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CONTENTS

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Editorial

Dear Readers,

It is with great pleasure that we present the latest issue of the Knowledge Economy. This edition features a diverse collection of articles that explore various aspects of culture, society, finance, and artificial intelligence.

The first article underscores the critical role of financial education awareness and emphasizes that policymakers, employers, and financial institutions should strengthen financial literacy by undertaking initiatives to encourage salaried employees to actively plan for their retirement.

The second article centers on the concept of *Rasa* in literature, describing it as an aesthetic experience born from the interplay of causes, expressions, and mental states with the heroic sentiment (*Vira Rasa*) embodying courage, strength, and sacrifice across various types and forms of heroes.

Amid the growing global focus on AI, the third article explores its impact on academic performance and skill development, highlighting its contribution to personalized learning and industry preparedness, while also offering recommendations for building an equitable, future-ready education system.

The fourth article delves into the knowledge economy of ancient India, highlighting how innovation, education, and knowledge dissemination advanced intellectual and economic growth, establishing India as a global centre that encouraged intercultural exchange and sustainable development.

The next study explores AI's role in recruitment within HRM, highlighting its ability to enhance efficiency and objectivity while underscoring the need for human judgment to ensure ethics and fairness.

Another study highlights the present scenario of grocery shopping, noting that although grocery apps provide convenience and accessibility, they also pose challenges.

The final article examines AI in e-commerce supply chains, highlighting factors shaping customer satisfaction, adoption across demographics, and recommendations to improve AI-driven strategies for better experiences.

We hope this issue sparks meaningful reflections, encourages thoughtful conversations, and inspires further research in the social sciences.

As always, we value your feedback and anticipate your continued support

Thank you for being a part of our scholarly community

Dr. R. Lakshmi
Dr. P. Nandini
EDITORS

July 2025

IMPACT OF FINANCIAL LITERACY ON RETIREMENT PLANNING AMONG SALARIED EMPLOYEES: A STUDY WITH REFERENCE TO SUNDARAMFINANCE LIMITED

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Abstract

This study investigates the relationship between financial literacy and retirement planning among salaried individuals, specifically employees of Sundaram Finance. A survey-based approach was employed to collect data from 200 employees. The results indicate a significant positive correlation between financial literacy and retirement planning. Employees with higher financial literacy levels tend to start planning for retirement earlier, contribute more to retirement accounts, and exhibit better investment diversification. The study highlights the importance of financial education in enabling individuals to make informed decisions about retirement planning. The findings have implications for policymakers, employers, and financial institutions to promote financial literacy programs and encourage salaried individuals to prioritize retirement planning.

Keywords

Financial literacy, Retirement planning, Employees, Salaried individuals

INTRODUCTION

Sundaram Finance, a prominent member of the TSF group, is India's most reputed non-banking financial company (NBFCs) was established in 1954 when Sri T.S. Santhanam, the Founder, envisioned the future of hire-purchase finance in India. The company was established with a paid-up capital of Rs. 2 Lakhs and promoted by Madras Motor & General Insurance Company, which was then one of the leading insurance companies in India prior to nationalisation in 1971.

The company was founded with the primary goal of providing finance for the purchase of commercial vehicles. Today, it is one of India's most reputable financial services companies. It has a nation-wide presence of nearly 1000 branches, over two lakh depositors, and three lakh commercial vehicle and car finance customers. Today, Sundaram Finance Limited has a diversified presence in Mutual Funds, Housing Finance, General Insurance, IT, Business Process Outsourcing, and Retail Distribution of a wide array of financial services and products.

The company's Diamond Jubilee in August 2014 was preceded by the birth centenary of its Founder in November 2012.The company follows a customer-centric approach, focusing on long-term relationships, personalized financial solutions, and robust risk management. Over the years, it has diversified its portfolio, expanding into home finance, mutual funds, and insurance while maintaining its core strength in vehicle finance.

OBJECTIVES OF THE STUDY

- To determine the level of awareness and preparedness regarding retirement planning.
- To inspect the investment and savings patterns adopted for retirement planning.

NEED OF THE STUDY

Sundaram Finance Limited is the focus of an investigation to study the connection between salaried employees' financial literacy and retirement planning. This study aims to examine the impact of financial literacy on decisions regarding retirement planning, as well as the current state of retirement planning among salaried employees in India. The purpose of this study is to determine the areas of financial literacy that require improvement in order to enhance retirement planning among salaried employees. The goal of this study is to make suggestions for Sundaram Finance Limited and other financial institutions on how to improve salaried employees' financial literacy and retirement planning.

SCOPE OF THE STUDY

The scope of the study on the retirement planning of salaried employees influenced by financial literacy covers multiple dimensions of financial literacy, retirement planning behaviour, and the socio-economic factors that impact employees' ability to plan for their future financial security. The research will focus on understanding the relationship between financial literacy and the effectiveness of retirement planning among salaried employees across various sectors.

THEORATICAL FRAMEWORK

SUNDARAM FINANCE LIMITED (SFL), based in Chennai, India, is a leading Non-Banking Financial Company (NBFC) in India, with a strong presence in vehicle finance, home finance, business loans, wealth management, and general insurance. Established in 1954, it is part of the Sundaram Group, which has a well-diversified presence in several industries, including financial services, manufacturing, and logistics.

Sundaram Finance Limited operates in the highly competitive financial services industry, offering a wide range of loan products, investment opportunities, and financial services to its customers, including individuals, small businesses, and corporations.

India's financial services industry is one of the largest and fastest-growing sectors in the economy, significantly contributing to the nation's GDP. The industry encompasses a wide range of segments, including banking, insurance, mutual funds, asset management, lending, and wealth management services.

Increasing urbanization, rising disposable incomes, and government policies promoting financial inclusion are some of the key factors driving the growth of the industry. The demand for personal loans, housing finance, vehicle finance, business loans, and mutual funds has witnessed a surge, with a growing middle class and increasing aspirations for home ownership and vehicle purchases.

The Reserve Bank of India (RBI) and Securities and Exchange Board of India (SEBI) are the primary regulators governing the industry, ensuring fair practices and stability.

Sundaram Finance Limited has grown over the years to establish itself as a trusted financial services provider with a focus on personalized solutions for its customers. The company's diverse offerings cater to the needs of individuals, small businesses, and corporations.

CORE BUSINESS SEGMENTS:

Vehicle Finance

- Vehicle Loans: Sundaram Finance has a strong presence in the vehicle finance segment, particularly in automobile financing, which includes cars, two-wheelers, and commercial vehicles.

Leasing & Hire Purchase: The company offers leasing and hire purchase schemes to customers who wish to buy vehicles on flexible terms.

Home Finance

- Sundaram Home Finance provides home loans for both residential and commercial properties.
- The company focuses on offering affordable housing finance solutions, catering to first-time homebuyers, low-income groups, and individuals in semi-urban and rural areas.

Business & SME Loans

- Sundaram Finance provides business loans and working capital financing solutions for small and medium-sized enterprises (SMEs), helping them expand their operations.
- The company is a key player in financing MSMEs, offering customized financial products designed for various industries.

Wealth Management

- Sundaram Finance offers wealth management services, including mutual funds, investment advisory, and financial planning for individuals looking to grow their wealth.
- The company's investment products are designed to meet the needs of both risk-averse and growth-oriented investors.

Insurance (Royal Sundaram General Insurance)

- Sundaram Finance is associated with Royal Sundaram General Insurance, which provides a wide range of general insurance products, including motor, health, home, and travel insurance.
- The company is known for its customer-centric insurance products that offer comprehensive coverage and affordable premiums.

Market Position and Competitive Advantage

Sundaram Finance Limited holds a strong market position in the NBFC sector, backed by its diverse financial services portfolio, long-standing market experience, and robust distribution network. The company has a competitive edge due to:

- Trusted Brand Name: With over 6 decades of operation, Sundaram Finance enjoys a strong reputation in the Indian financial services industry, particularly for its vehicle finance solutions.

- Customer-Centric Approach: Sundaram Finance's ability to offer customized financial products and personalized services to meet the specific needs of its diverse customer base is a key differentiator.
- Strong Network: The company has an extensive branch network and digital platforms that enable it to serve customers across India, including in remote and rural areas.

Industry Challenges

While Sundaram Finance has a strong market position, it also faces challenges that are typical of the financial services sector:

- Regulatory Compliance: Ensuring compliance with RBI guidelines and SEBI regulations is a constant challenge for NBFCs, especially in an environment of increasing scrutiny and evolving regulatory frameworks.
- Competition from Banks and Other NBFCs: The rise of digital lending platforms and increased competition from traditional banks and other NBFCs poses a challenge in maintaining market share.
- Credit Risk & Asset Quality: As an NBFC, Sundaram Finance is exposed to credit risk, especially in the areas of vehicle loans and business financing. Ensuring asset quality remains a priority.
- Economic Fluctuations: Changes in interest rates, inflation rates, and economic downturns can affect the performance of financial institutions, including NBFCs.

Sundaram Finance Limited has positioned itself as a leading player in the Indian NBFC sector, offering a wide array of financial products and services. With a strong brand presence, a diversified portfolio, and a customer-centric approach, Sundaram Finance continues to grow and innovate, ensuring its place at the forefront of the Indian financial services industry. The company is well-placed to tackle industry challenges and capitalize on future opportunities.

REVIEW OF LITERATURE

Patel et al. (2024) looked at how mobile apps and online learning platforms are becoming more and more important in raising people's financial literacy for retirement planning. According to the findings, employees are more likely to make informed and consistent decisions regarding their retirement savings if they participate in interactive online learning modules on topics like retirement investment strategies and long-term financial planning.

Dixit and Singh (2023) investigated the effects of FinTech tools and digital platforms on retirement planning. The study found that salaried workers were better prepared for retirement if they used digital financial planning tools like retirement calculators, robo-advisors, and online investment platforms. This demonstrates how technology is increasingly being used to educate workers and assist them in managing their retirement savings.

Agarwal and Gupta (2021) talked about how government programs like the Employee Provident Fund (EPF) and the National Pension Scheme (NPS) help people save for retirement. The study emphasized that salaried workers underutilize these programs due to a lack of financial literacy and awareness, but that they could be more effective if promoted alongside financial education.

Kim and Choi (2021) focused on retirement readiness and income levels. They discovered that salaried workers with higher incomes were more likely to have retirement savings aside from those required by pension plans. On the other hand, employees with low incomes had a hard time covering their daily expenses, which left little room for retirement savings.

Bertsch and Schumacher (2020), the provision of specialized financial education programs has the potential to significantly enhance financial literacy. Their research suggested that financial education that addresses investment knowledge, risk management, and long-term financial goals has a measurable impact on retirement savings.

RESEARCH METHODOLOGY

DATA COLLECTION METHODS

The researcher collected the data through structured or semi-structured questions that are administered online, over the phone, or in person. One-on-one interviews can be conducted in person, over the phone, or online. In-depth insights can be obtained through structured (fixed-question) or unstructured (open-ended) interviews. Secondary data was collected from Journal, website etc.

SAMPLE UNIT & SIZE

In this study, the sample unit is the salaried employees of **Sundaram Finance Limited (SFL).** This includes employees from different departments, job roles, and experience levels with the sample size of 125 respondents.

SAMPLING TECHNIQUES

The sampling technique used is Stratified Random Sampling, a probability sampling method that ensures proportionate representation of different employee segments. Target Population: Salaried employees of Sundaram Finance Limited (across different departments and job roles).

STATISTICAL TOOLS USED

Research tools like **One-Way ANOVA**, **Frequency & Percentage Analysis**, **Graphs & Charts (Bar charts, Pie charts)**, **Friedman test** were used

DATA ANALYSIS AND INTERPRETRATION

IDEMOGRAPHIC FACTORS:

● GENDER OF RESPONDENTS

Table showing the gender of the respondents

Gender	Frequency	Percentage
Male	72	58
Female	53	42
TOTAL	125	100

Source: Primary Data

Figure showing the gender of the respondents

INTERPRETATION

The data shows that out of 125 respondents, 72 (58%) were male and 53 (42%) were female. While both genders are well represented, the higher percentage of male respondents suggest the insights and trends identified in the study may reflect a marginally more male-oriented perspective in terms of retirement planning behaviour.

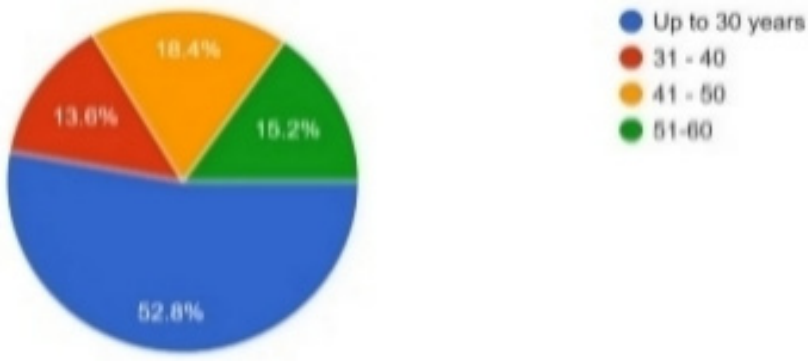
● AGE OF THE RESPONDENTS

Table 4.2.2 showing the age of the respondents

Age	Frequency	Percentage
Up to 30 years	67	53.6
31 - 40	17	13.6
41 - 50	23	18.4
51-60	18	14.4
Total	125	100.0

Source: Primary Data.

Figure showing the age of the respondents



INTERPRETATION

The age distribution of the respondents indicates that the majority—67 individuals (53.6%)—are aged up to 30 years, showing that more than half of the participants are relatively young and likely in the early stages of their careers. The next highest group is 41–50 years with 23 respondents (18.4%), followed by 18 respondents (14.4%) in the 51–60 years category, and 17 respondents (13.6%) in the 31–40 years range

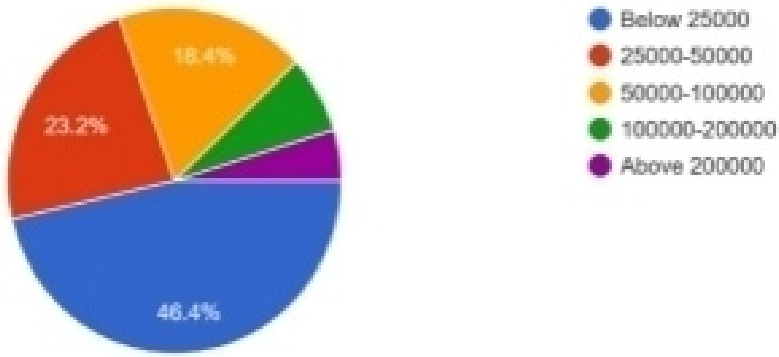
● INCOME OF THE RESPONDENTS

Table showing the income of the respondents

Income	Frequency	Percent
Below 25000	58	46.4
25000-50000	29	23.2
50000-100000	23	18.4
100000-200000	9	7.2
Above 200000	6	4.8
Total	125	100.0

Source: Primary Data

Figure showing the income of the respondents



INTERPRETATION

The income distribution of the respondents reveals that a significant portion—58 individuals (46.4%)—earn below ₹25,000, indicating that nearly half of the sample consists of low-income individuals. This is followed by 29 respondents (23.2%) in the ₹25,000–₹50,000 range, and 23 respondents (18.4%) earning between ₹50,000–₹1,00,000. A smaller portion of the sample, 9 respondents (7.2%), earn between ₹1,00,000–₹2,00,000, while only 6 respondents (4.8%) report an income above ₹2,00,000.

