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Contemporary Directions in **Humanities, Commerce and Management**



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PREFACE

Humanities, commerce, and management are dynamic fields that continuously evolve in response to social transformation, economic change, technological advancement, and emerging global challenges. The book *Contemporary Directions in Humanities, Commerce and Management* brings together diverse perspectives that reflect current developments, innovative approaches, and emerging areas of research across these interconnected disciplines.

The contemporary academic landscape increasingly encourages interdisciplinary thinking, where insights from literature, languages, history, culture, economics, business, finance, entrepreneurship, organizational studies, and management contribute to a broader understanding of society and its changing needs. Digital transformation has further accelerated this process by introducing new methods of communication, data analysis, business operations, education, research, and organizational decision-making.

In commerce and management, developments such as digital business, financial technology, sustainable entrepreneurship, marketing innovation, human resource practices, corporate governance, strategic management, and data-driven decision-making are reshaping traditional models. Organizations are increasingly expected to balance economic performance with ethical responsibility, social value, environmental sustainability, and stakeholder interests.

At the same time, the humanities remain essential for understanding human experiences, cultural identities, social relationships, values, creativity, and the broader implications of technological and economic change. Critical inquiry within the humanities can provide meaningful perspectives on contemporary society while encouraging dialogue, cultural awareness, and responsible citizenship.

This volume provides a multidisciplinary platform for academicians, researchers, educators, students, practitioners, and professionals to explore significant contemporary themes across humanities, commerce, and management. The contributions reflect varied research approaches and demonstrate how knowledge from different disciplines can complement one another in addressing complex challenges.

The book emphasizes the importance of innovation, critical thinking, ethical practice, and interdisciplinary collaboration in navigating the rapidly changing world. It is hoped that this volume will stimulate further research, encourage meaningful academic dialogue, and provide useful insights for understanding contemporary developments while contributing to the advancement of knowledge and practice in humanities, commerce, and management.

- Editors

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ORGANIZATIONAL CLIMATE: THE SECRET INGREDIENT FOR SUCCESS IN THE HEALTHCARE SECTOR

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Abstract

The organizational climate is a term that has gained relevance a few years ago, this is because currently most companies have recognized that the good environment of the subordinates within it contributes to its functioning, but for this environment flows positively, the improvement and maintenance of different factors must be taken into account, such as leadership, motivation, communication, collaboration or teamwork, among others. Therefore, the objective lies in identifying the factors that influence the creation of a positive organizational climate in the health sector. For this, a research with a qualitative approach, of a descriptive type, was carried out in which 25 sources of information were reviewed; 18 articles, 6 books and 1 thesis were included in the research; For the search words, the following terms were considered: Organizational climate, Public health and work environment; Articles and books that are related to the health sector, human resources management and organizational climate were selected; The search engines used are Google Academic, Scielo, Dialnet and ERIC. The analysis of the organizational climate in especially health institutions is influenced by social, economic and political aspects that condition constant changes for their evolution, in the management of the health-disease process as the scope of service administration.

Keywords: Organizational Climate, Health Sector, Workplace Well-Being, Leadership, Communication.

Introduction

Organizational climate is a term that has become established in recent years due to the growing awareness among many organizations of the importance of positive relationships among company personnel. A good work environment contributes to a healthy company with highly motivated employees, while a company with a poor organizational climate led to employees who are not motivated, experience poor communication, and suffer from poor interpersonal relationships.

Ameri *et al.* (2020) state that organizational climate is based on the emotional state of each employee and how they react to organizational situations, such as communication, leadership,

motivation, and interpersonal relationships, among others; as well as interactions such as organizational structure, technology, leadership, decision-making, and resources, among others. In the last century, Terry and Franklin (1985) stated that the main focus of administrative action is human behavior; What is achieved, how it is achieved, and why it is achieved are considered in relation to their impact and influence on the people who are the truly important component not only of management but also of organizations.

In the 1950s, the structuralist school emerged. Although the term "organizational climate" as such had not yet appeared, it began to address the fact that members working within an institution should feel like an important part of it. This was because these institutions were where they developed their lives, and if this were not the case, it could be interpreted that the members would experience frustration.

It wasn't until the behavioral school that the analysis of each individual participating in an organization began, studying their behavior, emotions, stimuli, and attention. This was because it was identified that psychological effects greatly influence productivity and performance within the organization.

