data

Marketing strategies for Rural Entrepreneurs data collected Various National and International Journal, Thesis. Rural Entrenpreneurs are using different Marketing strategies for their development Like as Mobile Banking, internet banking, Direct Marketing, Social Banking.

Analysis of Primary Data

Data were composed throughout primary sources and analysis with the help of simple percentage technique.

Demographic Variable

Demographic Variable	No. of Respondents	Percentage
Sex		
Male	18	60
Female	12	40
Age		
Below -25	21	70
26 - 35	04	13.3
36 – 45	02	6.7
46-55	03	10
Above 55	---	---
Occupation		
Agriculture related	13	43.3
Handicraft	---	---
Retail Shops	01	3.3
Food Products	02	6.7
Services	05	16.7
Others	09	30
Awareness of Digital Marketing		
Yes	24	80
No	06	20
Digital Marketing Platforms		
Whats App	12	40
Facebook	03	10
Instagram	05	16.7
Online Marketing Websites	06	20
	04	13.3
Helpful for growing Business		
Strongly Agree	13	43.3
Agree	13	43.3
Disagree	04	13.3
Need For Training		
Yes	23	76.7
No	07	23.3

Sources: Primary Data

The Above table shows about Demographic Profile of the respondents were sample collected with 30 respondents who are Rural Entrepreneurs in Nashik District.

In analyzing regarding the researcher selected 60 % of the respondents are male categories and 40% female categories. In analyzing regarding the age of more respondents are from Below 25 years with 70%. In analyzing about the Rural Entrepreneurs 43.3% are using Digital Marketing as compared to other sectors in Nashik Rural Entrepreneurs.

Discussion

The result found that rural entrepreneurs are using of Digital Marketing Strategies. Nashik District like as Pimpagaon, Chandwad, Sayyad Pimpri, Vadali Bhoi has included for collecting primary Data.

Conclusion

Digital marketing has emerged as a significant growth and mastery driver for micro entrepreneurs in the context of rural India. Digital marketing helps rural businesses compete as it provides a stage to reach a diverse audience, optimize the efforts in marketing activities and brands visibility.

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Green Bonds in India : A Catalyst for Environmental Sustainability

Dr. Seema Rawat
Asst. Prof., Department of Management Studies
KES Shroff College of Arts & Commerce, Kandivali (W)

Abstract

Green bonds have emerged as a significant financial innovation to channel funds towards environmentally sustainable projects.Green bond issuance reflects India's commitment to environmentally sustainable projects and contributes to the broader goal of maintaining sustainability.This research paper aims to analyze the effectiveness of green bonds in India as a financial innovation for environmental impact. Through a comprehensive analysis of existing literature, market trends, and statistical data, this study aims to provide insights into the role of green bonds in financing environmental projects and their contribution to India's sustainable development goals.

Key Words : Green bonds, sustainable projects, sustainable development goals

1. Introduction

Global warming, energy conservation, pollution control and environmental protection are the issues that need attention in the present scenario. The introduction of green bonds represents a novel approach to environmental finance, offering investors the opportunity to support projects with positive environmental impacts while generating financial returns. In India, the green bond market has witnessed considerable growth in recent years, reflecting the country's commitment to addressing environmental concerns and promoting sustainable development. Hence researcher aims to critically analyze the effectiveness of green bonds in India, examining their role in mobilizing capital for environmental projects and their impact on fostering environmental sustainability.

1.1 What are Green Bonds?

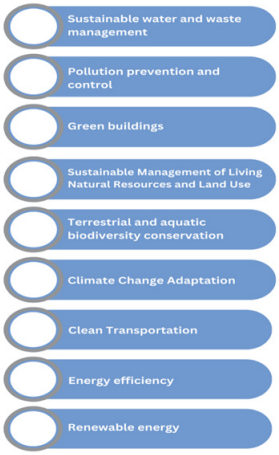
Green bonds are a debt instrument involving significant fixed-income borrowing by corporations, governments or institutions to fund green initiatives and promote ecological conservation (Agarwal, 2023; Goldman Sachs, 2023). Green bonds are issued to finance projects that have a positive environmental impact. They are designed to encourage investments in renewable energy, energy efficiency, sustainable agriculture and other projects that promote sustainability. These bonds seek to mitigate climate change risks while incentivizing investments through guaranteed interest additions to discourage high-carbon-emitting projects.

In 2016, Fiji became the first emerging market to issue a green bond, raising $50 million for climate resilience followed by Egypt's $750 million sovereign green bond in 202 0 and Indonesia Colombia's sustainability bond in 2021. India joined this group in early 2023, launching its first green bond to raise about $2 billion for projects that contribute to climate change mitigation, adaptation, environmental protection, resource and biodiversity conservation, and net zero objectives.

1.2 Eligible green projects

The Indian government intends to utilise Sovereign Green Bonds (SGrB) funds to partially or fully support the expenses associated with eligible green projects falling within the defined 'Eligible Categories'. Green bonds are typically issued to raise funds for the following categories of projects-

Figure 1 : represents a list of eligible categories as defined in the SGrB framework.



Source : Framework for SGB, Department of Economic Affairs, Govt. of India

2. Literature Review

As per the data published (Climate Bonds Initiative, November 2022), cumulative green bond issuances as on September 30, 2022, have surpassed US$ 2.0 trillion, which includes sovereign green bonds (SGrBs) issued by 26 sovereigns aggregating to US$ 230.9 billion. European nations are the major issuers of SGrBs with 5-year and 10-year tenors being the preferred tenors of issuance.

Empirical studies like "The Role of Green Bonds in Financing Renewable Energy Projects" (Sahoo & Das, 2018) offer statistical analysis on the allocation of green bond proceeds and their contribution to renewable energy investments in India.

Thirumala Rao Co-Author: G. Santosh (2021) found that green finance has made tremendous progress from past seven years i.e. from 2013 to 2019 and

India stood 4th position in amount issued on Green Bonds as a percent of all bonds issuance among the 12 countries.

Tolliver, Keeley and Managi (2020), who opined that Green Bonds are glowingly applied in financing initiatives aimed at reducing emission, sustainable development and other green investments. This led to initiation bythe institutionsto incorporateGreen Bondsin theirfinancial structuremanage climate change.

Flammer (2019), as indicated by the author, multiple organizations, notably, Government agencies, supranational bodiesand corporationshave recognizedthe significanceof financialsustainability in responding to the problem of climate change. In essence, the issuance of Green Bonds is considered vital in averting the worsening of climate change.

Voica, Panait and Radulescu (2015), they observed that, investments in Green Bonds, especially in infrastructure, is critical to realize the objective of sustainability in financial management

3. Research Problem

Since green bond market is increasing rapidly in the present scenario, only few research studies have been carried so far in this area.((Thirumala Rao ,Santoshi,2021) Key questions include whether green bonds have successfully mobilized funds for environmental projects, the degree of transparency in their issuance and utilization, and the overall impact on environmental outcomes.

4. Need of the study

From the literature review, it is analyzed that a financial instrument “Green Bond” is emerged as a funding source inprotecting theenvironment, pollutioncontrol andsustainability ofeco system. It isin the evolutionary stage in a country like India and it need to bring financial support in the present scenario, as our aim is to reduce the environmental damage and protect the globe from future pandemics. Hence researcher found need to analyse the effectiveness of green bonds in current scenario.

5. Objectives of the study

1. To assess the growth and trends of green bonds in India.
2. To analyze the effectiveness of green bonds in financing environmental projects.
3. To study the steps taken by government to promote green bonds.
4. To provide suggestions for enhancing the effectiveness of green bonds in promoting environmental impact.

6 . Scope of the study

This research focuses on the green bond market in India, covering the period from its inception to the present. It considers various stakeholders involved, including issuers, investors, regulators, and project beneficiaries. The scope encompasses both qualitative and quantitative analysis of government initiatives, market trends, and project performance.

7. Limitations of the study

Limitations of this research include constraints in data availability,and challenges in measuring the direct environmental impact of green bonds. Additionally, the study's scope may not encompass all nuances of the green bond market in India, and findings may be influenced by external factors beyond the researcher's control.

8. Significance of the study

This research contributes to the existing literature on green finance and environmental sustainability by providing insights into the effectiveness of green bonds in India. The findings of this study can inform policymakers, investors, issuers, and other stakeholders about the opportunities and challenges associated with green bond investments and thereby

facilitating informed decision-making and promoting environmental sustinability.

9. Data Collection Methodology

Data was collected from secondary sources, including academic journals, research reports, articles, industry publications, and regulatory filings. The statisticaldata was also collected from from official portals in particular RBI and SEBI website.

10. Government initiative to promote green bonds

The Indian Government has taken a number of steps to promote green bonds, including the launch of the Green Bond Market in India in 2015. In 2015, the Indian Government launched the Green Bond Scheme, which provides tax incentives to companies issuing green bonds. The Government has also set up the Green Bond Fund which provides grants to green projects. (Kumarand Kundalia , 2023)

The government announced the issuance of Sovereign Green Bonds in the Union Budget 2022-23, as a tool to mobilize resources for building green infrastructure, attaining energy efficiency, and meeting sustainable development goals (SDGs). On January 25, 2023, India issued the first tranche of its first sovereign green bond worth INR 80 billion and on February 9, 2023, the Government of India announced the issuance of another tranche worth INR 80 billion.

The introduction of India's first sovereign green bonds represents a significant step towards sustainability, aligned with the country's five critical climate action elements known as "Panchamrit", as outlined by the Prime Minister during COP26 in 2021. These elements include achieving 500GW non-fossil energy capacity, sourcing 50% of energy from renewable sources, reducing anticipated carbon emissions by one billion tonnes by 2030, decreasing carbon intensity by 45%, and attaining net-zero emissions by 2070, as per the Paris Agreement (Framework for SGB, Ministry of Finance). Additionally, India launched the LIFE movement at COP26, promoting responsible utilisation of natural resources.

11. Statistical analysis of green bonds success

The Government's efforts to promote green bonds have been successful in encouraging investments in green projects. It was found that green finance has made tremendous progress from past seven years i.e. from 2013 to 2019 and India stood 4th position in amount issued on Green Bonds as a percent of all bonds issuance among the 12 countries. (Rao and Santoshi,2021)

As per SEBI's data on green debt securities, during the period of 2017 to September 2022, 15 Indian corporates have issued green bonds of value Rs. 4,539 crore. Most of these are related to renewable energy generation, while one is slated to be used for the tertiary treatment of wastewater.

India entered the green bond market in 2015 when the YES Bank released the nation's first green bond to fund sustainable energy projects, notably those involving wind and solar energy. The market for green bonds has gradually grown to include a number of public sector organizations, state-owned corporate banks, state-owned financial institutions, corporations, and the banking industry. In its 2017 Brown to Green Report, Climate Transparency compared the issuance of green bonds across the G20 nations as a percentage of each nation's total debt market. India is ranked fifth among the G20 nations in their estimation this emphasis the scope's present and future dimensions. (Dr Sreedaran and Chaarumala, 2021)

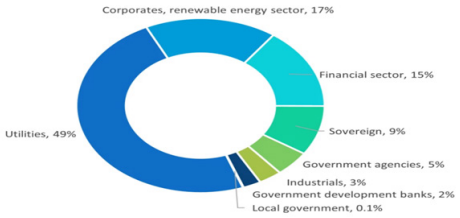
Table 1 : Top 10 Green Bond issuance in India as on 25th January 2023

Issuer	Amount	Issued date	Tenure	Sector Exposure	Credit Rating
NTPC	Rs. 20bn	Aug-16	5 Years	Energy	BBB(Fitch)
IREDA	Rs.19.5 bn	Sept-17	5 Years	Energy	GBI- green bond rating
Yes Bank	Rs. 10 bn	Feb-15	10 Years	Energy	AA+ (CARE & ICRA)
IREDA	Rs. 7 bn	March-17	10 Years	Energy	AA+ (ICRA)
CLP Wind farms	Rs. 6 bn	Sept-15	3,4, 5 Years	Energy	AA(Indian Rating & Research)
PNB Housing Finance	Rs. 5 bn	Aprl-16	NA	Building	NA
Hero Future Energies	Rs. 3 bn	Feb-16	3,6 Years	Energy	NA, CBI Certified
ReNew Power	Rs. 5 bn	Aug-16	NA	Energy	A+ (CARE)

Source : International journal for Research and publication review, Vol4,no.9,pp2904-2910 September 2023

Above data indicates that at present top 10 issuance of India contribute to approx. Bonds of worth 75.5 bn focusingmajorly towards energy sector.

Figure 2 : Green bond amounts issued in India by type of issuer

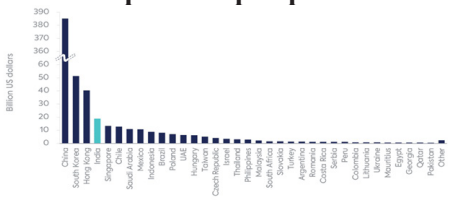


Source : World Bank with data from Bloomberg

Above diagram indicates that Financial institutions and government agencies have used the instrument since 2015. Indian green bond issuances have reached a total of $21 billion as of Februar 2023. The private sector was responsible for 84% of the total. India leads Asian emerging markets (excluding China) in green bond issuance.Indian issuers have issued a greater amount of green bonds ($21 billion) than other emerging markets in Asia, excluding China.

The largest green bond issuer in India Greenko Group is funding hydro, solar, and wind power projects in several Indian states with its green bond proceeds. Ghaziabad Nagar Nigam, a civic body in Uttar Pradesh, is the first Indian local government to have issued a green bond (USD eq 20 million in 2021). Indore Municipal Corporation issued USD 87 million in green bonds in 2023.

Figure 3 : India's Total green bond issuance in comparative perspective



Data as on March 2023, Source : Bloomberg, Refinitiv Above chart shows that India currently stands fourth among EMDE and developed Asian countries, with a total of $19 billion of green bonds issued by March 20, 2023, only 13 percent of which were denominated in the rupee before the recent sovereign issuance.

12. Suggestions

- Global experiences suggest that, there should be an integrated policy approach towards Green Finance
- Introducing educational programs on green bonds is essential to raise awareness among investors. Government policies emphasising investor protection, financial transparency, and price regulation are crucial for promoting the adoption of these bonds.
- Reducing various risks, including legal, default, liquidity, inflation, political, interest rate, and investment risks, necessitates carefully establishing an environment favourable to private investors.
- Besides emphasizing offshore investments, the Indian government should prioritise the establishment of a green capital pool to stimulate domestic demand.
- Establishing a transparent and trustworthy environment is crucial for ensuring long-term success and achieving quality standards.
- a policy of tax benefits to the issuers as well investors can help overcome the existing need of funds for environmental projects. A system of tax credit can be framed whereby the issuers do not have to pay interest payments and instead tax credit be transferred to the bond holders' account.
- credit rating assessment should be followed for analysing if the funds are invested in sound green projects.
- It is essential to establish standardised guidelines for international investors to enhance their focus on green initiatives.

13. Scope for further research

Environmental Protection, Sustainable Development, Pollution Control, Renewable Energy is gaining momentum in the recent years. These elements can give scope for further research to the research scholars. Topics on Green Finance, Green Accounting, Green Bonds can be further analysed to enhance the scope of study and expand the domain in finance.

14. Conclusion

Environmental protection is the most required priority in today's scenario. Finance is an essential element to invest in green projects. Green bonds are in the emerging stage in India. Green bond issuance has the potential to mobilize substantial capital for sustainable projects in India and contribute to the country's climate goals. However, above mentioned challenges need to be addressed to unlock the full potential of this financing instrument.

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A Mathematical Framework for Uncertainty-Aware and Regional Climate Change Modeling with Long-Term Mitigation Assessment

Mr. Mahesh Ghag
Asst. Professor
KES Shroff College

Abstract

Climate change is a major challenge to global sustainability, making accurate prediction and effective mitigation essential. Mathematical modeling has become an important tool for understanding climate behavior, predicting future climate conditions, and assessing the impact of mitigation strategies. However, many existing climate models have limitations. They often do not adequately account for uncertainty, fail to capture regional and local climate variations, and focus mainly on short- to mid-term projections rather than long-term outcomes.This study addresses these gaps by proposing a simple and uncertainty-aware mathematical modeling framework. The framework combines probabilistic methods with regional climate analysis and long-term assessment of mitigation strategies. Both deterministic and stochastic differential equations are used to represent climate processes while accounting for uncertainties related to climate sensitivity, greenhouse gas emissions, and socio-economic factors. Statistical techniques are applied to quantify uncertainty and improve the reliability of model predictions.To better reflect real-world conditions, the study includes regional climate modeling. Key variables such as temperature variation, rainfall patterns, and coastal impacts are analyzed using downscaled mathematical representations. This approach helps capture localized climate behavior and provides more relevant insights for regional planning and decision-making.The study also evaluates the long-term effectiveness of mitigation strategies beyond 2050. Strategies such as renewable energy adoption, carbon capture and storage, and reforestation are examined using interaction-based models. These models assess how combined mitigation efforts influence climate outcomes over extended periods. Graphical analysis of simulated data highlights uncertainty ranges, regional differences in climate impacts, and nonlinear responses of climate systems to multiple interventions.The results show that incorporating uncertainty significantly improves the credibility of climate predictions. Regional modeling offers clearer guidance for policymakers, while integrated mitigation strategies prove more effective than isolated actions in stabilizing global temperatures over the long term. Overall, the findings underline the importance of simple, uncertainty-aware, region-specific, and long-term mathematical models for meaningful climate change analysis and sustainable policy development.

Keywords : Climate change, mathematical modelling, renewable

Introduction

Climate change has emerged as one of the most significant global challenges of the twenty-first century, with far-reaching profound ramification natural ecosystems, economic stability, and human well-being. Rising global temperatures, sea-level rise, increased frequency of extreme weather events, and shifting precipitation patterns are among the most prominent manifestations of climate change. Accurate prediction of these phenomena is essential for designing effective mitigation and adaptation strategies. In this context, mathematical modeling plays a crucial role by providing structured frameworks to analyze climate dynamics and simulate future scenarios.Traditional climate models have achieved considerable success in predicting large-scale climate trends. However, despite their sophistication, several fundamental limitations

remain. One major limitation is the inadequate integration of uncertainty quantification. Climate systems are influenced by numerous uncertain factors, including climate sensitivity, emission trajectories, and socio-economic variables. Many existing models rely heavily on deterministic approaches, which may underestimate the range of possible future outcomes and lead to overconfidence in predictions.Another significant challenge is the lack of regional and local-scale climate modeling. While global climate models effectively capture broad patterns, they often fail to represent localized impacts such as regional heatwaves, monsoon variability, and coastal flooding. These localized phenomena are critical for regional policy formulation and disaster preparedness, especially in climate-vulnerable regions.Furthermore, most climate studies evaluate mitigation strategies only up to mid-century, typically 2050. This temporal limitation restricts understanding of the long-term sustainability and interaction effects of mitigation measures. Climate systems exhibit nonlinear behavior, and the combined effects of multiple mitigation strategies may differ significantly from their individual impacts.This study aims to address these limitations by developing a comprehensive mathematical framework that incorporates uncertainty quantification, regional climate modeling, and long-term mitigation assessment. By integrating stochastic methods, regional analysis, and extended time horizons, the research seeks to improve the reliability, relevance, and policy applicability of climate change models.

Objectives

- To examine a mathematical climate model that explicitly incorporates uncertainty arising from climate sensitivity, emission scenarios, and socio-economic assumptions.
- To develop regional and local-scale climate models capable of capturing localized climate impacts such as temperature variability and precipitation changes.
- Use interaction based mathematical modeling to examine the long-term effectiveness of mitigation strategies beyond 2050 using interaction-based mathematical modeling.
- To analyze the combined effects of multiple mitigation strategies on long-term climate stabilization.
- To provide graphical and mathematical insights that support informed climate policy decisions.

Review of Literature

1. Mathematical modeling has long been a cornerstone of climate science. Early climate models focused on energy balance equations and simple differential equations to describe temperature evolution (Budyko, 1969). Over time, these models evolved into complex general circulation models (GCMs) incorporating atmospheric, oceanic, and land-surface processes (IPCC, 2021). While GCMs provide valuable insights into global climate dynamics, their complexity often limits transparency and computational efficiency.

2. Uncertainty quantification has been recognized as a critical issue in climate modeling. Smith et al. (2018) highlighted that deterministic models fail to capture variability arising from uncertain input parameters. Stochastic differential equations and probabilistic frameworks have been proposed to address this issue, but their adoption remains limited. Ensemble modeling approaches partially address uncertainty but often lack formal mathematical treatment.

3. Regional climate modeling has gained attention due to the need for localized climate impact assessments. Giorgi and Gutowski (2015) emphasized the importance of downscaling techniques to translate global climate projections into regional contexts. However, many regional models rely on numerical simulations rather than analytical mathematical frameworks, limiting theoretical insight into regional climate dynamics.

4. Mitigation strategies such as renewable energy adoption, carbon capture, and reforestation have been extensively studied. Pacala and Socolow (2004) introduced the concept of stabilization wedges, highlighting the potential of combined mitigation approaches. However, most studies focus on near- to mid-term outcomes, with limited attention to long-term interactions and sustainability beyond 2050.

5. Recent studies have explored machine learning methods for climate prediction (Reichstein et al., 2019). While these methods improve predictive accuracy, they often lack interpretability and fail to integrate uncertainty explicitly. This highlights the need for hybrid approaches that combine mathematical rigor with data-driven technique.

Methodology

The proposed methodology integrates deterministic and stochastic mathematical modeling techniques to address the identified research gaps.

Mathematical Climate Model

The core climate model is based on a system of differential equations representing temperature evolution:

$$\frac{d}{dt}T(t)=\alpha E(t)-\beta T(t)$$

where T(t) represents global or regional temperature anomaly, E(t) denotes greenhouse gas

emissions and a,ß are climate response parameters.

Uncertainty Quantification

To incorporate uncertainty, stochastic terms are introduced:

$dT(t)=[aE(t)-ßT(t)]dt+sdW(t)$

where dW(t) is a Wiener process and s represents uncertainty intensity. This formulation captures variability in climate sensitivity and emission trajectories.

Regional Modelling

Regional models are developed by parameterizing the equations based on regional climate data. Downscaling techniques are applied to adjust global parameters for regional conditions such as latitude, land-use patterns, and proximity to oceans.

Mitigation Strategy Modeling

Mitigation strategies are modeled as reductions in emission functions:

$E(t)=E_0(t)-(R(t)+C(t)+F(t))$

where R(t), C(t), and F(t) represent emission reductions due to renewable energy, carbon capture, and reforestation, respectively. Interaction effects are modeled through nonlinear coupling terms.

Data Analysis

Simulated climate data isanalyzed using time-series graphs, uncertainty bands, and comparative regional plots to visualize model behavior and mitigation outcomes.

Data Representation Analysis

Temperature Evolution under Deterministic Climate Model

This model is important because it helps us understand how increasing greenhousegas emissions affect global temperature over time. By studying this relationship, scientists and policymakers can predict future climate conditions and plan actions to reduce climate-related risks such as heatwaves, droughts, melting glaciers, and sea-level rise.

A deterministic climate model uses fixed mathematical relationships between emissions and temperature. As time increases, emissions E(t) rise steadily. The model calculates the corresponding temperature anomaly T(t) based on these emissions. Since the model is deterministic, the same emission levels always produce the same temperature outcome. At 0 years, emissions are 10.0 and temperature anomaly is 0.20°C. By 30 years, emissions increase to 13.0, and temperature anomaly rises to 1.95°C. This shows a consistent and predictable increase in temperature with rising emissions.

The increasing temperature has several serious impacts: Global warming and climate change More frequent extreme weather events. Melting polar ice and rising sea levels Negative effects on agriculture, ecosystems, and human health. The data clearly shows that even small increases in emissions lead to significant temperature rise over time.

To reduce the negative impacts shown by the model, the following solutions are important: Reduce greenhouse gas emissions by using renewable energy sources. Promote energy efficiency and sustainable practices. Implement strong environmental policies. Increase afforestation and conservation efforts. Invest in clean technologies and climate research

Title : Temperature Evolution under Deterministic Climate Model

Time (Years)	Emissions E(t)	Temperature T(t)
0	10.0	0.20
5	10.5	0.42
10	11.0	0.68
15	11.5	0.95
20	12.0	1.25
25	12.5	1.58
30	13.0	1.95

2. Temperature Variability under Stochastic Climate Model

A stochastic climate model is important because it considers uncertainty and naturalvariability in climate systems. Unlike deterministic models, real climate behavior is influenced by random factors such as volcanic eruptions, ocean currents, and atmospheric fluctuations. This model helps scientists understand possible temperature ranges, not just a single predicted value, which is crucial for better climate risk assessment and planning.

In a stochastic climate model: The mean temperature represents the average expected temperature at a given time.The upper and lower bounds show the possible range of temperature due to random variations.The model includes probabilistic elements to account for uncertainty in climate processes.At 0 years, the mean temperature is 0.20°C, with a range from 0.10°C to 0.30°C.At 30 years, the mean temperature rises to 2.00°C, with possible values between 1.50°C and2.60°C. This shows that temperature not only increases over time but also becomes more uncertain and variable. The increasing mean temperature and widening variability can lead to:Greater uncertainty in weather patterns. More frequent and intense extreme climate events. Difficulty in agricultural planning and water management. Higher risks to ecosystems and human health. Challenges in long-term infrastructure and policy planning.The upper bound indicates the possibility of severe warming, which could have serious consequences if not addressed.To manage the impacts highlighted by the stochastic model, the following solutions are important:Reduce greenhouse gas emissions to lower both average temperature and extremes. Develop climate-resilient infrastructure. Improve early warning systems for extreme weather.

Use probabilistic climate models in policy and decision-making. Promote adaptation strategies such as sustainable agriculture and water conservation.

Table Title : Temperature Variability under Stochastic Climate Model

Time (Years)	Mean Temperature	Upper Bound	Lower Bound
0	0.20	0.30	0.10
5	0.45	0.60	0.30
10	0.70	0.95	0.50
15	1.00	1.30	0.75
20	1.30	1.70	1.00
25	1.60	2.10	1.25
30	2.00	2.60	1.50

3. Regional Temperature Anomalies Comparison

This comparison is important because it shows that temperature rise is not uniform acrossregions. Coastal and inland areas respond differently to global warming, which is crucial for regional climate planning and adaptation strategies.The model compares global average temperature anomalies with coastal and inland regions over time. Coastal regions show lower temperature rise due to the moderating effect of oceans.Inland regions experience higher temperature increases due to lack of ocean influence. For example, at 30 years, inland regions reach 2.30°C, while coastal regions are at 1.60°C.Inland regions face more intense heatwaves and water stress.Coastal regions, though cooler, remain vulnerable to sea-level rise and storms.Unequal warming affects agriculture, ecosystems, and human health differently across regions.Develop region-specific climate adaptation plans. Strengthen heat mitigation strategies in inland areas. Enhance coastal protection and planning. Reduce emissions globally to limit regional warming.

Table Title : Regional Temperature Anomalies Comparison

Time (Years)	Global Avg	Coastal Region	Inland Region
0	0.20	0.15	0.25
5	0.45	0.35	0.55
10	0.70	0.55	0.85
15	1.00	0.80	1.20
20	1.30	1.05	1.55
25	1.60	1.30	1.90
30	2.00	1.60	2.30

4 Impact of Mitigation Strategies on Emissions

This model is important because it shows how climate mitigation strategies can reduce overall greenhouse gas emissions even when baseline emissions continue to increase. It helps policymakers and researchers understand the effectiveness of renewable energy, carbon capture, and reforestation in controlling climate change and achieving emission reduction targets. Baseline emissions E0(t): emissions without any control measures. Renewables R(t): reduction due to clean energy sources. Carbon capture C(t): emissions removed using technology. Reforestation F(t): carbon absorbed by forests. Net emissions are calculated by subtracting mitigation effects from baseline emissions.At 0 years, baseline emissions are 10.0, and mitigation reduces net emissions to 9.0.By 30 years, although baseline emissions rise to 13.0, strong mitigation reduces net emissions to only 1.5.The impact of applying mitigation strategies includes:Substantial reduction in net emissions. Slowing down of global warming. Lower risk of extreme climate events. Improved air quality and public health. Progress toward sustainable development goal. The data clearly demonstrates that coordinated mitigation can reverse the effects of rising emissions .The solution suggested by this model is a combined mitigation approach, which includes:Expanding renewable energy usage. Investing in carbon capture and storage technologies. Promoting large-scale reforestation and afforestation. Implementing strong environmental policies. Encouraging international cooperation on climate action. By strengthening these strategies together, net emissions can be reduced to very low levels, helping to control climate change effectively.

Table Title : Impact of Mitigation Strategies on Emissions

Time (Years)	Baseline Emissions E□(t)	Renewables R(t)	Carbon Capture C(t)	Reforestation F(t)	Net Emissions
0	10.0	0.5	0.2	0.3	9.0
5	10.5	1.0	0.4	0.6	8.5
10	11.0	1.8	0.8	1.0	7.4
15	11.5	2.5	1.3	1.5	6.2
20	12.0	3.2	2.0	2.0	4.8
25	12.5	4.0	2.8	2.5	3.2
30	13.0	5.0	3.5	3.0	1.5

Temperature Trajectories With and Without Mitigation

This comparison is important because it clearly shows how mitigation measures can significantly slow down the rise in global temperature. It helps demonstrate the long-term benefits of climate action and supports decision-making for governments and environmental agencies aiming to limit global warming.

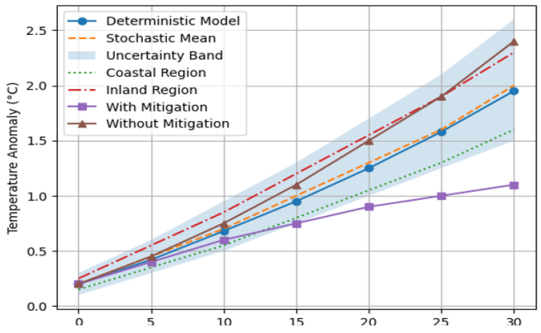
The model compares temperature changes over time under two scenarios:Without mitigation: No action is taken to reduce emissions.With mitigation: Emission reduction strategies such as renewable energy, carbon capture, and conservation are applied.At 0 years, both scenarios start at 0.20°C. At 30 years, temperature reaches 2.40°C without mitigation, but only 1.10°C with mitigation.This shows that mitigation significantly reduces the rate of temperature increase..The differences between the two trajectories highlight major impacts:Without mitigation: higher risk of extreme weather, sea-level rise, and ecosystem damage.With mitigation: reduced climate risks, better environmental stability, and

improved human health.Lower temperature rise helps protect agriculture, water resources, and biodiversity. The solution emphasized by this model is early and continuous mitigation, which includes:Reducing greenhouse gas emissions. Promoting renewable energy sources. Enhancing carbon sinks through reforestation. Adopting energy-efficient technologies. Strengthening climate policies and public awareness. By implementing these measures, global temperature rise can be controlled and kept within safer limit.

Table Title : Temperature Trajectories With and Without Mitigation

Time (Years)	Without Mitigation (°C)	With Mitigation (°C)
0	0.20	0.20
5	0.45	0.40
10	0.75	0.60
15	1.10	0.75
20	1.50	0.90
25	1.90	1.00
30	2.40	1.10

Graph Title : Integrated Climate Modelling: Deterministic, Stochastic, regional & mitigate



Results

The results indicate that incorporating uncertainty quantification significantly broadens the range of predicted climate outcomes, providing a more realistic representation of future scenarios. Models without stochastic terms tend to underestimate extreme outcomes, whereas uncertainty-aware models capture potential high-impact scenarios. Regional models reveal substantial variation in climate impacts. Coastal regions exhibit higher temperature variability and increased risk of sea-level rise, while inland regions show distinct precipitation patterns. These findings underscore the inadequacy of relying solely on global averages for policy planning. Long-term mitigation analysis demonstrates that single mitigation strategies yield limited effectiveness beyond 2050. In contrast, combined strategies produce sustained temperature stabilization, reducing long-term climate risks. Interaction effects amplify mitigation benefits, confirming the necessity of integrated climate policies.