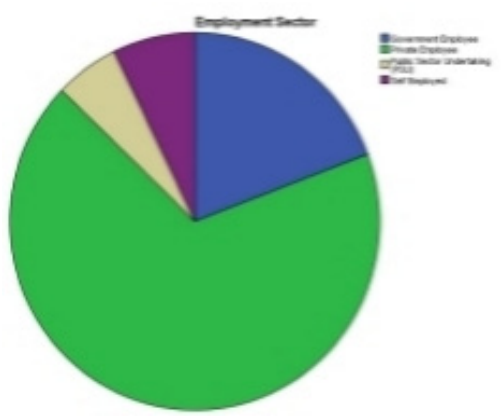
● EMPLOYMENT SECTOR OF THE RESPONDENTS

Table 4.2.4 showing the employment sector of the respondents

Employment Sector	Frequency	Percentage
Government Employee	24	19.2
Private Employee	85	68.0
Public Sector Undertaking (PSU)	7	5.6
Self Employed	9	7.2
Total	125	100.0

Source: Primary Data

Figure showing the income of the respondents



INTERPRETATION

According to the data, the majority of respondents—85 people, or 68.0 percent—are employed in the private sector, indicating that private employees make up the majority of the sample. 24 respondents, or 19.2%, work for the government, 7 respondents, or 5.6%, are employed by Public Sector Undertakings (PSUs), and 9 respondents, or 7.2%, are self-employed.

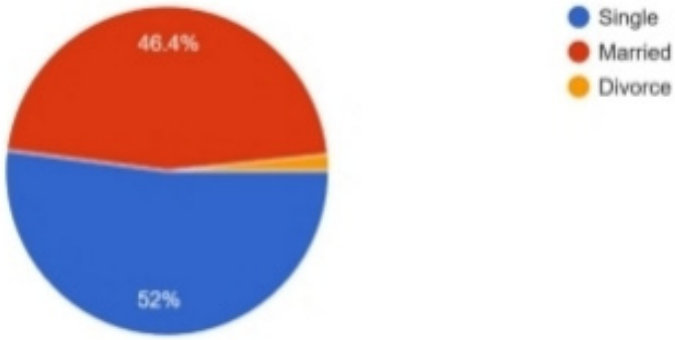
● MARITAL STATUS OF THE RESPONDENTS

Table 4.2.5showing the marital status of the respondents

Marital Status	Frequency	Percentage
Single	**65**	**52.0**
Married	**58**	**46.4**
Divorce	**2**	**1.6**
Total	**125**	**100.0**

Source: Primary Data

Figure showing the marital status of the respondents



INTERPRETATION

Among the 125 respondents, 65 individuals (52.0%) are single, making them the largest group in the sample. 58 respondents (46.4%) are married, while only 2 respondents (1.6%) are divorced. This indicates a nearly even split between single and married participants, with a slight majority being single.

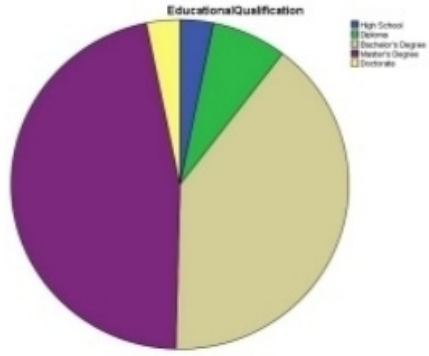
● EDUCATIONAL QUALIFICATION OF THE RESPONDENTS

Educational Qualification	Frequency	Percent
High School	4	3.2
Diploma	9	7.2
Bachelor's Degree	50	40.0
Master's Degree	58	46.4
Doctorate	4	3.2
Total	125	100.0

Table showing the Educational Qualification of the respondents

Source: Primary Data

Figure showing the Educational Qualification of the respondents



INTERPRETATION

The data reveals that the majority of respondents hold higher education degrees, with 58 individuals (46.4%) having a Master's degree, followed by 50 individuals (40.0%) holding a Bachelor's degree. A smaller portion have a Diploma (7.2%), while High School and Doctorate qualifications are represented equally with 4 respondents each (3.2%).

● INTERPRETATION WORK EXPERIENCE OF THE RESPONDENTS

Table showing the Work Experience of the respondents

Work Experience	Frequency	Percent
Less than 5	64	51.2
5-10	22	17.6
11-20	15	12.0
More than 20	24	19.2
Total	125	100.0

Source: Primary Data

Figure showing the Work Experience of the respondents

INTERPRETATION

The data shows that a majority of the respondents—64 individuals (51.2%)—have less than 5 years of work experience, indicating that over half of the sample consists of individuals in the early stages of their careers. This is followed by 24 respondents (19.2%) with more than 20 years of experience, 22 respondents (17.6%) with 5–10 years, and 15 respondents (12.0%) with 11–20 years of experience.

STATISTICAL ANALYSIS

FRIEDMAN TEST FOR IDENTIFYING THE LEVEL OF AWARENESS AND PREPAREDNESS AMONG INDIVIDUALS REGARDING RETIREMENT PLANNING.

H_0: There is a no significant difference between the mean ranks of level of awareness

H_1: There is a significant difference between the mean ranks of level of awareness

Test Statistics

	N	MEAN RANK	STD. DEVIATION	CHI-SQUARE	SIG.
Believing that important to start retirement planning as early as possible	125	3.26	.840	14.942	.005
Understand the different retirement investment options available to me	125	3.04	.860		
Awareness on the impact of inflation reduces my value of retirement savings	125	3.01	.884		
Understanding on how taxes will affect my retirement income	125	2.92	.870		
I am aware of financial risks associated with retirement planning	125	2.77	.789		

Source: Computed Data

INTERPRETATION

From the above table it is clear that P-Value is .005 which is lesser than 0.01. So, the Null hypothesis is rejected. Based on the mean rank, "Believing that it is important to start retirement planning as early as possible" (3.26) this item has the highest mean rank, indicating that respondents strongly agree with the importance of early retirement planning. Secondly, "Understand the different retirement investment options available" (3.04) Respondents moderately agree with their understanding of available options. This awareness level is relatively high but lower than the previous item. Thirdly, "Awareness on the impact of inflation" (3.01) Respondents are also somewhat aware that inflation can reduce retirement savings, showing moderate financial awareness. Fourthly, "Understanding how taxes affect retirement income" (2.92) There is slightly lower awareness in understanding tax impacts, suggesting a potential knowledge gap in tax planning for retirement. Fifthly, "Awareness of financial risks in retirement planning" (2.77) This has the lowest mean rank, indicating lower awareness of financial risks involved in retirement planning, which could be a critical area for improvement.

ANOVA TEST FOR INSPECTING THE INVESTMENT AND SAVINGS PATTERNS ADOPTED FOR RETIREMENT PLANNING.

H_0: There is no significant difference between the age and investment and savings patterns adopted for retirement planning.

H_1: There is a significant difference between the age and investment and savings patterns adopted for retirement planning.

Investment Preferences & Strategy	Age	Sum of Squares	df	Mean Square	F	Sig.
Prefer to have low-risk investment options for my retirement savings	Between Groups	4.326	3	1.442	2.220	.089
	Within Groups	78.602	121	.650		
	Total	82.928	124			
My retirement investment portfolio is diversified with different asset classes	Between Groups	1.000	3	.333	.385	.764
	Within Groups	104.648	121	.865		
	Total	105.648	124			
Major preference towards long-term assets for retirement security	Between Groups	2.484	3	.828	.943	.422
	Within Groups	106.316	121	.879		
	Total	108.800	124			
Regularly monitor and adjust my retirement plan based on financial market changes	Between Groups	.998	3	.333	.366	.778
	Within Groups	109.994	121	.909		
	Total	110.992	124			

Test Statistics

Source: Computed Data

INTERPRETATION

From the above table, although not statistically significant at the 0.05 level, the p-value is close to significance, suggesting that age may have a mild influence on preference for low-risk options (.089). Older individuals may lean more towards safer investments, a trend worth exploring further. The high p-value indicates no significant difference across age groups in diversification preferences (0.764). All age groups appear to have a similar approach toward diversifying investments. Again, there is no significant difference, implying that long-term investing is consistently valued regardless of age (0.422). No significant variation across age groups, suggesting that monitoring behaviour is not strongly age-dependent (0.778)

FINDINGS & SUGGESTIONS

FINDINGS

● **Demographic Insights**:

- A majority of respondents are young (below 30 years) and early in their careers, with over 50% having less than 5 years of experience.
- The sample is slightly male-dominated (58%), and most respondents are from the private sector.
- Most respondents hold Bachelor's or Master's degrees, indicating a relatively well-educated group.
- Income levels show that nearly half earn below □25,000, highlighting a need for low-cost, flexible retirement options.

● **Awareness & Preparedness**:

- Respondents strongly believe in starting retirement planning early.
- Moderate awareness exists about investment options and inflation's impact.
- Lower awareness is seen regarding tax implications and financial risks associated with retirement.
- Chi-square results showed significant differences in awareness levels across these dimensions ($p = 0.005$).

3. Investment Preferences:

- There is a general preference for low-risk and long-term investment options.
- Respondents reported some level of diversification and monitoring of retirement investments.
- ANOVA results indicate no significant difference in investment strategies across age groups, except for a near-significant preference for low-risk investments ($p = 0.089$).

Financial Literacy Influence:

- Descriptive and inferential statistics suggest that financial literacy plays a key role in shaping retirement planning behaviour.
- Respondents with higher education levels and experience tend to show better understanding of retirement concepts.

SUGGESTIONS

- Conduct targeted workshops/webinars on taxation, inflation, and risk management in retirement planning—especially for younger and less experienced individuals.
- Develop user-friendly, low-risk investment tools that cater to low- and middle-income individuals, particularly those in the private sector.
- Organizations and institutions can embed retirement education early in professional life, even during college or onboarding sessions at workplaces.
- Promote schemes like NPS (National Pension System) or EPF (Employees' Provident Fund) among private sector employees and self-employed individuals.
- Encourage personal finance advisory services, especially for individuals nearing retirement age or with family responsibilities.

CONCLUSION

The study concludes that while individuals recognize the importance of early retirement planning, there exists a gap in comprehensive awareness, particularly around risks, taxation, and inflation. Investment strategies tend to lean toward safety and long-term returns, regardless of age. Financial literacy, income level, and work experience significantly influence planning behaviour, emphasizing the need for customized education and support systems.

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EMOTIVE VALOUR AND ITS SHADES

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Abstract:

In everyday life there are emotions that are evoked by i.e., i. Causes(karana) such as the surrounding which provokes the reactions in the objects of emotion, ii. Effects such as physical emotions put forth by sahacharibhavas. In literature these causes, effects and subordinate mental states are called as vibhavas, anubhavas and vyabhicharins. When an emotion is evoked by representation of these bhavas, it is called Rasa. Rasa is a semi physiological and semi-psychological basis. Emotion is a personal experience and it cannot be communicated as it is. The Poet/Dramatist's task is to arouse such emotions. Heroic sentiment corresponds to the emotion of energy in people of superior disposition. The vibhavas are asammoha,adhyvasaya,naya, vinaya,parakrama, shakthi, pralapa. Through anubhavassuch as sthairya,Dhairya, shaurya, tyaga, vaisardya it can be depicted on the stage by actors. This sentiment is common to all the four types of Heroes, Dhirodatta, Dhiroddhata, Dhiralalita and Dhirasanta. Permutation and combination of these vibhavasandanubhavas further put forth varieties like Dana Vira, Dharma Vira and Yudhhavira.

The paper proposes to study various Internal divisions found within the **Vira Rasa.**

Key words: Cause*, Effect, Vibhava, Anubhava*, *Vyabhicahari bhava*, *Rasa*, *Vira Rasa*.

INTRODUCTION

In the realm of human experience, emotions play a central role in shaping thoughts, actions, and expressions. Our day-to-day lives are deeply colored by emotions that are triggered by both internal and external stimuli. In Indian aesthetics, particularly in the theory of **Rasa** as enunciated in the *Nāṭyaśāstra* by Bharata, this emotional landscape is codified and analyzed with remarkable precision.

The purpose of this article is to explore how emotions are evoked in real life and their literary manifestation through the concepts of **Vibhavas**, **Anubhavas**, and **Vyabhichāribhāvas**, culminating in the experience of **Rasa**. We will pay special attention to **Vīra Rasa**, the heroic

sentiment, to understand how the intricate interplay of bhāvas gives rise to a rasa that both transcends and communicates human experience.

Emotion in Everyday Life: Cause and Effect

I. Cause (Kāraṇa) – The Surrounding or Stimuli

In the psychological framework of emotions, a stimulus or cause—referred to as **kāraṇa**—triggers a reaction in an individual. This can be an environment, a person, a situation, or even a thought. For instance, the sight of a battlefield may invoke courage, or the presence of a loved one may evoke joy.

In Sanskrit aesthetics, this is codified as the **Vibhāva**.

- **Vibhāva** (literally "determinant") refers to the objective situation or the external cause which is responsible for the arousal of an emotion. These are classified as:
- **ĀlambanaVibhāva** – the person or object that causes the emotion.
- **UddīpanaVibhāva** – the environment or the stimulative factors that intensify the emotion.

Example: In Vīra Rasa, the battlefield, the sight of the enemy, the call of duty—these are all vibhāvas.

ii. Effect – The Physical and Psychological Response

Once the cause evokes a certain emotion, the individual manifests it through physical expressions or mental states. These are termed:

- **Anubhāva** – the voluntary physical expressions such as a firm gaze, erect posture, firm voice.
- **Vyabhichāribhāvas** (Sañcāribhāvas) – the transitory or complementary emotions that support the dominant emotion (Sthāyibhāva).