Several of the behaviorist authors pointed out that administrators should know what people's needs were, because this helped them better understand human behavior; One of the most important theorists was Maslow who designed the hierarchy of human needs which is a psychological theory, who said that human needs were represented hierarchically depending on their importance, Maslow described five needs in his pyramid:

1. Physiological needs
2. Security needs
3. Social needs
4. Esteem Needs
5. Self-actualization needs

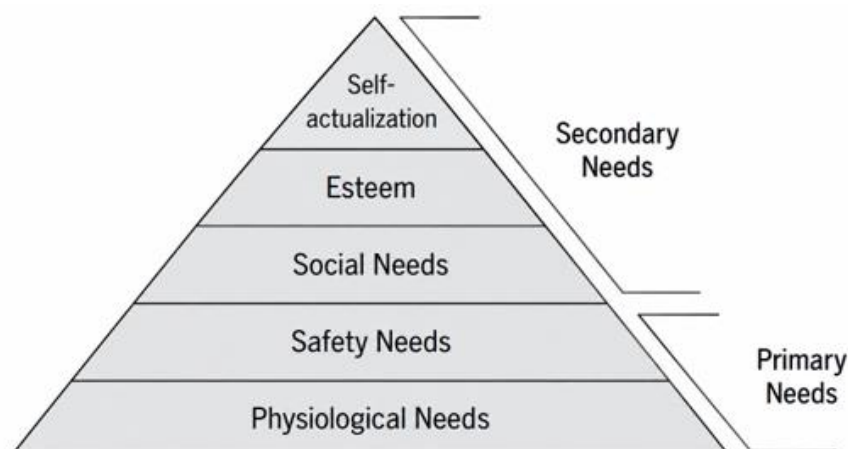


Figure 1: Hierarchy of human needs according to Maslow
(Adapted from Chiavenato, 2007)

During this period, other contributions emerged, such as the two-factor theory, Theory X, and Theory Y, and Likert's management systems theory. (Arano, Escudero, and Delfin, 2016)

Uribe Prado (2015) points out that, over time, specifically for more than 50 years, various definitions of the concept of organizational climate have arisen. Many authors have sought to define it, among them:

Forehand and Gilmer (1964) define organizational climate as "a set of characteristics perceived by employees to perceive an organization and distinguish it from others; its stability is relative over time and it influences the behavior of people in the organization."

While Cornell (1955) defines it as "a mixture of interpretations or perceptions that people in an organization make of their jobs or roles in relation to other colleagues."

Therefore, it can be understood that the organizational climate in a company or institution plays a very important role, and that we cannot find the same type of work climate in two different institutions, since it is unique to each one, due to the characteristics of the company and its employees. The interaction between members, work teams, departments, or even between staff and their superiors within a company will be reflected in the organizational climate, as it will create feelings of rejection, acceptance, or mere tolerance that undoubtedly manifest not only in attitudes and behaviors, but most of the time these end up affecting the company's functioning positively or negatively.

Thus, the human resources area achieves the implementation of strategies and stable working conditions to achieve good employee performance, taking into account occupational health, where the professional environment allows employees to have good physical strength, health, and physical, emotional, and social well-being; likewise, they receive good financial compensation for the work performed. to ensure that the worker feels satisfied in the workplace and aspects related to the organizational process (Ruiz Frutos, Delclos, García García, Ronda Pérez, and Benavides, 1997)

Alongside organizational climate, there is the term job performance. Beltrán and Téllez (2018) define job performance as a person's capacity to produce, create, manufacture, complete, and carry out tasks in less time, with less effort, and with higher quality.

Among the main characteristics of job performance are task performance, a skill demonstrated by someone who occupies a job and performs their work, contributing to the benefit of the company, whether in the technological aspect with materials or services. This is measured based on goals, plans, and leadership, and its indicators include knowledge, skills, and ability. Contextual performance, defined as behavior oriented toward task achievement, has indicators such as persistence, willingness, and cooperation. Individual productivity, the individual work performed by each employee to achieve an established goal, has indicators such as compliance with rules, adherence to procedures, and approval of organizational objectives (Achoma, 2020).

When we talk about organizational climate, we often associate it with businesses, but organizational climate is found in all types of institutions and sectors, such as education, public sector, commerce, and healthcare, among others. However, it is the latter that will be emphasized.

In public health, organizational climate is of great importance because it constitutes an essential element in the development of its organizational strategy. Each organization within the healthcare field is unique, and therefore each work group within it develops special characteristics.

The quality of the work environment is determined by how the staff carries out their activities within the organization, although people often pursue different objectives when they decide to provide their services to an organization. To achieve improvements in productivity, two aspects are important:

- Improvement of the quality of the work environment.
- Participation of people in contributing to the success of the organization in a meaningful way.

A key point of interest for achieving better performance in public health is determining whether job satisfaction leads to better performance or, conversely, whether better performance leads to higher levels of satisfaction. The possibility of increasing employee satisfaction within the system depends on ensuring that compensation and incentives meet expectations (Segredo Pérez and Reyes Miranda, 2004).

The objective of this research article is to analyze the various internal and external factors that influence the work climate in order to understand their impact on productivity, employee satisfaction, and the overall success of a healthcare organization.

The research question is: What factors influence the creation of a positive organizational climate in the healthcare sector?

Method

The approach of this research is qualitative. According to Bonilla and Rodriguez (2000), this method focuses on exploring specific cases in depth rather than generalizing. Its priority is not measurement, but rather qualifying and describing the social phenomenon being studied based on its defining characteristics.