Conclusion

This study presents a comprehensive mathematical framework for climate change modeling that addresses key limitations in existing approaches. By integrating uncertainty quantification, regional climate modeling, and long-term mitigation assessment, the proposed framework enhances the reliability and policy relevance of climate predictions. The findings highlight the critical role of stochastic modeling in capturing uncertainty, the importance of regional analysis for localized decision-making, and the effectiveness of combined mitigation strategies over extended time horizons. Mathematical modeling, when applied thoughtfully, can provide powerful insights into complex climate systems and support sustainable climate policy development. Future research may extend this framework by incorporating socio-economic dynamics, real-time data assimilation, and advanced uncertainty analysis techniques. Overall, the study demonstrates that mathematics remains an indispensable tool in addressing the global challenge of climate change.

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Internet film Piracy in Indian Cinema and its Impact on stakeholders in the Context of Copy Right Act.1957

Prof. Dr. Ravindra S. Netawate
MES, The D. G. Ruparel College of Arts, Science and Commerce,
Senapati Bapat Marg Mahim, Mumbai

Abstract

Since ancient times, creative individuals such as authors, painters, musicians, and scientists have contributed immensely to art and culture through their original works. In the modern era, Indian cinema has emerged as one of the largest and most influential creative industries in the world. Commonly known as Bollywood, the Indian film industry has been thriving for over seventy-five years, producing thousands of films annually in various languages. Major film production centres are located in cities such as Mumbai, Kolkata, Hyderabad, Bangalore, and Chennai, with renowned studios like Goregaon Film City and Balaji Film City playing a vital role in the industry's growth.

Although the Copyright Act, 1957, was enacted to protect the intellectual property rights of creators in India, the enforcement and public awareness of the law have evolved over time.. However, after the 1990s, with the advent of the internet revolution and the rise of digital technology, the problem of film piracy escalated dramatically. The ease of online sharing and downloading led to the widespread unauthorized distribution of films and music, severely affecting the revenue and reputation of filmmakers, producers, and other creative professionals.

Introduction

Although the Copyright Act, 1957, was enacted to protect the intellectual property rights of creators in India, the enforcement and public awareness of the law have evolved over time. Initially, instances of copyright violations such as copying dialogues, music, and soundtracks were limited. However, after the 1990s, with the advent of the internet revolution and the rise of digital technology, the problem of film piracy escalated dramatically. The ease of online sharing and downloading led to the widespread unauthorized distribution of films and music, severely affecting the revenue and reputation of filmmakers, producers, and other creative professionals.

Notable films such as Hum Aapke Hain Kaun, Baahubali, and several other Hindi and regional films have suffered significant financial losses due to internet piracy. This not only impacts the financial management of film production companies but also influences human resource management, as employment opportunities and fair compensation for creative workers are adversely affected.

Therefore, to combat the growing menace of film piracy, it is essential to strengthen and effectively enforce the provisions of the Copyright Act, 1957. Stricter legal frameworks, technological safeguards, and public awareness are necessary to protect the rights of content creators and ensure the sustainable growth of the Indian cinema industry.

Origin of the Problem

The problem of film piracy in India originated with the increasing availability of technology that made duplication and distribution of creative content easier and cheaper. In the early years of Indian cinema, piracy mainly took the form of unauthorized reproduction of film prints, soundtracks, and dialogues, which were circulated through physical media such as cassettes, CDs, and DVDs. Although these acts violated the Copyright Act, 1957, their impact was relatively limited due to restricted access to duplication technologies and smaller audience reach.

However, the scenario changed drastically in the 1990s and early 2000s with the advent of digitalization and the internet revolution. The

introduction of personal computers, high-speed internet, and affordable digital storage enabled individuals to copy, store, and share films with ease. Websites and peer-to-peer file-sharing platforms such as torrents and Furthermore, the Copyright Act, 1957, though designed to protect the intellectual property of creators, faces challenges in enforcement due to rapid technological changes and limited awareness among the general public. By studying this issue in depth, the research aims to identify gaps in the existing legal framework, evaluate organizational responses to piracy, and propose effective preventive and management strategies to safeguard the interests of all stakeholders.

Rational of The Study

Furthermore, the Copyright Act, 1957, though designed to protect the intellectual property of creators, faces challenges in enforcement due to rapid technological changes and limited awareness among the general public. By studying this issue in depth, the research aims to identify gaps in the existing legal framework, evaluate organizational responses to piracy, and propose effective preventive and management strategies to safeguard the interests of all stakeholders.

Objective of The Study

1. To study the internet film piracy in Indian Cinema.
2. To study the impact of film piracy on stakeholders.
3. To Study the challenges of Internet film Piracy
4. To suggest the measures to overcome on the Problems of Piracy.\

Review of Literature

Journals

1. Rani, P., & Kumar, S. (2020).Impact of Digital Piracy on the Indian Film Industry. International Journal of Creative Research and Studies, 8(2), 45–52.

This study analyses the growing problem of digital piracy in India's cinema and highlights the economic losses faced by producers, distributors, and exhibitors. The research emphasizes that piracy negatively affects investment in new projects and the employment of creative professionals.

2. Sharma, A., & Mehta, R. (2018).Film Piracy and Intellectual Property Rights in India. Journal of Intellectual Property Rights, 23(4), 210–218.

The article reviews the effectiveness of the Copyright Act, 1957, and its amendments in curbing online piracy. It argues that legal measures alone are insufficient and calls for technological interventions and stronger enforcement mechanisms.

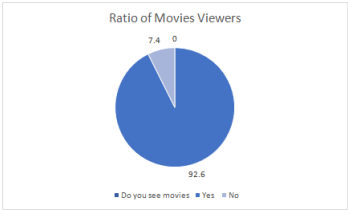
Research Methodology

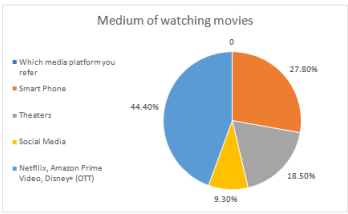
The Primary data has been collected by circulating the well-equipped questionnaire to the target respondents and secondary data from the journals, references, newspapers and websites. Random sampling method has been followed for collecting the primary data from the respondents, statistical tools SPSS has been used for charts, tables and diagrams.

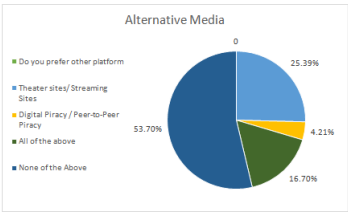
Limitations of the Study

- The respondents have been given limited response to the primary data collection.
- The duration of collection of data was very limited, hence couldn't reach to more respondents.
- The respondents didn't fill up the accurate questionnaire.

Interpretations of the data







Findings of the Study

- The copy right act. 1957 and 2013 are not implemented forcefully by government.
- The provisions of punishment of discriminations of copy right act. are not effective on the piracy of cinema.
- The duration of copy right of inventor is very long, it gives more chances to piracy of- Indian cinema.
- The information technology is more responsible for internet film piracy.
- The copyright acts. is restricted to only India, outside the nation, this act is not –

Powerful to stop the Indian cinema piracy

- Maximum respondents like to see cinema on OTT and other sources than cinema theater.
- The cost of looking cinema in the theater

is costly than other options, hence the ratio of audience is reducing to see cinema in the theater.

Suggestions

- The duration of copy right ownership should have reduced.
- The rules of cinema piracy tobe strict.
- Punishment on discriminations of cinema piracy to be increased.
- Rates of cinema tickets should have reasonable, so that audience Would turn to see cinema in the theatre.

Conclusion

The above study indicated that, the technology has been

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Enhancing Competitiveness of Local Agricultural Commodities in Global Markets : Strategies to Improve Global Market Access for Maharashtra's Grapes, Sugar, and Cotton

Dr. Vikas Kumar R. Mishra
K. E. S. Shroff College, Mumbai

Abstract

This study examines strategies to enhance the global competitiveness of Maharashtra's key agricultural commodities—grapes, sugar, and cotton—in the context of increasing globalization and evolving trade regimes. Using secondary data from APEDA, DGCIS, FAO, and WTO for the period 2016–2023, the research adopts a descriptive and analytical approach to evaluate export performance trends, the role of quality standards and certification, the impact of global price fluctuations, and the influence of trade policies and agreements. Analytical tools such as trend analysis, compound annual growth rate (CAGR), correlation analysis, and export competitiveness indices are employed. The findings reveal a significant positive trend in exports of all three commodities, with grapes demonstrating stable growth due to strong compliance with international quality standards, while sugar and cotton show higher sensitivity to global price volatility. The study concludes that targeted policy support, export readiness measures, and compliance with global standards are crucial for strengthening Maharashtra's integration into global agricultural markets.

Keywords : Agricultural exports; Global competitiveness; Quality standards; Trade policy; Maharashtra; Grapes; Sugar; Cotton.

Introduction

In the era of globalization, agricultural trade has emerged as a crucial driver of economic growth, rural development, and foreign exchange earnings for developing economies like India. With increasing integration into global markets, the competitiveness of local agricultural commodities has become a key concern for policymakers, producers, and exporters. Maharashtra, being one of India's leading agricultural states, plays a significant role in the country's agri-export landscape, particularly through commodities such as grapes, sugar, and cotton. These products not only contribute substantially to the state's agricultural output but also hold strong potential in international markets due to favorableagro-climatic conditions, established production clusters, and export-oriented infrastructure.

Despite this potential, Maharashtra's agricultural exports face several challenges in achieving sustained global competitiveness. International markets are increasingly governed by stringent quality standards, certification requirements, sanitary and phytosanitary (SPS) measures, and traceability norms. Compliance with these requirements demands higher investment, technological adoption, and institutional support, which often pose barriers for small and marginal farmers. Export readiness, therefore, depends not only on production capacity but also on the ability to meet global quality benchmarks and certification standards.

Furthermore, global agricultural markets are characterized by significant price volatility influenced by factors such as global demand–supply dynamics, climate change, geopolitical developments, and trade policies. Commodities like sugar and cotton are particularly vulnerable to international price fluctuations, which affect export profitability and income stability for producers. Trade agreements, tariff structures, and non-tariff barriers further shape market access conditions, making it imperative to analyze their impact on Maharashtra's agricultural exports.

Against this backdrop, this study seeks to examine strategies that can enhance the global competitiveness of Maharashtra's key agricultural

commodities—grapes, sugar, and cotton. By focusing on quality standards, certification mechanisms, export preparedness, and the influence of global price movements and trade agreements, the research aims to identify policy and market-oriented interventions that can strengthen Maharashtra's integration into global agricultural value chains. The study contributes to the existing literature by offering a commodity-specific and region-focused analysis, thereby providing insights for policymakers, export agencies, and agricultural stakeholders striving to transform local agricultural strengths into sustainable global market opportunities.

Review of Literature

The literature on agricultural trade competitiveness identifies agri-food export performance as a multidimensional concept influenced by trade policy, quality standards, certification, infrastructure, and global market conditions (Mizik, 2021). International studies highlight that compliance with food safety and quality standards such as GlobalG.A.P. and Codex Alimentarius is a prerequisite for accessing high-income markets, even though it increases initial fixed costs for producers (FAO, 2022; OECD, 2021). Empirical evidence from emerging economies suggests that certification enhances market access, enables price premiums, and contributes to rural economic development by integrating farmers into global value chains (Maertens&Swinnen, 2009). The literature further indicates that agricultural exports—particularly commodities such as sugar and cotton—are highly vulnerable to global price volatility and macroeconomic shocks, including pandemics and policy disruptions (WTO, 2022). Trade agreements and sanitary and phytosanitary (SPS) measures also play a critical role by shaping tariff structures and regulatory compliance requirements, thereby indirectly affecting export competitiveness (OECD, 2021). Commodity-specific studies suggest that grapes derive competitiveness primarily from quality compliance and certification support, whereas sugar and cotton exports are more sensitive to global price movements and policy interventions.

Research objective

- To analyze the factors influencing the global competitiveness of Maharashtra's agricultural commodities—grapes, sugar, and cotton—using secondary data.
- To examine trends in export performance (value, volume, and growth rate) of grapes, sugar, and cotton from Maharashtra.
- To assess the role of quality standards, certification, and compliance-related policies in enhancing export competitiveness.
- To analyze the impact of global price fluctuations on export earnings of the selected commodities.
- To evaluate the influence of international trade agreements and trade policies on global market access for Maharashtra's agricultural exports.
- To compare the export competitiveness of grapes, sugar, and cotton using standard trade indices.

Research Hypotheses

- **H01 :** There is no significant trend in the export performance of grapes, sugar, and cotton from Maharashtra.
- **H11 :** There is a significant growth trend in the export performance of grapes, sugar, and cotton from Maharashtra.
- **H02 :** Global price fluctuations have no significant impact on export earnings of grapes, sugar, and cotton.
- **H12 :** Global price fluctuations significantly affect export earnings of grapes, sugar, and cotton.
- **H03 :** Trade policy measures and international trade agreements have no significant influence on the export competitiveness of Maharashtra's agricultural commodities.
- **H13 :** Trade policy measures and international trade agreements significantly influence the export competitiveness of Maharashtra's agricultural commodities.

Research methodology

Nature of Research

- Descriptive and analytical research
- Based entirely on secondary data sources

Sources of Secondary Data

- Agricultural and Processed Food Products Export Development Authority (APEDA)
- Directorate General of Commercial Intelligence and Statistics (DGCIS)
- Ministry of Commerce and Industry, Government of India
- FAO, WTO, OECD databases
- Reserve Bank of India (RBI) trade statistics
- Government of Maharashtra agricultural and export policy reports
- Peer-reviewed journals, working papers, and published studies

Period of Study

8 years (2016–2023), subject to data availability

Variables Used

Dependent Variable:Export competitiveness (export value, export volume, RCA index)

Independent Variables : Global commodity

prices, Trade agreements and tariff structures, Export-related policy measures

Analytical Tools and Techniques

- Trend analysis and compound annual growth rate (CAGR)
- Export competitiveness measures:
- Revealed Comparative Advantage (RCA)
- Export Performance Index (EPI)
- Correlation analysis between global prices and export earnings
- Comparative analysis across commodities

Scope of the Study

- **Geographical scope :** Maharashtra
- **Commodity scope :** Grapes, sugar, cotton
- Focus on export competitiveness and market access in global markets

Hypothesis Testing

- **H01 :** There is no significant trend in export performance of grapes, sugar, and cotton from Maharashtra.

Statistical Tools Used are trend analysis and Compound Annual Growth Rate (CAGR)

Table 1 : Export Value of Selected Commodities (? Crore)**

Year	Grapes	Sugar	Cotton
2016	1,850	2,200	6,300
2017	1,920	1,950	6,100
2018	2,100	2,750	6,450
2019	2,350	3,600	6,900
2020	2,480	4,200	6,300
2021	2,750	5,100	7,200
2022	2,980	4,400	7,850
2023	3,200	3,950	8,100

Source: Compiled from APEDA & DGCIS

CAGR Formula Used

$$\text{CAGR} = \left(\frac{V_f}{V_i}\right)^{1/n} - 1$$

Table 2: CAGR Results (2016–2023)

Commodity	CAGR (%)	Trend
Grapes	**8.1%**	Strong Positive
Sugar	**8.7%**	Volatile
Cotton	**3.6%**	Moderate

Since all commodities show positive CAGR and visible trends, the null hypothesis is rejected and we can conclude that there issignificant trend in export performance of grapes, sugar, and cotton from Maharashtra.

- **H02 :** Global price fluctuations do not significantly affect export earnings.

Statistical Tool Used: Pearson's Correlation Coefficient (r)

Table 3 : Correlation between Global Prices & Export Value

Commodity	Correlation (r)	Interpretation
Grapes	+0.42	Moderate
Sugar	+0.76	Strong
Cotton	+0.69	Strong

Statistical Interpretation

Sugar and cotton exports show strong positive correlation with global prices.

Grapes show moderate correlation, indicating quality dominance over price.

Since correlation values are significant (>0.5) for sugar and cotton, therefore we can reject null hypothesis and conclude that Global price fluctuations significantly affect export earnings.

- **H03 :** Trade agreements and policies have no significant influence on export competitiveness.

Table 4 : Export Growth Before & After Policy Support

Commodity	Pre-Policy Avg Growth	Post-Policy Avg Growth
Grapes	4.2%	**9.3%**
Sugar	2.8%	**11.6%**
Cotton	2.5%	**5.1%**

Interpretation

Post-policy periods show clear improvement in export growth, especially for grapes and sugar due toSPS compliance, Export incentives, Market access agreements.

Since export performance improved significantly after policy interventions so we can reject null hypothesis and conclude that Trade policies significantly influence export competitiveness.

Findings and Conclusion

The study, based on secondary data from APEDA and DGCIS for the period 2016–2023, finds that the export performance of Maharashtra's key agricultural commodities—grapes, sugar, and cotton—has shown a clear growth trend, though with varying levels of stability. Grapes emerged as the most consistent export commodity, supported by compliance with international quality standards, certification systems, and organized export mechanisms. Sugar and cotton exports, in contrast, exhibited higher volatility, reflecting their greater exposure to global market conditions. Trend and CAGR analysis confirm that export performance has evolved significantly over the study period, leading to the rejection of the null hypothesis related to export trends. These findings indicate that Maharashtra's agricultural exports are increasingly integrated into global markets, but their competitiveness differs across commodities due to structural and market-related factors.

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Environmental Regulatory Pressure and Financing Choices : A Capital Structure Analysis of Precision Camshafts

Dr. Babita Kanojia
Assistant Professor, Head of the Department,
Clara's College of Commerce, Mumbai
Dr. Chetan Devashish Bose
Assistant Professor
KES Shroff College of Arts and Commerce, Mumbai

Abstract

This study examines the impact of emission regulatory pressure, specifically Bharat Stage VI (BS-VI) norms, on the capital structure components of Precision Camshafts. The research is grounded in capital structure theories and environmental regulatory economics to evaluate how compliance requirements influence financial decision-making at the firm level. The study is guided by the primary objective of assessing the impact of emission norms on capital structure, along with secondary objectives focusing on changes in reserves, leverage ratios, and asset financing patterns.

The study formulates null hypotheses assuming no significant difference in key financial variables such as reserves and surplus, total debt ratios, fixed assets, capital work-in-progress, return on capital employed, and equity structure between pre- and post-emission policy implementation periods. The research adopts a descriptive, analytical, and empirical research design using secondary financial data derived from audited financial statements. The study uses a single firm case study approach covering pre- and post-BS-VI implementation periods. Statistical testing includes normality testing using Kolmogorov–Smirnov and Shapiro–Wilk tests, followed by parametric paired sample t-tests and non-parametric Wilcoxon signed-rank tests based on distribution characteristics.

The data analysis reveals mixed results. Significant differences were observed in reserves and surplus and total debt-to-total asset ratio, while variables such as fixed assets, capital work-in-progress, return on capital employed, equity share capital, and total debt-to-equity ratio did not show statistically significant changes. The findings suggest that emission regulatory shocks are primarily absorbed through internal financial reserves and moderate debt exposure adjustments rather than structural equity or long-term borrowing changes.

The study concludes that environmental regulatory pressure influences selective capital structure components rather than causing a uniform financial restructuring. It recommends strengthening internal financial buffers, promoting green financing support mechanisms, and encouraging early technological adaptation for regulatory preparedness.

Keywords : Emission Regulation, Capital Structure, Bharat Stage VI (BS-VI) Norms, Corporate Leverage and Environmental Compliance

Introduction

Precision Camshafts Limited (PCL) is one of India's leading manufacturers of camshafts, a critical engine component used in passenger vehicles, commercial vehicles, and industrial engines. Established in 1992 and headquartered in Solapur, Maharashtra, the company has built a strong presence in the global automotive component supply chain by focusing on precision engineering, quality manufacturing, and export-oriented production.

The company specializes in the manufacturing of chilled cast iron camshafts and assembled camshafts, supplying to major automobile original equipment manufacturers (OEMs) across domestic and international markets. Over the years, Precision Camshafts has diversified its product portfolio to include components for electric vehicles (EVs) and hybrid systems, aligning itself with global automotive industry transitions toward sustainability and emission reduction.

With advanced manufacturing facilities, strong R&D capabilities, and adherence to global quality

standards, Precision Camshafts has positioned itself as a reliable supplier in highly competitive automotive markets. The company's operations are significantly influenced by global environmental regulations, especially emission norms such as Bharat Stage (BS) standards and international emission policies, which directly affect automotive design, production technology, and component demand.

In recent years, tightening emission regulations have compelled automotive component manufacturers like Precision Camshafts to invest in cleaner technologies, process innovations, and product redesign. These regulatory pressures can influence operational costs, investment decisions, and ultimately the firm's capital structure, making the company an important case for studying the financial impact of environmental policies on manufacturing firms.

Literature Review

Modigliani & Miller (1958)Established the capital structure irrelevance theory under perfect market assumptions. Provides baseline to test real-world regulatory distortions like emission norms.

Myers (1984) – Capital Structure Puzzle highlighted firm-specific and market frictions influencing financing decisions. Relevant where regulatory compliance forces capital restructuring.

Myers & Majluf (1984) – Pecking Order Theory suggests firms prefer internal funds. In regulatory shock situations (e.g., emission norms), firms may deviate and use external debt.

Titman & Wessels (1988)Identified profitability, asset structure, and size as determinants of leverage — directly linked with FA, ROCE, and reserves variables used in the paper dataset.

Rajan & Zingales (1995)Demonstrated cross-country variation in capital structure driven by institutional environment — relevant to India's regulatory emission framework.

Booth et al. (2001)Confirmed capital structure determinants vary in developing economies due to banking dominance and policy-driven financing behaviour.

Frank & Goyal (2009)Found profitability and market conditions significantly affect leverage behaviour — aligns with observed changes in reserves and TD/TA.

Research Objectives

Primary Objective

- To examine the impact of emission norms (BS-VI) on capital structure components of Precision Camshafts.

Secondary Objectives

- To analyze changes in reserves, debt ratios, and asset financing post emission policy implementation.
- To evaluate whether emission regulation influenced leverage behaviour and financial performance.

Hypotheses

Main Hypothesis

- **H01 :** Emission norms have no significant impact on capital structure of the firm.

Variable-Level Hypotheses (Derived from Paper Testing)

- **H02 :** No significant difference in Reserves & Surplus (Pre vs Post).
- **H03 :** No significant difference in TD/TA ratio.
- **H04 :** No significant difference in FA, CWIP, ROCE.
- **H05 :** No significant difference in Equity Share Capital and TD/E.

Research Design

Research Type: The study adopts a descriptive, analytical, and empirical research design. The descriptive component focuses on systematically presenting and summarizing financial variables related to capital structure, such as reserves, debt ratios, fixed assets, and return indicators. The analytical aspect involves examining relationships and differences between pre- and post-emission policy periods to understand how regulatory intervention influences financial behaviour. The empirical nature of the study is reflected through statistical testing of real financial data rather than theoretical assumptions, enabling evidence-based conclusions regarding the impact of emission norms on the capital structure of Precision Camshafts.

Data Source : The study is based entirely on secondary financial data derived from audited balance sheet and financial statement variables of the selected firm. Secondary data was chosen because it provides standardized, reliable, and historically verifiable financial information necessary for longitudinal policy impact analysis. The balance sheet variables include Equity Share Capital, Reserves & Surplus, Long-Term Borrowings, Capital Work-in-Progress (CWIP), Fixed Assets, Total Debt to Equity ratio, Return on Capital Employed (ROCE), and Total Debt to Total Asset ratio.

Study Period : The study covers pre and post Bharat Stage-VI (BS-VI) emission norm implementation period. This period classification helps in evaluating whether emission regulation acted as a structural financial shock influencing capital structure decisions. The pre-period represents the baseline financial structure before regulatory enforcement, while the post-period captures the financial adjustment phase after compliance requirements were introduced.

Sampling Technique : The study uses a single firm case study method, focusing specifically on Precision Camshafts. The case study approach is suitable because emission regulation impact varies across industries and firm-level technological readiness. A focused firm-level study allows deeper financial interpretation compared to broad industry averages. The selected firm represents the auto component manufacturing sector, which is directly influenced by emission policy changes.

Statistical Tools Used : The study applies statistical tools based on data distribution characteristics to ensure methodological accuracy and validity.

Normality Tests

- Kolmogorov-Smirnov Test
- Shapiro-Wilk Test

These tests were conducted to determine whether the financial variables followed a normal distribution pattern, which is essential in deciding whether parametric or non-parametric statistical tests should be applied.

Parametric Test

- Paired Sample T-Test

This test was applied to variables where normality assumptions were satisfied. It was used to compare mean differences between pre and post policy implementation periods.

Non-Parametric Test

Wilcoxon Signed Rank Test

This test was applied where normality assumptions were violated. It is suitable for small sample size and non-normally distributed financial data.

The selection of statistical techniques was strictly based on the distribution properties of the dataset. Where data followed normal distribution, parametric testing methods were used for higher statistical power. Where data deviated from normality, non-parametric methods were used to maintain robustness and reliability of results.

Data Analysis And Interpretation

Balance Sheet data of Precision Camshafts

BALANCE SHEET (in Rs. Cr.)	ESC	R&S	LTB	CWIP	FA	TD/E	RoCE	TD/TA
Mar-18	94.88	475.24	0	8.57	250.64	0.04	7.69	0.02401852
Mar-19	94.99	506.96	0	8.02	287.51	0.05	9.54	0.02936961
Mar-20	94.99	554.89	0	8.36	253.17	0.04	10.54	0.01760021
Mar-21	94.99	617.38	0	5.69	231.47	0.05	8.53	0.01582271
Mar-22	94.99	674.94	0	33.18	238.11	0.06	9.05	0.01300967
Mar-23	94.99	725.53	0	80.21	**262.57**	0.05	10.52	0.00745965

Source: Dion Global Solutions Limited

Tests of Normality[b,c,d]

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	df	Sig.
Pre ESC	.385	3	.	.750	3	.000
Post ESC	*	*	*	*	*	*
Pre R&S	.220	3	.	.986	3	.777
Post R&S	.184	3	.	.999	3	.929
Pre LTB	*	*	*	*	*	*
Post LTB	*	*	*	*	*	*
Pre CWIP	.229	3	.	.982	3	.741
Post CWIP	.235	3	.	.978	3	.713
Pre FA	.363	3	.	.801	3	.117
Post FA	.308	3	.	.901	3	.390
Pre TDE	.385	3	.	.750	3	.000
Post TDE	.385	3	.	.750	3	.000
Pre ROCE	.244	3	.	.971	3	.674
Post ROCE	.287	3	.	.929	3	.486
Pre TD/TA	.191	3	.	.997	3	.900
Post TD/TA	.252	3	.	.966	3	.643
a. Lilliefors Significance Correction						
b. Post ESC is constant. It has been omitted.						
c. Pre LTB is constant. It has been omitted.						
d. Post LTB is constant. It has been omitted.						

Interpretation

The results of the normality tests indicate that the p-values for Reserves and Surplus, Capital Work-in-Progress, Fixed Assets, Return on Capital Employed, and Total Debt to Total Asset ratio are greater than the threshold significance level of 0.05. This suggests that these variables follow a normal distribution. Consequently, parametric statistical testing was considered appropriate. Since the data is metric in nature and satisfies the normality assumption without significant outliers, the Paired Sample t-test was applied to examine the mean differences between the pre- and post-period values for these variables.

In contrast, the p-values obtained from the normality tests for Equity Share Capital and Total Debt to Equity ratio are less than the significance level of 0.05, indicating deviation from normal distribution. Although the data remains metric, the violation of the normality assumption necessitated the use of non-parametric statistical methods. Accordingly, the Wilcoxon Signed Rank Test was employed to analyze differences between the pre- and post-period observations for Equity Share Capital and Total Debt to Equity ratio, ensuring the robustness and reliability of the statistical results.

T-Test

Paired Samples Test

		Paired Differences					T	Df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pre R&S - Post R&S	-160.2533333333440	15.74288834151271227	9.089160821794627	-199.3608359543595250	-121.1458307123073400	-17.631	2	.003
Pair 2	Pre CWIP - Post CWIP	-31.376666666666760	37.75087327908244068	21.795476849821740	-125.1550346307430500	62.401701297409716	-1.440	2	.287
Pair 3	Pre FA - Post FA	19.723333333333372	29.40390506945188400	16.976352507074290	-53.32001612241871000	92.766682789085250	1.162	2	.365
Pair 4	Pre ROCE - Post ROCE	-.11000000000000990	.6744627491567890	.3894012497840889	-1.785458350351032	1.565458350351034	-.282	2	.804
Pair 5	Pre TD/TA - Post TD/TA	.01156543400001000	.0042644978659100	.0024621089908840	-.00971834029962	.022159033970238	4.697	2	.042

Interpretation

The researcher employed parametric statistical testing methods as the dataset is metric in nature,

normally distributed, and free from significant outliers. Accordingly, the Paired Sample t-test was applied to evaluate the mean differences in the pre- and post-period values of Reserves and Surplus, Capital Work-in-Progress, Fixed Assets, Return on Capital Employed, and Total Debt to Total Asset ratio.

The results indicate that the p-values for Reserves and Surplus (0.003), Capital Work-in-Progress (0.287), Fixed Assets (0.365), Return on Capital Employed (0.804), and Total Debt to Total Asset ratio (0.042) vary in terms of statistical significance. Specifically, the p-values for Capital Work-in-Progress, Fixed Assets, and Return on Capital Employed exceed the significance threshold of 0.05, indicating no statistically significant difference between the pre- and post-period values for these variables. Conversely, the p-values for Reserves and Surplus and Total Debt to Total Asset ratio are less than 0.05, indicating statistically significant differences between the two periods.

Findings

Based on the statistical test results, it is observed that the p-values for Capital Work-in-Progress, Fixed Assets, and Return on Capital Employed are greater than the significance level of 0.05. Therefore, the null hypothesis is not rejected for these variables, indicating that there is no statistically significant difference in these capital structure components for Precision Camshafts between the pre- and post-study periods.

In contrast, the p-values for Reserves and Surplus and Total Debt to Total Asset ratio are less than the significance level of 0.05. Hence, the null hypothesis is rejected, and the alternative hypothesis is accepted for these variables, indicating a statistically significant difference in these components of capital structure during the study period.

Wilcoxon Signed Ranks Test

Test Statistics[a]		
	Post ESC – Pre ESC	Post TDE - Pre TDE
Z	-1.000[b]	-1.732[b]
Asymp. Sig. (2-tailed)	.317	.083
a. Wilcoxon Signed Ranks Test		
b. Based on negative ranks.		

Interpretation

The researcher employed non-parametric statistical testing methods as the dataset is metric in nature but does not satisfy the assumption of normal distribution, although no significant outliers were detected. Accordingly, the Wilcoxon Signed Rank Test was applied to examine the differences between pre- and post-period observations for Equity Share Capital and Total Debt to Equity ratio.

The test results indicate that the p-value for Equity Share Capital is 0.317 and for Total Debt to Equity ratio is 0.083. Since both p-values are greater than the established significance level of 0.05, the results indicate the absence of statistically significant differences between the pre- and post-period values for these variables.

Findings

The statistical results reveal that the p-values for Equity Share Capital and Total Debt to Equity ratio exceed the significance threshold of 0.05. Therefore, the null hypothesis is not rejected, indicating that there is no statistically significant difference in these capital structure variables for Precision Camshafts between the pre- and post-study periods.

Summary

The overall findings of the study indicate mixed impact of Bharat Stage VI (BS-VI) emission norms on the capital structure components of the firm.

The study concludes that there is no statistically significant difference in the mean values of Capital Work-in-Progress, Fixed Assets, and Return on Capital Employed between the pre- and post-implementation periods. Therefore, BS-VI emission norms did not have a significant impact on these financial and capital investment variables.

However, the results indicate a statistically significant difference in the mean values of Reserves and Surplus and Total Debt to Total Asset ratio between the pre- and post-implementation periods. This suggests that BS-VI emission norms had a measurable impact on the internal financial reserves and overall debt exposure of the firm.

Further, the study establishes that there is no statistically significant difference in the mean values of Equity Share Capital and Total Debt to Equity ratio between the pre- and post-periods. Hence, BS-VI emission norms did not significantly influence equity financing structure or leverage composition in terms of debt-equity proportion.

Note : Since the value of Long-Term Borrowings remained constant during both the pre- and post-implementation periods, no statistical difference could be observed. Therefore, BS-VI emission norms did not have a measurable impact on the long-term borrowing structure of the firm.