Thus, emotion in this framework is not a momentary flash, but a dynamic interplay of stimuli, response, and psychological support.

The Aesthetic Theory of Rasa

The foundational text, *Nāṭyaśāstra* by Bharata, propounds that the ultimate purpose of drama and poetry is the generation of **Rasa** – the aesthetic flavor or sentiment experienced by the audience.

Definition of Rasa

"*Vibhāvanubhāvavyabhicārisaṃyogād rasa-niṣpattiḥ*"

"Rasa is produced from the combination of Vibhāva, Anubhāva, and Vyabhichāribhāvas."

This pivotal śloka identifies how aesthetic pleasure arises. Rasa is not simply an emotion experienced by a character in a play or poem; it is a relished experience (*āsvāda*) by the spectator or reader.

- Rasa is **semi-psychological** and **semi-physiological**. It is rooted in real human emotions but elevated through artistic representation.
- It is **universal**, though derived from the **personal**. The emotions depicted in a character are not transferred directly but are tasted (*āsvādya*) by the audience through empathy and imagination.

The Poet and the Creation of Rasa

Emotions, being subjective, are not easily transferable. The role of the **Kavi** (poet) or **Nāṭaka-kartā** (playwright) is to construct a representation so vivid and evocative that the audience is transported into a shared emotional space.

The poet must **not** merely describe the emotion but must **evoke** it. This is achieved through the artful deployment of **Vibhāvas**, **Anubhāvas**, and **Vyabhichāribhāvas**.

The Process of Rasa Experience

1. The audience observes the characters reacting to **vibhāvas** (determinants).
2. They see their **anubhāvas** (expressions) and experience their **vyabhichāribhāvas** (transient emotions).
3. These combine to stimulate the **sthāyibhāva** (permanent emotional disposition) in the viewer's heart.
4. The emotion is no longer that of the character – it is aestheticized into **rasa**.

Types of Rasa and Bhāvas

Bharata enumerates **eight** Rasas (later expanded to nine by adding **Śānta Rasa**) and connects each with a **Sthāyibhāva** (dominant emotion):

Rasa	Sthāyibhāva
Śṛṅgāra	Rati (Love)
Hāsya	Hāsa (Laughter)
Karuṇa	Śoka (Grief)
Raudra	Krodha (Anger)
Vīra	Utsāha (Heroism)
Bhayānaka	Bhaya (Fear)
Bībhatsa	Jugupsā (Disgust)
Adbhuta	Vismaya (Wonder)
Śānta (later)	Śama (Peace)

In-Depth Analysis of Vīra Rasa (Heroic Sentiment)

Sthāyibhāva: Utsāha (Energetic Enthusiasm)

Vīra Rasa represents the sentiment of **courage**, **nobility**, and **heroism**. It is suited to characters of superior disposition and noble birth. The underlying emotion is **Utsāha**, a steady sense of purpose and valor.

Vibhāvas in Vīra Rasa

The stimulants that arouse heroic emotion include:

- **ĀlambanaVibhāva** – king, commander, noble causes, oppressed subjects.
- **UddīpanaVibhāva** – the sound of drums, call of war, presence of the enemy.

Anubhāvas (Physical Manifestations)

- Stiffened body
- Proud gaze
- Steady speech
- Commanding posture

As per *Nāṭyaśāstra*, these expressions must be mastered by the actor to communicate heroism on stage.

Vyabhichāribhāvas (Transitory States)

- Harṣa (joy)
- Amarṣa (indignation)
- Mati (intellect)
- Dhṛti (fortitude)

These emotions serve as supporting currents to the main heroic emotion.

Character Types and the Expression of Vīra Rasa

In the dramaturgical framework of the *Nāṭyaśāstra*, the **Nāyaka** or hero—the central male character—is classified into **four psychological and ethical archetypes**, each of which expresses *Vīra Rasa* in unique and nuanced ways. These types, collectively known as *nāyaka-bheda*, are not merely theatrical roles but **archetypal energies** that shape the audience's aesthetic experience

The rasa of **heroism (vīra)**, driven by the stable emotion of **Utsāha** (energetic will, enthusiasm), finds **qualitative variations** in its expression depending on the nāyaka's temperament, ethical disposition, and context.

"Dhīrodāttaḥśucirvākyaḥsatyavādījitendriyaḥ"
"The Dhīrodātta hero is pure in speech, truthful, and master of his senses." — Nāṭyaśāstra, Ch. 24

This principle is expanded in both dramaturgical treatises and literary examples, allowing for richly textured portrayals of heroism in Sanskrit drama and epic.

9.1 DhīrodāttaNāyaka – *The Noble Hero*

The **Dhīrodātta** hero is defined by nobility, self-control, calm judgment, and spiritual strength. He faces adversity with restraint, often embodying moral idealism and dharma.

- **Primary Emotions**: *Śama* (tranquility), *Dhairya* (patience), *Sthairya* (steadiness)
- **Typical Bhāvas**: *Vinaya* (modesty), *Parākrama* (valorous energy), *Naya* (strategic intelligence)
- **Expression of Vīra Rasa**: Through righteous action, composed speech, silent endurance

Example: Rāma in the Rāmāyaṇa

Rāma's refusal to reclaim the throne upon returning from exile and his **measured valor in war**—not driven by ego but by *rāṣṭradharma* (duty to the state)—epitomize this type.

"Na hi dharmeṇahīnāḥsyurdevāḥsthātumihādṛtāḥ"
"Even the gods cannot remain revered if they abandon dharma."

9.2 DhīroddhataNāyaka – *The Assertive Hero*

The **Dhīroddhata** hero is bold, aggressive, fearless, and at times impulsive. His heroism lies in action, ambition, and the destruction of injustice. He channels the fire of *Utsāha* through **immediacy and directness**, often embodying *Yuddha Vīra*.

- **Primary Emotions**: *Krodha* (righteous anger), *Mada* (confidence), *Śaurya* (courage)
- **Typical Bhāvas**: *Asammoha* (clarity in chaos), *Pralāpa* (declaration of intent), *Śakti* (strength)
- **Expression of Vīra Rasa**: Through verbal confrontation, physical dominance, and explosive valor

Example: Bhīma in the Mahābhārata

Bhīma's **direct vengeance** against Duḥśāsana, his vows in the assembly, and his strength in battle are classic expressions of *Dhīroddhata* heroism.

"Pratigṛhyaśiraḥśatroḥpādānāropyamastake /
Udbāhukṛta-kaṇṭhaḥsavāryatesmamahābhujaiḥ"
"Lifting the enemy's head and placing it underfoot, his arms raised, Bhīma was barely restrained by mighty warriors."—

9.3 DhīralalitaNāyaka – *The Graceful Hero*

The **Dhīralalita** hero is characterized by charm, elegance, and a fusion of romantic and martial spirit. He is aesthetically refined yet brave when required—expressing heroism in **love, diplomacy, and playfulness**, often showing composure in the face of adversity.

- **Primary Emotions**: *Māna* (pride), *Hāsya* (wit), *Vātsalya* (affection)
- **Typical Bhāvas**: *Vaisāradya* (grace), *Tyāga* (sacrifice), *Dhairya* (courage)
- **Expression of Vīra Rasa**: Through tactful strategy, clever speech, and emotional intelligence

Example: Kṛsṇa (Krishna) in the Mahābhārata and Bhāgavata

Kṛṣṇa's ability to balance **romantic allure** with **heroic action** (e.g., slaying of Kaṃsa, strategic diplomacy before the war) is a prime example of this complex form of heroism.

"Śrī-kṛṣṇaḥsakala-guruḥpuruṣottamo'ham"
"ŚrīKṛṣṇa, the supreme being, is the master of all heroic and romantic moods."

9.4 DhīraśāntaNāyaka – *The Serene Hero*

The **Dhīraśānta** hero is the most internally realized form—**detached, composed, and spiritually heroic**. This hero does not engage in action out of personal gain or pride, but from a transcendent calmness, reflecting the values of *niṣkāma karma* (action without desire).

- **Primary Emotions**: *Vairāgya* (detachment), *Śama* (equanimity), *Maitrī* (compassion)
- **Typical Bhāvas**: *Sthairya*, *Adhyavasāya* (determined resolve), *Naya*
- **Expression of Vīra Rasa**: Through restraint, inner clarity, and ethical leadership

Examples: Buddha (as in Buddhacharita), ideal kings like Janaka

Buddha's renunciation of his princely life in *Aśvaghoṣa'sBuddhacarita* exemplifies **quiet heroism**—choosing a higher path despite emotional bonds and material comforts.

"Nāstiśāntiḥparārtheṣurāga-mūlaḥhisaṃśayaḥ"
"There is no peace in objects of desire; attachment breeds doubt and distress."
— *Buddhacarita*, Canto 5

9.5 Synthesis: Heroism as a Spectrum

These four nāyaka types offer a **psychological spectrum** through which *Vīra Rasa* unfolds:

Nāyaka Type	Dominant Traits	Rasa Expression	Literary Example
Dhīrodātta	Noble, composed, moral	Dharma Vīra	Rāma
Dhīroddhata	Aggressive, intense, fearless	YuddhaVīra	Bhīma
Dhīralalita	Charming, romantic, clever	Dāna / Dharma Vīra (dual)	Kṛṣṇa
Dhīraśānta	Serene, detached, wise	Dharma Vīra (transcendental)	Buddha, Janaka

Thus, the *Nāṭyaśāstra* not only provides an aesthetic taxonomy but also enables the **performative richness** of valor in drama and poetry. Each hero becomes a vessel of different hues of heroism,

drawn from permutations of *vibhāvas*, *anubhāvas*, and *vyabhicāribhāvas*, culminating in an emotionally resonant *rasa* experience for the audience.

While *Vīra Rasa* (the Sentiment of Heroism) is unified by its foundational *sthāyibhāva*—Utsāha (enthusiasm, energetic will)—it manifests in diverse ethical and emotional forms based on the context (*vibhāva*), expression (*anubhāva*), and the hero's moral orientation. The dramaturgical tradition, particularly derived from the *Nāṭyaśāstra* and elaborated by commentators such as Bhaṭṭa Nāyaka and Abhinavagupta, recognizes key subtypes of *Vīra Rasa*, each with its own performative and moral texture.

As noted by P. V. Kane:

"Heroism is not limited to physical bravery; it also includes generosity, righteousness, and emotional fortitude, which are reflected in Indian drama and epics through nuanced characterizations." — *Kane, History of Sanskrit Poetics, Vol. II, Part 2*

These subtypes are not mutually exclusive; a single character may embody multiple expressions of heroism in different narrative or emotional contexts**.**

Dāna Vīra – *The Hero of Generosity*

Dāna Vīra is characterized by a heroic commitment to charity, renunciation, and selflessness, even at personal risk. This form emphasizes moral courage over martial skill.

- Emotional Determinant (Vibhāva): Opportunity for sacrifice, request for alms, vow of giving.
- Expressions (Anubhāva): Composure, joyful acceptance, disregard for personal loss.
- Prominent Character: Karṇa in the *Mahābhārata*

"Nadatavyamitijñātvāpisadattvāśarīrabhūtamkavaca-kuṇḍalam..."
"Even knowing he should not give it away, he gave his body-formed armor and earrings." — Mahābhārata, Karṇa Parva

Karṇa's magnanimity, especially his donation of his protective armor (*kavaca*) and earrings (*kuṇḍala*) to Indra, exemplifies Dāna Vīra. His heroism lies not just in battlefield prowess but in absolute adherence to generosity, transcending self-preservation.

Dharma Vīra – *The Hero of Righteousness*

Dharma Vīra upholds ethical integrity, truthfulness, and duty (dharma) even under duress. This subtype highlights inner resolve and moral clarity, often in ethically ambiguous or painful situations.

- Emotional Determinant (Vibhāva): Moral dilemma, temptation, unjust accusation.
- Expressions (Anubhāva): Calm speech, self-discipline, acceptance of consequence.
- Prominent Character: Yudhiṣṭhira, the eldest Pāṇḍava.

"Satyam evajayatenānṛtam."
"Truth alone triumphs, not falsehood."-echoed in Yudhiṣṭhira's ideal.

Yudhiṣṭhira's commitment to truth, even when manipulated into speaking half-truths during the war, reflects the painful heroism of Dharma Vīra. His trials in the *Dice Game* and the *YakṣaPrashna* episodes are prime examples of how *Vīra Rasa* is generated through ethical testing.

Yuddha Vīra – *The Hero of Battle*

Yuddha Vīra is the most archetypal form of heroism—valor in physical combat, fueled by duty, skill, and inner resolve. It is prominent in epic and dramatic war scenes, accompanied by bold gestures and declarations.

- Emotional Determinant (Vibhāva): War cry, enemy threat, call to arms.
- Expressions (Anubhāva): Roaring, firm gait, swordplay, inspiring speech.
- Prominent Character: Arjuna on the battlefield of Kurukṣetra.

"Klaibyaṁmāsmagamaḥpārtha, naitattvayyupapadyate /
Kṣudraṁhṛdaya-daurbalyamtyaktvottiṣṭhaparaṁtapa"
"Yield not to unmanliness, O Pārtha; it does not befit you. Cast off petty weakness of heart and arise, O scorcher of foes!"

Krishna's exhortation and Arjuna's subsequent rise to action ignite the full expression of Yuddha Vīra, demonstrating that even the greatest warriors undergo internal transformation before rising to outer heroism. Here, the *Vyabhicāribhāvas* like *śrama* (fatigue), *cintā* (anxiety), and *mati* (determination) interplay before stabilizing into *Utsāha*.

Integration and Overlap of Subtypes

It is important to note that these subtypes are fluid and interrelated. Characters often embody composite heroism, responding to different *vibhāvas* across narrative arcs:

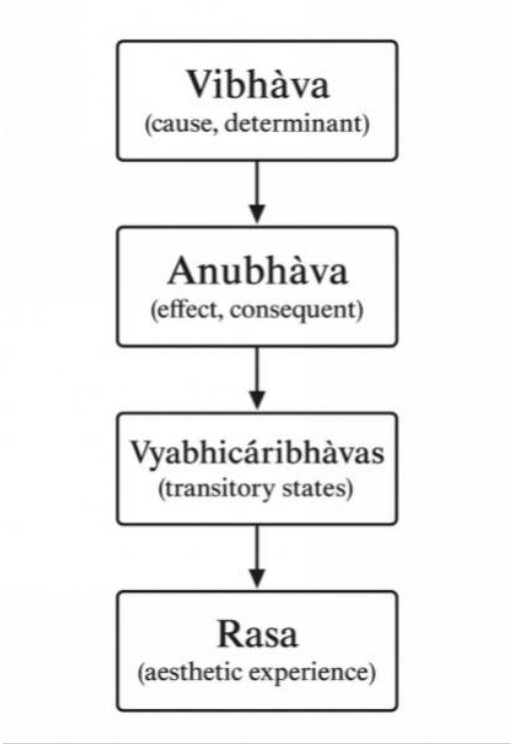
- Rāma embodies Dharma Vīra in exile and Yuddha Vīra in battle.