A descriptive review seeks to determine the degree to which a set of empirical studies in a specific research area reveals interpretable patterns or trends with respect to pre-existing propositions, theories, methodologies, or findings. It typically employs structured search methods to form a representative sample from a broader group of works related to the research area. Selection criteria are used, but not quality assessment criteria (King and He, 2005); therefore, this work is a descriptive systematic literature review.

Information was gathered on the theoretical framework and topics related to the subject, using resources such as books, journals, and electronic media. The research included 22 articles, 6 books, 1 thesis and 1 website; the following terms were considered for the search words: Organizational climate, Public health and work environment; articles and books related to the health sector, human resource management and organizational climate were selected; the search engines used were Google Scholar, Scielo, Dialnet and ERIC.

Reference Title	Indexing Database	Country	Year
Relationship between organizational climate and job performance of personnel at Ladrillera Tauro SAC-2019	Web of Science	Arequipa, Peru	2020
Evaluation of the quality of medical care: Expectations of patients and workers in medical units	Redalyc	Mexico	1990
Organizational climate and job performance: The case of a Peruvian dairy company	SciELO	Peru	2020
The origin of organizational climate from the perspective of schools of management: An approach	Google Scholar	Mexico	2016
Study of the perception of organizational climate in technologically advanced dairy farming companies in the province of Tundama, Boyacá, Colombia	SciELO	Colombia	2018
Beyond the dilemma of methods	Google Scholar	Colombia	1995
Characterization of organizational climate in high-complexity hospitals in Chile	SciELO	Chile	2015
Perception of motivation among middle managers in three hospitals in the Maule Region, Chile	Redalyc	Chile	2009
Human Resource Management (8th ed.)	Dialnet	Mexico	2007
Organizational climate, environment, and job satisfaction: A challenge for nursing	SciELO	Chile and Colombia	2015
Socially perceptive administration	Google Scholar	United States	1955
Environmental Variation in Studies of Organizational Behavior	APA PsycArticles	United States	1964
Organizational Climate and Its Diagnosis: A Conceptual Approach	Redalyc	Colombia	2009
Organizational climate in the Latin American public sector	Google Scholar	Mexico	2021

An approach to working conditions and safety in a small Mexican company	Redalyc	Venezuela	2010
An approach to organizational climate	SciELO	Cuba	2018
Organizational climate among workers at “La Villa” General Hospital: A secondary-level hospital in Mexico City	Redalyc	Mexico	2017
Understanding the Role and Methods of Meta-Analysis in IS Research	Google Scholar	United States	2005
Motivation and Organizational Climate	Google Scholar	United States	1968
Organizational Climate: A Case Study in a Health Center	SciELO	Mexico	2019
Human Rights	—	Switzerland	2023
Work climate as a key factor in the productive performance of companies: Case study of Hardepex Cía.	Redalyc	Colombia	2019
Organizational climate and institutional commitment in higher education institutions in Puerto Vallarta	SciELO	Mexico	2012
Human Resource Management: Its Organizational Process	ResearchGate	Mexico	2017
Work climate and organizational culture	Google Scholar	Spain	2014
Occupational health: Concepts and techniques for occupational risk prevention (4th ed.)	Google Scholar	Spain	1997
Organizational climate in public health	ResearchGate	Cuba	2004
Principles of Management (1st ed.)	Academia.edu	Mexico	1985
Organizational Climate and Environment	Google Scholar	Mexico	2015
Individual Performance Diagnosis: The Case of the Administration Department of an Irrigation District	Google Scholar	Mexico	2015

Results

Concept

Organizational climate determines how an individual perceives their work, performance, productivity, and satisfaction, considering the human and physical environment in which daily work takes place, thus influencing employee satisfaction and therefore productivity (Pilligua Lucas and Arteaga Ureta, 2019). While Litwin and Stringe (1968) proposed a model of work climate, suggesting that from the employee's perspective it must be both structural and subjective, because for them, work climate is: “The subjective, perceived effects of the formal

system, the informal 'style' of managers, and other important environmental factors on the attitudes, beliefs, values, and motivation of people working in a given organization.” This is supported by the study conducted by Ramírez Campos *et al.* (2012), which states that organizational climate is based on individual perceptions such as: “behaviors, feelings, and attitudes, which are manipulated by management to directly affect employees.”

Importance

Companies face the need to implement labor strategies to achieve efficiency and profitability. For this, the quality of human talent is fundamental, as it is human talent that manages all other resources. Vásquez Torres (2015) emphasizes that “therefore, the coordination, direction, motivation, and satisfaction of personnel are increasingly important aspects of the process.”