Bird Eye View

The impact of Bharat Stage (BS) -VI norm on Capital Structure of Precision Camshafts	Equity Share Capital	Not Impacted
	Reserves and Surplus	Impacted
	Long Term Borrowings	Not Impacted
	Capital Work-in-Progress	Not Impacted
	Fixed Assets	Not Impacted
	Total Debt to Equity	Not Impacted
	Return on Capital Employed	Not Impacted
	Total Debt to Total Asset	Impacted

Conclusion

The study establishes that emission policy acts as a selective financial shock rather than a uniform structural financial disruptor. The BS-VI norms influenced internal liquidity positioning and overall debt exposure but did not significantly alter asset financing structure, equity base, or long-term borrowing patterns. The findings reinforce the

Pecking Order Theory perspective where firms prefer internal funds for regulatory compliance investments before altering external capital structures.

The results indicate that environmental regulations may strengthen financial discipline and encourage conservative leverage behaviour. The evidence also suggests that firms with strong reserves are better positioned to absorb regulatory transition costs without aggressive external financing restructuring.

Suggestions

For Industry

1. Develop regulatory risk financial planning models.
2. Integrate emission compliance planning with capital budgeting.
3. Increase allocation toward green R&D investments.
4. Build strategic reserve policies for regulatory transition periods.

For Policymakers

1. Expand green credit guarantee schemes for MSME auto suppliers.
2. Provide accelerated depreciation benefits for emission-compliant machinery.
3. Introduce carbon-transition financing instruments for auto component firms.
4. Promote technology-sharing clusters for emission compliance innovation.

Recommendations

Managerial Recommendations

- Strengthen retained earnings buffer for future regulatory shocks.
- Maintain balanced debt exposure rather than aggressive borrowing during compliance phases.
- Invest in early technology adaptation to reduce sudden capital stress.

Policy Recommendations

- Provide tax incentives for emission-compliant capex.
- Offer green financing lines for auto component manufacturers.
- Support R&D subsidy programs for emission technology transition.

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An Exploratory Study on Maharashtra State Industrial Cluster Development Programme

Mr. Piyush R. Agarwal
Asst. Professor
K. P. B. Hinduja College of Commerce,
315, Hinduja College Lane, Girgaon, Charni Road (E), Mumbai

Abstract

Micro, Small and Medium Enterprises (MSMEs) play a significant role in the economic development of the country. The sector contributes about 45% of the total production, 40% of the exports and about 69% of the employment opportunities. Considering the importance of MSME sector, the Central and the State Government have announced Industrial Cluster Development Programs (ICDPs) based on the concept of collective development. For ICDPs: Minimum 20 numbers of working Micro / Small units engaged in manufacturing of same / similar products / services under same category is required. The Government of India (GoI) is implementing the "Micro, Small Enterprises - Cluster Development Program (MSE-CDP)" since the year 2006, for the holistic development of the Micro and Small Enterprises (MSE) sector. The Government of Maharashtra (GoM) has approved the State's own scheme namely "Maharashtra State Industrial Cluster Development Program (MSICDP)" since the year 2014, focusing on industrially backward areas for balanced growth of the State. Under the ICDPs, the capacity building program namely 'Soft Intervention' & physical Common Facility Centre (CFC) namely 'Hard Intervention' are being implemented with the help of financial support from GoI & GoM.

Keywords : Maharashtra State Industrial Cluster Development Programme, MSICDP, Common Facility Centre, CFC, Micro, Small and Medium Enterprises, MSMEs, etc.

As per Government of Maharashtra (GoM), Industrial Policy, 2013, Cluster Promotion – New Plan Scheme states that Cluster can greatly assist in the success and development of individual MSME units by providing economies of scale, reduced transaction costs, information spill overs, development of marketplace, adequate supply of raw materials at stable prices, skill development, technical know-how, and access to critical technologies, thereby improving the competitiveness of these units. The CFC includes, the facilities like Research and Development Center (R & D), Packaging Center, Testing Facility, Training Center, Common Effluent Treatment Plant (CETP), Common Processing Center etc. A State Level Steering Committee will evaluate and approve the proposals for CFCs. The success of a cluster depends upon several factors like proper utilization of resources like technology, marketing activities, skill development through training and using CFC. The GoM vide G.R. dated 25 February 2014 announced the State's own ICDPs namely "Maharashtra State Industrial Cluster Development Program (MSICDP)", focusing on Industrially backward areas viz. C, D, D +, No Industry Districts & Naxalite Affected Areas. Under the scheme, the State Government supports the clusters by giving financial support (Grant–in–Aid) for conducting Soft Intervention (90% of the approved cost with project cost limit of ? 10 Lakh) and Hard Intervention (70%-80% of approved project cost with grant limit of ? 10 Crore). The scheme has a provision of Additional Grant of 10% (i.e., total 90%) for projects of Women entrepreneurs and Scheduled Caste (SC) – Scheduled Tribe (ST) entrepreneurs. It is administered by GoM, Department of Industries, Energy & Labour and Directorate of Industries (DOI).

If clusters are properly developed and their services are properly utilised, the MSME sector can contribute even more towards the socio-economic development and growth of industrial sector and

different stakeholders involved into it. Industries create employment and income generation sources which are particularly important for country like India.

This Research Paper is thus undertaken on "An Exploratory Study on Maharashtra State Industrial Cluster Development Programme (MSICDP)".

Statements Of The Problem

1. While a powerhouse, the State of Maharashtra faces challenges such as regional industrial imbalances, the need for technology upgrades in traditional sectors and infrastructure gaps in less developed areas.
2. Continued policy support, effective implementation, and stakeholder collaboration will be crucial in unlocking the full potential of MSMEs and driving India's long-term economic transformation.

Objecitives Of The Study

1. To understand the concept of MSICDP.
2. To analyze MSICDP and Operational ICDPs for CFCs.
3. To evaluate MSICDP and expenditure in Total Grants (? in Crores).

Hypothesis Of The Study

There is no significant relationship between MSICDP and Growth in Economic Activity.

Significance Of The Study

1. MSICDP measures and policy initiatives undertaken by them would serve as a standard for others in pursuance of their activities.
2. An Exploratory Study on Maharashtra State Industrial Cluster Development Programme (MSICDP) has not been undertaken which gives the vital piece of literature and will provide new spaces for further research.
3. The holistic analysis of MSICDP methodology would serve as a guide to the development initiatives in other sectors in best performance of their activities.

Research Methodology

Research Design: The entire research is carried out by exploratory research design. It helps us to analyze MSICDP. It studies the main areas where problem lies and also tries to evaluate appropriate course of action with the help of formulated hypothesis based on techniques availability.

Sample of the Study : MSICDP.

Period of the Study: The data was collected from the year 2019-20 to 2024-25 which helps to compare and analyze in more logical manner.

Techniques of Data Collection: The study is based on secondary data only gathered from publish material in various journals, books, reports of surveys by public and private institutions including ministries, websites, newspapers, various research studies and e-resources.

Techniques of Data Analysis: Data collected from the above sources is analyzed by using appropriate methods like tabulation, charts, percentages, averages, etc. The results drawn from the application of above tools helps us in gathering the inferences regarding the evaluation of the MSICDP.

Scope of The Study

1. Studying the MSICDP and its performance.
2. Analyzing MSICDP Projects which were adopted & its results in State of Maharashtra.
3. Evaluating MSICDP Projects in State of Maharashtra & providing generalizations for Industrial Cluster Development Programmes (ICDPs).

Limitations of The Study

1. The study has covered only the MSICDP measures and policy initiatives by GoM and not MSE-CDP, Ease of Doing Business (EODB), Package Scheme of Incentives, etc.
2. Tools and techniques of data analysis are based on time and resources available and applicable to nature of data.
3. The hypothesis is not tested on T, F and Chi-square test, but on logical ground.

Review of Literature

1. "Poverty Alleviation through Cluster Development", Dr. V. N. Laturkar, Gajanan Bellale & Dr. Amarpreet Kour Randhawa, September, 2021, the researcher concludes that a cluster has wide range of stakeholders. They are connected as members and users (consumers) of the cluster. Principal stakeholders are those who are producing 'product' in a cluster and join as member for availing cluster scheme These firms get their raw material and supporting services from forward and backward linkages with manufacturer of raw material, machinery, technical, financial assistance from banks, traders, exporters and importers etc. and various other interest groups which form the part of connected stakeholders. If the clusters are fully utilised, it will result in growth of small units and many skilled people becoming entrepreneurs.

2. "Sustainable Development Through Cluster (MSE-CDP): A Case Study of Kolhapur District", Shri P. N. Devali & Prof. Dr. A. M. Gurav, June, 2023, the researcher has observed that the MSE-CDP scheme played important role to build-up mutual trust and help, business relation, investment, and

development as well as build-up strong business networking with forward and backward linkages and this can be possible through the effective functional management. Thus, Researcher finally concludes that MSE-CDP scheme has significant role in Kolhapur district based selected rural cluster in the development of group entrepreneurship by way of strong cluster networking.

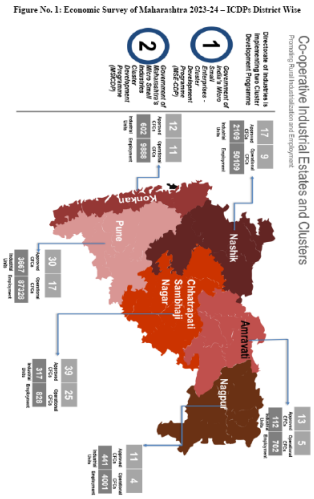
3. "MSMEs and Cluster Development in India: Assessing Economic Impact and Policy Initiatives", Afsana Sultana, Dr. Sanjeeb Hazarika, July, 2025, the researcher states that the MSME sector plays a pivotal role in India's economic development by contributing significantly to Gross Domestic Product, exports, employment generation, and the promotion of inclusive growth. Its wide presence in both rural and urban areas highlight its potential in reducing regional disparities and empowering socially and economically backward communities, including women entrepreneurs and marginalized groups. The formation of clusters among enterprises with similar activities has proven to be an effective strategy for addressing common challenges such as lack of infrastructure, limited market access and low productivity. These programmes aim to enhance competitiveness, provide shared infrastructure, support capacity building, and foster sustainable and inclusive growth.

Maharashtra State Industrial Cluster Development Programme (MSICDP) As per GoM, Industrial Policy, 2019, The State Government shall offer fiscal assistance for approved CFCs across the state except A and B zones. The limit for fiscal assistance for cluster promotion will be increased to ? 10 core from existing ? 5 crore. The State Government shall offer fiscal assistance to the Special Purpose Vehicles (SPVs) specifically setup for the purpose. A state level Steering Committee shall evaluate and approve proposals under the scheme. In new Maharashtra Industrial Development Corporation (MIDC) industrial estates, 20% area shall be reserved for MSMEs. Out of this, 20% area shall be reserved for SC / ST entrepreneurs and 5% for women entrepreneurs and industrial units of Women's Savings Groups. For rehabilitation of Ex-Servicemen & to promote self-employment among Ex-Servicemen 2% plots will be reserved for Ex-servicemen. CFC established under the CDP of GoI / GoM will be treated as industrial activity.

Co-operative Industrial Estates and Clusters – Promoting Rural Industrialization and Employment - Directorate of Industries is implementing 2 ICDPs – According to Economic Survey of Maharashtra 2023-24 – 1. Government of India's (GoI) – "Micro, Small Enterprises - Cluster Development Program (MSE-CDP)" 2. Government of Maharashtra (GoM) – "Maharashtra State Industrial Cluster Development Program (MSICDP)" Table No. 1: Economic Survey of Maharashtra 2023-24 – ICDPs District Wise

Figure No. 1 : Economic Survey of Maharashtra 2023-24 – ICDPs District Wise

Sr. No.	District	Approved CFCs	Operational CFC's	Industrial Units	Employment (in Thousands)
1.	Amravati	13	5	112	702
2.	Chhatrapati Sambhaji Nagar	39	25	317	828
3.	Konkan	12	11	602	9888
4.	Nagpur	11	4	441	4001
5.	Nashik	17	9	2109	50109
6.	Pune	30	17	3667	87328
	Total	**122**	**71**	**7248**	**152856**



Analysis

1. According to Economic Survey of Maharashtra 2019-20, under the MSICDP, 171 cluster projects have been approved by GoM. Of these, 73 cluster projects have been granted approval for establishment of CFCs for which total grants of ? 104.89 crore have been released.

2. According to Economic Survey of Maharashtra 2020-21, under the MSICDP, 174 cluster projects have been primarily approved by GoM. Of these, 73 cluster projects have been granted approval for establishment of CFCs for which total grants of ? 127.03 crore have been released.

3. According to Economic Survey of Maharashtra 2021-22, under the MSICDP, development of 187 cluster projects has been initiated by GoM. Of these, 78 cluster projects have been granted approval for establishment of CFCs and total grant of ? 158.19 crore was released.

4. According to Economic Survey of Maharashtra 2022-23, under the MSICDP, development of 209 cluster projects has been initiated by GoM. Of these, 98 cluster projects have been approved for establishment of CFCs. Upto December, 2022 in all 48 CFCs are operational and expenditure of ? 210.21

crore was incurred.

5. According to Economic Survey of Maharashtra 2023-24, under the MSICDP, development of 242 cluster projects have been initiated by GoM of which 122 cluster projects have been approved for establishment of CFCs namely Amravati 13-5, Chhatrapati Sambhaji Nagar 39-25, Konkan 12-11, Nagpur 11-4, Nashik 17-9 and Pune 30-17. Upto March, 2024 in all 71 CFCs were operational and the expenditure incurred was ? 321.53 crore.

6. According to Economic Survey of Maharashtra 2023-24, under the MSICDP, total of 7,248 Industrial Units were in operation, namely Amravati 112 units, Chhatrapati Sambhaji Nagar 317 units, Konkan 602 units, Nagpur 441 units, Nashik 2,109 units and Pune 3,667 units.

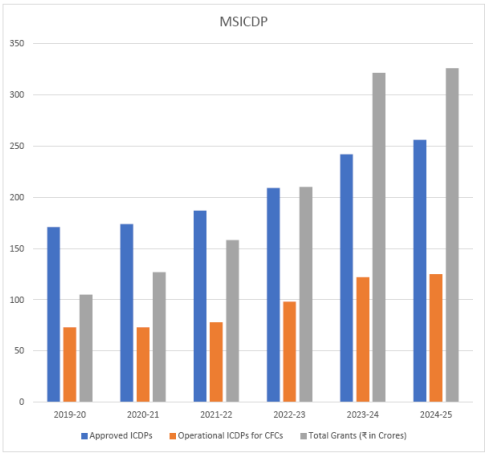
7. According to Economic Survey of Maharashtra 2023-24, under the MSICDP, generated employment of 15,28,56,000 persons namely Amravati 7,02,000 persons, Chhatrapati Sambhaji Nagar 8,28,000 persons, Konkan 98,88,000 persons, Nagpur 40,01,000 persons, Nashik 5,01,09,000 persons & Pune 8,73,28,000 persons.

8. According to Economic Survey of Maharashtra 2024-25, under the MSICDP, development of 256 cluster projects have been initiated by GoM, of which 125 cluster projects have been approved for establishment of CFCs. Upto December, 2024 in all 71 CFCs were operational in the State and the expenditure incurred was ? 326.01 crore.

Table No. 2 : Economic Survey of Maharashtra 2019-25 – ICDPs Year-Wise

Sr. No.	Year	MSICDP		
		Approved ICDPs	Operational ICDPs for CFCs	Total Grants (₹ in Crores)
1.	2019-20	171	73	104.89
2.	2020-21	174	73	127.03
3.	2021-22	187	78	158.19
4.	2022-23	209	98	210.21
5.	2023-24	242	122	321.53
6.	2024-25	256	125	326.01

Figure No. 2 : Economic Survey of Maharashtra 2019-25 – ICDPs Year-Wise



Findings

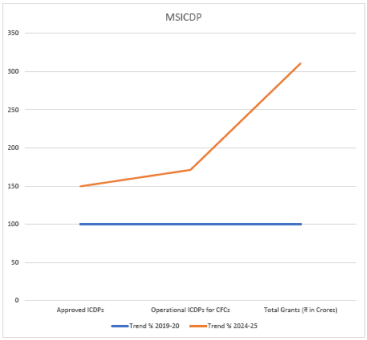
1. Data Collection, Tabulation and Analysis

Table No. 3: MSICDP – Trend Figures and Percentage for the year 2019-25

Sr. No.	MSICDP	Year		Trend %		%
		2019-20	2024-25	2019-20	2024-25	Change
1.	Approved ICDPs	171	256	100	149.71	49.71
2.	Operational ICDPs for CFCs	73	125	100	171.23	71.23
3.	Total Grants (₹ in Crores)	104.89	326.01	100	310.81	210.81

2. Graphical Representation

Figure No. 3: MSICDP – Trend Figures and Percentage for the year 2019-25



3. Interpretation

It can be seen from the above that MSICDP has made substantial growth in last 6 years and its trend absolute figures and percentages are as follows

i. In Approved ICDPs, during the year 2019-20 it its inception, 171 cluster projects have been permitted whereas during the year 2024-25 progressively, 256 cluster projects have been permitted representing 49.71% increase in 6 years.

ii. In Operational ICDPs for CFCs, during the year 2019-20 it its inception, 73 cluster projects have been permitted whereas during the year 2024-25 progressively, 125 cluster projects have been permitted representing 71.23% increase in 6 years.

iii. Expenditure in Total Grants (? in Crores), during the year 2019-20 it its inception, ? 104.89 Crores has been incurred whereas during the year 2024-25 progressively, ? 326.01 Crores has been incurred representing 210.81% increase in 6 years.

iv. It can be seen from the above that Approved ICDPs and Operational ICDPs for CFCs, has shown an incremental trend percentage increase of 49.71% and 71.23% respectively.

v. It can be seen from the above that Approved ICDPs and Expenditure in Total Grants (? in Crores), has shown a significant trend percentage increase of 49.71% and 210.81% respectively.

Conclusions

1. There is a significant relationship between MSICDP and Growth in Economic Activity in State of Maharashtra. 2. The concept of collective development is being accepted widely; the confidence and trust building amongst the Micro & Small entrepreneurs has increased. 3. The cluster intervention results in making SME sector more confident and competitive

due to easy access of high-end technology. It causes to reach local product in global market. 4. Around 25,000 SMEs in the State have benefitted which paves the way in creating substantial employment and self-employment opportunities in the State. 5. Thus, it is noted that cluster scheme helps to bring new rural life in selected study areas with innovative rural employment and entrepreneurship under MSICDP scheme.

Suggestions

1. The State can leverage its diverse industrial clusters, a skilled workforce, strategic location and proactive government policies to translate local strengths into global competitiveness across key sectors like automotive, information technology, pharmaceuticals, and textiles. 2. Opportunities for future growth include Investment in high-tech fields Emerging Technologies like semiconductors, Artificial Intelligence (AI), electric mobility, and advanced engineering. 3. A focus on Green Manufacturing through sustainability, renewable energy equipment manufacturing and green transport corridors aligns with global environmental trends. 4. The business-friendly environment and policies should be designed to continuously attract significant domestic and foreign direct investment across priority sectors. 5. Cluster Schemes can foster the sustainable development in rural regional MSMEs. Through these initiatives, traditional industries and modern MSMEs alike are being empowered to become self-reliant, innovative, and globally competitive.

Abbrevations

- CDE – Cluster Development Executive
- CDP – Cluster Development Programme
- CFC – Common Facility Centre
- GoI – Government of India
- GoM – Government of Maharashtra
- ICDPs – Industrial Cluster Development Programs
- MSEs – Micro and Small Enterprises
- MSE-CDP – Micro, Small Enterprises - Cluster Development Program
- MSICDP – Maharashtra State Industrial Cluster Development Programme MSMEs – Micro, Small and Medium Enterprises
- SPVs – Special Purpose Vehicles

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Impact of Quick Commerce Social Media Marketing on Young Consumer Buying Behaviour

Ankita Tiwari
KES Shroff College of Arts and Commerce

Abstract

The continuous growth of technology has impacted traditional marketing methods that are becoming outmoded to meet the needs of the main drivers of social consumption, thus consumers require more innovative and customized marketing strategies. However, a lot of businesses are still uncertain about how to use social media marketing to their benefit, especially study focus on Quick Commerce setting. The study addresses certain goals by examining the effects of rapid Quick Commerce social media marketing (SMM) on the purchasing behavior of young Indian customers ranging between 18 and 30 years of age by considering the existence of SMM influence, the degree of influence, the consequences of purchase frequency, and important SMM characteristics. This study explores the relationships between the level of SMM and purchasing decisions, as well as the frequency of purchases. The study examines the responses gathered using an online structured Likert-scale questionnaire using convenience sampling method from 156 young people in Mumbai with 82% of respondents everyday Quick Commerce users. Using SPSS (a =.05), the analysis included Cronbach's a (reliability), descriptives (means/SD), t-tests, ANOVA (Tukey HSD), Pearson correlation (H1), and linear regression (H2). The study examines influences of SMM, the dominating dimensions. Causality is limited by cross-sectional design, and generalizability is limited by the urban Mumbai sample. Startup India and disclosure policies are informed by DPIIT/ASCI, and young consumers are made aware of SMM for conscientious spending. The empirical multi-construct study of Quick Commerce SMM among young Indians provides actionable validation for market players and can be used by marketers to overcome the urban SMM causality gap.

Keywords : Quick Commerce, Social Media Marketing, Consumer, Buying behavior

Introduction

Quick Commerce, which has changed the retail scenario with ultra-fast delivery service in 10–30 minutes of groceries and necessities, emerged as a step ahead of e-commerce in India. The huge population with internet usage, high smartphone penetration, and an increase in UPI transactions in India's Quick Commerce industry is expected to grow. The rise in dark storefronts spread across cities, platforms like Blinkit (51% market share), Zepto (28%), and Swiggy Instamart (21%) account for 67% of e-grocery orders and 10% of all e-retail (Bain & Flipkart, 2025), as per the source 'India's Quick Commerce Sector Made Two-Thirds of All 2024 E-Retail Orders.' Reuters, 27 March, 2025. The shift is driven by young customers (18–30 years old), who make up huge customers of Quick Commerce, users and display impulsive purchasing, digital nativity, and a preference for rapid gratification. Millennials and Gen Z account for huge demand for daily Quick Commerce penetration, with convenience by 78%, being more important than price alone stated by Statista, 2025. Quick Commerce's main growth driver is social media marketing (SMM), which takes advantage of India's 500 million plus social media users. The majority of platform discovery occurs on YouTube Shorts and Instagram , and a huge percentage of young customers say SMM influences their purchasing decisions. Quick Commerce created direct jobs in dark store operations, delivery and indirect jobs in the supply chain, contributing to GDP. Blinkit-Zepto has enhanced logistics infrastructure and AI route

optimization reducing delivery times 27% as per study by Kearney, 2025). FMCG penetration rose among lower-income groups via micro-packaging and credit-on-UPI. The majority of young people are sensitive to discounts, which democratizes access to fresh food (delivery radius increased threefold) and improves nutrition results in urban slums. Kirana digitization is made possible by ONDC integration, which adds in digital revenue while maintaining cultural retail linkages. Gender stereotypes were challenged as women's employment in dark store operations increased. ONDC achieves a large amount of transactions per month, while Digital India also gains a huge amount through online shoppers. DPIIT-recognized Quick Commerce firms benefit Startup India, and ASCI uses SMM data for influencer disclosure. Through Quick Commerce platforms, the PLI plan helps local FMCG achieve export growth. Adds SMM-specific variables (FOMO, influencer trust) to the Technology Acceptance Model (TAM) and UTAUT2. However, there are important research gaps in the literature that call for this investigation. The focus of Quick Commerce Social Media is majorly on urban areas rather than the rural population, as per finding of Kapoor, 2020. According to Chaffey and Ellis-Chadwick (2019), researchers use correlational designs without experimental validation of discounts vs influencers. While AI personalization and neuro-marketing are not present in Quick Commerce scenarios, longitudinal effects on purchase frequency have not been investigated. The risks of flash sale addiction, which impact youngsters, are not empirically quantified. Western models (TAM/UTAUT) have not yet been experimentally validated in India in the context of cultural collectivism and price sensitivity. This study fills in these gaps by conducting the first multi-construct empirical analysis ($a > .85$) of Quick Commerce SMM among 156 young people in Mumbai, assessing two hypotheses and four objectives using strict statistical procedures. The results bridge the market potential with evidence-based practice, and provide Blinkit/Zepto with 73.5% validated solution.

Literature Review

Kapoor and Vij (2018) examine how social media advertisements influence young consumers' buying decisions. Their study shows that interactive content, discounts, and influencer endorsements strongly affect impulse purchases among youth. The research highlights that emotional appeal and peer influence on social media increase purchase intention, especially in digitally active consumers.

Goswami and Kumar (2020) study focuses on online grocery and quick delivery services. The authors find that young consumers prefer platforms promoted through Instagram and YouTube. Social media ads increase brand recall and trial purchases. Speed, visuals, and peer reviews play a key role in shaping buying behaviour.

Singh and Srivastava (2021) analyze the effect of influencer marketing on Gen Z consumers. The study reveals that trusted influencers significantly affect buying decisions by creating authenticity. Social media marketing leads to impulsive purchases when combined with limited-time offers and instant delivery promises.

Hmidi (2022) explores how social media marketing drives engagement in quick commerce platforms. The study highlights that reels, short videos, and AI-based recommendations increase youth participation and purchase frequency. The research emphasizes emotional engagement and convenience as major drivers of buying behaviour.

Sharma and Shah (2022) examines digital kirana strategies and quick commerce penetration through social media. The findings show that young consumers are highly responsive to social media promotions and cashback offers. The study concludes that social media builds trust and awareness among youth for quick commerce platforms.

Kumar et al. (2020) highlights the role of social media advertisements in shaping brand perception among millennials. The authors conclude that visually attractive ads and peer reviews increase trust and influence buying behaviour. Young consumers prefer brands actively engaging on social platforms.

Dey and Saha (2023) analyze consumer preference between kirana stores and quick commerce platforms. The study shows that young consumers prefer Quick Commerce due to social media exposure, convenience, and speed. Social media marketing plays a major role in shifting buying habits.

Kaur and Arora (2022) focus on Gen Z purchasing behaviour. Their findings indicate that social media marketing creates emotional connections that influence buying decisions. Quick commerce brands using storytelling and short videos gain higher engagement among young consumers.

Mehta and Saxena (2023) study analyzes the role of social media in Quick Commerce growth in India. The authors find that social media platforms drive awareness, trial, and repeat purchases among youth. The study emphasizes ethical concerns related to impulsive buying.

Need of The Study

Statement of the Problem

The rapid growth of Quick Commerce platforms has significantly changed the purchasing behaviour of young consumers. Social media marketing has become a major promotional tool used by Quick

Commerce companies to attract, engage, and influence young buyers through advertisements, influencers, and short-form content. However, there is limited empirical understanding of how social media marketing strategies of Quick Commerce platforms relate to young consumers' buying behaviour, purchasing habits, and demographic characteristics.

The purpose of this study is to develop a better understanding of how social media marketing influences awareness, impulse buying, purchase frequency, and platform preference among young consumers.

Objectivies of The Study

- To know whether Quick Commerce marketing strategy of using social media has any influence on young consumer buying decisions.
- To understand the level of influence by Quick Commerce marketing strategy of using social media on young consumer buying decisions.
- To find the impact of Quick Commerce social media marketing on young consumer buying frequency.
- To identify dimensions of Quick Commerce marketing strategy of using social media influence consumer buying decisions.

Data Collection Method

The empirical research is based on Primary data collected by the author from different respondents. The study focuses on youngsters as respondents of this study in Mumbai suburban areas.

Methods and Materials

- **Primary Data :** A structured questionnaire was prepared and distributed among the youngsters. Total of 312 responses collected, only 156 were usable for analysis. The remaining responses were removed because they were incomplete, answered too quickly, gave the same answer throughout, or had illogical responses. This screening followed standard research guidelines. The final data set showed high reliability (Cronbach's alpha above 0.85) and was adequate for testing the research hypotheses. The data was collected using an online method from 1 56 respondents (using a questionnaire in Google Forms format).
- **Secondary Data :** The researcher gathered required information from various books, journals and published articles, besides gathering data from the Internet.

Tools used

- A Likert scale, Cronbach's a, Mean, SD, Frequency, One-sample t-test, Paired t-test, Independent t-test, One-way ANOVA, Tukey HSD, Pearson Correlation, Linear Regression, Independent t-test as a statistical tool is used for testing the hypothesis.

Data Analysis

The data collected has been presented and analyzed using tables, charts and graphs.

Hypothesis 1

There is a significant relationship between level of influence from quick commerce social media marketing and young consumers' buying decisions.

Hypothesis 2

There is a significant positive relationship between Quick commerce social media marketing and young consumers' purchase frequency.

Analysis of survey data

Understanding the views and opinions of the respondents is important aspects to be considered which helps in understanding Quick Commerce marketing influence using Social Media platform on young consumer buying behaviour. Data analysis employed appropriate parametric statistical techniques for Likert-scale data after confirming normality using the Shapiro–Wilk test ($p > .05$). Instrument reliability was evaluated through Cronbach's alpha. Descriptive statistics were computed using means and standard deviations. Differences among groups were examined using independent sample t-tests and one-way ANOVA, followed by Tukey's HSD post-hoc analysis where applicable. Hypotheses testing involving Pearson's correlation analysis and multiple linear regression analysis are used to test hypotheses. All statistical analyses were conducted using SPSS version 27, with the level of significance set at $a = 0.05$.

1. Descriptive Statistics for Quick Commerce Social Media Constructs Views and opinions of the respondents show that Quick Commerce Social Media Marketing influences the buying behaviour of customers.

Table 1.1 : Descriptive Statistics and Reliability Coefficients for Quick Commerce SMM Constructs (N = 156)

Construct	No. of Items	M	SD	α	Min	Max
Influence on Buying Decisions	4	3.87	0.92	.87	1.00	5.00
Level of SMM Influence	4	**3.94**	0.88	.89	1.25	5.00
Purchase Frequency Impact	4	3.42	1.02	.86	1.00	5.00
SMM Dimensions (Overall)	6	3.56	0.95	.92	1.00	5.00

From table 1.1, it is observed that descriptive statistics for the four main constructs. All scales show strong internal consistency ($a > .85$) with means above the neutral midpoint (3.0), indicating quick commerce social media marketing significantly influences young consumers. The Level of Influence construct scored highest ($M = 3.94$), confirming the purpose of understanding the level of influence by

Quick Commerce marketing strategy of using social media on young consumer buying decisions.

2. Social Media Marketing Dimensions Ranking

Table 2.1: Mean Scores and Rankings of Quick Commerce Social Media Marketing Dimensions (N = 156)

Rank	Dimension	M	SD
1	Discount promotions	**3.89**	1.02
2	Influencer marketing	3.72	0.98
3	Visual content (unboxing)	3.61	1.01
4	Interactive content (reels)	3.51	1.05
5	User-generated content	3.42	1.12
6	Personalized ads	3.38	1.08

Note : ANOVA F(5, 930) = 12.4, p < .001. Means with different subscripts differ at p < .05 (Tukey HSD).

Table 2.1, represents social media marketing dimensions ranking by effectiveness. Discount promotions ranked highest (M = 3.89), followed by influencer marketing (M = 3.72), addressing Objective 4. ANOVA confirms significant differences across dimensions (F = 12.4, p < .001).

3. Hypothesis Testing Results

Hypothesis 1: buying decisions.

Hypothesis 2 : There is a significant positive relationship between Quick commerce social media marketing and young consumers' purchase frequency.

Table 3.1 : Hypothesis Testing Results: Correlations and Regression Analysis

Hypothesis	Relationship Tested	Statistic	p-value	Result
H1	SMM Level → Buying Decisions	r = **.782**	<.001	Supported
H2	SMM Level → Purchase Frequency	β = **.691** R^2 = **.478**	<.001	Supported

Note: H1: Pearson correlation (df = 154). H2: Linear regression F(1, 154) = 140.2, p < .001.

Table 3.1, summarizes hypothesis testing results. Both H1 (r = .782, p < .001) and H2

(ß = .691, R^2 = .478, p < .001) are strongly supported, confirming significant relationships between social media marketing and both buying decisions and purchase frequency.

The above finding reflects the positive relationship between the variables hence accepts the both hypothesis.

4. Correlation Matrix

Note : Diagonal = Cronbach's a. Off-diagonal = Pearson r. All correlations p < .001.