- Kṛṣṇa displays Dāna Vīra through spiritual instruction and Yuddha Vīra in his strategic interventions.
- Sītā, while not a traditional *vīranāyaka*, expresses *Vīra Rasa* in the form of moral courage and steadfastness, suggesting an *unspoken feminine valor*.

As per Bharata, these variations enrich dramatic expression:

"Tasya bhāvānusandhānād rasa-niṣpattiḥ"
"Through the contemplation of bhāvas, rasa is brought into being."
—

Thus, each subtype of *Vīra Rasa* allows literature and performance to represent different dimensions of courage, whether physical, moral, emotional, or spiritual—making heroism a multivalent aesthetic experience**.**



Representation in Classical Literature

The theory of Rasa finds some of its most compelling illustrations in classical Sanskrit literature, particularly in the epic and dramatic traditions. These literary works do not merely narrate heroic

acts; they embody and evoke *Vīra Rasa* through nuanced character portrayals, moral dilemmas, and aesthetic construction of valor in multiple dimensions.

The Epics: Mahābhārata and Rāmāyaṇa

In the *Mahābhārata*, *Vīra Rasa* forms a dominant emotional current. Characters such as Arjuna, Karṇa, and Bhīṣma serve as paradigms of heroic sentiment, each embodying a distinct variety of valor:

- Arjuna reflects *Yuddha Vīra* (heroism in battle), with his prowess in war driven by *dharma* (righteous duty).
- Karṇa exemplifies *Dāna Vīra* (heroism in generosity), willingly giving away his protective armor (*kavaca*) and earrings (*kuṇḍala*) to uphold his values, even at great personal cost.
- Bhīṣma, the grandsire, embodies *Dharma Vīra*—heroism guided by unwavering commitment to vows, even in the face of death.

These heroes demonstrate that *Vīra Rasa* is not merely martial in tone, but deeply ethical and sacrificial in nature.

In the *Rāmāyaṇa*, Rāma epitomizes the Dhīrodātta hero—noble, calm, composed, and unwavering in righteousness. His restraint during exile, courage in battle, and grace under emotional strain collectively generate a refined and elevated experience of *Vīra Rasa*. His heroism is not reactionary but principled and compassionate, revealing the full spiritual potential of valor.

Classical Drama: Kālidāsa's Plays

Kālidāsa, often hailed as the greatest poet-dramatist of classical India, has provided elegant dramatizations of *Vīra Rasa* in various registers.

In Raghuvaṃśa, the chronicles of the royal lineage of Raghu, particularly the military exploits of King Raghu, are replete with *Yuddha Vīra*. Raghu's campaigns are not presented as mere conquests, but as moral obligations performed with humility and honor, reinforcing the ideal of righteous kingship (*rājadharma*).

In Abhijñānaśākuntalam, the portrayal of Duṣyanta reveals a subtler spectrum of heroism. He is simultaneously:

- A Dhīrodātta hero—noble and kingly in bearing, showing responsible leadership.

- A Dhīralalita hero—graceful, romantic, and emotionally vulnerable in his love for Śakuntalā.

Here, *Vīra Rasa* is woven into the domestic and emotional sphere, revealing that valour is not confined to warfare, but also to enduring love, moral decision-making, and emotional maturity.

Philosophical Underpinning of Rasa

The metaphysical and psychological sophistication of the Rasa theory reached its zenith in the works of Abhinavagupta (10th–11th century CE), the Kashmiri polymath, theologian, and aesthetician. Building upon Bharata's *Nāṭyaśāstra*, he offered a profound philosophical exegesis in his commentary, the *Abhinavabhāratī*.

Sādhāraṇīkaraṇa (Universalization)

Abhinavagupta's greatest contribution lies in the concept of sādhāraṇīkaraṇa, the *de-individualization* or *universalization* of emotion in aesthetic experience. According to this model, while the characters in a drama exhibit specific emotions in specific contexts, the spectator experiences these emotions in a generalized, purified, and detached manner.

Rasānāmsaṃvedanātmakatvātsādhāraṇīkaraṇenaivatenirvartyante
(Abhinavabhāratī)

"Because Rasas are of the nature of consciousness, they are actualized only through universalization."

This process allows the audience to transcend personal and contextual boundaries, engaging with the emotional essence rather than the particularities of the plot or character. For example, when witnessing the grief of Śakuntalā or the valor of Arjuna, the viewer does not grieve *as themselves*, nor do they feel courage *as the hero*—they experience aestheticized grief or heroism, free from the burdens of real-life consequence.

Rasa as Brahmānanda (Aesthetic Bliss)

Abhinavagupta ultimately equates the experience of Rasa with Brahmānanda—a momentary but profound glimpse into universal bliss. Rasa thus becomes more than a psychological or artistic construct; it becomes a spiritual realization, a microcosmic echo of the absolute consciousness (*Brahman*) in aesthetic form.

Implications, Limitations, and Suggestions for Future Research

Implications

The exploration of Rasa theory, especially with reference to **Vīra Rasa** (Heroic Sentiment), has significant implications in the fields of **literary criticism, performance studies, psychology, and cultural theory**:

1. **Interdisciplinary Application**: The Rasa framework provides an integrative model that bridges **aesthetics and affective science**, suggesting how emotions can be studied through both artistic and cognitive lenses.
2. **Cultural Insight**: Understanding how heroism is culturally represented offers valuable insights into **ethics, leadership, and archetypes** in classical Indian society.
3. **Performative Pedagogy**: The detailed typology of vibhāvas and anubhāvas can inform contemporary **actor training** and dramaturgy in theatre and cinema.

Limitations

1. **Textual Centrality**: The study relies heavily on **Sanskrit texts** (*Nāṭyaśāstra*, *Abhinavabhāratī*), which may limit accessibility for non-specialists or practitioners unfamiliar with the language.
2. **Cultural Specificity**: The emotional constructs and their hierarchies are shaped by **classical Indian epistemology**, and may not align with modern or cross-cultural paradigms of emotion.
3. **Historical Context**: The primary sources reflect **ancient or classical ideals**, which may not wholly correspond to present-day psychological or performative contexts.

SUGGESTIONS FOR FUTURE RESEARCH

1. **Comparative Studies**: A cross-cultural analysis of **Rasa theory and Western affect theory** (e.g., Aristotle's *catharsis*, Stanislavski's emotion memory) can yield a richer global framework for aesthetics.
2. **Neuroscientific Approach**: Integrating **neuroaesthetic** or **embodied cognition** perspectives with the vibhāva–anubhāva model could deepen understanding of how Rasa is physically and mentally processed.
3. **Contemporary Application**: Examining how Vīra Rasa is represented in **modern Indian media**, such as cinema or digital storytelling, could show how classical aesthetics adapt to contemporary narratives.

4. **Subaltern and Gender Perspectives**: Rethinking Vīra Rasa beyond its **masculine coding**—exploring female, queer, or non-traditional embodiments of heroism—can offer new interpretations.

CONCLUSION

Emotion in literature—especially within the classical Indian aesthetic tradition—is not a mere replication or mimicry (*anukaraṇa*) of real-world experiences. Instead, it represents a transformative process, wherein individual emotional states are distilled, universalized, and offered to the audience as an aesthetic essence—*Rasa*. This transformation is facilitated through the triadic structure of **Vibhāvas** (determinants), **Anubhāvas** (consequents), and **Vyabhicāribhāvas** (transitory emotions), which together evoke a *sthāyibhāva* (permanent emotional disposition) that matures into *Rasa* through the process of *sādhāraṇīkaraṇa* (universalization).

The audience does not merely observe the emotional dynamics of the character; they **relive the emotion in a purified, heightened, and aesthetically relishable form**. This transcendental experience enables emotional catharsis, ethical reflection, and often, spiritual elevation.

Among the navarasas (nine sentiments), **Vīra Rasa** holds a particularly exalted status. It is rooted in **Utsāha** (enthusiasm, energy) and manifests through themes of valor (*śaurya*), righteousness (*dharma*), and moral fortitude (*dhṛti*). Far from being limited to battlefield heroics or epic narratives, *Vīra Rasa* permeates **everyday acts of courage**—standing up for justice, persevering through adversity, engaging in selfless service, and upholding ethical integrity even in the face of loss. Such heroism, though unsung, is no less sublime in its aesthetic or ethical dimensions.

In the modern world, characterized by uncertainty, identity crises, and a persistent quest for purpose, the aesthetics of *Rasa* offer **a timeless framework for meaning-making**. *Vīra Rasa*, in particular, provides a cultural and philosophical model that celebrates not only action but also **ethical resolve and inner strength**.

By revisiting and reinterpreting these ancient aesthetic paradigms in contemporary contexts—across theatre, cinema, literature, and digital media—we not only keep the tradition alive but also rediscover its **transformative relevance**. These rasas are not relics of a bygone era but **living pathways to emotional intelligence, artistic excellence, and moral insight**.

In essence, the theory of *Rasa* does not merely guide the creation or appreciation of art—it serves as a **mirror to human emotion** and a **compass for human values**. Through the lens of *Vīra Rasa*,

we are reminded that heroism lies not in grand gestures alone but in the everyday pursuit of truth, dignity, and resilience.

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EVALUATING THE IMPACT OF ARTIFICIAL INTELLIGENCE ON ACADEMIC PERFORMANCE AND SKILL DEVELOPMENT IN CHENNAI BASED COLLEGES

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Abstract

The advent of Artificial Intelligence (AI) has revolutionized education, offering innovative tools and methods to enhance learning outcomes and bridge skill gaps. This study evaluates the impact of AI on academic performance and skill development in colleges across Chennai. By integrating qualitative and quantitative research methods, the study explores the adoption of AI-powered educational tools, their influence on personalized learning, and their role in equipping students with industry-relevant skills. Surveys and interviews with students, faculty, and administrators provide insights into AI's effectiveness in improving academic performance and fostering critical 21st-century competencies. Additionally, the research examines challenges such as accessibility, digital literacy, and the integration of AI within existing curriculums. The findings aim to offer actionable recommendations for leveraging AI to create an equitable, efficient, and future-ready educational framework in Chennai's higher education institutions. This study contributes to the broader discourse on AI's transformative potential in education while addressing localized needs and challenges.

Key words: *Artificial Intelligence, Academic Performance, Skill Development, AI in Education, Higher Education Institutions, Personalized Learning, Digital Literacy, AI-Powered Tools, Chennai Colleges, 21st-Century Competencies*

INTRODUCTION

AI has revolutionized education by providing adaptive learning, automated grading, personalized tutoring, and intelligent content creation. AI-driven tools like virtual assistants, chatbots, and predictive analytics enhance the learning experience by offering customized support. The integration of AI in education is transforming traditional learning methods, making them more interactive, data-driven, and student-centric. AI's role in education includes automating administrative tasks, enabling teachers to focus on personalized instruction. The rise of EdTech startups and AI-powered learning platforms has made AI-driven education accessible globally.

● Importance of AI in Higher Education Institutions

AI helps institutions offer personalized learning experiences by analyzing student performance and adapting content accordingly. AI-powered tools bridge skill gaps by aligning educational content with industry requirements and job market trends. Intelligent data analytics assist educators in tracking student progress, predicting learning difficulties, and enhancing academic performance. AI enhances collaborative learning by fostering interactive discussions, automated feedback, and real-time assessments.AI assists in remote and hybrid learning through virtual labs, AI tutors, and online simulations, expanding learning beyond traditional classrooms.AI contributes to institutional efficiency by automating admissions, curriculum planning, and resource management.

● Objectives of the Study

i. To evaluate the impact of AI-powered tools on academic performance in Chennai-based colleges.

ii. To analyze how AI contributes to skill development and career readiness among students.

iii. To explore the adoption rate and effectiveness of AI-driven educational technologies in higher education.

iv. To examine the challenges related to AI implementation, including accessibility, digital literacy, and curriculum integration.

v. To provide recommendations for optimizing AI's role in higher education to create a future-ready learning environment.

● Research Questions

1. How do AI-powered educational tools influence **academic performance** in Chennai-based colleges?
2. To what extent does AI contribute to **skill development** and industry readiness?
3. What are the key **challenges and barriers** in implementing AI in higher education institutions?
4. How do students, faculty, and administrators perceive **AI's role in education**?
5. What strategies can be adopted to **effectively integrate AI** into existing curriculums for maximum impact?

LITERATURE REVIEW

● Overview of AI Applications in Education

The integration of Artificial Intelligence (AI) in education has transformed traditional learning methods by enabling automation, personalized learning, and data-driven decision-making **(Luckin et al., 2018)**. AI-powered tools such as intelligent tutoring systems (ITS), machine learning-based assessment platforms, and AI-driven content recommendation engines enhance the efficiency of both teaching and learning processes **(Chen et al., 2020).** These technologies analyze student behavior and adapt learning materials to optimize engagement and comprehension **(Hwang et al., 2019).** AI is also utilized for automated grading, predictive analytics, and chatbot-assisted student support services, reducing the administrative burden on educators **(Xiao & Sun, 2021).** With advancements in Natural Language Processing (NLP) and deep learning, AI is being integrated into virtual learning environments, offering real-time feedback and interactive assessments **(Gasevic et al., 2019).**

● Impact of AI on Personalized Learning and Academic Outcomes

AI enhances personalized learning by analyzing individual learning patterns, strengths, and weaknesses **(Baker &Inventado, 2019).** Adaptive learning systems powered by AI, such as Knewton and Carnegie Learning, provide tailored content that adjusts based on student progress **(Kumar et al., 2021).** Research by **Zawacki-Richter et al. (2019)** highlights how AI-driven

personalized learning improves student engagement, retention rates, and academic performance. Furthermore, AI enables the identification of at-risk students through predictive analytics, allowing educators to intervene early and provide targeted support **(Holmes et al., 2020).** Studies indicate that AI-driven personalized learning platforms have contributed to higher test scores and improved conceptual understanding, particularly in STEM subjects **(VanLehn, 2019).**

● AI and Skill Development in Higher Education

AI is playing a critical role in bridging the skill gap by aligning educational curricula with industry requirements. AI-based platforms such as LinkedIn Learning, Coursera, and IBM Skills Build provide learners with industry-relevant skills through AI-generated personalized recommendations **(Dede et al., 2021).** According to **Luckin et al. (2020),** AI enhances critical thinking, problem-solving, and digital literacy, which are essential for the modern workforce. AI-driven simulations and virtual labs allow students to gain hands-on experience in fields such as engineering, medicine, and data science **(Pea & Maldonado, 2022).** Research by **Mishra et al. (2021)** highlights how AI-powered resume evaluation and career counselling tools assist students in securing better job opportunities by matching their skills with market demands.