Administrative

Understanding the importance of climate for the life of an organization and its study constitutes the starting point. Currently, great importance is given to the assessment of organizational climate in institutions because it is an essential element in the development of their planned organizational strategy and enables managers to have a future vision of the organization. It is also a diagnostic element of the changing reality of the environment, since it allows for the identification of the institution's real needs in relation to the desired future, in order to outline the actions that will allow the institution to achieve its vision of the future. (Iglesias Armenteros and Torres Esperón, 2018). In the field of public health, organizational climate plays a very important role because it tends to modify people so that they can perform better and their performance revolves around and fulfillment of the needs and requirements of the company. Reyes (2017) mentions that organizational climate is important for workers to improve, impacting their development in the face of simple events, including communication and interaction. with other workers the openness and consideration; it also has an effect on the quality of life of those who participate in institutional development, where motivation stands out, strengthening of friendship in a spontaneous and honest way; likewise, it contributes to favoring the achievement of objectives, and helps the worker to acquire his own objectives.

Factors Influencing Organizational Climate

The World Health Organization (2023) indicates that it is essential to understand the factors that compel a medical institution to provide timely, acceptable, accessible, and satisfactory quality service. Therefore, Aguirre Gas (1990) points out that evaluating the perceptions of both users and staff is an inherent necessity of medical practice and represents an opportunity for improvement in the management of healthcare services. In other words, it is not enough to understand health outcomes from the user's perspective; it is also important to understand how services are organized and delivered within the hospital unit through the staff's perspective.

The climate can improve after a well-executed intervention. It is determined by the personal characteristics of the staff and by the organization's management, physical-environmental, and social realities. Organizational climate comprises a large number of factors, both physical and emotional, that influence the behavior and performance of team members (García, 2009). Several factors considered important within any organization influence the work environment. The perception that employees have of their workplace undoubtedly relates to trust, stability, teamwork, and overall synergy among them. This positive or negative outcome, of course, will influence the company's productivity.

Reyes (2010), in his research, describes six relevant factors for the work environment:

- Communication
- Collaboration
- Leadership
- Career development
- Job satisfaction
- Physical conditions.

However, the relationship between the work environment and productivity depends largely on an organization's management style, so the outcome is influenced by certain circumstances that can be largely controlled.

The Health Sector in Mexico and the World

Mexico faces rapid, unchecked changes in all social, economic, and political aspects, making it difficult to integrate into international markets and significantly impacting the health sector, where technology and knowledge play crucial roles in its development. Health centers are often small organizations, comprised of individuals who must collaborate to achieve goals and objectives, according to the population's health needs.

Therefore, it is important that their work takes place in a cordial environment with good communication and leadership that motivates staff, enabling them to fully perform their functions (Martínez Cortes, Molina Rodríguez, and Parada Toro, 2019).

Health organizations, whether public or private, operate in increasingly dynamic and competitive environments that demand constant transformations, and consequently, their members are also required to adapt to these changes. In this context, employee participation is a key factor, and it is unthinkable to request their support and cooperation if they are not involved in the decisions made. A study conducted by Juárez Adata (2017), applied to the staff of the "La Villa" General Hospital, yielded results indicating a moderate to high level of organizational climate within the institution. Leadership and motivation were the best-rated factors, followed by reciprocity, with participation ranking last.

The author also mentions that measuring organizational climate and establishing associations with factors of working life should be an essential part of the diagnosis that any management body must conduct of its institution; particularly in healthcare institutions, which produce services that directly impact the standard of living of society and address one of the community's most pressing needs.

Compared to organizational climate studies conducted in other countries, there isn't much difference; in fact, the results are often very similar to those in Mexico. For example, a study of organizational climate in two high-complexity hospitals in Chile by Bustamante, Grandón Avedaño, and Lapo Maza (2015) found that the organizational climate has three indicators at a medium-high level: identity, job motivation, and responsibility. These three variables relate to employees' interest in their work, their effort to perform their jobs efficiently, and their perception of being committed to their work. These characteristics are confirmed in motivation studies and reveal how people value their work, as they are, on the one hand, a motivating factor in themselves and, on the other hand, justify the fact that making a personal effort leads to an organizational or collective benefit that makes sense.

Conclusion

After analyzing the various authors cited in this document, it can be concluded that organizational climate undoubtedly has a direct influence on the performance of a company or organization. For this reason, it is very important and necessary to address the different topics mentioned above, as they are components that will allow a company to achieve fluidity, productivity, and significant overall growth. (Guerrero Zárraga and Cruz Flores, 2010).

Likewise, Contreras, Reynaldos G, and Cardona A; (2015) reinforce the idea that working conditions are extremely important for motivation in the workplace. Therefore, it is essential to ensure that new employees feel comfortable and at ease in their new jobs, perhaps even adding family photos and other mementos that allow them to feel a sense of belonging and ownership of the workplace.

Motivation and leadership are factors that have a greater influence than one might think, making them a fundamental part of the HR area of every company or organization. This is because they allow for the improvement of employee performance. In healthcare centers, there are employees who fulfill their duties completely and strive to complete their tasks in order to meet the institution's goals; however, there are other employees who love what they do and dedicate their lives to their work. Whatever the reason, it is valid, but it is crucial to maintain a positive work environment, as this ultimately impacts productivity and employee performance. Given the above, the conclusion is clear: "It is necessary to sustain, strengthen, and stimulate motivation as a permanent asset of the organization" (Bustamante-Ubilla, del Río-Rivero, Lobos-Andrade, and Villarreal-Navarrete, 2009).