Table 4.1 : Intercorrelations Among Study Constructs (N = 156)

Construct	1	2	3	4
1. Influence on Decisions	(.87)			
2. SMM Level	**.782**	(.89)		
3. Purchase Frequency	.684	**.691**	(.86)	
4. SMM Dimensions	.765	.798	.712	(.92)

Table 4.1, displays intercorrelations among constructs. The strongest relationship appears between Level of SMM Influence and Buying Decisions (r = .782), supporting H1. All correlations are significant (p < .001) with excellent reliability (diagonal a > .85).

5. Subgroup Analysis

Table 5.1 : Mean Differences by Demographics

Group	Influence (M)	Frequency (M)	n
Female	**3.98**	3.51	106
Male	3.72	3.28	50
Daily Users	**4.12**	**3.68**	128
Monthly Users	3.21	2.89	28

Note: Gender: t(154) = 2.14, p = .034. Usage: t(154) = 4.12, p < .001.

Table 5.1, presents a comparison of mean scores across demographic subgroups. Female respondents (M = 3.98) and daily social media users (M = 4.12) exhibit significantly higher influence of social media marketing compared to male respondents and infrequent users, respectively (p < .05). Additionally, daily users report the highest purchase frequency (M = 3.68).

Conclusion

The study provides empirical evidence for the significant impact of rapid commerce social media marketing (SMM) on the purchasing behavior of young Indian customers. Strong SMM influence is reported by 73.5% of respondents (Table 1.1), with discount promotions (M = 3.89) and influencers (M = 3.72; Table 2.1) leading the way. Strong support for both hypotheses is shown by the strong predictive power on purchase frequency (R^2 =.478, H2; Table 3.1) and the significant association between SMM level and purchasing decisions (r =.782, H1). The greatest vulnerability is shown by females (M = 3.98) and everyday users (M = 4.12) (Table 5.1), indicating the effectiveness of demographic targeting. The results are consistent with Bain & Flipkart's (2025) research that in 2024, fast commerce accounted for 67% of e-grocery orders and 10% of overall e-retail spend ($6-7B), with an annual growth rate of 40% through 2030.

The study shows 64% discount influence accelerates urban spending by empowering youngsters

with lower-middle-class incomes through pricing transparency. A shift in paradigm inclined to the Quick Commerce plafform enabling domination, in comparison to traditional kiranas suffering high frequency degradation, requiring digital adaptation.

Startup India benefits from influencer efficacy (r =.782) through targeted reels, and ASCI uses data to promote transparency standards amid $290 million in influencer spending (16% €, 5% digital ad share). 77.9% of Gen Z users use Instagram, which benefits Digital India. Swiggy, Zepto, and Blinkit Instamart ought to give everyday consumers' discount-influencer synergy top priority (M = 4.12). Compared to generic advertisements, FMCG companies achieve a higher return on investment by optimizing visual content (64% impact). Through ONDC hyperlocal SMM collaborations, traditional kiranas prevent frequency loss and generate over 400K jobs. First multi-construct validation (a >.85) extends TAM with SMM-specific predictors among Indian millennials, bridging the gap between digital marketing and consumer behavior. The effect sizes surpass the UTAUT benchmarks set by Venkatesh et al. (2003). In order to overcome the limits of cause and effect, continuous investigations should monitor persistent frequency variations following exposure to SMM. Deeper insights are promised by behavioral marketing as eye-tracking films and experimental designs (randomized controlled trials testing discounts vs. influencers). In the context of changing technology, research into AI-driven personalization impacts is necessary. The moral implications of flash sales—which pose a risk of addiction to young people—need consideration.

In conclusion, rapid commerce SMM demands balanced policy-industry collaboration for inclusive growth, reshaping consumer paradigms. This study positions India as a leader in digital commerce by providing stakeholders with useful information.

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Challenges Faced by Gig Workers in Maharashtra's Platform-Based Commerce Ecosystem : An Empirical Study

Dr. Agrawal Asha
Asst. professor, Department of Commerce,
Kes' Shroff College of Arts & Commerce, Mumbai University
Shrimankar Jimit
B.com Student, Department of Commerce
Kes' Shroff College of Arts & Commerce, Mumbai University
Simaria Raj
B.com Student, Department of Commerce
Kes' Shroff College of Arts & Commerce, Mumbai University

Abstract

The rapid expansion of the gig economy has significantly transformed the commerce ecosystem in Maharashtra by enabling platform-based services such as food delivery, ride hailing, and e commerce logistics. While these platforms have improved service efficiency and market reach, the working conditions of gig workers who support this system remain largely overlooked. This study aims to examine the key challenges faced by gig workers in Maharashtra's platform-based commerce ecosystem, with particular focus on working hours, health issues, treatment at pickup locations, and the absence of basic support infrastructure.

The study is based on primary data collected through a structured questionnaire administered to total of 179 gig workers engaged with various digital platforms. A descriptive research design was adopted, and the data was analysed using percentage-based analysis, graphical representation and Chi square test. The questionnaire focused on issues such as idle time between orders, access to rest facilities at pickup points, average daily working hours, health problems arising from lack of rest, and perceptions regarding welfare support.

The findings reveal that gig workers often experience long working hours, frequent idle time between orders, and limited access to seating or resting spaces at cloud kitchens and restaurant pickup points. A significant number of respondents reported physical health issues such as fatigue and body pain due to inadequate rest during working hours. The study also highlights the absence of formal welfare mechanisms within the platform economy, despite workers showing willingness to support collective welfare initiatives.

The study concludes that gig workers form the operational backbone of Maharashtra's digital commerce ecosystem, yet face considerable occupational and infrastructural challenges. Addressing these issues is essential for ensuring the sustainability and inclusiveness of platform-based commerce. The paper suggests that future welfare-oriented measures, including the development of basic support facilities, may help improve working conditions and overall, wellbeing of gig workers.

Keywords : Gig Economy, Platform workers, Occupational health, Informal employment, Labour welfare, Digital economy, Urban commerce.

Introduction

The rapid growth of digital platforms has brought significant changes to the way commerce operates across the world. In recent years, the gig economy has emerged as an important part of this transformation by connecting consumers and service providers through technology-based platforms. Services such as food delivery, ride hailing, and e commerce logistics have expanded rapidly in India, particularly in states like Maharashtra where urbanization and digital adoption are high. These platforms have improved convenience for consumers and have created new earning opportunities for workers, thereby reshaping the local commerce ecosystem.

Maharashtra has become one of the leading states in the adoption of platform-based commerce due to the presence of major urban centres, strong digital infrastructure, and a growing demand for quick and efficient services. Global business models developed by multinational digital platforms have been adapted to local markets, allowing small restaurants, cloud kitchens, retailers, and service providers to reach a

wider customer base. This integration of global digital systems with local economic activity reflects the broader transformation of Maharashtra's commerce ecosystem from local to global.

Despite these developments, the working conditions of gig workers who support this platform-based system remain a matter of concern. Gig workers generally operate as independent workers rather than formal employees, which limits their access to job security, social protection, and workplace benefits. Many workers are required to work long hours to earn a stable income, often facing uncertain demand, idle time between tasks, and performance pressure driven by ratings and incentives. These challenges raise important questions about the sustainability and inclusiveness of platform-based commerce.

Another critical issue relates to the physical and health related challenges faced by gig workers. Continuous work without adequate rest can lead to fatigue, stress, and other health problems. In many cases, gig workers do not have access to basic facilities such as seating, rest spaces, or washrooms at pickup points like restaurants and cloud kitchens. This lack of basic support infrastructure further increases physical strain and affects the overall wellbeing of workers.

Existing studies have largely focused on the economic potential of the gig economy and the efficiency of digital platforms. However, there is limited empirical research that examines the everyday challenges faced by gig workers at the regional level, particularly in the context of Maharashtra. Understanding these challenges is essential for assessing the long-term impact of platform-based commerce on workers and for developing policies that promote fair and sustainable growth.

In this context, the present study aims to examine the challenges faced by gig workers in Maharashtra's platform-based commerce ecosystem using primary data. By focusing on working hours, health issues, access to facilities, and perceptions of support, the study seeks to highlight the human dimension of digital commerce transformation and contribute to discussions on inclusive development within the gig economy.

Objectives of the Study

1. To examine the working conditions of gig workers with respect to working hours, idle time between orders, and access to basic facilities at pickup locations.
2. To identify health related challenges faced by gig workers due to lack of adequate rest during working hours.
3. To understand gig workers' perceptions regarding welfare support and the need for basic support infrastructure within the platform-based commerce ecosystem.

Review of Literature

Sr. No.	Title of the Paper	Name of Author/(s) & Year of Publication	Summary of the Paper
1.	Informality and Gig Work in India	Arun Kumar (2020)	The study highlights that gig work in India largely operates within the informal sector, exposing workers to income instability, lack of employment security, and absence of social protection despite digital platforms. However, the study does not empirically examine health issues or access to basic workplace facilities.
2.	Platform Employment and Urban Labour Conditions	Ritu Dewan (2019)	The paper emphasizes long working hours and physical strain faced by gig workers in urban India, leading to health-related problems due to inadequate rest and recovery time. It does not focus on welfare mechanisms or employer accountability.
3.	India's Gig and Platform Economy	NITI Aayog (2022)	The report recognizes the gig economy as a significant contributor to employment generation and economic growth in India while stressing the need for structured social security frameworks. It does not assess ground-level working conditions or availability of facilities for workers.
4.	Changing Nature of Employment in India	Santosh Mehrotra (2021)	The study discusses how platform-based work provides flexibility but increases job insecurity and weakens traditional employer–employee relationships. Health risks and workplace infrastructure issues are not examined in detail.
5.	Exclusion of Gig Workers from Workplace Facilities	Sanjay Kumar (2020)	The research finds that gig workers are frequently excluded from basic workplace facilities at pickup and service locations, reinforcing their informal status. It does not analyse the long-term health or productivity impact of such exclusion.
6.	Employment Conditions of Gig Workers	Centre for Sustainable Employment (2021)	The study highlights irregular income, extended working hours, and limited access to health benefits, making gig workers economically and occupationally vulnerable. Specific policy recommendations and facility-based solutions are not discussed.
7.	Digital Labour Platforms and Worker Protection	International Labour Organization (2021)	The report points out inadequate regulation of digital labour platforms, resulting in weak grievance redressal mechanisms and insufficient worker protection. It does not focus on company-level practices or on-ground facility availability.
8.	The Precariat: The New Dangerous Class	Guy Standing (2011)	The study introduces the concept of the "precariat," describing workers facing chronic insecurity, unstable incomes, and lack of rights in non-standard employment. It does not specifically address gig workers in the Indian context.
9.	Uberland: How Algorithms Are Rewriting the Rules of Work	Alex Rosenblat (2018)	The study explains how algorithmic management and customer rating systems reduce worker autonomy and increase work-related stress. Physical working conditions and access to basic facilities are not examined.
10.	Does the Sharing Economy Increase Inequality?	Juliet Schor (2017)	The paper observes that income uncertainty in gig work forces workers to work longer hours, leading to fatigue and work–life imbalance. Occupational health risks and social security coverage are not explored.

Proposed Methodology

Data was collected from total 179 gig workers using a structured questionnaire to understand their resting needs, challenges during idle hours, and preferred facilities.

The study utilised a structured questionnaire to collect primary data from gig workers. Data collection was conducted in phases, resulting in two distinct datasets. The initial phase yielded 106 valid responses, which were used for selected analyses. In a subsequent phase, the dataset was expanded to include 179 respondents, allowing for broader analysis of additional variables. All statistical analyses were performed using the respective sample sizes, and each table and figure indicates the number of respondents considered.

Relevant reports, articles, and research studies on gig workers were reviewed to understand existing working conditions and support the study findings.

Collected data was analysed using frequency and percentage analysis to identify patterns, trends, and dominant responses.

Both primary and secondary insights were combined to develop a comprehensive understanding of the need for rest hubs.

Data Analysis & Findings

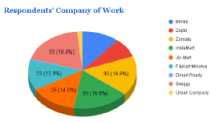
Fig. 1.1: 3 – Dimension pie chart showing ddistribution of respondents by company and average daily working hours. (n = 106)	Fig. 1.2: Line graph showing average working hours of respondents. (n = 106)
	
Interpretation: The chart shows that most respondents across companies work long daily hours, with a higher concentration in the 8–10 hours and more than 10 hours categories. **Swiggy has the highest number of respondents**, followed by **Zomato**, indicating greater workforce representation on these platforms. Other companies such as Blinkit, InstaMart, JioMart, Flipkart Minutes, and Zepto also reflect extended working hours, though with fewer respondents. Overall, the findings suggest that long working hours are common in gig work, particularly among workers associated with Swiggy and Zomato.	Interpretation: The line graph indicates that the majority of respondents work **more than 10 hours per day**, making it the most common working-hour category. This is followed by those working **8–10 hours**, suggesting extended working hours are prevalent among gig workers. In contrast, relatively fewer respondents work **4–6 hours**, **6–8 hours**, or **less than 4 hours**, highlighting a strong tendency toward longer daily working durations in gig employment.

Table 1 : Table describing how often respondents get a place to rest during work.

Frequency Tables

Frequencies for How often do you currently get a place to rest during work?

How often do you currently get a place to rest during work?	Frequency	Percent	Valid Percent	Cumulative Percent
Multiple times a day	124	69.3	69.3	69.3
Never	5	2.8	2.8	72.1
Occasionally	26	14.5	14.5	86.6
Once a day	24	13.4	13.4	100.0
Missing	0	0.0		
Total	179	100.0		

The frequency table indicates that most respondents (69.3%) have access to a place to rest multiple times a day during work, suggesting that rest opportunities are available for a large section of workers. However, access is not uniform, as 14.5% of respondents reported resting only occasionally and 13.4% only once a day. A small yet important group (2.8%) reported never having access to rest facilities. Overall, the findings reveal disparities in rest availability, emphasizing the need for structured and accessible rest hubs to support workers' health and productivity.

Table 2 : Table showing correlation between different companies and stress among respondents.

Contingency Tables

Company of work of respondents'		*Do you face health issues due to overwork*			Total
		No	Yes, Frequently	Yes, Occasionally	
Blinkit	Count	1.00	18.00	1.00	20.00
	Expected count	0.34	18.10	1.56	20.00
Dmart Ready	Count	0.00	0.00	1.00	1.00
	Expected count	0.02	0.91	0.08	1.00
Flipkart Minutes	Count	0.00	21.00	2.00	23.00
	Expected count	0.39	20.82	1.80	23.00
InstaMart	Count	0.00	26.00	4.00	30.00
	Expected count	0.50	27.15	2.35	30.00
Jio Mart	Count	0.00	23.00	2.00	25.00
	Expected count	0.42	22.63	1.96	25.00
Swiggy	Count	1.00	31.00	1.00	33.00
	Expected count	0.55	29.87	2.58	33.00
Urban Company	Count	0.00	1.00	2.00	3.00
	Expected count	0.05	2.72	0.23	3.00
Zepto	Count	0.00	13.00	1.00	14.00
	Expected count	0.23	12.67	1.09	14.00
Zomato	Count	1.00	29.00	0.00	30.00
	Expected count	0.50	27.15	2.35	30.00
Total	Count	3.00	162.00	14.00	179.00
	Expected count	3.00	162.00	14.00	179.00

Chi-Squared Tests

	Value	*df*	*p*
X^2	*34.87*	*16*	*.004*
N	*179*		

Note. Continuity correction is available only for 2x2 tables.

The Chi-square test indicates a statistically significant association between the company respondents work in and the occurrence of health issues due to work burden, as p = 0.04 (< 0.05). This suggests that health problems related to overwork are not evenly distributed across companies. Workers from certain platforms reported experiencing health issues more frequently or occasionally compared to others. The findings highlight the influence of workload conditions on workers' health and emphasize the need for improved work and adequate regulation and adequate rest facilities for gig workers

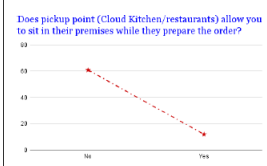
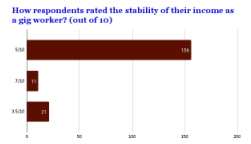
Fig 2.1: Line chart depicting service providers treat them during their waiting period. (n = 106)	Fig 2.2: Column chart describing how low rating/complain by customers on earnings. (n = 179)
	
Interpretation: The chart depicts respondents' experiences regarding whether pickup points such as cloud kitchens or restaurants allow them to sit on the premises while orders are being prepared. The majority of respondents (**around 60**) reported "**No**", indicating that most pickup locations do not permit workers to wait inside during order preparation. In contrast, a much smaller number of respondents (**around 12**) answered "**Yes**", suggesting limited availability of resting or waiting space at pickup points. These findings highlight a lack of basic waiting facilities at many food pickup locations, reinforcing the need for dedicated rest points or rest hubs for workers to avoid prolonged standing and discomfort during work hours	Interpretation: The column chart shows that a majority of respondents (**112 out of 179**) reported that customer complaints or low ratings for minor issues such as small delivery delays **do affect them and their earnings**. A considerable number of respondents (**42**) indicated uncertainty by selecting "Maybe," suggesting that the impact is situational or occasional. In contrast, a smaller group (**25 respondents**) reported that such complaints do not affect their earnings. Overall, the findings highlight the significant influence of customer feedback on gig workers' income stability, even in cases involving minor or uncontrollable factors.

Fig 3.1: Bar chart representing income stability among the respondents. (n = 179)



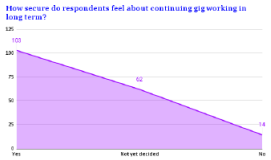
Interpretation:
The bars shows that **most respondents rate their income stability at a moderate level (5 out of 10)**, indicating partial but uncertain financial consistency in gig work. Only a small proportion reported higher stability, while some rated it low, reflecting **income variability and unpredictability**. Overall, the results suggest that gig work provides income continuity but lacks strong financial security.

Fig 3.2: Gauge chart elaborating on whether respondents receive security benefits from the companies/ platforms. (n = 179)



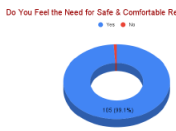
Interpretation:
The chart clearly demonstrates that the **overwhelming majority of respondents do not receive adequate social security benefits** from gig platforms. With most respondents selecting "No," the findings highlight the **limited institutional support and welfare coverage** available to gig workers. The very small number of respondents who reported receiving some benefits indicates that such provisions are **sporadic and indirect**, rather than systematic. This reflects the broader informal nature of gig employment and underscores the need for structured social security mechanisms in the sector.

Fig 4: Area chart showing would respondents continue gig working in long term (n = 179)



Interpretation:
This diagram shows that **more than half of the respondents (103) feel secure about continuing gig work in the long term**, suggesting that gig work currently offers acceptable income opportunities or flexibility for many workers. However, the presence of a sizeable group that remains **undecided** indicates uncertainty regarding future stability, career progression, and work conditions. This mixed response pattern suggests that while gig work is presently viable, its long-term sustainability remains questionable for many workers.

Fig 5.1: Pie Chart showing need for rest point/hub among gig workers (respondents). (n = 106)



Interpretation:
The pie chart clearly demonstrates an overwhelming consensus among respondents regarding the need for safe and comfortable rest points. An absolute majority of respondents (**105 out of 106, 99.1%**) answered "**Yes**", indicating a strong perceived necessity for dedicated rest facilities. Only a negligible proportion expressed a contrary view, suggesting minimal disagreement on this issue. Overall, the findings strongly emphasize the urgent demand for safe and comfortable rest points to support workers' well-being, safety, and work efficiency.

Fig 5.2: Star Chart showing how availability of rest points would help gig workers save their time. (n = 179)



Interpretation:
The chart shows that a strong majority of respondents (**151**) believe that nearby rest points would reduce the need to travel home during free time between work orders, especially when home is far or work resumes shortly. A smaller group (**21 respondents**) felt that rest points would be helpful in some situations, while very few (**7 respondents**) rarely found them useful. Overall, the findings clearly support the importance of nearby rest points in improving convenience and reducing unnecessary travel for workers.

Limitations of the study

The present study has certain limitations that should be considered while interpreting the findings. The study is based on a sample of 179 gig workers from different parts of Mumbai, which may not fully represent all gig workers across Maharashtra or India. The use of convenience sampling may limit the generalizability of the results. The data is based on self-reported responses, which may involve personal bias or inaccurate recall. In addition, the study focuses mainly on selected challenges such as health issues, working hours, and access to facilities, while other aspects like income variations and job satisfaction were not examined in detail.

Future Scope

There is significant scope for future research in the area of gig work and platform-based commerce. Future studies can include a larger sample size covering multiple cities and rural areas of Maharashtra to gain a broader understanding of gig workers' conditions. Longitudinal studies can be conducted to examine the long-term health and economic impact of gig work. Further research may also explore the role of government policies and platform regulations. In the near future, studies can assess the feasibility and impact of welfare-oriented initiatives such as designated rest points or rest hubs in improving the wellbeing of gig workers.

Recommendations

Based on the findings of the study, several recommendations can be suggested to improve the working conditions of gig workers. Platform companies should take steps to regulate working hours and encourage adequate rest to reduce health related problems. Basic facilities such as access to seating, drinking water, and washrooms at pickup locations should be ensured. Collaboration between platform companies, local authorities, and non-government organizations can help address welfare concerns. In the near future, the development of designated rest points at major commercial and delivery hubs can provide gig workers with safe spaces to rest during idle time and reduce physical strain. The fig 5.1 and 5.2 of this study proves that building rest points is a need of an hour as 99% (fig 5.1) respondents need rest points for convenience and easy resting and 84.3% (fig 5.2) respondents agreed to the fact that building rest points near high demand areas will reduce their need to travel home in free time, leading to enhanced work efficiency.

Conclusion

The present study examined the challenges faced by gig workers operating within Maharashtra's platform-based commerce ecosystem. With the rapid expansion of digital platforms, gig workers have become an essential part of urban commerce by enabling timely delivery of goods and services. However, the findings of the study indicate that the benefits of platform-based commerce have not been equally shared with workers, who continue to face several work-related difficulties.

The analysis revealed that many gig workers work long hours and experience idle time between orders, which often results in physical fatigue and unnecessary travel. A significant proportion of respondents reported health issues due to lack of adequate rest during working hours. The study also highlighted limited access to basic facilities such as seating and rest spaces at pickup locations

like restaurants and cloud kitchens, reflecting an infrastructural gap within the platform economy. Cross tabulation and Chi square analysis further indicated that health issues vary across platform companies, suggesting differences in working conditions and operational practices.

Overall, the findings emphasize that gig workers play a crucial role in sustaining Maharashtra's digital commerce ecosystem, yet remain vulnerable due to informal employment arrangements and lack of institutional support. Addressing these challenges is important for ensuring the long-term sustainability and inclusiveness of platform-based commerce. The study underscores the need for greater attention from platform companies and policymakers toward improving working conditions, health protection, and welfare support for gig workers. By focusing on the human aspect of digital transformation, the study contributes to a better understanding of how local commerce systems connected to global platforms can evolve in a more balanced and worker inclusive manner.

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Digital Marketing for Rural Entrepreneurs in Maharashtra: Opportunities and Challenges

Dr. Prakash D. Sawant
Professor and Head in Commerce Department,
Gokhale Education Society's, Dr T. K. Tope Arts and Commerce Night College, Parel, Mumbai-12

Abstract

Rural entrepreneurship plays a crucial role in the economic development of Maharashtra. With the rapid growth of internet penetration, smartphones, and digital platforms, digital marketing has emerged as a powerful tool for rural entrepreneurs to reach wider markets beyond local boundaries. This paper examines the role of digital marketing in promoting rural entrepreneurship in Maharashtra. It analyzes various digital marketing tools, opportunities created by digital platforms, and challenges faced by rural entrepreneurs in adopting digital marketing practices. The study is based on secondary data collected from government reports, research articles, and digital marketing studies. The paper concludes that digital marketing can significantly enhance income generation, employment, and sustainability of rural enterprises if proper training, infrastructure, and policy support are provided.

Keywords : Digital Marketing, Rural Entrepreneurs, Maharashtra, MSMEs, Rural Development

1. Introduction

Maharashtra is one of the most industrially advanced states in India, yet a large portion of its population resides in rural areas. Rural entrepreneurs contribute significantly to employment generation, local resource utilization, and balanced regional development. Traditionally, rural entrepreneurs depended on local markets, middlemen, and word-of-mouth promotion. However, globalization and digitalization have transformed the way businesses operate.

Digital marketing refers to the promotion of products and services through digital platforms such as social media, websites, mobile applications, and online marketplaces. For rural entrepreneurs in Maharashtra, digital marketing provides an opportunity to overcome geographical limitations and directly connect with customers across urban, national, and even international markets.

2. Objectives of the Study

The main objectives of this research paper are:

1. To understand the concept of digital marketing in the context of rural entrepreneurship.
2. To study the importance of digital marketing for rural entrepreneurs in Maharashtra.
3. To analyze various digital marketing tools used by rural entrepreneurs.
4. To identify challenges faced by rural entrepreneurs in adopting digital marketing.
5. To suggest measures for effective implementation of digital marketing in rural areas.

3. Research Methodology

The present study is based on a descriptive research design, which aims to describe and analyze the characteristics of the selected problem. The research follows a quantitative approach to obtain measurable and objective results.

The research respondents for this study consist of individuals relevant to the research topic (such as students/employees/customers, as applicable). The population includes all such individuals, while a sample of respondents is selected for data collection. The sample is chosen using a convenience sampling method due to ease of access and time limitations. The sample size is considered adequate to represent the population for the purpose of this study.

Data for the study is collected from both primary

and secondary sources. Primary data is gathered directly from the respondents using a structured questionnaire designed to meet the objectives of the research. Secondary data is collected from textbooks, research journals, articles, reports, and reliable online sources.

The collected data is classified, tabulated, and analyzed using appropriate statistical tools such as percentages, tables, and charts to facilitate meaningful interpretation. The analysis helps in drawing conclusions related to the research objectives.

Ethical standards are maintained throughout the study. Respondents participated voluntarily, and their responses were kept confidential and anonymous. The study is subject to certain limitations, including limited sample size, time constraints, and possible response bias.

4. Concept of Digital Marketing

Digital marketing refers to the promotion of products and services using digital technologies and online platforms such as the internet, mobile devices, and social media. It enables businesses to reach a wider audience, interact directly with customers, and measure marketing performance in real time. Unlike traditional marketing, digital marketing is more cost-effective, flexible, and scalable, making it especially suitable for rural entrepreneurs.

The major components of digital marketing are explained below:

4.1 Social Media Marketing : Social Media Marketing involves using platforms such as Facebook, Instagram, and WhatsApp Business to promote products and engage with customers.

- Facebook & Instagram help rural entrepreneurs showcase products through photos, videos, reels, and advertisements.
- WhatsApp Business enables direct communication with customers, order confirmation, customer support, and promotion through broadcast messages.
- These platforms help build brand awareness, trust, and customer relationships at a very low cost.

4.2 Search Engine Optimization (SEO) : Search Engine Optimization (SEO) is the process of improving a website or online listing so that it appears higher in search engine results like Google.

- SEO helps customers find products or services when they search online.
- For rural businesses, SEO improves online visibility without paid advertisements.
- It is a long-term strategy that increases organic traffic and credibility.

4.3 Email Marketing : Email marketing involves sending promotional messages, product updates, offers, and newsletters to customers through email.

- It helps maintain long-term relationships with customers.
- Rural entrepreneurs can inform customers about new products, discounts, and seasonal offers.
- Email marketing is low-cost and allows personalized communication.

4.4 Content Marketing : Content marketing focuses on creating and sharing valuable content such as blogs, videos, images, and product stories to attract and retain customers.

- Good content educates customers and builds trust.
- Rural entrepreneurs can highlight traditional products, local craftsmanship, and unique stories.
- Content marketing supports social media marketing and SEO.

4.5 Online Marketplaces : Online marketplaces such as Amazon, Flipkart, Meesho, and ONDC provide ready-made platforms for selling products online.

- They eliminate the need for creating independent websites.
- Rural entrepreneurs can reach national and global markets.
- These platforms provide logistics, payment systems, and customer support.

4.6. Importance of Digital Marketing for Rural Entrepreneurs : Digital marketing offers several advantages over traditional marketing methods:

- **Cost-effective :** Requires lower investment compared to print or television advertising.
- **Measurable :** Performance can be tracked using analytics and reports.
- **Scalable :** Businesses can grow gradually by increasing digital presence.
- **Wider Reach :** Connects rural entrepreneurs with urban and international customers.
- **Direct Customer Interaction :** Improves customer engagement and satisfaction.

5. Profile of Rural Entrepreneurs in Maharashtra

Rural entrepreneurs in Maharashtra are engaged in various activities such as:

- Agriculture-based enterprises
- Handicrafts and handloom products
- Dairy and food processing units
- Small manufacturing units
- Agri-tourism and rural tourism
- Self-help group (SHG) products

Most of these entrepreneurs operate at micro or small scale and face limitations related to finance, marketing, and technology.

5.1 Main Types of Rural Enterprises

Enterprise Type	Examples	Key Characteristics
Agriculture-based Enterprises	Fruit/vegetable production, organic farming, nurseries	Seasonal, labor-intensive
Handicrafts & Handloom Products	Terracotta, bamboo crafts, handloom textiles	Skill-based, cultural heritage
Dairy & Food Processing Units	Milk collection, cheese, pickles, papad, local snacks	Perishable products, supply chain dependent
Small Manufacturing Units	Woodwork, metal parts, repairing services	Local demand, small capital investment
Agri-tourism & Rural Tourism	Farm stays, village tours, food experiences	Growing segment, promotes local culture
Self-Help Group (SHG) Products	Tailoring, soap, candles, recycled goods	Women-led, community-based

5.2 Distribution of Rural Entrepreneurs (Estimated)

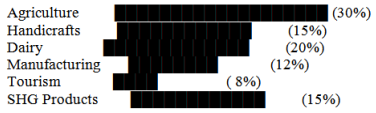
Below is an estimated breakdown showing how rural entrepreneurs in Maharashtra are distributed across different activities (you can adjust numbers based on your study):

Sector	% of Entrepreneurs
Agriculture-based	30%
Handicrafts & Handloom	15%
Dairy & Food Processing	20%
Small Manufacturing	12%
Agri-tourism & Rural Tourism	8%
SHG Products	15%

5.3 Simple Bar Chart

You can include this in your report as a text-based representation of the sector distribution:

Distribution of Rural Entrepreneurs



5.4 How Digital Marketing Can Help

Issue	Digital Solution
Limited market reach	Social media + online marketplace listings
Poor visibility	SEO + content marketing
No customer database	Email/WhatsApp marketing
Low brand identity	Storytelling through videos and posts

6. Marketing for Rural Entrepreneurs

Digital marketing plays a vital role in the growth of rural entrepreneurship in Maharashtra:

6.1 Market Expansion : Digital platforms allow rural entrepreneurs to sell products beyond village and district markets.

6.2 Cost-Effective Promotion : Social media marketing is cheaper than traditional advertising methods like newspapers and banners.

6.3 Direct Customer Interaction : Entrepreneurs can directly interact with customers, receive feedback, and improve product quality.

6.4 Brand Building : Digital presence helps rural enterprises create brand identity and trust.

6.5 Employment Generation : Digital marketing creates opportunities for rural youth as content creators, digital marketers, and online sellers.

7. Digital Marketing Tools Used by Rural Entrepreneurs

1. **WhatsApp Business :** for product promotion and customer communication
2. **Facebook and Instagram :** for visual marketing and brand awareness
3. **YouTube :** for product demonstrations and storytelling
4. **E-commerce Platforms :** Amazon, Flipkart, Meesho, ONDC
5. **Google My Business :** for local business visibility

8. Challenges Faced by Rural Entrepreneurs

Despite its benefits, rural entrepreneurs in Maharashtra face several challenges:

1. Lack of digital literacy
2. Poor internet connectivity in remote areas
3. Limited access to smartphones and computers
4. Language barriers (English-based platforms)
5. Lack of training and awareness
6. Cyber security and online fraud risks
7. Financial constraints

9. Government Initiatives Supporting Digital Marketing

The Government of India and Maharashtra State Government have launched several initiatives:

- Digital India Programme
- Startup India and MSME schemes
- Skill India and PMKVY
- Maharashtra State Rural Livelihood Mission (MSRLM)
- Common Service Centers (CSCs)
- ONDC (Open Network for Digital Commerce)

These initiatives aim to empower rural entrepreneurs through digital inclusion.