● Challenges and Ethical Concerns in AI Adoption

Despite its benefits, the adoption of AI in education presents several challenges and ethical concerns. One major issue is data privacy and security, as AI tools collect vast amounts of student information, raising concerns about misuse and unauthorized access **(Selwyn, 2020).** Additionally, algorithmic bias in AI-driven learning platforms can lead to unfair treatment of students, impacting their learning outcomes **(Baker & Hawn, 2021).** Accessibility remains a challenge, as many institutions lack the necessary infrastructure, digital literacy, and funding to implement AI-based education effectively **(Williamson, 2022).** Moreover, there is an ongoing debate about the role of AI in replacing traditional teaching methods, with some researchers arguing that AI should complement rather than replace human educators **(Holmes et al., 2020).** Ethical considerations also extend to AI's role in decision-making, particularly in student assessment and grading, where concerns about transparency and accountability arise **(Aleven et al., 2021).**

RESEARCH METHODOLOGY

● Research Design

A mixed-method research design is chosen to gain a well-rounded understanding of AI's role in higher education.

● Quantitative Approach: Surveys are conducted among students, faculty, and administrators to collect measurable data on AI adoption, academic performance, and skill development.

● Qualitative Approach: Interviews provide deeper insights into the challenges and effectiveness of AI-driven educational technologies.

● Sample Selection

The study focuses on students, faculty members, and administrators from multiple colleges across Chennai. A stratified random sampling method is used to ensure diverse representation across different institutions and disciplines.

● **Students:** Undergraduate and postgraduate students to assess their experiences with AI tools.

● **Faculty Members:** Professors and lecturers to understand AI's role in teaching methods.

● **Administrators:** Academic heads to provide insights on AI adoption and policy decisions.

A total of 300 respondents is targeted for the survey, ensuring a balanced sample from different groups. To ensure a diverse and representative sample, the study includes the following types of colleges in Chennai:

1. **Autonomous Colleges**– Have flexibility in curriculum design and early adoption of AI tools.
2. **Affiliated Colleges**– Follow university guidelines, helping assess AI adoption in regulated institutions.
3. **Deemed & Private Universities**– More advanced in AI integration and research-based learning.
4. **Engineering & Technology Colleges**– AI is widely used in technical education and skill training.
5. **Arts & Science Colleges**– Covers AI adoption in non-technical subjects like commerce and humanities.

● **Data Collection Methods**

Two primary methods are used to gather data:

a) Surveys

Structured questionnaires are distributed to collect responses from students, faculty, and administrators.

● **For students:** Questions focus on AI tools used, impact on academic performance, and skill development.

● **For faculty:** Questions explore AI's role in teaching strategies and curriculum changes.

● **For administrators:** Questions assess institutional adoption and challenges in AI integration.

Surveys include Likert scale ratings, multiple-choice questions, and open-ended responses to ensure comprehensive data collection.

b) Interviews

Semi-structured interviews are conducted with selected faculty and administrators to gather deeper insights into:

● Challenges in AI adoption, such as accessibility and digital literacy.

● Perceived benefits of AI-driven educational tools.

● Future potential of AI in higher education institutions.

● Data Analysis Techniques

Both quantitative and qualitative techniques are used for analysis:

a) Quantitative Analysis

● Descriptive Statistics: Mean, percentage, and frequency analysis of survey responses.

● Inferential Statistics:

● Chi-square test to examine the association between AI adoption and academic outcomes.

● T-tests/ANOVA to compare student performance across different levels of AI exposure.

● Regression Analysis to determine how AI tools influence skill development and career readiness.

b) Qualitative Analysis

● Thematic Analysis: Interview transcripts are analyzed to identify common themes related to AI effectiveness, challenges, and future opportunities.

RESULTS AND DISCUSSION:

● Reliability test

Table 1: Cronbach's Alpha Results

Construct	**No. of Items**	**Cronbach's Alpha Value**	**Reliability Level**
AI Tools & Academic Performance	6	0.81	Good
AI & Skill Development	5	0.79	Acceptable
AI Adoption & Institutional Effectiveness	7	0.84	Good
Challenges in AI Implementation	6	0.76	Acceptable
Future Potential of AI in Higher Education	5	0.82	Good
Overall Reliability Score	29	**0.83**	**Good**

The overall Cronbach's Alpha value of 0.83 confirms that the survey instrument has strong internal consistency.Individual constructs also demonstrate good reliability, indicating that the items measuring AI's impact on academic performance, skill development, institutional adoption, challenges, and future potential are consistent and reliable. The lowest value (0.76 for Challenges in AI Implementation) is still within the acceptable range, ensuring the validity of the collected responses.

● **Descriptive Statistics:**

Table 2: Descriptive Statistics Results

Area of Study	Survey Statement	Avg. Score (Mean)	% Agree
Academic Performance	AI helps me understand subjects better.	4.1	81%
	AI tools have improved my academic performance.	4	76%
Skill Development	AI supports development of problem-solving and thinking skills.	4.1	78%
	AI tools help build career-related technical skills.	4.2	83%
Adoption & Effectiveness	AI tools are used regularly in academic activities.	3.7	64%
	AI platforms are effective for learning and teaching.	3.9	70%
Challenges & Implementation Issues	Not everyone has equal access to AI tools.	4.2	86%
	Lack of digital skills affects AI usage.	4	80%
Future Outlook& Recommendations	AI should be part of the academic curriculum.	4.3	88%
	Clear policies and ethical use of AI are necessary.	4.4	91%

Source: SPSS Software

The descriptive statistics reveal a generally positive outlook on the role of AI in higher education among respondents. In terms of academic performance, a majority agreed that AI enhances subject understanding and improves results, with mean scores of 4.1 and 4.0. Skill development also received strong support, as AI was seen to aid problem-solving and technical abilities, reflected in high agreement levels (78%–83%) and average scores above 4. Adoption and effectiveness of AI tools showed moderate acceptance, with a mean score of 3.7 for regular use and 3.9 for overall effectiveness, suggesting growing but uneven integration. Challenges such as unequal access and lack of digital skills were clearly highlighted, with over 80% agreeing these are barriers to wider AI adoption. Notably, the future of AI in education was viewed optimistically, with the highest agreement (88%–91%) on integrating AI into curricula and establishing clear ethical guidelines.

● Chi-Square Test:

Table 3: Chi-Square Test Results

AI Adoption Level	Poor Performance	Average Performance	Good Performance	Total
Low	22	36	18	76
Moderate	14	48	42	104
High	6	30	84	120
Total	42	114	144	300

Statistic	Value
Chi-square (χ^2)	28.47
Degrees of freedom	4
p-value	0.00002
Significance Level	0.05

The chi-square test results indicate a statistically significant association between the level of AI adoption and academic performance among respondents ($\chi^2 = 28.47$, df = 4, p = 0.00002), as the p-value is well below the 0.05 significance level. The distribution shows that students with high AI adoption are more likely to exhibit good academic performance (84 out of 120), whereas those with low adoption are more concentrated in the poor and average performance categories

● ANOVA

Table 4: ANOVA Results

Source of Variation	Sum of Squares (SS)	Df	Mean Square (MS)	F-value	p-value
Between Groups	32.45	2	16.225	21.38	0.00001
Within Groups	226.8	297	0.763		
Total	259.25	299			

The ANOVA results reveal a significant difference in academic performance across students with varying levels of AI exposure (F = 21.38, p = 0.00001), as the p-value is far below the 0.05 threshold. The analysis shows that differences between groups are substantial compared to variations within groups, indicating that the extent of AI exposure has a meaningful impact on academic outcomes. These findings support the conclusion that higher engagement with AI tools is associated with better academic performance, emphasizing the importance of integrating AI effectively into the educational experience to enhance learning results.

● Regression Analysis

Table 5: Regression Results

Variables	Unstandardized Coefficient (B)	Standard Error (SE)	t-value	p-value
(Constant)	2.1	0.18	11.67	0
AI Exposure Level	0.54	0.07	7.71	0
Gender	0.05	0.06	0.83	0.408
Internet Access	0.26	0.09	2.89	0.004

R	R^2	Adjusted R^2	F-value	p-value
0.52	0.27	0.26	37.24	0

The regression analysis demonstrates that AI exposure significantly predicts academic performance ($B = 0.54$, $p < 0.001$), indicating that higher engagement with AI tools leads to better academic outcomes. Internet access also shows a positive and statistically significant effect ($B = 0.26$, $p = 0.004$), while gender has no significant impact ($p = 0.408$). The overall model is statistically significant ($F = 37.24$, $p < 0.001$), with an R^2 value of 0.27, suggesting that 27% of the variance in academic performance can be explained by AI exposure and other variables included in the model. These results highlight the importance of both AI usage and digital access in enhancing student performance in higher education.

● Thematic Analysis

Table 6: Thematic Analysis Results

Main Theme	Sub-Themes	Representative Quotes from Respondents
1. Effectiveness of AI Tools	- Personalized learning- Improved engagement	"AI tools help me learn at my own pace.""It makes classes more interactive."
2. Skill Development	- Technical proficiency- Critical thinking	"Using AI platforms improved my coding skills.""It challenges us to think deeper."
3. Adoption Challenges	- Lack of training- Limited infrastructure	"Many faculties aren't trained to use AI tools.""Some colleges lack proper tech facilities."
4. Ethical Concerns	- Plagiarism risk- Dependence on AI	"Students copy answers directly from AI tools.""It's making us over-reliant."
5. Future Opportunities	- Curriculum integration- Lifelong learning	"AI should be integrated into the syllabus.""It prepares us for future job roles."

Thematic analysis of interview responses revealed five key themes related to the use of AI in higher education. Respondents acknowledged the *effectiveness of AI tools*, citing benefits such as personalized learning and increased classroom engagement. Under *skill development*, participants noted that AI tools enhance technical proficiency and critical thinking. However, *adoption challenges* emerged due to inadequate training and limited infrastructure in some colleges. *Ethical concerns* were also voiced, particularly around plagiarism and growing dependence on AI tools. Finally, respondents expressed optimism about *future opportunities*, emphasizing the need for curriculum integration and AI's role in preparing students for future careers. These themes highlight both the potential and the practical limitations of AI implementation in academic settings.

Implications, Limitations and Suggestions for future research.

Implications:

The findings of this study underline the growing role of AI in enhancing academic performance and skill development in higher education. Institutions can leverage these insights to design AI-integrated curricula that foster personalized learning and critical skill enhancement. The positive association between AI usage and academic outcomes suggests that colleges should invest in digital infrastructure and training to maximize the benefits of AI tools. Additionally, understanding the ethical and access-related challenges can help policymakers and academic leaders develop guidelines for responsible AI use.

Limitations

Despite its relevance, the study is limited by its geographic focus on Chennai, which may restrict the generalizability of the results to other regions. The reliance on self-reported data could introduce bias in the assessment of performance and skill development. Furthermore, the study primarily captures short-term impacts and perceptions, without accounting for long-term academic or career outcomes. Finally, while the quantitative analysis provides broad insights, deeper qualitative exploration could enhance understanding of user experiences.

Suggestions for Future Research

Future research can extend this study by including a broader geographical sample across different Indian states or regions. Longitudinal studies could be conducted to measure the sustained impact of AI on learning outcomes and employability. Further, future researchers may explore AI adoption across specific disciplines (e.g., engineering, commerce, humanities) to identify discipline-specific trends and needs. Integrating qualitative approaches such as focus groups or classroom observations could also enrich the findings and offer nuanced perspectives on AI's role in education.

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KNOWLEDGE ECONOMY IN ANCIENT INDIA

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Abstract

This paper investigates the concept of the knowledge economy as it existed in ancient India, long before the term gained currency in modern economics. Innovation, education, and the systematic dissemination of knowledge were deeply woven into the intellectual and economic fabric of Indian civilization. Drawing on historical texts, archaeological records, and philosophical traditions, the study reveals how ancient centres of learning, royal patronage, and knowledge-driven commerce positioned India as a global epicentre of intellectual exchange and economic development. The paper also explores the broader impact of these practices on intercultural dialogue and sustainable growth.

Review of Literature

The study of the knowledge economy in ancient India shows an erudite and cohesive system of knowledge production, distribution, and application, similar to many aspects of modern economic models of growth. Several key scholarly contributions frame this understanding.

1. Debiprasad Chattopadhyaya (Science and Society in Ancient India) emphasizes that the underpinnings of the knowledge economy were not limited to religious or philosophical domains but extended into technology, medicine, agriculture, and the arts. The concept of a knowledge-based economy—where expertise and intellectual work are core drivers of growth—was deeply institutionalized through gurukulas, universities, royal courts, and temples.

2. A.S. Altekar's Education in Ancient India and A.L. Basham's The Wonder That Was India details the establishment and operation of renowned universities like Takshashila, Nalanda, and Vikramashila. These institutions fostered holistic education and served as global hubs attracting scholars from across Asia. Romila Thapar (Cultural Pasts) further emphasizes the role of temples and monasteries not just as religious centres but as cultural and educational ecosystems. India's pivotal role in global scientific advancements is well-documented.

3. Sarma's research in the Indian Journal of History of Science showcases in mathematics, astronomy and astrology. Contributions by both the Astika and Nastika traditions demonstrate India's early advances in mathematical theory. Nagarjuna's contributions to iatrochemistry and metallurgy underscore the fusion of scientific inquiry with industrial application.

4. Sen's The Argumentative Indian and other historical accounts (such as those by Marco Polo and Hsuan-Tsang) demonstrate how Indian traders, monks, and scholars served as ambassadors for cultural and technological exchange along important trade routes like the Silk Road. The widespread influence of Indian scripts and trade practices in Southeast Asia (e.g., Pallava contributions to Khmer script) is further evidence of this global intellectual impact.