González Vásquez *et al.* Al (2021) mentions that all resources, including financial, technological, material, and even commercial ones, are relevant and predominant in establishing competencies that facilitate emergence; however, without solid internal factors such as culture, communication, leadership, and work climate, the socio-labor dynamics of employees can be affected.

The study of organizational climate in the public sector is undoubtedly one of the strategic tools that currently contribute to organizational improvement. This is because its analysis allows for the identification of elements or factors where the organization is experiencing problems and those that will undoubtedly lead to improved service quality. While this is often considered irrelevant, the truth is that this phenomenon is highly relevant and influences employee motivation and performance, which in turn has consequences for productivity, satisfaction, and work quality.

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UNDERSTANDING CONSUMER ATTITUDE IN THE AGE OF DIGITAL BUSINESS TRANSFORMATION

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Abstract

Few concepts in the marketing literature have proliferated like the concept of attitude. However, a closer look at studies investigating attitudes as consumers' responses to marketing efforts reveals a considerable diversity in perspectives about the concept of attitude and its formation. Attitudes are considered either relatively stable object–associations, or temporarily constructed evaluations, which are formed through memory (cognitive)-based information processing or contextual and affect-based information processing. The current paper discusses the various research models contextual to online consumer attitude and organizes these different theoretical viewpoints. By approaching the topic through an integrative lens, the paper works on the review and critique of online consumer attitude and provides a foundational framework for future research in this area.

Keywords: Online Consumer Attitude, E-Commerce, Research Postulations.

Introduction

With rapid economic growth and increase in prosperity in the last few years, Indian consumer markets have seen unprecedented expansion in interest and activity across all product and service categories. Additionally, recent policy initiatives like Digital India coupled with the launch of 4G cellular services may provide further impetus for the same. Digital India project that aims to offer a one-stop shop for Government services have further bolster the sector and rapid growth has been witnessed especially in online market place. According to the latest report by ASSOCHAM, e-commerce market in India will likely to touch \$38 billion mark in 2016, a huge 67 per cent jump over the \$23 billion revenues for 2015. At present more than 3,100 digital startups are in India and by the end of 2020 more than 11,500 startups are expected to get established (Source: NASSCOM Reports, 2014). India's e-commerce industry is likely to clock a

compounded annual growth rate (CAGR) of 35% and cross the \$100-billion mark over the next five years, from \$17 billion at present (Source: The Times of India, Sep 6, 2015). Some of the internet ready device, technological innovation, banks and other players have provided a strong e-commerce ecosystem. The country also saw increase in the venture funding and more than 800 internet start-ups got funding in 2014 as compared to 200 in 2012. (Source: IAMAI annual report 2014-15). Riding on the strong growth momentum of 2015, the e-commerce sector is expected to see a huge growth potential in country. The advent of internet has further intensified this growth, closing many gaps between urban and tier 2/tier 3 cities. Leading online stores such as Flipkart, Snapdeal, ebay and Amazon claims that almost half of their sales come from tier-II and III towns and cities. Entrepreneurs are coming up with clutter-breaking ideas to create newer verticals. This has given rise to new shopping experiences to the customers. Consumers in these cities are tech savvy and seeking always branded or stylish products. Offline unavailability of such kind of products and rising disposable income of the consumers in these cities provide the impetus to increase in online shopping trends. India is experiencing tremendous growth and the potential it has is very promising, in order to grasp maximum of opportunity from Indian market, the marketers need to understand consumer attitude deeply or broadly, that's why online consumer attitude is an important area of study in present time. Therefore, the study has attempted to review and critique of online consumer attitude models and tried to provide meaningful insights for the academicians and practitioners in order to have deep understating of online consumer attitude by analyzing or examine some of the critical or important factors effecting online consumer attitude. After analyzing more than 20 research based models certain gaps have been identified and on the basis of those research gaps few research postulations have been derived which is open for empirical validation in the future study.

Synoptic Review – Online Consumer Attitude

In the extant literature, consumer attitudes are a composite of three elements: cognitive information, affective information, and information concerning a consumer's past behavior and future intentions. In other words, attitude consists of thoughts or beliefs, feelings, and behaviors or intentions towards a particular thing, which in this case is usually a good or service. Consumer's attitude towards online shopping refers to their psychological state in terms of making purchases over the Internet. Since the mid-1970s, the study of consumer's attitudes has been associated with consumer purchasing behavior research. According to the model of attitude change and behavior (Fishbein and Ajzen, 1975), consumer attitudes are affected by intention. When this intention is applied to online shopping behavior, the research can examine the outcome of the purchase transaction. Attitude is a multi-dimensional construct. One such dimension is the acceptance of the Internet as a shopping channel (Jahng, Jain, and Ramamurthy, 2001). Previous research has revealed attitude towards online shopping is a significant predictor

of making online purchases (Yang *et al.*, 2007) and purchasing behavior (George, 2004; Yang *et al.*, 2007).