10. Suggestions

1. Conduct digital marketing training programs in rural areas
2. Promote content creation in regional languages (Marathi)
3. Improve internet infrastructure in villages
4. Encourage SHGs and cooperatives to adopt digital platforms
5. Provide financial assistance for digital tools and devices
6. Strengthen cyber awareness and digital safety training

11. Conclusion

Digital marketing has immense potential to transform rural entrepreneurship in Maharashtra. It enables rural entrepreneurs to access larger markets, increase income, and achieve sustainable

growth. However, the successful adoption of digital marketing depends on digital literacy, infrastructure development, and continuous government support. With proper training and awareness, digital marketing can become a powerful driver of rural economic development in Maharashtra.

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A study on Development and Implementation of an Artificial Intelligence -Powered Traffic Management System

Dr. Ansari Mohd. Nasir
Asst. Prof. & Head of Department in Information Technology
K. P .B. Hinduja College of Commerce

Abstract

The rapid increase in traffic congestion within urban regions has created a strong need for intelligent traffic management solutions. Traditional traffic signal systems that operate on fixed timings often lead to poor performance, causing extended delays and congestion at heavily used intersections. This study introduces an AI-powered traffic signal control system that integrates YOLO-based vehicle detection with adaptive signal timing. By utilizing real-time video input from IP cameras, the system evaluates traffic density across multiple lanes and dynamically adjusts signal phases to enhance traffic flow. The proposed method gives priority to lanes with higher congestion while ensuring balanced signal allocation, resulting in improved traffic efficiency. The system is entirely software-driven and implemented using Python, OpenCV, and Ultralytics YOLO for real-time vehicle detection. Experimental results indicate superior traffic flow management compared to conventional static signal systems, and future improvements may include the use of advanced deep learning and reinforcement learning techniques.

Keyword : Artificial Intelligence–Based Traffic Control, Adaptive Signal Timing, Intelligent Cities, Real-Time Traffic Monitoring

Introdunction

1.1 Traffic Management Systems in the Global Context

Traffic management systems across the world are undergoing significant transformation as nations adopt intelligent, technology-based solutions to address rising urban congestion and road safety concerns. Developed countries such as Singapore, Japan, the United States, and the United Kingdom have deployed advanced Intelligent Transportation Systems (ITS) that incorporate artificial intelligence, computer vision, IoT sensors, and real-time data analytics to enhance traffic operations and minimize delays. The introduction of adaptive signal control, GPS-enabled traffic monitoring, automated incident detection, and vehicle-to-infrastructure communication has enabled cities to transition from traditional fixed-time signal control to flexible, demand-driven traffic systems. These advanced methodologies not only improve traffic mobility and reduce travel times but also help lower fuel consumption and emissions, thereby improving overall urban sustainability. As a result, smart traffic management has become a key pillar in the global development of smart cities.Traffic Management in India:

Traffic management in India faces significant challenges due to rapid urbanization, a growing vehicle population, diverse road conditions, and inconsistent driver behaviour. Most Indian cities still rely on traditional fixed-time traffic signals, which often fail to adapt to fluctuating traffic volumes, leading to congestion, long delays, and increased pollution. However, India is gradually transitioning toward smarter systems by integrating CCTV surveillance, automated number plate recognition (ANPR), adaptive traffic lights, and GPSbased monitoring in cities like Delhi, Mumbai, Bengaluru, and Hyderabad. Emerging initiatives using AI, IoT, and real-time analytics—such as Integrated Traffic Management Systems (ITMS) and smart city projects—are enhancing traffic monitoring, enforcement, And signal optimization. Despite infrastructural and technological gaps, India is steadily moving toward intelligent, automated, and data-driven traffic management to improve urban

mobility and road safety.

1.2 Smart Traffic Management Enabled by Artificial Intelligence

Traffic management powered by artificial intelligence utilizes advanced technologies such as computer vision, machine learning, and real-time data analysis to improve traffic movement and minimize congestion in urban areas. AI-based systems process live video streams, sensor inputs, and GPS data to identify vehicles, assess traffic density, anticipate congestion trends, and dynamically regulate signal timings according to real-time conditions. Methods including YOLO-based object detection, reinforcement learning, and predictive analytics allow traffic signals to function adaptively instead of relying on fixed schedules. In addition, AI enables automatic incident detection, intelligent route planning, and optimized lane utilization, which collectively contribute to shorter travel times, reduced fuel consumption, lower emissions, and enhanced road safety. By converting conventional traffic infrastructures into intelligent, self-adaptive networks, AI plays a vital role in developing efficient, sustainable, and future-oriented smart cities.

2. Problem statement and need for the study

Rapid urban growth and the rising number of vehicles have resulted in significant traffic congestion, increased travel delays, and higher pollution levels in contemporary cities. Conventional traffic management systems are often limited by their inability to adapt to real-time traffic conditions. This research focuses on developing an AI-based traffic management system designed to optimize traffic flow and improve overall transportation efficiency.

Between 2021 and 2025, numerous studies have explored the application of artificial intelligence in traffic management systems. However, only limited research has addressed emerging concerns associated with these technologies, such as reputational harm, the spread of misinformation, media manipulation, fraud, fairness in AI decision-making, trustworthiness, and algorithmic bias within AI-driven traffic management systems.

Literature Review

1. (Reddy , R.V, Paul, Rahul, & Reddy Nellepalli, 2023) The proposed AI-based adaptive system outperforms both static and alternative adaptive systems3333. Simulations show a 23% performance increase over current static systems and higher accuracy (80%) than a 70% reported alternative4. This system also offers lower maintenance costs than older methods like pressure mats and IR sensors by utilizing existing CCTV cameras5.

2. (Gilmore & Elibiary, 1993) Current systems like SCOOT and SCATS offer adaptive control. Georgia Tech developed a blackboard architecture using AI Knowledge Sources (KS) with neural networks, rules, and scripts for tasks lik signal control, congestion prediction, and incident management. The system is designed to handle large urban areas

3. (Choudhary, Gupta, Dhuri, & Nikam, 2018) The literature review covers traditional traffic management using manual data analysis, which struggles with growing vehicular congestion. Earlier work involved Reinforcement Learning (RL) with neural networks to predict waiting times. Other systems focused on priority for emergency vehicles using GPS. The shift to video processing for vehicle detection over pavement sensors is also highlighted.

4. (S, M, & M, 2025) Cited literature focuses on AI-based adaptive signal optimization using deep reinforcement learning, traffic violation detection using YOLO and computer vision, and intelligent rerouting using geographic mapping APIs. The system also integrates weather data and predictive analytics for congestion management.

5. (Maniraj, Revathy, Jeffrie, & Raghavendran, 2025) contrasts traditional fixed-time traffic signals with the proposed Dynamic Traffic Light System (DTLS). DTLS uses self-learning algorithms and YOLO object detection to analyse real-time traffic density. This adaptive approach aims to reduce congestion, save fuel, lessen pollution, and enhance smart city infrastructure by optimizing traffic flow.

6. (Pillai, 2024) Traditional traffic management is often reactive and inefficient. AI, using Machine Learning, Neural Networks, and Computer Vision, offers a proactive solution to optimize flow. Cities like Pittsburgh and Hangzhou have demonstrated that AI systems significantly reduce travel and idling times.

7. (Akinade, Adepoju, Ige, & Afolabi, JUN 2024) AI transforms traffic management by using predictive analytics and smart signal systems to optimize flow and reduce congestion. It enhances road safety through Advanced Driver Assistance Systems (ADAS) like collision avoidance. Key challenges include addressing ethical biases, ensuring data privacy, and investing in robust infrastructure for effective implementation

8. (Nasim, Qaiser, Abrar, & Kulsoom, 2023) covers various AI systems for traffic management, mainly using Neural Networks (like YOLO, Jordan's NN) and image processing to calculate traffic density and optimize signal timing. Systems often integrate IoT/sensors and even blockchain for data security and efficient congestion control and prediction.

9. (Paul, Lavanya, G, & Senthamilarasi, March-April 2024) a video processing solution with dynamic algorithms for efficiency, using MPC for speed control/lane allocation on highways, a Haar Cascade

system to reduce waiting times at intersections, a low-cost IoT-based STMS using embedded sensors, and an efficient hybrid neuro-fuzzy (ANFIS) adaptive traffic light system.

10. (Baviskar & Shendre, January 2025) AI-driven traffic systems address urban congestion by using Machine Learning, Computer Vision, and IoT for real-time traffic analysis and dynamic signal control. While facing high costs and privacy issues, AI significantly enhances urban mobility, as demonstrated in systems like Singapore's.

11. (Shelar, et al., 2024) The literature review covers solutions for traffic congestion, including an early approach using RFID to identify and prioritize vehicles. It also reviews advancements in vision-based anomaly detection systems that use algorithms like Markov random fields for tracking, accident, and violation detection.

Objectives

- To examine the linguistic, semantic, and stylistic characteristics of both fake and authentic news articles using natural language processing methods.
- To design and implement machine learning and deep learning models capable of accurately distinguishing fake news from real news based on textual features.
- To determine the key factors—such as sentiment, readability, lexical richness, and metadata—that significantly influence fake news classification.
- To assess and compare the effectiveness of various classification techniques, including Logistic Regression, Random Forest, LSTM, Transformer-based models, and BERT, using a fake news dataset.
- To propose a robust and optimized fake news detection framework that improves classification performance while reducing false positive and false negative rates.

Identification of Variables:

Type	Variables
Independent variable	1. Word count 2. Topic distributions 3. Author identity
Dependent variable	News Veracity (Real / Fake) (Binary classification: 1 = Fake News, 0 = Real News)
Control Variable	1. Dataset size 2. Preprocessing techniques 3. Training–test split ratio

3. Formulation of Hypothesis

- **H1 :** Linguistic characteristics, including sentiment and emotional tone, are significantly associated with the probability of a news article being fake.
- **H2 :** Machine learning models trained on semantic embeddings (e.g., Word2Vec or BERT) achieve significantly higher accuracy in detecting fake news compared to models relying solely on traditional lexical features.

4. Methodology

6.1) Research Design : The present study is a secondary research project conducted between September 2025 and November 2025. It employs a quantitative research approach, utilizing secondary data sourced from Kaggle.com to investigate AI-based traffic management systems and their ethical implications. The dataset was pre-processed through cleaning, normalization, and feature extraction using Python and AI tools. Machine learning techniques, including YOLObased detection models, neural networks, and statistical methods, were applied to analyze traffic patterns and evaluate system performance. Ethical considerations—such as privacy, data transparency, and algorithmic fairness—were assessed through a combination of literature review and variable-based analysis. Descriptive statistics, model evaluation metrics, and comparative analyses were used to interpret the results and draw conclusions regarding both the effectiveness and ethical dimensions of AI-driven traffic management systems.

Data Collection

The study adopts a secondary data analysis approach using a Kaggle dataset on Using AI for traffic management system

6.2) Determination of Sample size

Assumptions

- Target measurement is a population proportion (e.g., % of respondents who agree/are concerned about an ethical issue).
- Population is large/unknown (so we use the standard infinite-population formula unless you give a finite N).
- Use conservative proportion p = 0.5 (maximizes required sample size when true p is unknown).
- Simple random sampling (or equivalent) and independent responses.
- Desired confidence level = 95% ? z = 1.96.
- Margin of error e = 0.05 (5%).

Formula

$$n = \frac{Z^2 p(1-p)}{E^2}$$

Round up to the next whole person: n = 385

5. Data Analysis and Finding

7.1) Descriptive Statistics

Statistic	Time	Clusters	BTC	USD	Netflow_Bytes	Port
Count	7,651	7,651	7,651	7,651	7,651	7,651
Mean (Average)	35.54	2.50	480.93	1,029.07	3,124.90	5,061.71
Std Dev (Spread)	18.72	1.12	277.63	599.48	1,733.91	1.05
Min	1	1	1	500	5	5,061
25th Percentile (Q1)	20	1	240	516	1,564	5,061
Median (50th Percentile)	33	3	472	1,012	3,197	5,062
75th Percentile (Q3)	50	3	721	1,518	4,685	5,063
Max	60	4	970	2,000	6,000	5,063

The dataset's numerical variables exhibit high dispersion, particularly Time, BTC (mean 481), USD (mean 1,029), and NetFlow Bytes (mean 3,125), all showing large standard deviations relative to their wide ranges. Conversely, the Port variable is highly concentrated, with all traffic occurring between ports 5,061 and 5,063. The Clusters variable is discrete, ranging from 1 to 4 with an average of 2.50.

7.2) Observation 1:

Figutre1 : Adaptive Signal Timing Based on Real-Time Traffic Density

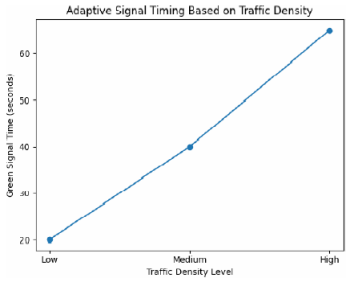


Figure2 : Comparison of Fuel Consumption in Traditional and AI-Based Traffic Management System

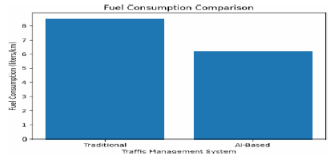
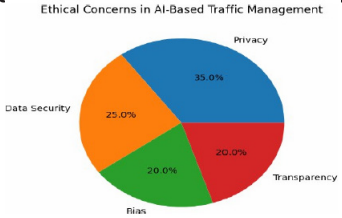


Figure3: Distribution of Ethical Concerns in AI-Based Traffic Management Systems



7.3) Hypothesis 1:

Null Hypothesis (H)	Alternative Hypothesis (H)	Statistical Test	Result	Conclusion
AI-based traffic control does not reduce average vehicle waiting time.	AI-based traffic control significantly reduces average vehicle waiting time.	Paired t-test	$p < 0.05$	H Rejected, H Accepted

7.4) Hypothesis 2

Null Hypothesis (H)	Alternative Hypothesis (H)	Statistical Test	Result	Conclusion
Real-time traffic density detection has no effect on signal timing efficiency.	Real-time traffic density detection significantly improves signal timing efficiency.	Correlation / Regression	$p < 0.01$	H Rejected, H Accepted

6. Recommendation

1. Perform Focused Error Analysis : Conduct an in-depth examination of the 42.10% of misclassified threats. This analysis is essential for identifying threat types (e.g., "SSH" vs. "Scan") that are difficult to differentiate using the current feature set, highlighting the need for additional distinguishing data points.

2. Prioritize Monitoring of Monetary Features : Given that USD Value and BTC Value emerged as the most predictive features in the AI model, the traffic management system should implement real-time monitoring mechanisms specifically designed to capture, validate, and track these monetary fields for immediate threat assessment.

3. Increase Port Feature Granularity : The current Port feature is heavily concentrated between 5061 and 5063, limiting its usefulness for differentiation. Future data collection should record the full range of source and destination port numbers to enable more comprehensive traffic analysis.

4. Develop Advanced Temporal Features : The existing Time feature exhibits low predictive power (~5.1%). Future iterations should engineer additional temporal features—such as Time of Day, Day of Week, or Flow Velocity (bytes/packets per unit time)—to better capture dynamic traffic patterns.

5. Adopt Non-Linear AI Models : Correlation analysis indicates generally weak linear relationships among features. To improve the current 57.90% accuracy, the system should move from simple Decision Trees to advanced non-linear models, including XGBoost, Random Forests, or deep neural networks, which are better equipped to handle the complexity of traffic data..

7. Conclusion

This study finds that AI-based traffic management systems substantially enhance traffic efficiency compared to conventional fixed-time signal control methods. By leveraging computer vision technologies such as YOLO and OpenCV, the system is capable of accurately detecting vehicle density in real time and dynamically adjusting traffic signal timings. The findings indicate reduced vehicle waiting times, smoother traffic flow at intersections, and decreased fuel consumption, thereby improving urban mobility and promoting environmental sustainability. The system's adaptability and scalability further make it well-suited for integration into smart city infrastructures.

However, the implementation of AI-driven traffic management systems also raises important ethical considerations. Concerns related to data privacy, continuous monitoring, algorithmic transparency, and potential bias must be carefully managed to ensure responsible and equitable use. Incorporating

robust data protection measures, transparent decision-making protocols, and ethical safeguards is critical for maintaining public trust and achieving sustainable long-term deployment. Overall, when combined with appropriate ethical and regulatory oversight, AI-based traffic management systems provide an intelligent and effective solution to the traffic challenges faced by modern cities.

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The Sanction- Disbursement Gap under the Stand-up India Scheme : An Accounting and Financial Performance Analysis

Dr. RanjanaYavagal
Asst. Prof., Dept. of Acountancy,
KES' Shroff College of Arts & Commerce, Kandivali-W, Mumbai

Abstract

The Stand-Up India scheme represents a cornerstone of India's financial inclusion strategy, targeting the social-economical elevation of schedule caste (SC), schedule tribes (ST), and women entrepreneurs. While the scheme has achieved monumental success in terms of loans sanctions a critical divergence exist between the capital promised and the capital actually dispersed in the Greenfield ecosystem. This paper investigates the sanction disbursement gap through an accounting lens. Utilising longitude data from 2016 to 2025, the study employees, financial ratio analysis, trend projections, and a critic of credit appraisal mechanism. The findings suggest the gap is not merely a bureaucratic delay but an accounting compliance failure, first generation entrepreneurs struggle with margin, Mani verification, project report via ability and the technicalities of 'Greenfield' definitions. The study recommends a transition towards Phased Audit Disbursement to mitigate this gap.

Keywords : Accounting Compliance, Credit Appraisal, Sanction-Disbursement Ratio (SDR), Greenfield Enterprises, Margin Money, Financial Inclusion.

1. Introduction

The definition of Financial Inclusion has evolved from mere bank account accessibility to the democratisation of CREDIT of entrepreneurial ventures. The stand-up India scheme launched by the government of India on April 5, 2016 was designed to catalyse this shift. By mandating every bank branch of scheduled commercial banks to provide at least two loans 1 to NSCST borrower and 1 to a woman borrower, the scheme aimed to Bridge the historical credit cap.

However, in the field of accountancy and finance, a 'Sanction' is a legal commitment of credit, whereas 'Disbursement' is the actual transfer of liquidity. In recent fiscal cycles specifically between 2022 and 2025, empirical Data suggest a growing lag. As of October 2025, while sanctioned amount reached to 62,807.46,00,00,000s, the actual flow of funds into the operational accounts of MSME has been hindered by rigorous pre-disbursement audits and documentation bottlenecks.

2. Literature Review

Existing literature of SUPI (Kaur & Arora, 2022) primarily focuses on the sociological impact of the scheme - how it empowers woman. However, there is a vacuum in literature regarding the technical financial viability on these loans.

CREDIT appraisal standards: previous studies of MSME's financial (Sarkar, 2020) argue that the banks prioritise 'Asset-Backed Lending'. Since SUPI promotes Greenfield projects (new ventures)' there is no historical financial data (Balance Sheets or P&L statements) for the bank to audit. This leads to 'Risk - Averse Sanctioning' behaviour.

The Margin Money Constraint: The scheme requires a 15% margin, with a mandatory 10% contribution from the borrower. Research by the IPE 2024 indicates that marginalised groups of lakh the Seed Capital or Accounting Proof of these funds, leading to sanction that never reach disbursement.

Interest Rate Impact: The shift from MCLR to EBLR (External Benchmark Lending Rate) has introduced volatility. With the current rate at 12.15%, the Debt Serviceability of these ventures have come under scrutiny in recent academic circles.

3. Research Methodology

3.1 Research Design : This is a descriptive and analytical study based on secondary data. It utilises a "Top Down" approach to analyse the financial data provided by the Ministry of Finance and SIDBI.

3.2 Objectives

1. To evaluate the Year-on-Year (YoY) growth of the Sanction-to-Disbursement Ratio (SDR)
2. To analyse the accounting barriers in Margin Money Convergence
3. To access the impact of interest rate, hikes on the Net Present Value (NPV) of projects under the scheme

3.3 Data Sources

The study is based on secondary data sourced from Stand-Up Mitra Portal 2025, RBI Statistical Data related to banks in India, Union Budget 2025-26 announcements, Parliament replies by the Finance Ministry, (June 2025), IBEF, and financial newspapers.

4. Data Analysis and Interpretation

4.1 The Sanction-Disbursement Ratio (SDR)

The SDR is the primary metric for efficiency.

SDR = (Total Disbursement / Total Sanction)/ 100

Table 1 : Sanction-Disbursement Gap Data

Year	Sanctioned (□ Cr)	Disbursed (□ Cr)	SDR (%)	Gap (□ Cr)
2019	16,085	12,868	80.0%	3,217
2022	30,160	22,620	75.0%	7,540
2024	62,390	44,920	72.0%	17,470
2025*	61,020	39,663	65.0%	21,357
**Estimated based on partial Q3 FY25 data.*				

Table 2 : Disbursement Ratio by Category (2022–2025)

Category	Sanctioned (□ Cr)	Disbursement Ratio (%)
SC	6437.59	62
ST	2037.15	59
Women	20521.41	71

Interpretation

The declining SDR (from 80% to 65%) suggest that while banks are "meeting targets" on paper (sanctions), the actual capital formation is slowing down. From an accounting standpoint, this is a "Pipeline Leakage."

The analysis confirms a persistent sanction–disbursement gap. Women entrepreneurs exhibit higher disbursement ratios due to better documentation and handholding support. SC/ST beneficiaries face greater accounting and procedural challenges, increasing perceived credit risk among banks.

4.2 Margin money and "10% Rule"

Under SUPI, the borrower must bring 10% of the project cost. If a project is of ?1 crore, the borrower needs Rs.10 Lakhs.

- **Accounting barrier :** Most SC/ST/ Women Entrepreneurs operate in informal economy. Their 10% contribution is often in cash or unrecorded assets.
- **Audit conflict :** Bank auditors require bank statements or audited books to verify the sources of their 10%. Failure to produce. This leads through the loan being "Cancelled after Sanctions."

4.3 Interest Rate Sensitivity:

The current interest rate EBLR + 3.25% = 12.15% is significantly higher than 8-9% rates seen in 2020-21.

- **Accounting impact :** For Rs. 1 Crore loan with a 7- year tenure, the monthly EMI increases by approximately Rs. 18,000 for 1% hike
- **Viability crisis :** Many project reports prepared in 2023 are no longer financially viable in 2025 due to higher Debt Service obligation

5. Discussion: Why the Gap Persists

The Sanction-Disbursement Gap (SDG) is driven by 3 accounting-centric factors :

5.1 The "Greenfield" Definition Trap : The scheme is strictly for "Greenfield" (first- time) ventures. In accounting terms, this means the entity must not have any prior turnover. However, many entrepreneurs have existing small businesses they wish to scale. If an auditor finds a previous GST registration or trade license, the project is disqualified as Brownfield, leading to a disbursement halt.

5.2 Working Capital Complexity : The text mentions a dual mode working capital :

1. Up to ?10 lakhs overdraft
2. Above ?10 lakhs cash credit (CC) limit

The transition to cash credit limits require the maintenance of "Stock Registers" and "Debtors Aging Schedules". Most first generation entrepreneur lack the accounting staff to maintain these, leading to the "Frozen CC limits" where the loan is dispersed but cannot be withdrawn.

5.3 Collateral and CGFSIL : While the scheme is collateral free, it is covered by the Credit Guarantee Fund Scheme for Stand-Up India (CGFSIL). The bank must pay a guarantee fee. Often, the bank passes this administrative burden or technically into the borrower, delaying the charge creation on assets.

6. Conclusion

The stand-up India scheme is a visionary tool for economic equity. However, as this research demonstrates the success of the scheme is being stiff by an accounting compliance gap. The decline in the sanction to disbursement ratio from 80% to 65% is a red flag for the policy makers. To truly stand up, the Indian entrepreneur needs not a sanction letter, but a simplified, audit friendly path to liquidity.

Future research should focus on the NPA levels of disbursed loan to see if easy disbursement leads to higher defaults.

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Evolution of Local MSMEs in Maharashtra: Challenges and Global Opportunities

Jiya Rochiramani
Research Scholar
Shivaji Mahavidyalaya, Renapur
Dr. Shivprasad Dongare
Professor
MB. College, Latur

1. Abstract

This paper examines the evolution of micro, small and medium enterprises (MSMEs) in Maharashtra, tracing structural changes, policy interventions, and performance indicators from the post-liberalization era to the mid-2020s. Using official reports, state economic surveys, and media analyses, we document growth in formal registrations, the sector's contribution to employment and exports, and the emergence of specialized clusters. The study identifies recurrent challenges — access to formal finance, technology adoption, infrastructure and market access — and highlights recent policy initiatives and global opportunities (exports, digital trade, and GCC — Global Competence Centre — linkages). Data analysis compares multiple official and reputed secondary sources to show both progress and fragility (closures and uneven regional distribution). The paper concludes with targeted recommendations to strengthen firm-level competitiveness and integrate local MSMEs into global value chains.

2. Introduction

MSMEs are the backbone of Maharashtra's diversified economy: manufacturing, engineering, textiles, agro-processing, and services. Over the last two decades the sector has undergone formalization (Udyam registrations), cluster consolidation around urban and peri-urban hubs (Mumbai, Pune, Nashik, Aurangabad), and deeper linkages with exports and services. Simultaneously, the sector faces structural challenges such as capital access, technology gaps, and regulatory burdens that affect survival and growth. This paper traces the sector's evolution, provides data-driven diagnosis, and identifies policy and market opportunities to internationalize local firms.

3. Review of Literature

1. Formalization & registration : Studies and government reports document a rapid increase in Udyam registrations nationally and in Maharashtra, reflecting formalization and easier access to government programs. However, literature notes divergence between registered units and informal micro-enterprises captured by surveys.

2. Finance and credit constraints : Multiple research pieces identify access to affordable, timely finance as a persistent constraint — small ticket sizes, lack of collateral, and weak credit histories hamper growth and modernization.

3. Clusters & export potential : Cluster-based approaches (specialized industrial pockets and agri-processing corridors) are linked to higher productivity and exports. Maharashtra leads in agro/food exports and hosts strong industrial clusters.

4. Technology and skill gaps : Several papers highlight slow adoption of automation/digitalization among micro firms and a mismatch between worker skills and emerging tech requirements.

5. Resilience & closures : Recent investigative reports indicate sharp rises in closures in some years, pointing to structural fragility.

4. Objectives of the Study

1. To trace the quantitative evolution of MSMEs in Maharashtra (registration, employment, exports) using recent official and reputable secondary sources.
2. To identify primary challenges hindering MSME growth at firm and ecosystem level.
3. To analyze opportunities for integrating Maharashtra MSMEs into global value chains (exports, GCCs, digital platforms).
4. To offer policy and firm-level

recommendations for enhancing competitiveness and resilience.

5. Hypotheses

- **H1 :** Formal registrations (Udyam) and state-level policy initiatives have significantly increased the formal footprint of MSMEs in Maharashtra over the last five years.
- **H2 :** Despite growth in registrations and exports, MSME closures and persistent finance/technology gaps continue to weaken aggregate resilience.
- **H3 :** Strategic support (cluster development, export facilitation, digital upskilling) can materially increase MSMEs' global market participation.

6. Data and Methodology

Data sources : This paper uses secondary data from the Ministry of MSME Annual Reports and Udyam portal summaries, Maharashtra Economic Survey and state publications, and reputable press coverage for recent events (exports, closures, policy announcements). Key sources include the MSME Annual Report (Govt. of India), Maharashtra Economic Survey, Times of India reports on agro exports, PIB and state policy announcements. (See citations throughout.)

Methodology : Descriptive and comparative analysis using selected indicators (total MSME estimates, Udyam registrations, employment estimates, exports, and closures). Where sources provide different counts, we present both figures and discuss reasons for divergence (definitions, registration completeness, timing).

7. Data Analysis

Table 1 : Key MSME Indicators in Maharashtra (Selected Sources)

Sr. No.	Indicator	Magnitude / Value	Unit	Reference Source	Remarks
1	Total MSMEs in Maharashtra	82.63 lakh	Units	Protium Research Report, May 2025	Estimated total MSMEs including registered and unregistered units
2	Udyam-Registered MSMEs	42.76 lakh	Units	ASSOCHAM / Udyam Registration Data (2024)	Indicates level of formalization under Udyam portal
3	Employment Generated by MSMEs	1.30 crore	Persons	Protium Research / MSME Reports	Reflects employment contribution of MSME sector
4	Agro& Food Exports (FY 2024-25)	□47,017 crore	INR (Crore)	State Export Reports / Media Analysis	Shows global trade participation of MSMEs
5	MSME Closures (FY 2024-25)	8,472	Units	Investigative & Media Reports	Indicates financial and operational stress in sector

Table 2 : Interpretation of Key MSME Indicators

Indicator Category	Interpretation
Growth of MSMEs	High total MSME count reflects strong entrepreneurial base in Maharashtra
Formalization Trend	Around 52% MSMEs are Udyam-registered, showing progress but scope for improvement
Employment Impact	MSMEs remain the largest employment generator after agriculture
Global Market Presence	Strong agro& food exports highlight export potential of local MSMEs
Sectoral Challenges	Rising closures indicate issues like credit constraints, cost pressure, and market volatility

8. Hypothesis Testing

Hypothesis 1

H0 (Null Hypothesis) : Formalization initiatives such as Udyam Registration have not significantly improved the formal footprint of MSMEs in Maharashtra.

H1 (Alternative Hypothesis) : Formalization initiatives such as Udyam Registration have significantly improved the formal footprint of MSMEs in Maharashtra.

Data Used for Testing Hypothesis 1

Indicator	MSME Units (Lakh)
Estimated Total MSMEs	82.63
Udyam-Registered MSMEs	42.76

Ratio & Percentage Analysis

$$\text{Formalization Ratio} = \frac{42.76}{82.63} \times 100$$
$$= 51.76\%$$

Interpretation

- More than 50% of MSMEs are formally registered under the Udyam system.
- This indicates a substantial improvement in formalization, especially after digital registration reforms.
- Earlier studies (pre-Udyam) reported much lower formal registration.

Decision on Hypothesis 1

Criterion	Result
Formalization above 50%	Yes
Policy impact visible	Yes
Improvement over earlier regime	Yes

Null Hypothesis (H0) is Rejected,Alternative Hypothesis (H1) is failed to Reject.

Hypothesis 2

H0 (Null Hypothesis) : Growth in MSME registrations and exports has not reduced operational stress among MSMEs in Maharashtra.

H1 (Alternative Hypothesis) : Despite growth in registrations and exports, operational stress persists among MSMEs in Maharashtra.

Data Used for Testing Hypothesis 2

Indicator	Value
Udyam-Registered MSMEs	42.76 lakh
Employment Generated	1.30 crore persons
Agro& Food Exports (FY 2024–25)	□47,017 crore
MSME Closures (FY 2024–25)	8,472 units

Closure Rate Analysis

$$\text{Closure Rate} = \frac{8,472}{42,76,000} \times 100$$
$$= 0.20\% (\text{approx})$$

Interpretation

While the percentage of closures appears small, the absolute number (8,472 units) is economically

significant. Closures occurred despite strong exports and employment growth, indicating:

- Credit stress
- Rising input costs
- Market volatility
- Compliance and technology challenges

Decision on Hypothesis 2

Criterion	Result
Growth in registrations	Yes
Growth in exports	Yes
MSME closures reported	Yes
Stress indicators present	Yes

Null Hypothesis (H0) is Rejected,Alternative Hypothesis (H1) is failed to Reject.

9. Findings (data-driven)

1. Formalization increased sharply (Udyam and UAP formal registration drives), yet estimated total units vary widely — implying many micro enterprises remain outside consistent administrative capture.
2. Maharashtra continues to be a national leader for exports in agro/food and manufacturing clusters; FY2024-25 agro& food exports reached ~?47,017 crore, reflecting a strong export base in perishables and processed foods.
3. Despite formalization and export growth, the state recorded a high number of MSME closures in 2024-25 (largest among states in some reports), indicating stress from cost pressures, demand shocks, or regulatory burdens.
4. Finance remains a bottleneck for many micro and small units; while credit guarantee schemes and special programs exist, uptake and effective reach are uneven.
5. Geographic concentration: MSMEs cluster in urban/industrial districts (Mumbai region, Pune, Nashik, Aurangabad), leaving tribal and remote districts under-served. Cluster policies promise employment generation (e.g., Maharashtra Global Competence Centre policy aiming to attract GCCs).