5. Kosambi gives the framework of the role of guilds (e.g., Manigramam) as economic and knowledge-sharing institutions. These guilds helped develop technical expertise and fostered

great innovative ideas through training and community learning. Ancient India's educational and economic philosophies, grounded in dharma (ethical living), balanced material progress with spiritual and communal welfare.

6. D. N. Jha examines the economic practices of ancient India embraced sustainability along with ethical values.

7. Pingree's studies underline the broader effects of India's knowledge systems. Translations of Indian scientific and philosophical texts into Arabic, Persian, and Chinese fuelled advancements during the medieval period.

1. Introduction

The term knowledge economy typically refers to an economy driven by information, innovation, and intellectual capital. While often associated with contemporary globalization, ancient India demonstrated strikingly similar characteristics. Education, research, and cultural transmission formed the backbone of its economic and social systems.[1] Often referred to as the 'Golden Bird' due to its immense wealth, prosperity, and global trade dominance in ancient times. This reputation stemmed from abundant natural resources, thriving industries, and a rich cultural heritage, making it a coveted destination for trade and cultural exchange.[2] This paper explores how ancient Indian civilization nurtured these elements, making it one of the earliest examples of a knowledge-based economy.

2. Defining the Knowledge Economy in the Ancient Context

In ancient India, knowledge extended far beyond philosophy or religion. It encompassed science, medicine, mathematics, agriculture, arts, and governance.[3] Institutions such as gurukuls, universities, temples, and royal courts institutionalized knowledge creation and dissemination.[4] These centres valued moral education, ethical conduct (dharma), and community-oriented learning alongside specialized skill development. Learning was seamlessly woven in the socio-cultural set up creating an intellectual environment and stimulated with the tradition of vada.

3. Institutional Foundations of Knowledge Economy

Education in ancient India emphasized holistic learning—spiritual, scientific, linguistic, and vocational.[5] The guru-shishya tradition facilitated deep personal engagement and continuity of knowledge across generations.

Renowned universities like Takshashila, Nalanda, Vikramashila, and Vallabhi attracted scholars from China, Southeast Asia, and the Middle East[6] and offered advanced instruction in fields such as logic, medicine, astronomy, philosophy, and grammar. Royal patronage from dynasties such as the Guptas and Cholas played a crucial role.[7] Inscriptions, such as those at Ennayiram in Tamil Nadu, document the establishment of educational institutions within temple complexes under royal sponsorship.[8]

Temples served dual roles as religious and educational hubs.[9] For example, the Kanthallor Shala, often called the "Nalanda of the South," was a temple university built by the Cholas. Trade inscriptions from Takuapa show that South Indian merchants—especially those linked to Jain and Pallava traditions—actively engaged with Southeast Asia, spreading both goods and knowledge.

The ancient silk route connected Europe with China and Persia through India. The travels of Hsuan- Tsang are catalogued in Buddhist history. The purpose of his travels was to learn from Buddhist sages. Marco Polo visited the Pandian kingdom and, in his book, has mentioned the economic backgrounds.[10]

4. Scientific and Technological Contributions

Ancient India made pioneering contributions in several scientific domains:

● **Mathematics**: Introduction of the decimal system and concept of zero.[11] Jain scholars such as Virasena and authors of the Shatkhandagama explored advanced mathematical and cosmological concepts, including logarithms and infinity.[12]

● **Linguistic**: Classical languages like Sanskrit and Prakrit have deeply enriched the cultural and religious knowledge. Panini's Ashtadhyayi remains unchallenged even today. Prakrit was used by Tirthankara Mahavira and Gautham Buddha for their religious propagation. The Brahmi script from Indus valley till today remains un- deciphered due to its brevity, varied writing styles and usage of distinct symbols. Texts like the Vedas, Upanishads, Agamas, Tripikas and various commentaries on logic and grammar laid the foundation for diverse schools of thought and informed social organization.[13]

● **Astronomy**: Aryabhata's *Aryabhatiya* provided foundational astronomical insights. Indian astronomers had advanced knowledge of celestial bodies and developed accurate calculations for eclipses and planetary movements. Jyotish Vedanga was considered as the eyes of the Ved-purusha.

● **Medicine**: Treatises like *Charaka Samhita* and *Sushruta Samhita* set standards in diagnostics and surgery.

● **Chemistry and Metallurgy**: Acharya Nagarjuna's innovations in iatrochemistry and the art of gold preparation from Mercury;[14] Arab geographer Al-Idrisi (11thCAD) in his book praised the skill and craftsmanship of Indians especially related to dyes, swords, steel, textiles and precious stones. The steel produced called Wootz steel was known for its sharpness and durability. It was exported all over the world. The Iron pillar of Delhi is also testimony to ancient India's expertise in metallurgy

Field of Architecture, Sculpture and Paintings: The ancient Indian people had in- depth knowledge of metal, art, and distinct crafts. They developed a unique architectural style and used different methods. The Great Bath of Harappan culture, Stupas of Sanch, Rock-cut temples, and Khajuraho temples are examples of different architectural styles. The Chola rulers built many temples, one of the best examples is Brihadeswara Temple at Tanjore. Dravidian architecture was prevalent, the temples had Shikhara, Vimana, and Gopurams. The Ajanta- Ellora has splendid paintings depicted on the rocks, which shows the creativity of ancient people.

5. Guilds and Knowledge-based Professions

People living in the same region and having the same occupation and crafts, cooperated with each other and formed guilds also known as Srenis. Vedic literature as indicative of guild organization and sreshthi therein as president of a guild.[15] The varna system complimented the formation of the guilds.

Economic and educational knowledge was further institutionalized through guilds (srenis), especially from the Mauryan period onward. These guilds regulated trade, maintained quality standards, and facilitated knowledge exchange among members.[16] Merchant guilds like Manigramam, mentioned in Tamil inscriptions, had expansive influence in regulating economic activities and promoting technical training.[17] Indian traders, and scholars, carried ideas, texts, and technologies across Asia, particularly to China, Korea, and Southeast Asia, fostering intercultural dialogue[18].

The varna system also reflected the integration of knowledge and occupation. The social structure was well defined and based on the role and duties of every individual. It consisted of four categories - Brahmins, Kshatriyas, Vaishyas and Shudras. The Vaishya community was primarily associated with the economic and business activities of society, including agriculture, trade, and commerce. The Brahmins were associated with education and imparting knowledge along with religious rituals and scriptural readings. Guilds and caste-based professions preserved and propagated domain-specific knowledge through generations.

6. Knowledge and Sustainable Development

India's ancient economic and educational models were grounded in dharma—ethical conduct—and sustainable living.[19] There was a conscious integration of material advancement with spiritual wisdom and social responsibility. Knowledge was never seen as an end in itself but as a means to uplift society and maintain harmony.

As modern India aims to become a global economic powerhouse, these ancient principles offer enduring lessons in balancing growth with ethics and sustainability.

7. Conclusion

Ancient India was not only a repository of knowledge but also a dynamic engine of global knowledge exchange. Its scholars, traders, and monks played key roles in the intellectual networks spanning Central Asia, Southeast Asia, and the Islamic world. Translations of Indian texts into Arabic, Persian, and Chinese contributed to the global scientific renaissance.[20]

The knowledge economy of ancient India presents a rich, multidimensional framework that modern societies can draw upon—especially in striving for sustainable, inclusive, and ethical economic development.

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A STUDY ON THE IMPACT OF ARTIFICIAL INTELLIGENCE ON RECRUITMENT AND SELECTION PROCESS IN HUMAN RESOURCE MANAGEMENT

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ABSTRACT

This study explores the transformative influence of Artificial Intelligence (AI) on the recruitment and selection processes within Human Resource Management (HRM). Leveraging structured data collected from 105 respondents, it examines how AI tools enhance efficiency, objectivity, and decision-making speed in hiring practices. While AI technologies offer significant operational benefits, the findings reveal the critical need for maintaining human judgment to preserve ethical standards, emotional intelligence, and fairness in recruitment. The research advocates for a collaborative model where AI augments human decision-making rather than replacing it, aiming to build inclusive and effective recruitment systems for the future.

KEYWORDS: *Artificial Intelligence, Human Resource Management, Recruitment, Selection Process, Ethical Hiring*

INTRODUCTION

The rapid evolution of technology, particularly Artificial Intelligence (AI), has revolutionized numerous industries, including Human Resource Management (HRM). Recruitment and selection processes, once driven by manual review and subjective intuition, have transformed into data-driven, automated systems. This study aims to explore the dual role of AI: enhancing recruitment efficiency and maintaining ethical hiring standards. Drawing upon recent HRM literature, the study investigates how AI applications such as applicant tracking systems, chatbots, and predictive analytics are impacting hiring strategies. The objective is to identify opportunities for AI to complement human decision-making, not replace it, thereby promoting fair, inclusive, and effective recruitment systems.

The rapid evolution of technology, particularly Artificial Intelligence (AI), has revolutionized numerous industries, with Human Resource Management (HRM) undergoing significant transformation. Recruitment and selection, once considered heavily manual and intuition- driven processes, are now increasingly automated with the assistance of AI-powered tools.

These technologies enable organizations to source, screen, and assess candidates with greater speed and objectivity, minimizing human error and unconscious bias.

AI applications such as Applicant Tracking Systems (ATS), chatbots, predictive analytics, and automated interview assessments are redefining the way talent is identified and hired. This shift has not only improved operational efficiency but also introduced new standards for transparency and fairness in hiring practices. However, alongside these advancements, ethical concerns have surfaced — ranging from data privacy issues to the potential loss of human empathy in decision-making.

This study investigates the dual nature of AI's impact: its potential to enhance HR practices, and the caution needed to ensure that recruitment remains a fundamentally human-centered endeavor, enriched but not overridden by technological innovation.

NEED FOR THE STUDY

The global talent landscape has become increasingly competitive, with organizations striving to attract and retain top-tier candidates quickly and efficiently. Traditional recruitment methods — involving manual resume screening, multiple interview rounds, and subjective evaluations — often lead to delays, increased costs, and inconsistent hiring outcomes.

In this context, AI offers a promising solution by automating repetitive tasks, improving candidate engagement, and providing data-driven insights that enhance decision-making.

Nevertheless, there is an urgent need to critically assess whether AI genuinely mitigates recruitment challenges or introduces new complexities such as algorithmic bias, reduced transparency, and ethical dilemmas.

This study is essential to bridge the knowledge gap by analyzing the real-world impact of AI on recruitment and selection. It provides valuable insights for HR practitioners, decision- makers, and researchers to better understand how to integrate AI in ways that support organizational goals while upholding fairness, transparency, and human dignity in hiring practic.

OBJECTIVES OF THE STUDY

- **To assess the efficiency improvements** introduced by AI in recruitment and selection processes.
- **To explore employee perceptions** regarding the effectiveness and fairness of AI- driven hiring methods.
- **To examine potential biases** and ethical concerns arising from the use of AI in candidate evaluation.
- **To recommend strategies** for the responsible and effective implementation of AI in HR practices.
- **To evaluate the balance** between automation and human involvement in recruitment to achieve optimal hiring outcomes.

Through these objectives, the study aims to provide actionable insights that organizations can apply while adopting AI in their recruitment systems.

SCOPE OF THE STUDY

This research is confined to studying the role of AI in recruitment and selection processes within a single organizational context, encompassing multiple departments and diverse job roles. It focuses primarily on:

- Employees' experiences and perceptions of AI-driven recruitment practices,
- The operational effectiveness of AI tools in different stages of hiring (sourcing, screening, shortlisting),

- Ethical concerns and biases that may arise from automated decision-making.

However, the study does not extend to other HR functions such as training, performance evaluation, or employee retention. Moreover, while the research offers valuable insights, its findings may not be universally generalizable across all industries, organizational types, or geographic regions. Future studies can build on this foundation by including broader and cross-sectoral perspectives.

REVIEW OF LITERATURE

Studies in Tamil Nadu

- **Senthil Kumar (2020)** found that AI significantly reduced screening time and costs in Chennai's IT sector, boosting recruiter satisfaction.
- **Balasubramanian R. P. (2021)** noted challenges in tier-2 cities, where HR professionals often lack digital literacy, hampering AI adoption.
- **Geetha A. (2022)** highlighted ethical dilemmas, stressing that AI must complement, not replace, human empathy in hiring.

Studies from Other Indian States

- **Narayanaswamy V. (2019)** cautioned that AI systems sometimes replicate existing biases due to flawed historical data.
- **Rao P. S. (2021)** observed that Bengaluru startups embraced AI for its scalability and cost-saving advantages.
- **Singh N. (2022)** raised concerns about opacity in AI-driven hiring within the Delhi government sector.

International Studies

- **Anderson S. L. (2020, UK)** urged for greater transparency in AI systems to ensure ethical hiring practices.
- **Williams L. K. (2020, Australia)** recommended a hybrid model combining AI screening with human interviews for better candidate experiences.
- **Johnson O. (2021, Denmark)** emphasized that transparent AI systems foster higher trust among job applicants

RESEARCH METHODOLOGY (Enhanced)

Research Design:

A **descriptive research design** was chosen, ideal for gathering detailed information about existing phenomena through direct observation and structured inquiry.

Sources of Data:

- **Primary Data:** Collected through structured questionnaires distributed online via Google Forms. The questionnaire contained both Likert scale items and multiple- choice questions to capture nuanced opinions.

- **Secondary Data:** Sourced from academic journals, HR department records, industry reports, and previous research studies on AI in HRM.

Sampling Technique:

A **simple random sampling** method was used, ensuring each respondent had an equal opportunity to participate, thus enhancing the credibility and objectivity of the data.

Sample Size

The study gathered valid responses from **105 employees**, representing a broad cross-section of departments and hierarchical levels.

Research Instrument:

A well-structured questionnaire was used, designed to be straightforward, anonymous, and conducive to honest responses. It focused on topics like awareness, perceived fairness, efficiency improvements, and ethical concerns.

Statistical Tools Applied:

- **Chi-Square Test:** To test associations between categorical variables.
- **Correlation Analysis:** To examine the strength and direction of relationships between variables.
- **U-Test:** For comparing differences between two independent groups.
- **Kolmogorov-Smirnov Test (K-S Test):** For assessing distribution differences.
- **F-Test:** For variance comparison across multiple groups.

Ethical Considerations:

Informed consent was obtained, participant confidentiality was strictly maintained, and the purpose of the research was transparently communicated to all respondents.

RESULTS AND DISCUSSION (Revised)

This section presents the results of five hypothesis tests conducted to evaluate various aspects of AI's impact on recruitment and selection. Each test includes the hypothesis, statistical method used, and conclusions derived from the analysis.