Electronic commerce has become one of the essential characteristics in the Internet era. Online shopping behavior (also called online buying behavior and Internet shopping/buying behavior) refers to the process of purchasing products or services via the Internet. The process consists of five steps similar to those associated with traditional shopping behavior (Liang and Lai 2000). In the typical online shopping process, when potential consumers recognize a need for some merchandise or service, they go to the Internet and search for need-related information. However, rather than searching actively, at times potential consumers are attracted by information about products or services associated with the felt need. They then evaluate alternatives and choose the one that best fits their criteria for meeting the felt need. Finally, a transaction is conducted and post-sales services provided. There have been intensive studies of online shopping attitudes and behavior in recent years. Most of them have attempted to identify factors influencing or contributing to online shopping attitudes and behavior. The researchers seem to take different perspectives and focus on different factors in different ways. For example, Case, Burns, and Dick (2001, p.873) suggest that “internet knowledge, income, and education level are especially powerful predictors of Internet purchases among university students” according to an online survey of 425 U.S. undergraduate and MBA students. Ho and Wu (1999) discover that there are positive relationships between online shopping behavior and five categories of factors, which include e-stores’ logistical support, product characteristics, websites’ technological characteristics, information characteristics, and homepage presentation. Schubert and Selz (1999) examine the quality factors of electronic commerce sites in terms of information, agreement, and settlement phases. They also review those factors related to e-commerce community. These studies have all made important contributions to our understanding of the dynamics of online shopping field.

In the next section a review of some noteworthy online consumer models from the past literature is being presented. It is expected that this review would provide a foundational framework to researchers in this area.

Review of Empirical Online Consumer Attitude Models

Consumer Characteristics and Attitude Towards Online Shopping

Wu, (2003), has studied on the relationship between consumer characteristics and attitude toward online shopping. The attitude of internet users towards online shopping was measured using the Fishbein Model. They have taken the variables like consumer demographics, consumer purchase preferences, consumer benefit perception and customer life style. Researchers tested the hypotheses based on research framework and found that the attitude towards online shopping is significantly different based on the various consumer demographics, their purchase preferences

and online shopping rate. It was also found that the attitude towards online shopping has a significant relationship with the consumer's benefits perception and their life style. Chiu, Lin and Tang, (2005), studied on the Gender differs: assessing a model of online purchase intentions in e-tail service and proposed a model of online purchase intentions which include construct such as personal awareness of security, personal innovativeness, perceived ease of purchasing, and perceived usefulness. The Data were collected via questionnaires from customers of the leading internet service provider (ISP) in Taiwan. Structural equation modeling (SEM) was used to examine the model. They found that the influences of personal innovativeness and perceived usefulness on attitudes and online purchase intentions are similar for males and females. The influences of personal awareness of security on both attitudes and online purchase intentions are strong for males, while no such effects exist for females. The influences of perceived ease of purchasing on both attitudes and online purchase intentions are stronger for females than for males. Koo, Kim and Lee, (2007), have investigated the motivational effects of personal values on benefits, attributes, and re-patronage intention in the context of online shopping and by using means-end chain theory as a basis for the theoretical framework. They tested the conceptual model of the relationships among the constructs of personal values, benefits, attributes, and re-patronage intention. The hypotheses were proposed, and then tested using structural equation modelling on data from 279 experienced online customers in South Korea and they found that personal value of "social affiliation" acts as an enduring belief in motivating a customer to seek hedonic and utilitarian benefits, whereas a personal value of "self-actualization" produces motivation to seek only utilitarian benefits. The seeking of hedonic and utilitarian benefits leads customers to evaluate certain attributes of online stores – such as visual design, product assortment, information quality, and after-sales service. The attributes of online stores have a positive effect on re-patronage intention.

Perceived Benefits/Risks and Attitude Towards Online Shopping

Doolin and Dillon, (2002), studied on the perceived risk and the internet shopping experience in online purchasing behavior and developed a hypothesized research model which included factors such as consumer risk, convenience, loss of social interaction and user characteristics. The model was validated with the help of web-based survey of 700 New Zealand internet users. The survey was designed to explore the importance of perceived consumer risk and the internet shopping experience in the online purchasing behaviour of internet users. Both perceived consumer risk and loss of social interaction in internet shopping were found to be negatively associated with the amount of online purchases made. The results of the study suggest that electronic retailing web sites could usefully include features that reduce perceived consumer risk and enhance online customer service. Lodorfos, Trosterud and Whitworth, (2006), has studied e-consumers' attitude and behavior in the online commodities market. They investigated the factors determining e-