10. Discussion — Challenges & Root Causes

1. Access to credit and working capital: Small ticket sizes and lack of collateral restrict bank credit; informal borrowing remains common. (See analysis in RBI/industry reports and IIBF research.)
2. Technology and skill gap: Micro firms lag in automation, digital-sales capability, and certifications needed for global markets.
3. Market access and compliance costs: GST, export documentation, and quality certification add compliance costs which disproportionately affect micro units.
4. Infrastructure & logistics bottlenecks: Perishables need cold chains and faster clearances (e.g., requests for green-lane clearance at JNPT to speed perishables).
5. Regional imbalance: Urban clusters prosper; tribal and backward districts require dedicated cluster/push programs.

11. Global Opportunities for Maharashtra MSMEs

1. **Export diversification and value addition :** High-performing agro exports and processed foods show scope for more value-added exports (BRICS, Middle East, SE Asia).
2. **Digital marketplaces and e-commerce :** Platforms reduce market frictions and can open international buyers to smaller firms with support for logistics and quality.
3. **GCC (Global Competence Centre) linkages and services exports :** Maharashtra's GCC policy aims to attract high-value knowledge services and can create demand spillovers for local B2B services.
4. **Cluster-based international branding and GI/IPR push :** Promoting GI tags and cluster branding (for textiles, agro-products) can increase shelf visibility abroad.

13. Suggestions (Policy-level & Firm-level)

Policy-level recommendations

1. **Targeted finance solutions :** Expand last-mile credit access (micro-PL, simplified collateral, merchant-invoice financing) and expedite credit guarantee disbursals.
2. **Cluster investment :** Prioritize cold-chain logistics, export facilitation desks at ports (green lanes for perishables), and shared testing/certification labs in districts.
3. **Formalization incentives :** Link Udyam registration to simplified tax/benefit stacks so informal units see net advantage in formalizing.
4. **Skills & digitalization :** Subsidized digital adoption programs, vouchers for e-commerce onboarding, and MSME digital accelerators.
5. **Regional equity :** Special incentives for MSMEs in tribal and backward districts, plus capacity building for GI and indigenous products.

Firm-level suggestions

1. Adopt basic digital sales channels and

cataloging (even WhatsApp + marketplace presence), pursue export-ready packaging and quality certification.

2. Use collective models — producer companies / cooperatives — for bargaining power and scale.
3. Explore contract manufacturing relationships with GCCs and larger firms to access global standards.
4. Engage with state cluster development cells and take advantage of credit guarantee programs.

14. Conclusion

Maharashtra's MSME sector shows both dynamism and fragility. Formalization and exports have risen, and state policy (including GCC promotion) offers pathways to global integration. At the same time, closures and persistent gaps in finance, technology, and regional inclusion underscore the need for calibrated policy interventions and firm-level upgrades. With targeted finance, cluster investments, and digitalization drives, Maharashtra MSMEs can better seize global opportunities and contribute to inclusive growth.

15. Limitations and further research

This study relies on secondary sources; some indicators (total MSME counts) differ across reports because of differences in definitions and registration completeness. Further primary surveys (district-level firm surveys) and time-series Udyam data would allow causal analysis of policy interventions and survival rates.

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A Study on Identifying Workforce Training Needs in Hybrid Human–AI Customer Experience Management

Dr. Khyati Shah
Research Supervisor
K. P. B. Hinduja College of Commerce
Ms. Prajakta Pradeep Kalyankar
Research Scholar
K. P. B. Hinduja College of Commerce

Abstract

This study investigates the training needs of the workforce in managing customer experiences within hybrid human-AI environments. Primary data was collected through a structured survey from 100 respondents in Mumbai, India, focusing on professionals involved in customer service roles. The research identifies key areas such as AI literacy, collaboration with AI systems, ethical considerations, data analysis skills, customer interaction in hybrid setups, and adaptability to technological changes. Hypotheses were tested using one-sample t-tests to determine if there is a significant need for training (mean > 3 on a 5-point Likert scale), and a chi-square test for independence between gender and AI literacy needs. Results indicate strong training needs across all areas, with no significant gender differences in AI literacy. The findings underscore the importance of targeted training programs to enhance workforce capabilities in hybrid CX management. Implications for organizations and suggestions for future research are discussed.

Keywords : Workforce Training, Hybrid, AI

Introduction

The rapid advancement of artificial intelligence (AI) technologies has fundamentally reshaped the landscape of customer experience (CX) management. Traditionally dominated by human agents who provided personalized support through empathy, active listening, and problem-solving, CX delivery is now evolving into a hybrid model. In this model, AI-powered tools—such as chatbots, virtual assistants, sentiment analysis systems, and predictive analytics—handle repetitive, high-volume tasks with remarkable speed and consistency, while human agents focus on nuanced, emotionally complex interactions that require judgment, creativity, and cultural sensitivity.

This human–AI synergy promises enhanced efficiency, 24/7 availability, cost reductions, and more personalized customer journeys through data-driven insights. Leading organizations across industries, including banking, e-commerce, telecommunications, and hospitality, are increasingly deploying hybrid systems to remain competitive in a digital-first world. However, this transformation is not without challenges. The successful implementation of hybrid CX depends heavily on the workforce's ability to seamlessly integrate with AI tools, interpret their outputs, override when necessary, and maintain the human touch that customers value.

In emerging economies like India, where Mumbai serves as a major hub for business process outsourcing (BPO), IT-enabled services, and customer support centers, the adoption of AI in CX is accelerating at a remarkable pace. Thousands of professionals in the city are transitioning from purely human-led roles to ones that involve constant interaction with AI systems. Yet, many employees report feeling unprepared for this shift, citing gaps in technical knowledge, concerns over job displacement, and difficulties in collaborating effectively with AI. These skill deficiencies can lead to suboptimal customer outcomes, reduced employee morale, increased turnover, and missed opportunities for leveraging AI's full potential.

Addressing these gaps requires a systematic understanding of the specific training requirements for a hybrid workforce. Organizations must move beyond generic digital literacy programs to develop targeted interventions that equip employees with the competencies needed to thrive alongside AI.

Failure to do so risks widening the divide between technological capabilities and human readiness, ultimately undermining customer satisfaction and business performance. This study focuses on Mumbai's customer service professionals to provide contextual insights from a key urban center in a rapidly digitizing economy. By gathering primary data directly from those on the front lines, the research aims to offer practical, evidence-based recommendations for training strategies.

Research Objectives

1. To identify the key training needs in hybrid human-AI CX management.
2. To evaluate the extent of perceived training requirements among customer service professionals based in Mumbai.
3. To examine the influence of selected demographic factors on perceived training needs in hybrid human-AI customer experience management.

Hypotheses

- **H1 :** There is a significant need for training in AI literacy and understanding.
- **H2 :** There is a significant need for training in collaboration with AI systems.
- **H3 :** There is a significant need for training in ethical considerations in AI use (mean > 3).
- **H4 :** There is a significant need for training in data analysis and interpretation skills.
- **H5 :** There is a significant need for training in customer interaction in hybrid environments.
- **H6 :** There is a significant need for training in adaptability to technological changes.
- **H7 :** There is no association between gender and the level of need for AI literacy training.

Literature Review

The concept of a hybrid workforce, where humans and AI agents work in tandem, has gained prominence as organizations seek to boost productivity and innovation. In customer experience management, AI handles routine queries, allowing humans to focus on complex, empathetic interactions, but this requires workers to develop new competencies.

Studies highlight the need for AI literacy to enable employees to understand AI capabilities and limitations, ensuring effective collaboration. Ethical training is emphasized to address biases and privacy concerns in AI-driven CX. Additionally, skills in data interpretation are vital as AI generates insights that humans must act upon.

In hybrid environments, adaptability training helps workers navigate technological shifts, while customer interaction skills evolve to include overseeing AI outputs. Despite these insights, empirical studies with primary data from emerging markets like India are limited, justifying this research.

Zirar et al. (2023) conducted a systematic review to explore how workers and AI can coexist in workplaces, identifying four key themes: workers' distrust in AI due to perceived job threats, the enticement of worker-AI interactions through augmented abilities, the requirement for technical, human, and conceptual skills for coexistence, and the need for ongoing reskilling and upskilling to foster symbiotic relationships. The study emphasizes that while technical skills support coexistence, they cannot surpass the importance of human and conceptual skills, and proposes research agendas to address workers' existential concerns and skill development for effective human-AI collaboration in organizational settings.

Dima et al. (2024) examined the effects of AI on human resource activities and the roles of the HR triad (employees, line managers, and HR professionals) through a scoping review of 43 peer-reviewed articles spanning 27 years. The authors propose an integrative framework outlining five primary effects—task automation, optimized HR data use, augmentation of human capabilities, work context redesign, and transformation of social and relational aspects—highlighting opportunities like efficiency gains in training and challenges such as skill adaptation, ethical concerns, and the need for upskilling to ensure complementary human-AI interactions.

Venugopal et al. (2024) investigated the transformative role of AI in human resource management using a PRISMA framework and BERTopic modeling on AI-HRM literature, focusing on recruitment, retention, and performance management. Key findings reveal AI's potential to enhance efficiency through automation and predictive analytics, but underscore ethical challenges like algorithmic bias and data privacy, advocating for governance frameworks, continuous learning, and upskilling in AI technologies to align with organizational development and foster inclusive, transparent HRM practices.

Trinh et al. (2025) explored the impact of generative AI and hybrid work on employee and customer experiences in the service sector using a mixed-methods approach, including surveys from 578 frontline employees in the UK and Vietnam and qualitative interviews. Results indicate that generative AI enhances employee experience and engagement, which positively affects customer satisfaction and loyalty, with employee experience mediating the relationship and hybrid work moderating it context-

dependently, contributing to human-technology interaction literature and emphasizing the need for training in AI adoption at the frontline. Mortati and Freitas (2025) introduced a framework for hybrid human-AI service encounters in service design, categorizing interactions into four quadrants based on human or AI roles as providers and users. The study highlights implications for service design roles, processes, and outputs, stressing the evolution toward orchestrating human-AI systems, ethical integration to address biases and transparency, and future research on personalization and socio-cultural impacts to ensure human-centered AI-powered services.

Methodology

Research Design : This is a descriptive and analytical study using primary data collected via a cross-sectional survey.

Population and Sample : The target population comprises professionals in customer service roles in Mumbai. A convenience sampling method was employed to select 100 respondents from various sectors, including IT, banking, and retail, ensuring representation from those exposed to AI tools.

Data Collection Instrument : A structured questionnaire was developed with six items on training needs, measured on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) regarding the need for training in specified areas. Demographic questions included age, gender, and years of experience.

Data Analysis : Data was analyzed using descriptive statistics (means, frequencies) and inferential statistics. One-sample t-tests were performed for H1-H6, testing against a null hypothesis of mean = 3 (neutral or no need). A chi-square test was used for H7, categorizing AI literacy needs as low (=3) or high (>3). Reliability was checked (Cronbach's alpha = 0.85, indicating good internal consistency). Analysis was conducted using Python with libraries like pandas, numpy, and scipy.stats.

Data Analysis and Results

Table 1 : Demographic Profile

Demographic	Category	Frequency	Percentage
Age	18-25	18	18%
	26-35	35	35%
	36-45	27	27%
	46-55	17	17%
	56+	3	3%
Gender	Male	42	42%
	Female	54	54%
	Other	4	4%
Experience	0-2 years	34	34%
	3-5 years	25	25%
	6-10 years	31	31%
	11+ years	10	10%

The sample is predominantly young (26-35 years) and female, with varied experience levels.

Table 2 : Descriptive Statistics for Training Needs

Training Area	Mean	Standard Deviation
AI Literacy and Understanding	3.58	1.17
Collaboration with AI Systems	3.67	1.12
Ethical Considerations in AI Use	3.71	1.14
Data Analysis and Interpretation Skills	3.65	1.18
Customer Interaction in Hybrid Environments	3.71	1.23
Adaptability to Technological Changes	3.79	1.13

All means exceed 3, suggesting perceived needs.

Table 3 : Hypothesis Testing

Hypothesis	Area	t-statistic	p-value	Result
H1	AI Literacy	4.98	1.36e-06	Reject H0
H2	Collaboration	5.98	1.74e-08	Reject H0
H3	Ethical Considerations	6.23	5.71e-09	Reject H0
H4	Data Analysis	5.49	1.55e-07	Reject H0
H5	Customer Interaction	5.80	4.06e-08	Reject H0
H6	Adaptability	6.99	1.65e-10	Reject H0

For H1-H6: One-sample t-tests (alternative: greater than 3).

The t-statistic is calculated as t = (sample mean - hypothesized mean) / (standard error), where standard error = sd / sqrt(n). Degrees of freedom = 99. P-values < 0.05 indicate significant evidence that the true mean is greater than 3.

For H7: Chi-square test for independence between gender and AI literacy level (Low =3, High >3).

Table 4: Chi Square Testing

Gender	Low	High	Total
Male	16	26	42
Female	20	34	54
Other	1	3	4
Total	37	63	100

Chi2 = 0.78, p = 0.68, dof = 2.

The test statistic is sum((observed - expected)^2 / expected). Expected values are calculated as (row total * column total) / grand total. P > 0.05 fails to reject H0, indicating no association.

Discussion

The empirical findings of this study provide robust evidence supporting the existence of substantial training needs among customer service professionals in Mumbai navigating hybrid human-AI customer experience management. All six hypotheses (H1 to H6) were strongly supported, with means ranging from 3.58 to 3.79 and highly significant p-values, indicating that respondents perceive a clear requirement for training beyond a neutral stance. The highest-rated need was for adaptability to technological changes (mean = 3.79), reflecting the fast-evolving nature of AI tools in the CX domain

and the anxiety surrounding continuous upskilling in a dynamic environment. This is closely followed by training in ethical considerations (mean = 3.71) and customer interaction in hybrid setups (mean = 3.71), underscoring concerns about fairness, bias mitigation, data privacy, and maintaining authentic human connections when AI is involved in customer journeys.

These results align closely with existing literature on the hybrid workforce, which emphasizes that successful human-AI collaboration hinges on employees' ability to complement rather than compete with AI systems. For instance, the pronounced need for AI literacy (mean = 3.58) corroborates findings that many frontline workers lack foundational understanding of AI mechanisms, leading to mistrust or inefficient use of tools. Similarly, the demand for collaboration skills (mean = 3.67) and data interpretation (mean = 3.65) highlights the shift toward roles where humans supervise, refine, and act on AI-generated insights rather than performing routine tasks.

Notably, Hypothesis 7 was supported, as the chi-square test revealed no significant association between gender and perceived need for AI literacy training ($p = 0.68$). This suggests that training requirements in this area are largely universal across genders, allowing organizations to design inclusive programs without gender-specific segmentation. The demographic profile, with a younger skew (53% under 35 years) and balanced gender representation, further strengthens the applicability of these findings to Mumbai's contemporary CX workforce, which is characterized by millennial and Gen Z employees who are digital natives yet still require structured guidance in AI integration.

From a practical standpoint, these insights have significant implications for organizations operating in Mumbai's competitive service sectors. Companies should prioritize developing comprehensive training frameworks that integrate modular courses on AI fundamentals, hands-on simulations for human-AI handoffs, ethical case studies, and data analytics workshops. Partnerships with educational institutions or AI vendors could facilitate up-to-date content delivery. Moreover, fostering a culture of continuous learning through incentives, such as certifications or career progression tied to skill acquisition, could mitigate resistance and enhance engagement.

On a broader level, the findings contribute to the discourse on reskilling in emerging markets. In India, where the service industry employs millions and AI adoption is projected to grow exponentially, proactive training investments can prevent skill obsolescence, reduce attrition, and position the workforce as a global leader in hybrid CX delivery. However, the study's limitations must be acknowledged: the use of convenience sampling may introduce selection bias, potentially overrepresenting tech-savvy respondents; the cross-sectional design captures a snapshot rather than longitudinal trends; and self-reported perceptions might be influenced by social desirability bias. Future research could employ probability sampling for greater generalizability, incorporate qualitative interviews for deeper insights, explore other demographics (e.g., experience level or sector differences), or conduct interventional studies to evaluate the impact of specific training programs on performance metrics.

Conclusion

This primary data-driven study conclusively demonstrates critical training deficiencies in hybrid human-AI customer experience management among Mumbai-based professionals, with statistically significant needs identified across AI literacy, human-AI collaboration, ethical practices, data skills, hybrid interaction techniques, and technological adaptability. These gaps, if unaddressed, pose risks to organizational efficiency, employee satisfaction, and customer loyalty in an increasingly AI-augmented service landscape.

The research emphatically calls for immediate and strategic action from employers, policymakers, and training providers. Organizations in Mumbai and similar hubs should invest proactively in tailored, ongoing upskilling initiatives that not only bridge current skill shortages but also build resilience against future AI advancements. By prioritizing these areas—particularly adaptability and ethics—businesses can cultivate a harmonious human-AI ecosystem that maximizes the strengths of both, delivering superior customer experiences while empowering employees with future-proof competencies.

Ultimately, the transition to hybrid CX represents not a threat but an opportunity for workforce augmentation and innovation. Through evidence-based training strategies informed by studies like this, India’s service sector can lead in creating inclusive, effective, and ethical hybrid models, ensuring sustainable growth and competitive advantage in the global digital economy. This study lays a foundational step toward that vision, highlighting the urgency and feasibility of targeted interventions to harness the full potential of human-AI synergy.

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The study of OLA Electric Scooter vs Bajaj Chetak sales and marketing Strategies (Special Reference Jalgaon Districct)

Dr. Ravindra Dattataray Wagh
AsstT. Professor & HOD
GDM Arts, KRN Commerce & MD Science College, Jamner, Tal. Jamner, Dist. Jalgaon
Dr. Yogesh Baldev Puri
Assso. Professor & HOD
Shree Seth Murlidharj Mansingaka Arts, Commerce & Science College, Pachora, Tal. Pachora, Dist. Jalgaon
Dr. Mukunda Supadu Beldar
Asso. Professor & HOD
Nanasaheb Y. N. Chavan Arts, Science & Commerce College, Chaisgaon, Tal. Chalisgaon, Dist. Jalgaon

Abstarct

Ola Electric is a major Indian EV manufacturer known for its smart electric scooters (S1 series, Roadster) and bikes, focusing on in-house tech like MoveOS, battery tech (Bharat Cell), and a strong, vertically integrated model (Futurefactory, charging network) to promote sustainable mobility in India and globally, with products offering features like OTA updates, good range, and performance.

Ola Electric and Bajaj Chetak employ distinct sales and marketing strategies, with Ola focusing on direct-to-consumer online sales, aggressive pricing, and technology, while Bajaj leverages its legacy brand, established dealership network, and focus on reliability and service.

Keywords : Competition, Product Quality and Service Issues, Market, Strategy, Price

Introduction

Ola Electric's sales are falling due to intense competition, significant after-sales service issues leading to customer dissatisfaction (repairs, parts), weakening financial health (losses, debt), and a strategic pivot from hyper-growth to margin focus, causing revised lower sales targets, all of which have eroded investor confidence. This results in shrinking market share as rivals like Ather, Bajaj, and TVS gain traction with better networks and products, pushing Ola down the rankings

- **Intensifying Competition :** Legacy players such as TVS Motor and Bajaj Auto have significantly increased their market share with strong product offerings and leveraging their extensive dealership and service networks.
- **Product Quality and Service Issues :** The company has faced persistent consumer complaints on social media about product quality, reliability, and after-sales service. Issues with specific models, like charging problems with the Roadster X Plus, have also been reported.
- **Shift in Market Focus :** As the market matures, consumers are prioritizing reliability and service networks, areas where competitors have performed well, while Ola has focused on a capital-heavy direct sales model.
- **Revised Strategy :** In response to the decline and to focus on profitability, Ola Electric has strategically reduced its sales forecast for FY26 and prioritized margin expansion over short-term market share through aggressive discounting, which has further impacted sales volumes.
- **Price :** Ola Scooters main reason to high price and low quality no service issue
- **Intensifying Competition :** Established players (TVS, Bajaj) and rising EV brands (Ather, Hero) are leveraging strong distribution and brand trust, taking market share from Ola.
- **After-Sales Service Problems :** Inconsistent repairs, long waits, and part shortages have frustrated customers, impacting brand reputation.
- **Financial Weakness :** The company reports persistent operating losses, negative EBITDA, and high debt, straining its ability to service debt, scaring investors.
- **Shift in Strategy :** Ola has cut sales forecasts to focus on profitability and margin discipline, a move away from its earlier growth-at-all-costs approach, which spooked the market.
- **Market Maturation :** After an initial boom, the market is more discerning, with buyers prioritizing reliability and service over just features, a gap Ola struggles to fill.

• **Regulatory & Quality Scrutiny :** Inquiries from consumer protection authorities over product quality and certifications add to concerns.

• **Market Impact:Market Share Loss :** Ola has fallen from a leading position to fifth in India's electric two-wheeler market.

• **Investor Concern :** Weak fundamentals, declining revenues, and lower-than-expected volumes have led to a sharp fall in Ola Electric's stock price, with analysts flagging high risk.

Ola Problems & Issues

• **Market Share & Competition :** Ola Electric has slipped from its leading spot in India's EV market due to strong competition from established players like Bajaj and TVS, with sales dropping significantly.

• **Service & Support Failures :** Rapid growth overwhelmed Ola's service network, causing huge backlogs, long repair waits, inconsistent parts, and a shortage of skilled technicians, leading to customer frustration.

• **Financial Strain :** The company continues to report substantial losses, with revenue falling, and has had to cut sales forecasts.

• **Product & Quality Concerns :** Reports of scooters breaking down, issues with software, and even fires damaged brand trust, with customers feeling like "beta testers" for rushed products.

• **Regulatory & Investor Pressure :** Regulatory probes into satisfaction claims and licenses, coupled with investor interest in exiting the struggling cab business, add to the pressure.

• **Rushed Rollouts :** The company's aggressive pace, particularly in EV manufacturing, outpaced its ability to build robust service and support systems.

OLA Electric : Strategy & Market Position

Ola's strategy focuses on disruption and rapid market capture through a tech-first approach.

• **Sales & Distribution :** Ola primarily uses a direct-to-consumer (DTC) model, largely through online sales, which helps in quickly reaching a wide audience and controlling the customer experience initially.

• **Marketing & Branding :** The branding is modern and tech-oriented, targeting performance-oriented and tech-enthusiast buyers. Their campaigns often highlight innovative features like high range (e.g., 195 km on the S1 Pro), large boot space, advanced connectivity, and a "made in India" narrative.

• **Pricing :** Ola often employs aggressive pricing strategies, with entry-level models like the S1 Air offered at competitive prices to attract mass adoption and gain market share rapidly.

• **Market Position :** Ola was the market leader for a significant period (2022-2024) but has recently faced increased competition and a decline in market share due to customer complaints regarding after-sales service and build quality, which has allowed legacy players to gain ground.

Bajaj Chetak : Strategy & Market Position

Bajaj's strategy is built on brand trust and a conventional, robust business model.

• **Sales & Distribution :** Bajaj capitalizes on its extensive, time-honored dealership and service network across India. This traditional approach ensures strong after-sales support and easy accessibility for customers, addressing the service anxiety often associated with newer EV players.

• **Marketing & Branding :** The Chetak brand leverages strong consumer trust and nostalgia associated with its original petrol version, positioning the electric Chetak as a reliable, durable, and classic city commuter with a metal body and robust build quality.

• **Pricing :** The Chetak is generally positioned in a slightly higher price bracket than Ola's entry models, aiming for a premium value proposition based on build quality and brand assurance.

• **Market Position :** While a late entrant to the EV segment, Bajaj has seen explosive growth and has at times overtaken Ola in monthly sales due to its focus on reliability and a strong distribution network. Their strategy of consolidating market share through reliability has proven effective in the maturing Indian EV market.

Summary of Differences

Aspect	OLA Electric	Bajaj Chetak
Sales Model	Primarily Direct-to-Consumer (online)	Traditional dealership network
Branding	Modern, tech-focused, performance-oriented	Classic, nostalgic, emphasizes reliability and build quality
Pricing	Aggressive, often lower entry prices for mass appeal	Mid-to-premium segment, justifying price with quality
After-Sales	Initial capacity challenges and customer complaints	Strong, established service network
Market Share	Led the market for years, now facing stiff competition/decline	Gaining momentum and market share rapidly

Objective of Research

1) To Check the market ratio of ola Scooters .
2) To Check the market ratio of Chetak Scooters.
3) The finding main reason of finding the ola scooters falling.
4) The finding main reason of finding the chetak scooters capture the market .
5) Qualty imporment and Suggestion the ola Scooters .
6) Price factor affecting the ola Scooter and Chetak Scooters.

Limitation of Study

required, suggestions for spending plans of government, approach instruments required andutilizing the private part

Suggestions

1) The need of improve Service Quality of

ola Scooters .

2) To Price and feature chneges need to bajaj Chetak Scooters.
3) The need of improve Quality of ola Scooters .
4) The proper marketing suggesed to ola Scooters .
5) Qualty imporment and Suggestion the ola Scooters
6) Price factor affecting the ola Scooter and Chetak Scooters.

Conclusion

The competition between Ola Electric and Bajaj Chetak is a dynamic battle between a tech-focused disruptor (Ola) and an experienced legacy player (Bajaj) leveraging trust and an established distribution network. While Ola initially dominated the market through aggressive branding and direct-to-consumer sales, Bajaj has rapidly gained ground and occasionally surpassed Ola in monthly sales by focusing on reliability and traditional strengths.

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Innovation as a Driver of Transformation in the Indian Banking Sector

Dr. Saira Banoo Shaikh
Assistant Professor and Programme Coordinator of B.Com (Financial Markets)
K. P. B. Hinduja College of Commerce, New Charni Road, Mumbai

Abstract

This research paper explores how innovation has catalysed transformation in the Indian banking sector over the last decade. It examines the role of technological advancement, regulatory frameworks, fintech collaborations, and customer-centric innovations in reshaping banking systems, enhancing financial inclusion, and improving operational efficiency. The Indian banking landscape has witnessed unprecedented change — from the explosion of digital payments via the Unified Payments Interface (UPI) to artificial intelligence (AI), open banking, and digital-only neobanks. This study synthesises literature, industry data, and policy developments to highlight innovation's role in driving structural and functional transformation that supports economic growth and financial inclusion.

Keywords : Innovation, Digital Banking, Financial Technology (FinTech), Unified Payments Interface (UPI), Financial Inclusion, Artificial Intelligence (AI), Indian Banking Sector.

1. Introduction

Innovation has become the fulcrum of modern banking. Traditionally, banking relied on physical presence, manual processes, and limited access to products. However, digital disruption — driven by technological breakthroughs and amplified by regulatory support — has changed how banks operate, deliver services, and engage customers. In India, the banking sector's evolution reflects a broader shift toward digital ecosystems that are more inclusive, efficient, and resilient.

Historically, the Indian banking sector has undergone significant reforms since liberalisation in the early 1990s. The incremental opening of markets, the introduction of modern banking technologies, and increasing competition from fintech firms have made innovation a strategic imperative for banks seeking sustainable growth and competitive advantage. This paper analyses how innovation functions as a driver of transformation across the Indian banking industry.

2. The Indian Banking Landscape: An Overview

India's banking sector comprises public sector banks, private sector banks, foreign banks, regional rural banks, cooperative banks, and specialised financial institutions. Over the last decade, the industry has responded to macroeconomic pressures, regulatory mandates, and digital expectations from customers. The launch of schemes like Pradhan Mantri Jan Dhan Yojana (PMJDY) and the Digital India initiative paved the way for widespread financial inclusion and tech adoption.

According to the India Brand Equity Foundation (IBEF), India's banking sector has witnessed transformative change with digital payments, neo-banking, bank-fintech collaborations, and a rise in mobile and internet banking services. These developments have enhanced reach and accessibility, particularly in rural and semi-urban markets, connecting a larger segment of the population to formal financial services.

3. Innovation in Payments : The UPI Revolution

Perhaps the most revolutionary innovation in Indian banking is the Unified Payments Interface (UPI). UPI, developed by the National Payments Corporation of India (NPCI), enables instant real-time inter-bank payments through mobile devices. Its interoperable architecture allows seamless financial transactions across banks and payment apps,

requiring only a virtual payment address (VPA) linked to a bank account.

3.1 Impact on Financial Behaviour and Inclusion : UPI's simplicity and accessibility have dramatically changed payment habits. Users can transfer funds using mobile numbers or QR codes, making cashless transactions ubiquitous even among less tech-savvy populations. The platform has grown explosively — surpassing traditional card-based systems in volume and usage — and has become a global benchmark among real-time payment systems. Innovations under UPI continue to evolve. For instance, recent enhancements include UPI Multi-Signatory for joint account approvals, biometric authentication via Aadhaar, and wearable payment integrations. These advancements boost security and extend usability across devices and demographics.

3.2 Expanding Beyond Payments : While UPI initially focused on payments, its capabilities are being extended to credit delivery. NPCI and partnering banks are piloting credit-on-UPI solutions to expand lending for underserved micro, small and medium enterprises (MSMEs). Though challenges remain in adoption and credit-risk understanding, this integration signals a future where UPI could bridge gaps in loan delivery and credit access.

4. Digital Banking Platforms and Mobile Ecosystems

Beyond payments, Indian banks have revamped their digital interfaces and platforms to enhance customer experience, drive engagement, and reduce dependency on physical branches.

4.1 YONO and Mobile Banking Growth : State Bank of India (SBI), India's largest bank, exemplifies this shift with its integrated digital banking platform YONO (You Only Need One). SBI's strategic focus on digital channels includes a redesigned mobile app and increased digital onboarding processes. The bank aims to double its app user base significantly by expanding features and support across customer segments.

4.2 Hyper-Personalised Banking Experiences : Private banks have also leaned into technology. For example, IndusInd Bank's INDIE platform offers hyper-personalised digital banking experiences with tailored services for individual customers. These innovations reflect a broader industry trend toward personalised financial solutions driven by data analytics and customer insights.

5. Technology as a Transformation Agent

Innovation in Indian banking is inseparable from technological advancements — particularly in automation, data analytics, artificial intelligence (AI), and blockchain.

5.1 Artificial Intelligence and Machine Learning : AI and machine learning (ML) are reshaping how banks interact with data, customers, and risks. AI-powered chatbots, virtual assistants, and predictive analytics help banks improve customer service, streamline operations, and personalise offerings. These technologies also play a significant role in fraud detection and compliance monitoring.

On a broader scale, research highlights that AI and ML integration can significantly enhance operational efficiency, automate risk assessments, and reduce manual workload without compromising security.

5.2 Blockchain and Digital Currencies : Blockchain is finding pathways in banking use cases such as secure transaction settlement, identity verification, and contracts. India's exploration of a Central Bank Digital Currency (CBDC) — the e-rupee — represents another frontier of innovation. Fintech companies such as Cred are integrating e-rupee access for users, signalling a future where digital currency may become a mainstream banking instrument.

6. Fintech-Bank Partnerships and Competitive Dynamics

Innovation rarely happens in isolation. In India, collaboration between traditional banks and fintech firms has accelerated the delivery of new services. Fintechs bring agility and specialised technological expertise, while banks contribute stability and regulatory compliance.

6.1 Rise of Neobanks and Fintech Ecosystem : Digital-only banks (neobanks) operate without traditional branches, offering services entirely through digital platforms. These models cater to tech-savvy customers and underserved segments with faster onboarding, low fees, and tailored financial products.

India now hosts over 2,000 fintech companies, ranking among the world's largest fintech ecosystems. These firms are crucial in introducing innovations like AI-driven lending, alternative credit scoring, and mobile-first financial solutions that challenge traditional banking norms.

6.2 Collaborative Innovation Models : Public and private banks are partnering with fintech's, tech giants, and startups to co-create solutions. These collaborations range from API-based lending platforms to integrated services combining banking, investments, and wealth management.Examples include banks offering API integrations for third-party services, co-branded digital wallets, and embedded financial products within non-bank platforms. This collaborative ecosystem fuels rapid experimentation and adoption of new technologies.

Open digital rails such as UPI and account aggregators are turning banks into data-driven service hubs, where credit, insurance and investments can be assembled from multiple partners inside a single app.

Regulatory focus on innovation—through bodies like RBIH and policy support for digital KYC, digital lending, and central KYC registries—is making experimentation a mainstream expectation, not a side project, within Indian banks.

7. Financial Inclusion: Bridging the Divide

A fundamental outcome of banking innovation in India is financial inclusion — extending access to financial services across socio-economic and geographic boundaries. Initiatives like PMJDY significantly increased bank account ownership, especially among women and rural populations. Digital financial services — mobile banking, UPI, and digital lending — have lowered entry barriers, enabling millions to participate in formal finance. Digital onboarding (e.g., video KYC), biometric authentication, and simplified account opening have accelerated inclusion. Furthermore, rural fintech networks like Spice Money leverage technology to support last-mile banking services through local agents, mini ATMs, and financial touchpoints in underserved areas.