HYPOTHESIS 1: AGE GROUP & AWARENESS OF AI IN RECRUITMENT

- **H_0:** There is no significant relationship between the age group of individuals and their awareness of AI in recruitment and selection.
- **H_1:** here is a significant relationship between the age group of individuals and their awareness of AI in recruitment and selection.
- **Test Used:** Chi-square Test
- **Result & Conclusion:** The calculated value (7.198) was less than the tabulated value (15.51).

Therefore, the null hypothesis is accepted. This indicates that the age group does not significantly influence awareness of AI in recruitment and selection processes.

HYPOTHESIS 2: HR EXPERIENCE & PERCEPTION OF AI BIAS

- **H_0:** Years of HR experience do not influence the perception that AI systems perpetuate bias.
- **H_1:** Years of HR experience influence the perception that AI systems perpetuate bias.
- **Test Used**: Correlation Analysis
- **Result & Conclusion:** The correlation coefficient obtained was 0.01805, showing a very weak positive correlation. Thus, the null hypothesis is accepted, indicating that HR experience does not significantly shape perceptions of AI bias.

HYPOTHESIS 3: EDUCATION LEVEL & PERCEPTION OF AI IN SCREENING

- **H_0:** There is no significant difference in perception based on education level regarding AI's role in screening candidates.
- **H_1:** There is a significant difference in perception based on education level regarding AI's role in screening candidates.
- **Test Used:** U-Test

RESULT & CONCLUSION:

The calculated Z value (0.417) was less than the critical value. Hence, the null hypothesis is accepted. This implies that education level does not significantly influence perceptions about AI-based candidate screening.

HYPOTHESIS 4: HR EXPERIENCE & CANDIDATE EXPERIENCE WITH AI

- **H_0:** HR experience does not influence perceptions of AI enhancing candidate experience.
- **H_1:** HR experience does influence perceptions of AI enhancing candidate experience.
- **Test Used:** KS-Test
- **Result & Conclusion**: The calculated KS value was 1, which exceeds the tabulated value (0.409). Thus, the null hypothesis is rejected, supporting the alternative hypothesis. It shows that individuals with more HR experience are more likely to perceive AI as enhancing the candidate experience.

HYPOTHESIS 5: DEPARTMENT & AI IDENTIFYING PASSIVE CANDIDATES

- **H_0:** There is no significant relationship between the department and perception of AI's ability to identify passive candidates.
- **H_1:** There is a significant relationship between the department and perception of AI's to identify passive candidates.
- **Test Used:** F-Test
- **Result & Conclusion:** The calculated F value (0.410) was less than the table value (6.26).

Therefore, the null hypothesis is accepted. This indicates that department affiliation does not significantly affect perception regarding AI's capability to identify passive candidates.

These findings reveal that HR experience plays a key role in shaping perceptions of AI effectiveness, particularly regarding candidate engagement. Other demographic variables such as age, education, and department were not found to significantly influence attitudes toward AI in recruitment. This supports the view that AI's role in recruitment is more universally acknowledged, but nuances appear based on professional exposure.

IMPLICATIONS OF THE STUDY

The findings from this study have both **practical** and **theoretical** implications for organizations, HR professionals, technology developers, and policymakers.

Practical Implications:

- **Strategic Hiring Practices:** Organizations can leverage AI to enhance the speed and precision of recruitment processes, reducing time-to-hire and administrative burdens.
- **Bias Mitigation:** Although AI aims to reduce human bias, organizations must implement regular audits and ethical guidelines to prevent algorithmic discrimination.
- **Enhanced Candidate Experience:** Proper use of AI can improve candidate communication and engagement, resulting in a stronger employer brand.
- **HR Skill Development:** HR professionals need to upskill themselves in AI technologies to manage, monitor, and interpret AI outcomes effectively.

Theoretical Implications:

- **Contribution to AI-HR Research:** This study adds empirical data to the growing field of research on AI applications in HRM.
- **Human-AI Collaboration Model:** It highlights the necessity of developing theoretical models where AI and human judgment work synergistically rather than competitively.
- **Ethical Recruitment Frameworks:** Future research can use these findings to explore frameworks that ensure fairness, transparency, and ethical integrity in AI-led recruitment.

LIMITATIONS OF THE STUDY

- **Sample Size Restriction:** The study was limited to 105 respondents, which, though diverse, may not be sufficiently large to represent broader industry perspectives.
- **Organizational Context Limitation:** The research focused on employees from a single organizational setting, limiting the ability to generalize findings across different industries or multinational corporations.
- **Self-Reported Data:** The use of questionnaires may introduce personal bias, as responses depend on individual perceptions rather than objective measures.
- **Limited HR Functions Covered:** The study specifically addressed recruitment and selection, leaving out other areas where AI could have a significant impact (e.g., training, performance management, employee engagement).
- **Temporal Limitations:** Data collection was cross-sectional, not longitudinal, thereby limiting insights into long-term impacts of AI implementation.

SUGGESTIONS AND RECOMMENDATIONS

1. Invest in HR Technological Literacy:

Regular training programs should be conducted to familiarize HR professionals with AI tools and ethical usage practices.

2. Design Ethical and Inclusive AI Systems:

AI algorithms must be developed using diverse, unbiased datasets, and organizations should enforce transparency standards in AI operations.

3. Regular Audits and Bias Monitoring:

Periodic assessments of AI-based recruitment systems are necessary to identify and correct any emerging biases or discriminatory patterns.

4. Encourage Hybrid Recruitment Models:

Combining AI efficiency with human intuition can ensure both operational excellence and ethical soundness in hiring decisions.

5. Promote Candidate-Centric Approaches:

AI must be used to enhance the candidate experience, not just organizational convenience. Personalized communication and transparent feedback mechanisms should be maintained.

6. Widen Research on AI in HRM:

Researchers should explore AI's influence on various HR functions beyond recruitment to ensure comprehensive integration across employee life cycles.

7. Government and Legal Regulations:

There is a pressing need for regulatory bodies to draft guidelines and policies that oversee AI use in recruitment to protect candidates' rights and promote fairness.

CONCLUSION

This study concludes that Artificial Intelligence has emerged as a game-changer in recruitment and selection, offering remarkable benefits in terms of speed, objectivity, and efficiency. However, while AI-driven systems significantly enhance operational aspects, they cannot replace the nuanced judgment, empathy, and ethical considerations that human HR professionals bring to the table.

A balanced, synergistic model—where AI handles repetitive tasks and humans provide critical oversight—is necessary to create fair, transparent, and inclusive hiring processes. Organizations must approach AI adoption thoughtfully, ensuring technological innovation serves human values rather than compromising them.

Moving forward, a greater emphasis on ethical AI development, skill-building among HR professionals, and continuous evaluation will be key to realizing AI's full potential in Human Resource Management.

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PERCEPTION OF THE BUYERS TOWARDS ONLINE GROCERY SHOPPING APPLICATIONS

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ABSTRACT:

In the era of both men and women sharing household chores, grocery purchase has become an integral part. People who are working and also the people who are managing the household find it difficult to make a grocery purchase in their hectic schedule. To help the people in such situations there are several Groceries purchasing apps that have come into existence. Covid-19 pandemic was the time during which these apps began to flourish. People prefer these apps for many reasons: A few are time saver, home delivery, immediate dispatch etc… In the world of online shopping apps, grocery shopping apps have become a prominent one. These online apps provide facilities which are not available in all direct shopping. Some of them are like cut vegetables, one place for all for e.g. Stationery, raw meat, dairy products etc… In spite of having numerous benefits, these apps have few setbacks like the price difference when compared to the local shops, higher delivery charges, not having a physical check on the product's quality and expiry date.

KEY WORDS: *Grocery, Online Grocery Shopping Apps, Buyer Perception.*

INTRODUCTION:

Shopping is an activity that attends to both necessity & indulgence. Whether strolling through the crowded markets or exploring trendy boutiques, or browsing online stores, shopping connects people with goods & services. It can act as both: a quick errand to purchase essentials or a worthy experience of discovering unique items that reflect one's personal choices. Beyond purchasing products, shopping also helps people to support local businesses, and provides an opportunity for exploration. Online grocery shopping is a way for people to buy required household products using a web-based shopping service. A customer can then arrange for a home delivery directly from the store, or he can pick up his order at the store once an employee has assembled it.

SCOPE OF THE STUDY:

The purpose of the study is to understand the perception of buyers towards the online grocery shopping apps that exist in the current market.

OBJECTIVES OF THE STUDY:

- To study the demographic profile of the respondents.
- To understand the benefits and limitations of the online grocery shopping apps.
- To find the association between Gender and the Willingness of the customers to purchase more than what they require to get more discounts

LIMITATIONS OF THE STUDY:

- Number of respondents
- Respondents locality limited to Chennai City alone
- Usage of tools
- The Study was based only on the perception of the buyers and thus excludes rest of the other factors

RESEARCH METHODOLOGY

- Respondents Number : 200
- Data collection:
- PRIMARY – Structured Questionnaire
- SECONDARY – Journals and Books
- Statistical package that are used : MS – EXCEL , SPSS version 22

REVIEW OF LITERATURE

Mohammed Rafiq, Heather Fulford (2005) studied on the topic "Loyalty transfer from offline to online stores in the UK grocery industry". The study aims to examine the effectiveness of UK supermarkets in transferring store loyalty to online loyalty. The methodology through which the survey was conducted was using an online survey of university staff to test both the brand equity proposition that loyal customers are more likely to adopt brand extensions, and the double jeopardy model's prediction that market leaders benefit disproportionately from loyalty transference. The study also provides support for the brand equity and double jeopardy propositions. Tesco's and Sainsbury's dominance of both the online and offline markets coupled with their retention indices of 92 per cent (Tesco) and 76 per cent (Sainsbury's), support the brand equity view. Tesco also attracts a disproportionately higher percentage of its customers from competitors (67 per cent) compared with Sainsbury's (14 per cent), suggesting that it is benefiting from its market leadership position, as predicted by the double jeopardy model.

Chris Hand (2009) did a study on "Online grocery shopping: the influence of situational factors" using both quantitative and qualitative data and by having a cluster analysis. Situational factors like newly birthed mothers and people with health issues prefer online shopping the most until that factor has disappeared.

Qiujie Zheng, Junhong Chen, Robin Zhang, H. Holly Wang (2020) studied on the topic "What factors affect Chinese consumers' online grocery shopping? Product attributes e-vendor characteristics and consumer perceptions". This paper's study is based on a simple conceptual framework with empirical analysis to investigate the effect of product attributes and e-vendor characteristics that are potentially included in the online shopper's information search. The research methodology that was used was a two-part model, considering product attributes & e-vendor characteristics and consumer perceptions & characteristics. The result of the study says that consumers are more likely to purchase via online for fresh food if they have a price advantage. But consumers who view price as a top factor are likely to buy less fresh food online. Thus

competitive prices might be a motive for online fresh food shopping, but consumers concerned about price do not necessarily shop frequently. Negative perceptions of product freshness reduce consumers' likelihood and frequency of shopping for fresh food online. Concerns on food quality and e-vendors' credibility prevent consumers from frequent shopping for fresh food online. Social and demographic characteristics can also influence consumers' decisions.

Reema Singh, Magnus Söderlund (2020) studied on the topic "Extending the experience construct: an examination of online grocery shopping". The purpose of the study is to assess factors influencing customers' online grocery shopping experiences, and it evaluates the central role of customer service and consumers' responses to satisfying grocery shopping. The LIWC method was used.

Ing Grace Phang, Bamini K.P.D. Balakrishnan, Hiram Ting (2021) "Does sustainable consumption matter? Consumer grocery shopping behavior and the pandemic." The COVID-19 pandemic took the world by surprise in early 2020. The preventive measures imposed by many countries limited human movement, causing uncertainty and disrupting consumption patterns and consumer decision-making. This study aims to explore consumers' panic buying (PB) and compulsive buying (CB) as outcomes of the intolerance of uncertainty (IU). The moderating role of sustainable consumption behaviors (SCBs) (e.g. quality of life [QOL], concern for future generation and concern for environmental well-being) were also tested to raise awareness of responsible and mindful consumption amongst the society and business stakeholders. To empirically examine the grocery shopping behaviors of Malaysian consumers during COVID-19, a total of 286 valid grocery consumer survey responses based on a purposive sampling were collected and analyzed during the movement control order period between March and July 2020. The findings confirmed the statistically significant impact of IU on both PB and CB and the impact of PB on CB behavior. Amongst the three SCBs tested, only QOL significantly moderated the relationship between the IU and PB.

Kimberly Thomas-Francois Simon Somogyi (2022) studied "Consumers' intention to adopt virtual grocery shopping: do technological readiness and the optimization of consumer learning matter?" The study was conducted in Canada with a sample of 1034 adult respondents. The tool that was used was SEM (Structural equation modeling). CLUSTER ANALYSIS was used for the research. The study found out that the attitudes of consumers towards virtual shopping, convenience motivation; perceived ease of use (PEOU), perceived risk and consumer learning are those factors that impact consumers' intention towards virtual food shopping.

ANALYSIS:

● PERCENTAGE ANALYSIS

TABLE 1: PERCENTAGE ANALYSIS

FACTORS		FREQUENCY	%
GENDER	Male	68	34
	FEMALE	**132**	**66**
MARITAL STATUS	**SINGLE**	**134**	**67**
	Married	66	33
OCCUPATION	Salaried	60	30
	Self Employed	34	17
	Unemployed	14	7
	STUDENT	**82**	**41**
	Retired	5	2.5
	Home-maker	5	2.5

Source: Questionnaire

The above table shows the % of respondents belonging to each category and the highest among them are being highlighted using the **BOLD** key.

● MULTI RESPONSE ANALYSIS:

TABLE 2: - BENEFITS Of Online Grocery Shopping

VARIABLE	RESPONSE	FREQUENCY	%
Quick delivery	88	47.3	23.6
TIME SAVING	**128**	**68.8**	**34.4**
Payment method	71	38.3	19
Offers & discounts	85	45.6	23
TOTAL	**372**	**200**	**100**

Source: Questionnaire

The above table shows the result of respondents choosing the benefits of OGS and it was found out that 34% of people were finding time savings as the biggest benefit of Online Grocery

Shopping.

TABLE 3: - LIMITATIONS Of Online Grocery Shopping

VARIABLE	RESPONSE	FREQUENCY	%
No personal access to products	83	46.6	23.3
NOT GETTING SMALLER/REQUIRED QUANTITY	**86**	**48.4**	**24.2**
Delivery charges	115	64.6	32.3
Non availability of products	72	40.4	20.2
TOTAL	**356**	**200**	**100**

Source: Questionnaire

The above table shows the result of respondents choosing the limitations of OGS and it was found out that 32% of people were finding delivery charges as such a factor that makes a halt in their thought of proceeding towards Online Grocery Shopping.