consumers re-purchasing behaviour in the e-business to consumer market. The theory of planned behaviour (TPB) is used as a theoretical framework to interpret consumers' behaviour in the online environment and to study the antecedents of e-purchasing decisions. Researchers extended the theoretical framework and studied the variables such as experience, price, convenience, security, trust and their influence over attitude, intention to purchase and intention to repurchase. The study adopted a quantitative methodological approach within the context of the online CD, Books, music, magazines and DVDs purchasing industry, surveying 211 consumers with prior purchasing experience in this range of products. The questionnaires were designed using local focus groups from a similar population to identify the most salient beliefs influencing consumers' attitude towards e-purchasing. The research revealed that consumers' attitude towards past e-purchases had significant impact on their intent to re-purchase and that the consumers' experience with an e-brand significantly affected their beliefs regarding the importance of trust, security and convenience in the online environment. Delafrooz, Paim and Khatibi, (2011), studied on the understanding consumer's internet purchase intention in Malaysia and an integrated research framework was developed in order to understand how consumers form their attitude and make purchase intentions toward online shopping. It examined the factors influencing consumers' attitude toward online shopping and shopping intention from the Malaysian perspectives. A purposive sampling method was used and the sample comprised of 370 students studying at a public university in Malaysia. Data were collected via self-administered questionnaire. The data were examined using frequency and path analysis. Result of path analysis showed that trust and attitude had stronger direct effect on online shopping intention, whereas utilitarian orientation, convenience, prices wider selection, and income had stronger indirect effect on online shopping intention through the attitude towards online shopping as mediation. Bianch and Andrews, (2011), has studied on the risk, trust, and consumer online purchasing behaviour: a Chilean perspective and developed a theoretical framework in which they took construct such as perceived online risk, trust in online vendors, trust in third party assurance, consumer propensity to trust and cultural environment of trust. The paper tested a model of the influence perceptions of risk and trust on consumers' attitudes and intentions to continue purchasing on the internet. An online survey method was used and sample of 176 Chilean consumers who purchase online was taken. The data were analyzed using structural equation modeling (SEM). The study revealed that the perceived risk online had an inverse relationship with consumers' attitude and that attitude has a positive influence on intentions to continue purchasing. Of the trust factors examined, trust in third party assurances and a cultural environment of trust have the strongest positive influence on intentions to continue purchasing online, whereas trust in online vendors and a propensity to trust were both insignificant. Javadi *et al.* (2012), analyzed factors affecting on online shopping behavior of consumers that might be

one of the most important issues of e-commerce and marketing field and they completed it by using a model examining the impact of perceived risks, infrastructural variables and return policy on attitude toward online shopping behavior and subjective norms, perceived behavioral control, domain specific innovativeness and attitude on online shopping behavior as the hypotheses of study. In order to investigate the hypotheses 200 questionnaires dispersed among online stores of Iran and regression analysis was used. The study identified that financial risks and non-delivery risk negatively affected attitude toward online shopping. Results also indicated that domain specific innovativeness and subjective norms positively affect online shopping behavior. Furthermore, attitude toward online shopping positively affected online shopping behavior of consumers.

Online Reviews and Consumer Attitude

Cheung, Lee and Rabjohn, (2008), researched on the impact of electronic word-of-mouth and by using dual-process theories, an information adoption model was developed to examine the factors affecting information adoption of online opinion seekers in online customer communities. The model consisted factors like argument quality, source credibility, information usefulness and information adoption. Later on, the model was tested empirically using a sample of 154 users who had experience within the online customer community, Openrice.com. Users were required to complete a survey regarding the online consumer reviews received from the virtual sharing platform. The purpose of study was to examine the extent to which opinion seekers are willing to accept and adopt online consumer reviews and which factors encourage adoption. The researchers found comprehensiveness and relevance to be the most effective components of the argument quality construct of the research model, making them key influencers of information adoption. Mo, Li and Fan, (2015), researched on the effect of online reviews on consumer purchase behavior and the purpose of study was to understand the effect of online reviews on consumer purchase behavior, more than 400 online reviews are collected. Based on S-O-R model (Stimulus-Organism-Response Model), they studied the influence on consumer purchase behavior according to online reviews of experience goods from a new perspective of consumer learning. The results showed that the positive reviews, describing rating, picture reviews, appended reviews and cumulative reviews have an effect on consumer purchase behavior. The moderate reviews, negative reviews, logistics rating and service rating are not significant in the results. Xu and Yao, (2015), developed a research model that examines the effect of argument quality and argument perspective on the adoption of online reviews in a value-based decision model. The research model included the constructs or variables like information credibility, quantity sufficiency, argument quality, argument perspective, perceived value and online reviews adoption. In order to validate the research model, a questionnaire survey was conducted in the Chinese online shopping context. Hypotheses were tested using partial least squares analysis on a

data set of 208 online consumers. The results suggested that argument quality and argument perspective have positive impacts on perceived value, further influencing the adoption of online reviews. Moreover, the results confirmed that the information credibility and quantity sufficiency of online reviews are positively associated with argument quality. The findings also indicated that argument quality mediates the relationship between argument perspective and perceived value.