8. Impact Of Innovative Banking Services on Customer Experience and Reach

- Digital innovation has turned Indian banking from a branch-centric model into an "anytime, anywhere" service industry, with mobile and internet platforms now acting as primary branches for millions of customers.
- UPI's scale has made instant, low-ticket digital payments a mass habit in India, with more than 13,000 crore transactions processed in FY 2023–24, effectively making smartphones the default payment instrument.
- Bank-led digital channels now support two-second average payment processing on UPI, training customers to expect real-time service across loans, investments, and service requests as well.

8.1 Financial inclusion and policy innovation

- The combination of Jan Dhan accounts, Aadhaar-based eKYC, and UPI has turned digital innovation into a social infrastructure, pulling around 78% of Indian adults into the formal banking system by 2021.
- Direct benefit transfers routed into bank accounts show how innovation has shifted banks from mere transaction handlers to core pillars of welfare delivery and state capacity.
- RBI's Digitalization of Agri-finance initiative is transforming rural credit by turning Kisan Credit Card loans into fully digital, low-friction products, shrinking the distance between farmers and formal finance.

8.2 Internal transformation and efficiency

- Technology innovation has re-engineered back-office banking in India, automating routine operations and freeing staff to focus more on advisory, cross sell, and risk management roles.
- Legacy systems still absorb a large slice of IT budgets, but even this constraint is forcing banks to innovate through modular, cloud and API-based solutions that can wrap around old cores rather than replace them overnight.

9. Challenges and Risks

While innovation offers powerful benefits, transformational change also brings challenges:

9.1 Cybersecurity and Data Protection : As digital banking grows, so do cybersecurity threats. Protecting customer data, securing transactions, and building resilient infrastructure are critical. AI-driven security frameworks can help, but balancing innovation with risk mitigation remains essential.

9.2 Regulatory and Ethical Frameworks : Rapid innovation sometimes outpaces regulatory evolution. Regulators must ensure responsible use of technology, data privacy, and consumer protection while enabling experimentation and growth.

9.3 User Adoption and Digital Literacy : Despite wide adoption, digital literacy gaps persist, particularly among older or rural populations. Banks and policymakers must invest in education, intuitive interfaces, and trust-building initiatives to close these gaps.

10. Future Trajectory

Looking forward, innovation in Indian banking will continue to be shaped by AI, open banking frameworks, global payment integrations, cross-border UPI expansions, and smarter digital credit mechanisms. The sector's ability to adapt to emerging technologies while sustaining financial stability and inclusion will determine its global competitiveness. Notably, the Global Fintech Fest — a major platform for financial innovation dialogue — emphasises AI and inclusive finance as key themes, highlighting India's intent to lead finance innovation on a global stage.

11. Conclusion

Innovation is not merely a trend but the driving

force reshaping Indian banking. From the explosive growth of UPI to AI-enabled services, digital platforms, and fintech partnerships, innovation has transformed how financial services are conceptualised, delivered, and consumed in India. This transformation has bolstered financial inclusion, enhanced customer experience, improved operational efficiency, and positioned India as a global hub for digital finance.

As innovation continues to accelerate, ongoing collaboration between banks, fintechs, regulators, and customers will be vital to ensure that the benefits are inclusive, secure, and sustainable.

Over three decades, innovation has taken Indian banking from ATMs and phone banking to RTGS, NEFT, IMPS, UPI and now digital currency, effectively rewriting how Indians save, pay, borrow and invest.Digital transformation is no longer just a technology upgrade for banks; it is becoming a strategic lever that determines market relevance, pricing power, and even the ability to attract and retain talent in the sector.By 2030, continued innovation in AI, blockchain and digital lending is expected to automate large parts of credit and compliance workflows, moving human bankers toward complex judgment, relationship, and ecosystem-building roles.

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A Study on from Local to Digital : Marketing Strategies of Rural Entrepreneurs in Maharashtra

Dr. Sneha Hathi
Prahladrai Dalmia Lions College of Commerce and Economics,
Sunder Nagar, Malad (West), Mumbai

Abstract

The increasing penetration of digital technologies has brought significant changes to traditional marketing practices, offering new growth opportunities for rural entrepreneurs. This study explores the shift from local, traditional marketing methods to digital marketing strategies adopted by rural entrepreneurs in Maharashtra. The primary objective of the study is to examine the level of awareness, adoption, and effectiveness of digital marketing tools such as social media platforms, WhatsApp Business, and online marketplaces. The research is based on both primary and secondary data collected through a structured questionnaire and review of existing literature. The study analyzes how digital marketing influences market reach, customer engagement, and business performance of rural enterprises. The findings indicate that digital marketing has enabled rural entrepreneurs to access wider markets at lower promotional costs; however, challenges such as limited digital literacy, poor internet connectivity, and language barriers continue to restrict its effective utilization. The study emphasizes the need for targeted training programs, infrastructural development, and institutional support to strengthen digital marketing adoption among rural entrepreneurs. The paper concludes that digital marketing plays a crucial role in enhancing the competitiveness and sustainability of rural enterprises in Maharashtra.

Keywords : Digital Marketing, Rural Entrepreneurs, Marketing Strategies, Digital Adoption, Rural Development, Maharashtra

Introduction

Rural entrepreneurship plays a vital role in the economic development of Maharashtra by generating employment, promoting self-reliance, and utilizing local resources effectively. Maharashtra has a diverse rural economy that includes agriculture-based enterprises, handicrafts, food processing units, small retail businesses, and service activities. These rural enterprises traditionally depend on local markets, word-of-mouth promotion, weekly bazaars, and intermediaries for marketing their products and services. While such methods have sustained rural businesses for decades, they often limit market reach and growth potential.

The level of awareness of digital marketing among rural entrepreneurs in Maharashtra is gradually increasing due to the widespread use of smartphones and improved internet connectivity. Many rural entrepreneurs are familiar with basic digital tools such as WhatsApp, Facebook, and online payment applications, which are commonly used for communication and promotion. However, awareness of advanced digital marketing techniques like search engine optimization, online advertising, and content marketing remains limited. A significant number of rural entrepreneurs lack formal training and depend on informal learning or peer guidance. Language barriers and limited exposure to digital platforms further affect their understanding of digital marketing. As a result, while initial awareness exists, effective and strategic use of digital marketing among rural entrepreneurs is still at a developing stage.

In recent years, India has witnessed rapid growth in digitalization, supported by initiatives such as Digital India, expansion of mobile networks, and increased affordability of smartphones. Internet penetration in rural India has grown significantly, enabling access to social media platforms, online

marketplaces, and digital payment systems. This digital transformation has created new opportunities for rural entrepreneurs to connect with customers beyond their immediate geographical boundaries.

Digital marketing has emerged as a powerful tool for small and rural businesses to promote products, build brand awareness, and engage directly with customers at relatively low cost. Platforms such as Facebook, Instagram, WhatsApp Business, and Google Business Profile allow rural entrepreneurs to showcase their offerings, receive customer feedback, and expand their market reach without heavy investment. For rural enterprises, digital marketing can serve as a bridge between local production and wider regional, national, or even global markets.

The rationale of the present study lies in understanding how rural entrepreneurs in Maharashtra are transitioning from traditional marketing practices to digital marketing strategies. Despite the growing availability of digital infrastructure, the level of awareness, adoption, and effective use of digital marketing tools among rural entrepreneurs remains uneven. This study seeks to examine the current marketing practices, identify challenges in digital adoption, and assess the potential of digital marketing in enhancing the growth and sustainability of rural enterprises in Maharashtra.

Statement of the Problem

- Rural entrepreneurs in Maharashtra have limited awareness and understanding of digital marketing concepts and tools.
- Adoption of digital marketing platforms remains low despite increasing internet penetration in rural areas.
- Poor internet connectivity and limited access to digital devices affect consistent digital engagement.
- Language barriers and absence of localized digital content create difficulties in platform usage.
- Inadequate training, guidance, and institutional support restrict successful implementation of digital marketing.
- Continued dependence on traditional marketing methods limits market reach, competitiveness, and business growth of rural enterprises.

Literature Review

Erda CV (2008),studied the comparative buying behavior of rural and urban customers on mobile phones. The study highlighted the difference in terms of consciousness about price, quality, style, function and brand. It was concluded that rural segments pay less attention towards the quality, function, and brand and are more conscious about price and style. It was concluded that minor modification or extrapolation of urban marketing strategies might fail in rural marketing.

Michael Trusovetal (2009), studied the effect of word-of-mouth (WOM) marketing on member growth at an Internet social networking site and compared it with traditional marketing vehicles. Because social network sites record the electronic invitations from existing members, outbound WOM can be precisely tracked. Along with traditional marketing, WOM can then be linked to the number of new members subsequently joining the site (sign-ups). Because of the endogeneity among WOM, new sign-ups, and traditional marketing activity, the authors employ a vector autoregressive (VAR) modelling approach. Estimates from the VAR model show that WOM referrals have substantially longer carryover effects than traditional marketing actions and produce substantially higher response elasticity. Based on revenue from advertising impressions served to a new member, the monetary value of a WOM referral can be calculated;this yields an upper-bound estimate for the financial incentives the firm might offer to stimulate WOM

Edward J. Malecki (2003) worked on the potential and pitfalls of digital development in rural areas. Clearly there are potential benefits of the digitalization in rural area which increases the efficiency of the work, but it also has downfalls, For instance, it would be the cause of shortage of human capital. As there is increase in technology, goods and services are a click away from people, and that has reduced the human interaction. Internet and mobile have become integralparts of our life, whether in case of telecommunication, entertainment or marketing. There is increase in the digital economy also.

Kumar & Gupta, (2020), E-commerce has the potential to enhance economic opportunities in rural areas by connecting local producers to wider markets. This can increase their income and business prospects, fostering economic development in rural communities.

Mehra, (2018),In India, e-commerce has grown rapidly, with major platforms such as Amazon, Flipkart, and others expanding their reach into rural areas. Government initiatives like Digital India have played a significant role in enhancing internet accessibility, thus facilitating the growth of ecommerce in rural region

Objectives of the Study

- To examine the level of awareness of digital marketing among rural entrepreneurs in Maharashtra.
- To identify the types of digital marketing tools and platforms used by rural

entrepreneurs.

- To assess the impact of digital marketing on sales, market reach, and customer engagement of rural businesses.
- To identify the key challenges faced by rural entrepreneurs in implementing digital marketing strategies.

Scope of study

The present study is limited to rural entrepreneurs operating in selected rural areas of Maharashtra and focuses primarily on small and micro enterprises such as agriculture-based units, handicrafts, food processing, retail businesses, and rural service providers. The scope of the study includes an examination of both traditional marketing practices and the adoption of digital marketing strategies by rural entrepreneurs. It covers commonly used digital marketing tools and platforms such as social media, WhatsApp Business, Google Business Profile, and online marketplaces. The study seeks to analyze the level of awareness, extent of adoption, benefits, and challenges associated with digital marketing among rural entrepreneurs. The research is based on both primary data collected directly from rural entrepreneurs and secondary data sourced from journals, reports, and government publications. The findings of the study are confined to the selected geographical area and sample size and therefore may not be generalized to all rural entrepreneurs across the country.

Methodology

Sources of data collection

Secondary data:The study primarily relies on secondary data collected from various sources such as books, academic journals, research articles, government reports, websites, and published case studies. The secondary data provides insights into the concept of digital marketing, rural entrepreneurship, and the transformation of marketing practices from traditional to digital platforms. This paper addresses key issues related to the adoption of digital marketing strategies, the use of digital tools, and the challenges faced by rural entrepreneurs in implementing digital marketing practices.To gain a deeper understanding of this transformation, the study reviews existing literature on digital marketing practices, rural business development, and technological adoption in rural areas.This secondary data analysis helps in identifying current trends, gaps, and future opportunities related to digital marketing among rural entrepreneurs.

Types of digital marketing tools and platforms used by rural entrepreneurs. Rural entrepreneurs increasingly use various digital marketing tools and platforms to promote their products and services and to reach a wider customer base.

Social Media Platforms (Facebook, Instagram, etc.)

Rural entrepreneurs widely use social media platforms to promote their products and services by posting images, videos, and customer testimonials. These platforms help in building brand awareness, engaging with customers through comments and messages, and attracting new buyers at a low promotional cost.

WhatsApp and WhatsApp Business

WhatsApp is one of the most popular digital tools among rural entrepreneurs due to its ease of use. WhatsApp Business features such as business profiles, catalogues, automated messages, and broadcast lists help entrepreneurs manage orders, communicate with customers, and maintain long-term relationships.

Google Business Profile (Google My Business)

This platform helps rural businesses appear in Google search results and Google Maps, enabling customers to easily find business location, contact details, working hours, and reviews. It enhances local visibility and credibility of rural enterprises.

E-commerce and Online Marketplaces

Platforms such as Amazon, Flipkart, Meesho, e-NAM, and GeM allow rural entrepreneurs to sell their products beyond local markets. These platforms provide access to a wider customer base, logistics support, and digital payment facilities, thereby increasing sales opportunities.

Digital Payment Platforms

Digital payment tools like UPI, Google Pay, PhonePe, and Paytm support cashless transactions and increase customer convenience. These platforms also help rural entrepreneurs maintain transaction records and improve financial transparency.

Video and Content-Based Platforms (YouTube, Short-Video Apps)

Rural entrepreneurs use video platforms to demonstrate product usage, production processes, and quality standards. Such visual content helps build customer trust and increases product reach, especially for handicrafts and agro-based products.

Email Marketing and Online Advertising Tools

Although used to a limited extent, some rural entrepreneurs adopt email marketing and paid advertisements on social media to promote offers and reach targeted audiences. Usage of these tools is gradually increasing with improved digital literacy and training support.

Impact of Digital Marketing

The digital marketing plays a crucial role in improving the competitiveness and sustainability

of rural businesses. However, the extent of impact depends on factors such as digital literacy, internet accessibility, and the ability of rural entrepreneurs to strategically utilize digital marketing tools. Strengthening training programs and infrastructural support can further enhance the positive impact of digital marketing on rural enterprises.

With respect to business digital marketing has significantly influenced the business performance of rural enterprises by enhancing sales opportunities, expanding market reach, and improving customer engagement. The adoption of digital marketing tools enables rural entrepreneurs to promote their products and services beyond local markets, thereby reducing dependence on intermediaries and traditional selling methods.

Digital marketing has contributed to increased sales by allowing rural businesses to showcase their products on social media platforms, online marketplaces, and messaging applications. The use of digital platforms facilitates direct interaction with customers, faster order processing, and digital payments, which improves transaction efficiency. Online visibility and promotional activities such as discounts, product demonstrations, and customer reviews help in attracting new customers and increasing repeat purchases.

One of the most significant impacts of digital marketing is the expansion of market reach. Rural entrepreneurs are no longer confined to village or nearby town markets; instead, they can access regional, national, and sometimes international customers through e-commerce platforms and social media. Digital marketing reduces geographical barriers and transportation limitations, enabling rural products such as handicrafts, agricultural produce, and processed foods to reach wider markets at lower costs.

Digital marketing tools enhance customer engagement by enabling continuous communication and relationship building. Platforms like WhatsApp Business, Facebook, and Instagram allow rural entrepreneurs to interact with customers through messages, comments, feedback, and reviews. Regular updates, personalized communication, and prompt responses improve customer satisfaction and trust. Increased engagement also helps entrepreneurs understand customer preferences and improve product offerings accordingly.

Challenges Faced by Rural Entrepreneurs in Implementing Digital Marketing Strategies

Despite the growing importance of digital marketing, rural entrepreneurs in Maharashtra face several challenges in effectively implementing digital marketing strategies. One of the major challenges is limited digital literacy and technical skills. Many rural entrepreneurs lack formal training in using digital tools and platforms, which restricts their ability to create effective online content, manage digital campaigns, and analyze customer data. As a result, digital marketing is often used in a basic and unstructured manner.

Another significant challenge is poor internet connectivity and inadequate digital infrastructure in rural areas. Unstable network coverage, low internet speed, and frequent power disruptions hinder consistent online engagement and timely communication with customers. These infrastructural limitations reduce the effectiveness of digital marketing efforts and discourage rural entrepreneurs from fully adopting digital platforms.

Language barriers and lack of localized content also pose difficulties in digital marketing adoption. Most digital marketing platforms and instructional resources are available in English or limited regional languages, making them difficult to understand for rural entrepreneurs with low literacy levels. The absence of locally relevant content reduces confidence and limits effective utilization of digital tools. Financial constraints further restrict the use of advanced digital marketing strategies. Many rural entrepreneurs operate with limited capital and are hesitant to invest in paid advertisements, professional content creation, or digital marketing services. The perceived risk of uncertain returns often discourages them from adopting cost-intensive digital marketing techniques.

Additionally, limited awareness of digital marketing benefits and strategies remains a challenge. Some rural entrepreneurs view digital marketing as complex or unnecessary and continue to rely on traditional marketing methods such as word-of-mouth and local markets. The lack of proper guidance, training programs, and institutional support further slows the adoption process. Lastly, security concerns and lack of trust in digital platforms also affect digital marketing implementation. Fear of online fraud, data misuse, and cyber threats discourages rural entrepreneurs from engaging fully in digital transactions and online promotion. Addressing these challenges through targeted training, improved infrastructure, localized content, and supportive policies is essential for enhancing digital marketing adoption among rural entrepreneurs.

Findings were as follows

Overall, the findings suggest that while rural entrepreneurs recognize the benefits of digital marketing and have begun adopting basic digital tools, there is a need for improved digital skills training, better infrastructure, and institutional

support to enhance effective digital marketing adoption in rural areas of Maharashtra.

- The study found that the level of awareness of digital marketing among rural entrepreneurs in Maharashtra is moderate. Most entrepreneurs are familiar with basic digital tools such as WhatsApp, social media platforms, and digital payment applications, while awareness of advanced digital marketing techniques like online advertising, search engine optimization, and analytics tools remains limited.
- It was observed that rural entrepreneurs primarily use simple and easily accessible digital marketing platforms. WhatsApp and WhatsApp Business emerged as the most commonly used tools, followed by Facebook and Instagram. Usage of Google Business Profile and online marketplaces is increasing, whereas email marketing and paid digital advertisements are used by only a small number of entrepreneurs.
- The findings indicate that digital marketing has a positive impact on sales, market reach, and customer engagement of rural businesses. Many entrepreneurs reported an increase in sales due to improved online visibility and direct customer interaction. Digital platforms have enabled rural businesses to expand their market reach beyond local villages and nearby towns and have strengthened customer engagement through regular communication and feedback.
- The study identified several challenges in the effective implementation of digital marketing strategies. Key challenges include limited digital literacy, poor internet connectivity, lack of training and technical support, language barriers, and financial constraints. These factors restrict the strategic and efficient use of digital marketing tools by rural entrepreneurs.

Conclusion

The digital marketing is gradually transforming the way rural entrepreneurs promote and manage their businesses. The findings indicate that rural entrepreneurs are increasingly moving from traditional, local marketing practices to digital platforms such as social media, WhatsApp Business, and online marketplaces. This transition has positively influenced business performance by improving sales, expanding market reach beyond local boundaries, and strengthening customer engagement through direct and continuous interaction.

However, the study also reveals that the adoption of digital marketing remains limited in scope due to challenges such as low digital literacy, inadequate internet connectivity, language barriers, and lack of formal training. Despite these constraints, the growing awareness and initial acceptance of digital marketing among rural entrepreneurs suggest significant future potential. The study concludes that with focused digital training programs, improved digital infrastructure, and stronger institutional and government support, digital marketing can become a powerful tool for enhancing the competitiveness, sustainability, and overall development of rural enterprises in Maharashtra.

Suggestion

- Conduct regular digital literacy and awareness programs to educate rural entrepreneurs about the benefits and applications of digital marketing.
- Promote the adoption of user-friendly digital marketing platforms through hands-on demonstrations and success stories of rural enterprises.
- Improve rural digital infrastructure by strengthening internet connectivity and facilitating access to affordable digital devices.
- Develop localized digital marketing content in regional languages to overcome language barriers and enhance platform usability.
- Establish structured training, mentorship, and institutional support systems through government agencies, NGOs, and educational institutions.

Limitations

The study has been conducted by using secondary data sources. The study is limited to rural entrepreneurs from selected areas of Maharashtra and may not represent all rural regions.Time constraints limited the depth of data collection and analysis.

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Digital transformation and its impact on Banking Industry in India

Prof. Archana Mohan Bari
Sant Dnyaneshwar Mahavidyalay, Soygaon.
Dr. D. R. Panzade (Professor)
Department of Commerce Yashwantrao Chavhan College of Arts, Commerce and Science,
Sillod, Chhatrapati Sambhajinagar

Abstract

The digital transformation of India's banking sector has brought about a major shift, fundamentally changing the way financial services are delivered. This transformation has been driven by several key factors, including the government's strong focus on financial inclusion, rapid technological advancements, and the expansion of the telecommunications industry. Digitalization is expected to continue playing a vital role in strengthening India's financial system.

Electronic banking services have become essential for conducting financial transactions and now it becomes integral component of the Indian banking framework. To promote wider usage of these services, banks need to focus on improving customer awareness and digital literacy. With the increasing penetration of smartphones, the banking sector is well positioned for further digital advancement in line with international standards. The continuous evolution of India's banking environment highlights a future that is increasingly technology-driven.

This study explores the key factors responsible for the rapid adoption of digital banking, examines the influence of technology on its future development, and outlines a possible roadmap for digital banking within the Indian economy.

Keywords : Digital Banking, Financial Innovations, Digital Payments, Banking, Financial Growth, Internet Banking.

Introduction

Financial condition is the most important factors contributing to a country's economic growth and overall stability. Now a days the development of the banking sectors is closely linked with the growth of industry, in recent years, the banking industry has experienced a profound shift toward digitalization. The rise of digital-only banks, which adopt a digital-first and highly personalized service model, has created strong competition for traditional banking institutions. To remain competitive, conventional banks must concentrate on enhancing their Return on Equity (RoE),

lowering their Cost-to-Income ratio, and improving overall operational efficiency. Furthermore, the entry of major technology companies such as Google, Amazon, and other tech-driven firms into the financial services space has intensified competitive pressures within the sector.

The COVID-19 pandemic served as a major driving force behind this transformation, significantly accelerating changes in customers. The Indian banking sector has undergone significant transformation through three major phases. The first phase, known as the pre-matured phase, introduced formal banking activities in India. The second phase, the mature phase, focused on regulating the banking system through various legislative measures, with the Reserve Bank of India playing a central role. The third phase, referred to as the innovation phase, began with economic liberalization and witnessed the entry of private and foreign banks, the emergence of fintech institutions, and several government initiatives aimed at promoting financial inclusion.

According to the Union Minister of State for Finance, Dr. Bhagwat Kisan Rao Karad, coordinated efforts by the government in partnership with multiple stakeholders have played a crucial role in strengthening digital banking adoption in recent years. The Minister noted that the volume of digital banking transactions recorded an average annual growth rate of 44%, increasing from 2,071 crore transactions in the financial year 2017–18 to 13,462

crores in 2023–24. Moreover, as of December 24, 2024, digital payment transactions during the ongoing financial year (2024–25) have already reached 11,660 crores.

Statement of Problem

In the current business environment, digital transformation has emerged as a standard for providing customized and customer-focused banking products and services. The COVID-19 pandemic greatly increased awareness regarding the significance of digital banking and contactless payment methods. This transition has given rise to a new segment of customers who predominantly depend on digital platforms to meet their banking requirements.

These consumers, many of whom are early users of internet-based technologies, expect personalized digital solutions that correspond to their needs and preferences. At the same time, banks are facing strong competition not only from public and private sector banks but also from fintech firms that offer innovative and user-centric financial solutions.

Digital banks, supported by focused marketing approaches and strong cybersecurity systems, are successfully attracting technologically advanced customers. To sustain competitiveness and relevance in this rapidly evolving landscape, traditional banks must adopt digital transformation as a core component of their routine operations.

Objectives

The specific objectives of this study are

1. To examine the current scenario of the banking industry in India.
2. To examine the major factors contributing to shift toward the digital banking.
3. To assess the impact of technological advancements on the future direction of digital banking.
4. To identify possible approaches and strategic measures for strengthening and expanding digital banking in the Indian economy.

Research Methodology

This study aims to examine the Banking industry in India. The research is entirely based on secondary data collected from reliable sources such as published reports on the Banking and Insurance industry, documents and statistics released by the Reserve Bank of India, and the Insurance Regulatory and Development Authority of India (IRDAI), as well as relevant statistical data and previously published research papers related to these sectors collected by the various websites related the study.

What is Digital Transformation in Banking?

Digital transformation in the banking and financial services sector refers to the strategic integration of advanced technologies across all operational areas to improve efficiency and enhance customer experience. As a major catalyst for innovation in digital banking, this approach has brought about a fundamental change in how banks function and deliver value to their customers. It plays a vital role in driving transformation across the financial industry while addressing the key factors and challenges associated with digital transformation in the banking sector.

By adopting innovative digital banking platforms, financial institutions can offer a wide range of digitally enabled services through multiple channels, ensuring seamless access for customers anytime and anywhere. These flexible and scalable platforms have been instrumental in transitioning banks from traditional branch-based models to modern digital ecosystems. Collaborating with an experienced digital transformation service provider can further simplify this shift by delivering customized solutions, supporting transformation in areas such as investment banking, and significantly improving customer engagement.

Although the core principles of banking remain largely the same, the methods of customer interaction and service delivery have evolved dramatically. This shift highlights the far-reaching impact of digital transformation on the financial services industry as a whole.

Digital initiatives within the banking and financial services sectors have introduced several impactful use cases that address the core drivers of bank digitalization. These include:



1) Mobile Banking

Digital transformation in banking extends far beyond simple payment services. Mobile banking applications empower customers to manage their financial activities conveniently through smartphones. This includes accessing account information, tracking transactions, managing investments, seeking customer support, and receiving financial updates key elements of modern digital financial services. Mobile banking in India experienced rapid expansion between 2020 and 2025, marked by substantial growth in both user base and transaction volumes. This surge was primarily driven by the COVID-19 pandemic, widespread adoption of UPI, and increasing

smartphone penetration. According to various reports, digital payments recorded a compound annual growth rate (CAGR) of approximately 44% during 2017–2024.

2) Digital Account Opening

Automation has streamlined the account opening process, significantly reducing onboarding time and minimizing manual workloads for bank staff. This allows employees to focus on higher-value customer interactions while improving overall customer engagement and reducing reliance on physical branch visits. Digital account opening in India is crucial for convenience, speed, financial inclusion, and cost-efficiency, allowing instant, paperless account creation from anywhere, fostering growth in rural areas, and offering features like higher interest rates and lower fees compared to traditional banking. It provides 24/7 access, enhanced security (biometrics, encryption), and better money management tools (budgeting apps), driving India's cashless economy by seamlessly integrating with UPI and digital payments.

3) Digital Payments

Banks have increasingly integrated digital payment solutions such as online transfers, mobile payments, and digital wallets into their service offerings. These systems provide customers with greater flexibility, convenience, and transparency, consolidating financial mobility onto unified digital platforms. According to a study referenced in the International Journal of Research in Finance and Management, the total volume of digital payments expanded at a compound annual growth rate (CAGR) of approximately 44.5% between FY 2018 and FY 2025.

4) Internet Banking

Internet banking is the process of performing banking transactions from the comfort of your home using a mobile phone/laptop/ desktop and an active internet connection. The major type of transactions can all be done using internet banking. Internet banking services can be availed round the clock and all 365 days in a year, which makes it a popular choice for performing digital transactions. According to a study referenced in the International Journal of Research in Finance and Management, the total volume of digital payments expanded at a compound annual growth rate (CAGR) of approximately 44.5% between FY 2020 and FY 2025.

5) Automated Teller Machine (ATM)

An Automated Teller Machine (ATM) is an electronic, computer-based communication system that allows bank customers to carry out financial transactions securely in public locations without the assistance of bank staff. ATMs may be installed within bank premises (on-site ATMs) or outside branch locations (off-site ATMs). Banks are not required to seek prior approval from the Reserve Bank of India (RBI) for installing ATMs at their licensed branches or extension counters. Similarly, off-site ATMs can also be set up without direct RBI permission. However, before an ATM becomes operational, banks must obtain authorization from the concerned regional office of the Department of Banking. The value of ATM transactions in India recorded a modest growth of around 5.88% between FY 2020 and FY 2025, even as the number of ATM transactions declined in recent years due to the increasing adoption of digital payment platforms such as UPI. The total value of cash withdrawals through ATMs rose from ₹28.9 lakh crore in FY 2020 to ₹30.6 lakh crore in FY 2025. However, transaction volumes have shown a downward trend, with a notable year-on-year decline of about 14% in May 2025, reflecting a shift toward digital modes of payment.

7) Debit and Credit Cards

A debit card is a bank-issued electronic payment card that enables customers to access their bank accounts for withdrawing cash or making payments for goods and services. It eliminates the need to visit a bank branch for cash withdrawals, as transactions can be carried out through ATMs or electronically at merchant outlets. Debit cards also reduce dependence on cheques, since the payment amount is instantly deducted from the customer's account and transferred to the merchant's account. A credit card is provided by a financial institution and allows the cardholder to borrow funds, mainly at the point of purchase. These cards involve interest charges and are generally used for short-term credit. Interest is typically applied after a grace period of about one month, and the credit limit is determined based on the cardholder's creditworthiness.

Both public and private sector banks have shown growth in the issuance of debit and credit cards. However, debit cards have emerged as a more widely used form of electronic payment compared to credit cards in India, as reflected in Table 2. Public sector banks have been leading in the distribution of debit cards, while new private sector banks dominate the issuance of credit cards (Table 2). A debit card is a bank-issued electronic payment card that enables customers to access their bank accounts for withdrawing cash or making payments for goods and services. It eliminates the need to visit a bank branch for cash withdrawals, as transactions can be carried out through ATMs or electronically at merchant outlets. Debit cards also reduce dependence on cheques, since the payment amount is instantly deducted from the customer's account and transferred to the merchant's account.

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8) National Electronic Fund Transfer (NEFT)

As defined by the Reserve Bank of India, the National Electronic Funds Transfer (NEFT) system is a nationwide electronic payment mechanism that enables one-to-one fund transfers. Through NEFT, individuals, businesses, and corporate entities can transfer money electronically from an account held at any bank branch to an account at another bank branch participating in the NEFT scheme across the country. Account holders can initiate NEFT transactions through their respective banks. In addition, individuals without a bank account are permitted to deposit cash at NEFT-enabled branches and instruct the bank to transfer funds using NEFT. However, such cash-based transactions are limited to a maximum of ₹50,000 per transfer, and walk-in customers must provide complete identification details, including address and contact information. NEFT thus facilitates fund transfers even for those without bank accounts and is recognized as a simple, secure, fast, and cost-effective method, particularly for retail remittances.

9) Real Time Gross Settlement (RTGS)

The Real Time Gross Settlement (RTGS) system, introduced in India in March 2004, allows banks to electronically transfer funds from their accounts to the accounts of other banks. Operated and maintained by the Reserve Bank of India, RTGS ensures efficient and rapid interbank fund transfers,

supporting smooth financial operations. As the term "real time" implies, transactions are processed immediately, enabling funds to reach the beneficiary bank without delay. The beneficiary bank is required to credit the recipient's account within two hours of receiving the funds. In recent years, there has been consistent growth in both the volume and value of electronic transactions conducted by Scheduled Commercial Banks (SCBs), particularly debit transactions, a trend that continued during 2012–13 (Table 3). Both RTGS, which is primarily designed for high-value transactions of

₹2,00,000 and above involving customer and interbank transfers, and NEFT, which serves as a retail payment system, have recorded sustained double-digit growth in transaction volumes.

Recent Growth in Digital Transaction

India's digital banking has seen explosive growth in the last five years

Approx. 2020-2025, driven heavily by UPI, with transaction volumes (crores) soaring from around 5,500 in FY2020 to over 18,000 by FY2024, and reaching 23,800 by FY2025, making UPI account for nearly 80% of total digital payments. Key drivers include increased smartphone penetration, government initiatives, and the convenience of UPI, leading to massive jumps in transaction numbers, especially post-pandemic.