● CHI-SQUARE ANALYSIS:

ASSOCIATION BETWEEN GENDER & THE WILLINGNESS OF THE CUSTOMERS TO PURCHASE MORE THAN WHAT THEY REQUIRE TO GET MORE DISCOUNTS

H_0 - There is no significant association between gender and the Willingness of the customers to purchase more than what they require to get more discounts

H_1 - There is a significant association between gender and the Willingness of the customers to purchase more than what they require to get more discounts

TABLE 4: - Association Between Gender and the Willingness of the customers to purchase more than what they require to get more discounts

Yes		More purchase to get more discounts			Total
		No	Exit the app		
Gender	Male	31	25	12	68
	Female	73	40	19	132
Total		104	65	31	200

TABLE 5: - CHI – SQUARE TABLE

Independent variable	Value	Df	Asymp. Sig (2sided)
Pearson Chi-Square	1.698	2	.428

Source: Questionnaire

These tables show the CHI-SQUARE association between gender and the Willingness of the customers to purchase more than what they require to get more discounts

Since the significant value (.**428**) is more than .05 @ 5% significance level, there is no significant association between gender and the willingness of the customers to purchase more than what they require to get more discounts. Hence H_0 – NULL HYPOTHESIS is ACCEPTED.

FINDINGS:

- The demographic profile states: majority of the respondents were **females**, most respondents were **Single** and **Students.**
- According to the study, people think that **Time Saving** was considered as a biggest benefit and **Not Getting Smaller/Required Quantity** was the major limitation.
- Through the Chi-Square test it has been proved that **Gender** has **No** association on **willingness of the consumers to purchase** more than what they require to **get more discounts.**

SUGGESTIONS:

On the basis of data collected through questionnaire, which was circulated among the user, the following are suggested

- App owners can provide some concessions to regular buyers in terms of offers & reduce delivery charges.
- Buyers can purchase all required items in one order, because Apps provide higher discounts & offers on bulk orders.

CONCLUSION:

When people are moving towards technological advancement, online grocery shopping apps have also started to become popular and it has come to a stage where avoiding them has become impossible. People have started to adapt to these technologies and are able to gain knowledge about the usage of these apps, its features, benefits and limitations, different products that are available, offers and discounts etc…

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"AI AND SUPPLY CHAIN MANAGEMENT IN E -COMMERCE: A PATHWAY TO EXCEPTIONAL CUSTOMER SATISFACTION"

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Abstract

This research paper explores the transformative impact of artificial intelligence (AI) on E-Commerce supply chain management and its correlation with customer satisfaction. The study aims to determine the association between demographic profiles and the level of AI adoption in e-commerce supply chain management. It also seeks to identify the factors influencing customer satisfaction in AI-enhanced e-commerce supply chain management. With the rapid growth of e-commerce, efficient supply chain management has become pivotal for achieving exceptional customer satisfaction. AI technologies, such as machine learning, predictive analytics, and automation, have been integrated into supply chain processes to enhance efficiency, accuracy, and responsiveness. This paper examines the extent of AI adoption across various demographic segments and analyzes the impact of these technologies on customer satisfaction levels. The paper concludes with recommendations for e-commerce businesses to optimize their AI-driven supply chain strategies to enhance customer satisfaction.

Keywords: *Artificial Intelligence (AI), Supply Chain Management, E-Commerce, Customer Satisfaction, Personalized Customer Experience*

Introduction

Artificial Intelligence (AI) is the simulation of human intelligence by machines and computer systems, which enable us to perform tasks such as Machine learning, problem-solving, and decision-making. In Supply Chain Management (SCM), AI technologies like machine learning, predictive analytics, natural language processing, and robotic process automation (RPA) which helps e-commerce businesses to operate faster and smarter. AI enhances every stage of the supply chain from demand forecasting and inventory optimization to warehouse management, logistics, and customer support. AI helps businesses make faster and more accurate decisions, reduce operational costs, minimize delays, and improve customer satisfaction.

The rapid advancement of technology has led to significant transformations in various industries including E-commerce. One of the most notable technological advancements shaping the future of E-commerce is Artificial Intelligence (AI). AI has the potential to transform supply chain management, enhancing efficiency, accuracy, and customer satisfaction. This study explores the relationship between AI and supply chain management in the E-commerce sector, exploring how these advancements contribute to exceptional customer satisfaction. AI in E-commerce supply chain management includes a wide range of technologies, including predictive analytics, robotic process automation (RPA), the Internet of Things (IoT), and machine learning algorithms. These technologies enable businesses to optimize their supply chain processes, from demand forecasting and inventory management to order processing and delivery. AI helps E-commerce companies to achieve greater operational efficiency, reduce costs, and provide a seamless shopping experience to their customers.

Objectives of the Study

- To determine association between demographic profiles and the level of AI adoption in E -Commerce supply chain management.
- To identify the factors that influence customer satisfaction in AI-enhanced E -Commerce supply chain management.

Review of Literature

Jao, P., Shurong, Z., & Manjing, Y. (2024) [1]This study investigates how AI can be integrated into e-commerce supply chains to enhance customer satisfaction. The research carried on using a mixed-methods approach, including surveys, interviews, and case studies of leading e-commerce companies. The findings suggest that AI improves demand forecasting, inventory control, logistics, and customer service, leading to higher customer satisfaction.

Song, H., & Cao, J. (2023)[2]This review paper explores recent advancements in AI technologies and their impact on e-commerce supply chains. The authors discuss how AI-driven solutions, such as machine learning algorithms and predictive analytics, have improved supply chain operations, leading to enhanced customer satisfaction. The paper also addresses the challenges of AI adoption, including data privacy concerns and the need for skilled personnel.

Kumar, R., & Singh, A. (2022)[3]This review paper examines the applications of AI in e-commerce supply chain management, focusing on areas such as demand forecasting, inventory management, and logistics optimization. The authors highlight the benefits of AI in improving supply chain efficiency and customer satisfaction and also discuss the challenges and limitations of AI implementation.

Wamba and Queiroz (2020) [4] identified key challenges in adopting SCM are data privacy and security integration, skills gap and high implementation costs. The study recommends the development of standardized AI frameworks to facilitate smooth integration into existing supply chains.

Sanders and Wood (2019) [5] examined AI's impact on sustainable supply chains. The study found that AI-driven predictive analytics contribute to environmental sustainability by reducing carbon footprints, optimizing delivery routes, and minimizing energy consumption in logistics operations.

Research Gap

The literature review for the study reveals that while several studies have explored the use of AI in supply chain management, very few have focused on how AI contributes to improving customer satisfaction in e-commerce. Limited empirical evidence for emerging markets like India connecting AI applications with end-to-end customer experience in the e-commerce supply chain.

Research Methodology

The Research study is based on both primary and secondary data. The primary data was collected from 105 respondents in Chennai city. A well-structured questionnaire was designed to collect the information form the respondents the questionnaire was designed to find the relationship

between demographic profiles and the level of AI adoption in E-commerce Supply Chain Management (SCM), as well as to identify factors influencing customer satisfaction in AI-enhanced E-commerce SCM.The first part comprises of demographic profile of the respondents and for this percentage analysis is calculated to understand socio-economic status of respondents. The second part consists of Likert five-point scale measurement to know the relationship between demographic profiles and the level of AI adoption in E-commerce Supply Chain Management (SCM) for this Chi -Square test analysis was used. The third part of the questionnaire helps to find out factors influencing customer satisfaction in AI-enhanced E-commerce SCM to analyze thisSpearman's Rank Correlation were adopted. The said analysis was carried on with help of SPSS and MS Excel Software. Secondary data was collected through existing sources like periodical journals, books, and websites.

The reliability analysis of the questionnaire is analysed using Cronbach's Alpha and the value is .986 which indicates excellent internal consistency. This high value suggests that the statements are highly consistent in measuring the AI adoption and customer satisfaction in AI-enhanced e-commerce supply chain management.

Limitation of the study

- The study is limited only to the sample size of 105.
- The study has been concluded in Chennai city.
- The study focuses on AI adoption in E-commerce Supply Chain Management and does not consider other industries.

Data Analysis and Interpretation

Table 1: Demographic Profile of the Respondents

S.NO	Variables	Frequency	Percentage
1	**Age (In Years)**		
	Under 18	6	5.7
	18-24	43	41.0
	25-34	20	19.0
	35-44	14	13.3
	45-54	14	13.3
	55 and above	8	7.6
	Total	105	100.0
2	**Gender**		
	Male	45	42.9
	Female	60	57.1
	Total	105	100.0

3	**Education Level**		
	School level	14	13.3
	Bachelor's Degree	60	57.1
	Master's Degree	25	23.8
	Professional	4	3.8
	Others	2	1.9
	Total	105	100.0
4	**Occupation**		
	Student	39	37.1
	Employed	48	45.7
	Self-employed	12	11.4
	Unemployed	3	2.9
	Retired	3	2.9
	Total	105	100.0
5	**Monthly Income**		
	Less than Rs 25,000	24	22.9
	Rs25,001- Rs 50,000	36	34.3
	Rs.50,001 – Rs 75000	33	31.4
	Rs75,001- Rs 1,00,000	10	9.5
	Rs 100,000 or more	2	1.9
	Total	105	100.0
6	**Marital Status**		
	Single	54	51.4
	Married	49	46.7
	Widowed	2	1.9
	Total	105	100.0

Source: Computed data

Inferences:

The table 1 shows that the majority of respondents are aged 18-24 years (41%). More females (57.1%) than males (42.9%) participated. Most of the respondents have a Bachelor's Degree (57.1%). The largest groups are employed individuals (45.7%) and students (37.1%). The highest monthly income bracket is Rs25,001- Rs 50,000 (34.3%), and most of the respondents are single (51.4%).

Table 2 shows the Chi-square between demographic Profile and the level of AI adoption in E -Commerce supply chain management.

H0 There is no significant difference between demographic Profile and the level of AI adoption in E -Commerce supply chain management.

H1 There is a significant difference between demographic Profile and the level of AI adoption in E -Commerce supply chain management.

Category	P-value	Degree of Freedom	Significance
Age	**67.704[a]**	**70**	**.556**
Gender	**24.694[a]**	**14**	**.038**
Education Level	**86.919[a]**	**56**	**.005**
Occupation	**91.040[a]**	**56**	**.002**
Monthly Income Level	**80.148[a]**	**56**	**.019**

Source: Computed data

Inference

The Chi-square analysis examines the association between demographic profiles and the level of AI adoption in E-Commerce supply chain management. The results indicate that Age ($p = 0.556$) does not significantly affect AI adoption, as the p-value exceeds the 0.05 significance. Whereas, Gender ($p = 0.038$), Education Level ($p = 0.005$), Occupation ($p = 0.002$), and Income Level ($p = 0.019$) show statistically significant relationships with AI adoption, as their p-values are below 0.05. The demographic variables used in survey gender, education, occupation, and income, play a significant role in influencing the adoption of AI technologies in E-Commerce supply chain management.

Table 3 shows Spearman's Rank Correlation to identify the factors that influence customer satisfaction in AI-enhanced E -Commerce supply chain management.

H0 There is no significant relationship between AI-driven factors and customer satisfaction in AI-enhanced e-commerce supply chain management.

H1 There is a significant relationship between AI-driven factors and customer satisfaction in AI-enhanced e-commerce supply chain management.

AI Factor	Customer Satisfaction factor	Spearman's P	Significance
Order Tracking Accuracy	Overall Satisfaction	0.75	0.002
AI Customer Service Responsiveness	Satisfaction with Customer service	0.68	0.005
AI Timely Delivery	Satisfaction with Order Tracking	0.62	0.010
AI Pricing Fairness	Satisfaction with AI Pricing	0.45	0.080
AI Inventory Management	Satisfaction with Inventory Management	0.72	0.003
AI Payment Processing	Satisfaction with Payment Processing	0.58	0.020

Source: Computed data

Inference

Spearman's Rank Correlation analysis shows the relationship between AI-driven factors and customer satisfaction in AI-enhanced e-commerce supply chain management. The results indicate that order tracking accuracy, AI-driven inventory management, AI customer service, AI timely delivery, and AI payment processing show statistically significant relationships with Customer Satisfaction as the $p < 0.05$. Whereas the AI-driven pricing fairness is not significant which means the customers are unaware about the AI pricing strategies.

Findings

- Age is not a significant factor in AI adoption.
- Gender, education level, occupation, and income level significantly influence AI adoption in e-commerce supply chains.
- Order Tracking accuracy, AI-driven inventory management, AI customer service, AI timely delivery, and AI payment processing Shows significant relationships with Customer Satisfaction.
- AI-driven pricing fairness is not significant

Suggestions

- Develop strategies tailored to different demographic groups (e.g., gender, education level, occupation, income) to promote AI adoption.
- Provide specific training programs and awareness campaigns to address the unique needs and preferences of these groups.
- Focus on improving key areas such as demand forecasting, inventory control, and logistics to enhance customer satisfaction in AI-enhanced e-commerce SCM.
- Invest in training programs to bridge the skills gap and ensure that employees are well-equipped to manage AI technologies.

Conclusion

The research study highlights the key factors influencing AI adoption in e-commerce supply chain management and identifies key elements affecting customer satisfaction in AI-enhanced systems. The findings suggest that demographic profiles, including gender, education level, occupation, and income, play a crucial role in AI adoption. AI technologies significantly enhance customer satisfaction by improving supply chain operations.

To increase the benefits of AI adoption, e-commerce companies should implement targeted strategies for different demographic groups, focus on enhancing key areas of customer satisfaction, address challenges related to data privacy and skills gaps, and develop standardized AI frameworks. By doing so, companies can effectively AI to optimize their supply chain management and improve customer experiences, ultimately leading to higher satisfaction and a competitive advantage in the market.

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LETTERS TO THE EDITOR

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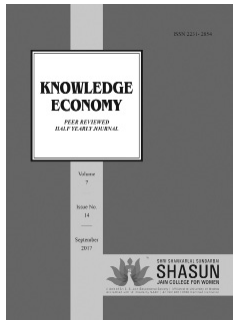

The articles provide useful insights for students, professionals, and businesses to adapt and succeed in today's world.

- Alfeya Thabasum A

The studies highlight the importance of holistic knowledge in personal and professional growth.

- Ishwarya E

The articles captivate readers by linking historical knowledge to modern innovations and contribution.

- Harini S

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