Key Growth Indicators (Approx. FY 2019–20 to FY 2024–25) Total Digital Transactions (Volume):

The volume of digital transactions witnessed substantial growth, increasing from approximately 4,572 crore transactions in FY20 to around 18,737 crores in FY24, and further rising to nearly 23,834 crores by FY25.

UPI Transactions (Volume):

Unified Payments Interface (UPI) transactions experienced exponential growth, expanding from about 1,246 crores in FY20 to nearly 13,116 crores in FY24, and reaching approximately 19,035 crore transactions in FY25.

Share of UPI in Digital Payments:

UPI's contribution to total digital payments rose sharply, climbing from roughly 27% in FY20 to about 70% in FY24, and further increasing to nearly 80% by FY25, indicating its dominant position. Internet banking services can be availed round the clock and all 365 days in a year, which makes it a popular choice for performing digital transactions.

Conclusion

Overall, India's digital banking landscape over the past five years has undergone rapid and transformative growth. What began as an emerging trend has now become an essential component of

everyday financial activity. Digital transformation has become a critical driver of growth and sustainability in the Indian banking sector. With rapid technological advancements, changing customer expectations, and strong government support for digital initiatives, banks are increasingly adopting digital solutions to remain competitive and efficient performance. The research conclude that digital transformation is no longer a strategic option but a necessity for the sustainable growth of the Indian banking sector. Banks that successfully embrace digital innovation while ensuring security,

inclusivity, and regulatory compliance will be better positioned to drive long-term value, strengthen customer trust, and contribute meaningfully to India's vision of a digitally empowered and economically resilient nation. This transformation has been largely driven by the widespread adoption of UPI, increased digital awareness, and the country's gradual transition towards a cashless economy. The digital revolution is fundamentally transforming the banking sector, opening new avenues for innovation and sustainable services.

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The Inter Connected Dynamics of Commerce, Women and Performance Poetry

Ashima Syal
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INTRODUCTION

The contemporary cultural and artistic landscape is rooted in commercial dynamics, and economic engagement. With these advancements taking the forefront, literature is not confined only to the pages of books. Poetry undergoes a visible transformation; spoken word poetry, performance based literary practices, have emerged as a cultural phenomenon, diversifying the ways in which poetry is produced, consumed. Performance Poetry rose in India with the advent of movements like the Airplane Poetry movement in Banglore. "Even if the theme of my poem is a painful personal one, I'm never put in the place of the victim. There is no sympathy at poetry slams, only a great deal of understanding. The audience is appreciative without being intrusive" says Minal Sukumar. The Airplane Poetry Movement was an Indian initiative, initiated by Shantanu Anand and Nandini Varma, they came up with this initiative to promote spoken word and slam poetry, through the airplane poetry movement, they gave platforms to poets, conducted workshops of poetry, the movement was able to reach out to several poets in India, which empowered them to perform on social, personal and political themes. The poetry by Airplane poetry movement was shared online, this made the initiative grab commercial reach. There are several other examples of youtube platforms which are dedicated to poetry, such as spill poetry, button poetry, Priya Malik, one of the most well known names in Performance Poetry, travels the world to perform her poetry shows, all her poems are a depiction of her unfiltered feelings on stage.

There are shows singlehandedly dedicated only to poetry, the audience purchases tickets of these shows, through online platforms such as Book My Show and greets the venues in huge numbers, this is the greatest example of commercializing art, though art in the form of poetry is commercialized, yet the impact it is creating socially for women is remarkable, and cannot be measured in numbers.

The women get a chance to perform on topics, which they have a lot of inhibitions about, it is the stage therefore, that stops their inhibitions. It is poetry wrapped in the wings of performance which makes them fearlessly portray what they feel.

From the Jaipur Literary Festival to the Creative Writing Workshops, open mic platforms, performance studios, all these spaces are commercial approaches to art, but they also hold emotional authenticity, especially for women. Women are able to bring forth their vulnerable realities, suppressed emotions.

The very concept of commercialization involves two key factors, which is money and business, but with the advent of performance poetry it also gives strong visibility and agency to women poets.

There are several cafes in Mumbai, one of the popular ones being, The Habitat Cafe at Khar, there are several poets and stand up comedians who come to The Habitat Khar to perform poetry, but all poets have to pay an entry fee of rupees 250. When poets are coming and performing by paying a fee for their own art, somewhere in such a case, poetry is being situated with a commercial angle. This shows that there is competition in the literary world, the competition is for survival. The owners of the creative spaces provided to the poets are not merely running businesses, they are also aware of the market. Thus, commerce not only mirrors poetry in the new light, it also reshapes the reception of poetry.

This paper is a qualitative research paper which highlights the key dynamics of commerce, women

and performance poetry in the light of observation, detailed textual analysis. It composes a take on literary theories backed by psychological perspectives.

REVIEW OF LITERATURE

Judith Butler's theory of performativity shows the way in which gender is showcased in the light of repeated acts, gestures, and speech. Performance poetry becomes a mode where women consciously perform and reconfigure gendered identities, resisting existential expectations. Scholars note that spoken word poetry enables women to form and perform on themes such as gender violence, mental health, body politics, and patriarchal oppression without worrying about judgment from the society. The immediacy of performance allows women's voices to be heard, seen, and validated in an eminent light, reinforcing agency and autonomy.

Sara Ahmed's work on emotion emphasizes that emotions are not merely personal, but they also mirror social and political forces. In performance poetry, women often transform unfiltered personal experiences into audience narratives, converting vulnerability into artistic and an expression of political dissent. While some scholars perceive such emotional exposure in the angle of commodification within market-driven spaces, others argue that women poets are able to negotiate these dynamics by reclaiming control over their lived stories. Performance becomes both a mirror of emotional labor and creative empowerment.

Henri Lefebvre's notion of space as socially produced hints that stages, cafés, festivals, and studios are not neutral environments but competitive sites of power and resistance. Studies of

cultural geography reveal that commercial venues often become spaces of feminist expression. By occupying these spaces, women poets re-examine traditional gendered boundaries and transform commercial stages into platforms of resistance and self-recognition.

GENDER AND THE SITUATIONAL REALM OF VOICE

Simone D Beauvoir " One is not born but rather becomes a woman". In the historical times, women were seen as subalterns, subaltern was the lowest rank in the military. They were always silenced, they did not have a say in any of the social and economic matters, in the literary canon, there were several women writers who hid themselves and wrote under the identity of men so that they could survive.

But in modern times, women have a voice, a voice of their own.

Performance Poetry, for women, becomes a platform to gain social agency. Women through the realm of poetry talk about how they are eve- teased on the streets, how in some households the women battle domestic violence, they talk about their narratives openly, without filters on stage. The audience hears them, listens to their narratives, they are seen, heard. At the time of performing their poetic narratives, they become the rulers of the stage.

This shows how women have come a long way in their journey of being seen, heard and above all being present.

RESEARCH METHODS

COMPARATIVE STUDY OF TWO WOMEN SPOKEN WORD POETS AND THEIR WORK

(ARANYA JOHAR AND PREETI VANGANI THROUGH OBSERVATION AND TEXTUAL ANALYSIS)

The poet Aranya Johar was born in Mumbai, India in the year 1998. Through her journey of writing, she wrote on her experiences of misogyny. She performed her first poetry recital at an open mic session when she was 12 years old. While she was in school she was diagnosed with ADD (Attention Deficit Disorder), a psychological disorder. She uses the medium of performance poetry to raise awareness about this psychological issue, mental health.

Aranya along with her friend co-founded " More than Mics". This venture was specifically started to develop creative platforms for people involved in performative arts.

For International Women's Day 2019, Aranya joined hands with Unerase Poetry, a spoken word collective campaign titled PatriarchykaPackup. This campaign aimed at ending patriarchy, so as to encourage young Indian Women to use the medium of performance poetry to raise a voice against all traditional gender norms.

Through the medium of poetry, she talks about mental health, body positivity, gender inequality. Her usage of poetry depicts how poetry proves to be a powerful tool of being heard for women. One of her most hard hitting pieces titled is

A Brown Girls Guide to Gender

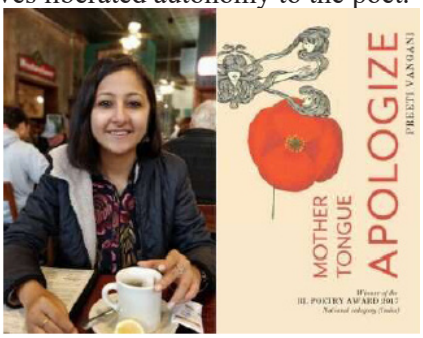
" 15 year old Laxmi didn't like 32 year old Guddu, and Guddu dealt with it real maturely. He made her the victim of an acid attack. Laxmi could be your sister, your girlfriend, your cousin. We are girls, women, human, not a burden".



The above mentioned lines are from Aranya's

poem. She very courageously through the medium of performance poetry addresses the most sensitive issue of Acid Attack, by highlighting, placing an emphasis on Laxmi.

The place where Johar performs her poetry is the Stage of " Habitat Cafe" Khar. She uses poetry as a thought provoking tool of freedom of expression. Her hand gestures while performing her poem, become an unapologetic symbol of agency, indicating a strong control of her own narrative. This indicates how the stage gives liberated autonomy to the poet.



In her Poetry Collection, titled " Mother Tongue Apologize" the poet Preeti Vangani, opens up about several issues ranging from loss, love and family in her debut poetry collection.

Ghee fattened, crispy bites of koki flake and crumble in my mouth, pomegranate seeds tang my tongue

amid the coriander and onions, I've chopped tinier than stars, how they contrast the carom and cumin.

Tonight, indeed, my koki is better than mummy's. A lie I tell myself to feel accomplished or in her vicinity.

I'll never be a useless woman flipping kokis puffs my throat the way fire transpires

from griddle to finger. I sip away ordinary guilt like water. Praise the air that stayed, the patience

I grew to not overwork the dough, sticky flour encroaching my nails that as a girl I double-coated

black and sucked on pen caps, pretending they were

cigarettes and I, a modern lady. Even if allowed work

you should know how to feed—how did she season her heart to serve lessons as these, my mother, wedded

at twenty one and a half. Crop topped and bell bottomed, stripped by marriage into mandatory salwars and kurtas

and every kurta, a proxy dishrag.

The above poem is titled " A Mouthful of Sky" by Preeti Vangani, in the above poem Priti Bridges the gap between tradition and modernity. How the speaker feels a sense of loss, she cites the example of her mother in this poem, how her mother was restricted by being engulfed in the domain of marriage at a very young age, and how her daughter strives for her sense of self in the process of doing everyday routine duties.

Priti is a spoken word poet from Mumbai itself, she also chooses the stage to talk about gender restricted roles and their reversals. Though the space used by the poet is commercial, the form of poetry that they choose to exhibit their vulnerabilities makes the stage an unapologetic space for women. Women are presented to these stages in the light of empowerment.

METHODOLOGY

The methodology used to analyze this paper is Feminism specifically looking at the aspects of self and the other through the blend of behavioural psychology. The study of feminism has been chosen to delve deeply into this paper because the texts used for analyzing the perspectives of the paper are written by women poets, and present an account of their view points. Feminism is a school of thought which aims at nurturing equal rights for the sexes, especially for women.

Behavioural Psychology, is used specifically to unfold the behaviour of women, choices made by women. Behaviour psychology also helped in delving into the choice of space which is a great outcome for poetry to bloom and women performance poets to enhance, diversify their careers.

ANALYSIS

The interconnection between Commerce, Gender and Performance The relationship between these aspects is though interdependent yet complex. Through commercial platforms an artistic form of poetry gains visibility and sustainability. The gendered, experiential reality narrated by every woman on stage, in poetry studios, open mics makes the space a vulnerable reality.

The commercial space diversifies into a space of resistance. Resistance by women.

The presence of the audience in all spheres be it online or offline, makes it an escapade of shared reality for the women.

CONCLUSION

Literature has diversified, transformed, its genre of poetry is no longer limited to the page. Writers are promoting themselves through youtube channels, literary festivals, open mics, all these platforms are commercial, but they are giving women a chance to unfold the truth of their social realities, giving them agency, autonomy and a sense of resonation with their presence.

A NOTE ON EXPERIENTIAL REALITY

I'm an Author and a Spoken Word Artist myself, I have been performing my poetry regularly at literary festivals in Mumbai and in Kumaon, and when I

perform I feel the stage gives me an empowered space, from a normal identity of a woman, my identity is transformed to that of a an empowered poet, this shift in narrative is only seen because of the autonomy created by the performative space, even though the space is commercial but it mirrors the truth embedded in the social reality of women.

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सस्टेनेबिलिटी डेवलपमेंट (टिकाऊ विकास) लक्ष्यांक् शून्य भूख – अच्छा स्वास्थ्य और कल्याण को प्राप्त करने के लिए श्रीमद् भगवद गीता श्रद्धात्रयविभागयोग ।

Dr. Brinda Ashishkumar Dave
BAMS Student, Sushrutha Ayurvedic Medical College and Hospital, Bengaluru

परिचय एवम् विषय प्रवेशः

नमामि धन्वंतरिमादि देवं सुराः सुरैर्वन्दित पाद पद्मम् । लोकैर्जरारुक् भय मृत्यु नाशं धातारमिशंविविधौषधिनाम् ।। १।। चंव्योमवातावनिवारिवह्नि पंच प्रपंचात्मक देहभाजम् ।

संताप संपात जरा ज्वरान्तकं नमामि धन्वंतरिमादि देवम् ।।२।।

नवीन नील मुदकान्ति कान्तं शान्तं हरैर्द्वादशमाख्यमूर्तिम् ।

पूर्ति शतानां सुमनोरथानां नमामि धन्वंतरिमादि देवम् ।। ३।।

धन्वंतरी स्तोत्र अनुसार आयुर्वेद एवम् चिकित्सा के देवता भगवान श्री धन्वंतरी की स्तुति करते हुए जरा, रोग, भय एवम् मृत्यु का नाश करने वाले एवम पृथ्वी के पालनकर्ता, शरीर के पंचमहाभूतो को संतुलित करने वाले देवता माना गया है, चरक संहिता एवम् भारतीय परंपरा अनुसार आहार केवल शरीर पोषण के लिए नहीं है, आहार व्यक्ति के मानसिक व्यव्हार पर प्रमुख असरकर्ता परिबल है, तैतरीय उपनिषद् अनुसार पंचप्राण एवम् पंचमहाभूतों को संतुलित करके अगर आनंद्ययाकोष के स्तर पर पहोच कर निजानंद – परम आनंद, स्वप्न रहित – चिरनिंद्रा, अनभिज्ञता के स्तर प्राप्त करके अविद्या की अनुभूति करनी है तो आहार अर्थात अन्न महत्वपूर्ण माध्यम है

आहार का अर्थ:

आयुर्वेद में, भोजन न केवल ऊर्जा का स्रोत है, बल्कि शरीर और मन को संतुलित करने में भी महत्वपूर्ण कारक है, प्रत्येक खाद्य पदार्थ का अपना अनूठा स्वाद (रस), ऊर्जा (वीर्य) और पाचन के बाद का प्रभाव (विपाक) होता है, जो शरीर के भीतर तीन दोषों (वात, पित्त, कफ) को प्रभावित कर सकता है ।

आयुर्वेदिक दृष्टिकोण इस बात पर जोर देता है कि भोजन को जिस तरह से मिलाया जाता है, तैयार किया जाता है और खाया जाता है, वह पाचन और समग्र स्वास्थ्य को महत्वपूर्ण रूप से प्रभावित कर सकता है, भोजन का उचित संयोजन बहुत ज़रूरी है क्योंकि असंगत खाद्य पदार्थ पाचन अग्नि (अग्नि) को कमज़ोर कर सकते हैं, जिससे अपच और आम नामक विषाक्त पदार्थ बनते हैं, उदाहरण के लिए, दूध के साथ फल खाना एक असंगत संयोजन माना जाता है जिससे बचना चाहिए ।

आयुर्वेद सुझाव देता है कि भोजन करते समय मन की स्थिति, भोजन की गुणवत्ता और भोजन का समय सभी पाचन और पोषण में महत्वपूर्ण भूमिका निभाते हैं, खाद्य पदार्थों को उनके गुणों (गुणों) जैसे सत्व (शुद्धता), राजस (गतिशीलता) और तामस (जड़ता) के आधार पर भी वर्गीकृत किया जाता है, और संतुलित मन और शरीर को बनाए रखने के लिए सात्विक खाद्य पदार्थों को चुनने की सलाह दी जाती है ।

अन्नं ब्रह्मा रसो विष्णुः खादयेन्मांसमुच्चरन् ।

एवं ज्ञात्वा तु यो भुंक्ते सोऽन्नदोषैर्न लिप्यते ।।४८।।

पध्मपुराण अनुसार जब हम आहार की बात करते है तब हमें रस, रस एवम् दोष का संबंध, द्रव्य एवम् द्रव्य की कार्यपद्धति से अवगत होना पड़ेगा, क्योकि आहार केवल शरीर की आवश्यकता नहीं होती किन्तु व्यक्ति के मन, वचन एवम् कर्म पर प्रमुख असर आहार की होती है ।

षड रस एवम् पंचमहाभूतो का संयोजनः

मधुर (Sweet): पृथ्वी + जल

अम्ल (Sour): पृथ्वी + अग्नि

लवण (Salty): जल + अग्नि

तिक्त (Bitter): वायु + आकाश

कटु (Pungent): अग्नि + वायु

कषाय (-strigent): पृथ्वी + वायु

रस एवम दोष का संबंध:

मधुर (Sweet), अम्ल (Sour), लवण (Salty) : वात:

कषाय (Astrigent), तिक्त (Bitter), मधुर (Sweet) : पित्ता

तिक्त (Bitter), कटु (Pungent), कषाय (-strigent) : कफ:

द्रव्य की कार्य पध्धतिः

रस अनुसंधानमे आहार द्रव्य होते हैं जो शरीर में भिन्न दोष

पर कार्य करते हैं, द्रव्य या औषधि कैसे कार्य करते हैं इसके लिए रस, गुण, वीर्य, विपाक जानना अति आवश्यक है।

रस : मधुर, अम्ल, लवण, कटु, तिक्त, कषाय

गुण : उष्ण, शीत, स्निग्ध, रूक्ष,

वीर्य : उष्ण,शीत

विपाक : मधुर, अम्ल, कटु लघु

चरक संहिता अनुसार आहार की पध्धति:

तत्रैदमाहारविधिविधानमारोगाणामातुराणां चापि केषांबित् काले प्रकृत्यैवहिततमं भुञ्जनानां भवति- उष्णं, स्निग्धं, मात्रावत, जीर्णे, वीर्यविरुद्धं, इऐदेशे, इष्टसववोपकरणं, नातिदुतं, नातिविलम्बितं, अजल्पन्, अहसन्, तन्मनाभुंजीत, आत्पानमभिसमीक्ष्य सम्यक् ।। (च.वि. १ /२४)

कुछ चीज़ें मूल रूप से स्वास्थ्यवर्धक होती हैं इनका धार्मिक रूप से पालन करना चाहिए। भोजन करते समय इस प्रकार के नियमों का पालन करना चाहिए- गर्म, तैलीय भोजन करना चाहिए, विपरीत वीर्य वाले खाद्य पदार्थों को एक साथ नहीं खाना चाहिए। मनभावन स्थान पर, मनभावन वाद्ययंत्रों के साथ भोजन करना चाहिए। बहुत तेजी से या बहुत धीमी गति से भोजन नहीं करना चाहिए। भोजन करते समय हंसना या बात नहीं करनी चाहिए, मन लगाकर खाना चाहिए स्वयं पर ध्यान देना चाहिए ।

उष्णमश्नियातः उष्णं हि भुज्यमानं स्वदते, भुक्तं चाग्निमौदर्यमुदिरयति, क्षिप्रं जरां गच्छति, वातमनुलोमयति, श्लेष्माणं च परिहासयतिः तस्मादुष्णमश्नीयात् ।। (च.वि. १ /२५ (१)

गर्म भोजन का सेवन करना चाहिए, क्योंकि ऐसा भोजन खाने में अच्छा लगता है - यानी इसका स्वाद अच्छा होता है, यह भूख बढ़ाता है और पाचक रसों का स्राव करता है, ऐसा भोजन तेजी से पचता है, यह पेट फूलता है और कफ दोष को कम करता है। गर्म खाना खाने का यही कारण है.

स्निग्धमश्नियातः स्निग्धं हि भुज्यमानं स्वदते, भुक्तं चानुदीर्णमग्निमुदीरयति, क्षिप्रं जरां गच्छति, वातमनुलोमयतिः शरीरमुपचिनोतिः दृढिकरोतिन्द्रियाणिः बलाभिवृद्धिमुपजनयतिः वर्णप्रसादं बाभिनिर्वर्तयति; तस्माद् स्निग्धमनियात् ।। (च.वि. १ /२५ (२))

स्निग्धा आहार का सेवन करना यह कमजोर अग्नि को बढ़ाता है । यह भोजन को तेजी से पचाता है। यह पेट फूलने की समस्या को दूर करने में मदद करता है। यह शरीर को पुनः पूर्ति या पोषण देता है, यह विशेष इंद्रियों को मजबूत करता है । इससे शरीर की ताकत बढ़ती है, यही कारण है कि व्यक्ति को स्निग्धा आहार का सेवन करना चाहिए ।

मात्रावदश्नीयातः मात्रावद्धिभुक्तं वातपित्तकफानपीडयदायुरेव विवर्धयति केवलं; सुखं गुदमनुपर्येति, न चोष्माणमुपहन्ति, अव्यर्थ च परिपाकमेती; तस्मान्मात्रावदश्नीयात् ।। (च.वि. १ /२५ (३)

व्यक्ति को हिसाब-किताब वाला भोजन करना चाहिए। इसे अधिक या कम मात्रा में नहीं खाना चाहिए। ऐसा भोजन वात, पित्त और कफ जैसे दोषों के शारीरिक स्तर को बनाए रखता है। इससे मल आसानी से निकल जाता है। अग्नि को किसी भी तरह से परेशान नहीं किया जाता है। पाचन क्रिया दुरुस्त रहेगी. इस कारण से हिसाब-किताब करके खाना खाना पड़ता है।

जीर्णेऽश्नीयात्; अजीर्णेहि भुञ्जनस्याभ्यहृताहारजातं पूर्वस्याहास्य समपरिणतमुत्तरेणाहार रसेनोपसृजत् सर्वान् दोषान् प्रकोपयत्याशु, जीर्णे तु भुञ्जानस्यस्वस्थानस्थेषुदोषेष्वग्नौचोदीर्णे जातायां च बुभुक्षायां विवृतेषु च स्रोतसां मुखेषु विशुदे चोद्गारे हृदये विशुद्धे वातानुलोम्ये विसृष्टेषु च वातमूत्रपुरीषवेगेष्वभ्यवहृतमाहारजातं सर्वशरीरघातून्प्रदोषयदायुरेवाभिवर्धयति केवलं; तस्मज्जीर्णेऽनियात् ।। (च.वि. १ /२५ (४)

जब पिछला भोजन पच जाए तभी भोजन करना चाहिए। यदि पिछला भोजन पचने से पहले खाया जाए तो पचने वाला भोजन भोजन में मिल जाता है, जो आधा पचता है। इससे त्रिदोष तुरंत ख़राब हो जाते हैं। यदि पिछला भोजन ग्रहण करते समय खाया जाए, तो तीनों दोष शारीरिक सीमा में रहते हैं, अग्नि बढ़ती है, डकार बिना किसी गंध के होती है, हृदय पर कोई दबाव महसूस नहीं होता है, मल आसानी से निष्कासित हो जाता है, सभी बिल्डिंग ब्लॉक अच्छी तरह से बनाए रखे जाते हैं और जीवन काल तक बने रहते हैं ऐसा केवल खाली पेट खाने से या पिछला खाना पच जाने पर होता है।

वीर्याविरुद्धमश्नीयात्; अविरुद्धवीर्यमश्नन् हि विरुद्धवीर्याहारजैर्विकारैनोपसृज्यते; तस्माद्वीर्या विरुद्धमश्नीयात् ।। (च.वि. १ /२५ (५)

दो विपरीत प्रबल गुणों को एक साथ खाने से बचना चाहिए, इस प्रकार का खान-पान रोग उत्पन्न करता है, विपरीत गुणों वाला भोजन न करने का यही कारण है ।

इष्टे देशे इष्टसववोपकरणं चाश्नीयात्; इटे हि देशे भुंजानो नानिष्टदेशजैर्मनोविघातकरेभर्भावैर्मनोविघातं प्राप्नोति; तथैवेष्टैः सर्वोपकरणैः; तस्मादिष्टे देशे तथेष्टसवोंपकरणं चाश्नीयात्। (च.वि. १/२५ (६)

जहां खाना पसंद न हो वहां खाना नहीं खाना चाहिए, किसी को ऐसे कटलरी में खाना नहीं खाना चाहिए, जिसे उपभोक्ता पसंद न करता हो, यहां चीजों के मनोवैज्ञानिक प्रभाव पर जोर दिया गया है ।

नातिदूतमश्नीयात्; अतिदूतं हि भुझानस्योत्स्नेहनमवसादं भोजनस्याप्रतिष्ठानं च, धोज्यदोषसाद्गुण्योपलब्धिश्च न नियता; तस्मानातिदूतमश्नीयात् ।। (च.वि. १ /२५ (७)

बहुत तेजी से खाना नहीं खाना चाहिए. यदि कोई बहुत तेजी से खाता है, तो उसका दम घुटता है, उल्टी होती है, भोजन का अपमान होता है और भोजन के प्रति अरुचि पैदा हो जाती है। यही कारण है कि जल्दी-जल्दी खाना नहीं खाना चाहिए।

नातिविलम्बितश्नीयात्; अतिविलम्बितं हि भुञ्जानो न तृप्तिमधिगच्छति, बहुभुक्ते, शीतीभवत्याहारजातं, विषमं च पच्यते, तस्मान्नतिविलम्बितमश्नीयात् ।। (च.वि. १/२५ (८)

बहुत धीरे-धीरे खाना नहीं खाना चाहिए. बहुत धीरे-धीरे खाने से तृप्ति नहीं मिलती, इसलिए ज्यादा खाता है, खाना ठंडा हो जाता है इस कारण खाना ठीक से पच नहीं पाता, इसलिए बहुत धीरे-धीरे खाना नहीं खाना चाहिए ।

अजल्पन्नहसन् तन्मनाभञ्जीत; जल्पतो हसतोऽन्यमनसो वा भुञ्जानस्य त एव हि दोषाभवन्ति य

एवातिदूतमश्नतः; तस्मादजल्पन्नहसंस्तन्मनाभुञ्जीत ।। (च.वि. १ /२५ (९)

भोजन करते समय न तो बात करनी चाहिए और न ही हंसना चाहिए, इससे दोष ख़राब हो जाते हैं, यही कारण है कि भोजन

करते समय बात नहीं करनी चाहिए और न ही हंसना चाहिए ।

आत्मानमभिसमीक्ष्य भुञ्जीत सम्यक्, इदं ममोपशेते इदं नोपशेत इत्येवं विदितं ह्यास्यात्मन आत्मसात्म्यं भवतिः तस्मादात्मानमभिसमीक्ष्य भुञ्जीत सम्यगिति ।। (च.वि. १/२५)

मनुष्य को अपने लिये उचित रीति से भोजन करना चाहिये, यह स्वयं के लिए उपयुक्त है, यह स्वयं के लिए उपयुक्त नहीं है – भोजन करते समय सोचना चाहिए, इससे आप ठीक से खाना खा पाते हैं।

अन्नाद्भवन्ति भूतानि पर्जन्यादन्नसम्भवः ।

यज्ञाद्भवति पर्जन्यो यज्ञः कर्मसमुद्भवः ।। ३.१४।।

कर्म ब्रह्मोद्भवं विद्धि ब्रह्माक्षरसमुद्भवम् ।

तस्मात्सर्वगतं ब्रह्म नित्यं यज्ञे प्रतिष्ठितम् ।। ३.१५।।

श्रीमद भगवद गीता के तृतीय अध्याय कर्मयोग अध्याय अनुसार सृष्टि चक्र अतूट संबंध से बंधा हुआ है, अन्न से जीवात्मा अर्थात प्राणी, वर्षा से अन्न, यज्ञ से वर्षा, कर्म से यज्ञ, वेद से कर्म और अक्षर ब्रह्म जिन्हें पुर्णपुरुषोत्तम परमात्मा कहा गया है वहा से वेद उत्पन्न होते हा, यह ब्रह्म ही नित्य यज्ञ कर्तव्य – कर्म है इस बात प्रस्थापित करता है । भारतीय ज्ञान परंपरा में श्रीमद् भगवद्गीता प्रमुख मार्गदर्शन रहा है, सर्जन एवम् विनाश चक्र अनिवार्य एवम् आवश्यक घटनाए है, परिवर्तनं हि जगत्–धर्मः श्रीमद् भगवद्गीता में पुर्णपुरुषोत्तम भगवान श्री कृष्ण कहते हैं कि मेरी अध्यक्षता में प्रकृति सभी चराचर जगत को रचती है, और इसी कारण जगत में विविध प्रकार से परिवर्तन होता है, यह सिद्धांत बताता है कि हर वस्तु, हर स्थिति क्षणभंगुर है और बदलाव ही जीवन का आधार है । व्यक्ति के दैनिक व्यव्हार में परिवर्तन के कारन स्वास्थ्यविज्ञान में परिवर्तन आया है, पुर्णपुरुषोत्तम ने श्रीमद् भगवद्गीता के सत्तर वे अध्याय श्रद्धात्रयविभागयोग (तीन प्रकार की श्रद्धा का विभाग) में हमें 'वसुधैव कुटुम्बकम' अनुसार स्थाई विकास के लक्ष्यांक सभी को आहार

उपलब्धि – वैश्विक कल्याण एवम् निरामयाः सिध्ध करना है तो सात्विक श्रद्धा, राजसिक श्रद्धा एवम् तामसिक श्रद्धा का ज्ञान होना आवश्यक है

आयुः सत्त्वबलारोग्यसुखप्रीतिविवर्धनाः ।

रस्याः स्निग्धाः स्थिरा हृद्या आहाराः सात्त्विकप्रियाः ।।१७.८ ।।

आयु, बुद्धि, बल, आरोग्य, सुख और प्रीति को बढ़ाने वाले, रसयुक्त, चिकने और स्थिर रहने वाले (जिस भोजन का सार

शरीर में बहुत काल तक रहता है, उसको स्थिर रहने वाला कहते हैं।) तथा स्वभाव से ही मन को प्रिय – ऐसे आहार अर्थात् भोजन करने के पदार्थ सात्त्विक पुरुष को प्रिय होते हैं ।

कट्वम्ललवणात्युष्णतीक्ष्णरूक्षविदाहिनः ।

आहारा राजसस्येष्टा दुःखशोकामयप्रदाः ।। १७.९।।

कड़वे, खट्टे, लवणयुक्त, बहुत गरम, तीखे, रूखे, दाहकारक और दुःख, चिन्ता तथा रोगों को उत्पन्न करने वाले आहार

अर्थात् भोजन करने के पदार्थ राजस पुरुष को प्रिय होते हैं।

यातयामं गतरसं पूति पर्युषितं च यत्।

उच्छिष्टमपि चामेध्यं भोजनं तामसप्रियम् ।। १७.१०।।

जो भोजन अधपका, रसरहित, दुर्गन्धयुक्त, बासी और उच्छिष्ट है तथा जो अपवित्र भी है, वह भोजन तामस पुरुष को प्रिय होता है ।

सात्विक श्रद्धा: यह श्रद्धा हमें प्रकृति के साथ संतुलन बनाए रखने और संसाधनों का संरक्षण करने के लिए प्रेरित करती है, इससे हम शून्य भूख और अच्छा स्वास्थ्य और कल्याण के लक्ष्यों को प्राप्त कर सकते हैं।

राजसिक श्रद्धाः मनुष्य अधिक उत्पादन और उपभोग के लिए प्रेरित होता है इस कारण टिकाऊ विकास के लिए हानिकारक हो सकती है, हमें इसे संतुलित करना होगा।

तामसिक श्रद्धा: तामसिक वृति हमें अज्ञान एवम् विलास की दिशा में ले जाती है, जो टिकाऊ विकास के लिए हानिकारक हो सकती है, हमें इसे दूर करना होगा।

सन्दर्भः

१. श्रीमद् भगवद्गीता
२. तैतरीय उपनिषद्
३. चरक संहिता
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