Website Design and Consumer Attitude

Lee and Lin, (2005), has studied on the customer perceptions of e-service quality in online shopping and developed a research model to examine the relationship among e-service quality dimensions, customer satisfaction and purchase intentions. In the research model they have taken the factors like website design, reliability, responsiveness, trust and personalization and have studied impacts of these factors over customer satisfaction and purchase intentions. Data from a survey of 297 online consumers were used to test the research model. Confirmatory factor analysis was conducted to examine the reliability and validity of the measurement model, and the structural equation modeling technique was used to test the research model. The results showed that the dimensions of web site design, reliability, responsiveness, and trust affect overall service quality and customer satisfaction. Moreover, the latter in turn are significantly related to customer purchase intentions. However, the personalization dimension is not significantly related to overall service quality and customer satisfaction. Ganguly and Dash, (2009), researched on the website characteristics, trust and purchase intention in online stores: An empirical study in the Indian context and proposed a model and provided empirical evidence on the impact of the website characteristics on trust in online transactions in Indian context. A questionnaire was designed to measure trust, purchase intention and website characteristics. The data collected from the students from various premier B-schools in India. The study provided empirical evidence that trust represents the generic mechanism through which website factors increase purchase intention and reduce perceived risk. Online stores should use effective implementation of website factors such as information design, communication, privacy and security, as a marketing tool by which trust towards the website can be created and subsequently enhance purchase intention.

Research Gaps and Research Postulation

It is evident from the aforementioned discussion that there is scant research in Indian settings. Consumer behavior such as attitude formation is susceptible to cultural and social settings. In this regard, it may be clearly understood that exact replication of western consumer (online) models may not suffice in Indian settings. Additionally, several factors remain unexplored in the extant literature. Some of these are presented next and based on them certain research postulation is advanced.

Consumer Characteristics

Consumer characteristics are often used to predict how likely a group of people are to purchase a specific product and when we study attitude of consumer it becomes very important to understand that how different consumer characteristics impact or influence online consumer attitude. In the literature we have seen that there are certain consumer characteristics that have been discussed deeply and have been proved scientifically such as personal characteristics, consumer demographics, consumer life style and their purchase preferences etc. But still there are some of the unexplored characteristics which may have impact on online consumer attitude; on the basis of those characteristics further postulations have been derived.

Opinion Leadership: Opinion leadership is defined as “the degree to which an individual is able to influence other individual’s attitudes or overt behavior informally in a desired way with relative frequency”. On the other way in its simplest form, opinion leadership means the process by which an opinion leader informally influences the actions or attitudes of others who may be opinion seekers or merely opinion recipients. Chaudhry and Irshad, (2013), have studied on opinion leadership but in context to offline shopping, in case of online shopping this factor is still unexplored and it can have good impact on online consumer attitude because in these days, consumers are faced with an array of product selection. In such a scenario, opinion leadership plays an external factor to influence the consumers’ purchasing behavior to make a strong and positive recommendation about a particular brand. Given the fact that most of us love watching television, celebrity advertising is an attention-grabbing technique that is extensively used across the world. Consumers get used to ads and obtain word-of-mouth opinions on brands and product categories from these celebs (opinion leaders).

Locus of control: Locus of control refers to the extent to which individuals believe they can control events affecting them. Locus of control can be divided in to two parts i) internal locus of control and ii) external locus of control. If locus of control is internal than consumer would find a way to blame himself for the perceived failure. If locus of control is external, it would be easy, even natural, and to blame outside sources beyond your control. This is an important factor which has not been explored earlier and can have its impact on consumer’s attitude towards online shopping.

P1: Consumer characteristics- a) opinion leadership and b) locus of control will have an impact on online consumer attitude.

Situational Characteristics

A situation is how a person reacts in different environments, called situational reactions. Consumer’s attitude may vary as per the situation in which they are shopping e.g. attitude of a regular shopper and attitude of first-time visitor may vary in different sense. In the previous studies some of the important situational characteristics such as internet access, past experience

and switching cost etc have been discussed in detail but some of the factors have remained unexplored. Keeping all these things in mind we have attempted to postulate some of the situational factors which may impact or influence online consumer attitude.

Impulsive shopping: An impulse purchase or impulse buying is an unplanned decision to buy a product or service, made just before a purchase. One who tends to make such purchases is referred to as an impulse purchaser or impulse buyer. When any consumer does such kind of purchase, attitude may vary as compare to the attitude he or she possesses when purchases with pre planned way. Impulsive buying may impact on online consumer attitude that's why it is considered to be important to work on in future.

Occasional shopping: In occasion-based shopping marketers divide market into groups according to specific occasions when buyers are to buy, actually make the purchase and then they use the products, means consumer looks for a specific products or items on specific occasions. Consumers may react differently when shop occasionally as compare to the time when shop generally. Occasion based segmentation is widely used nowadays throughout the web by many sellers, so it becomes very important to understand online consumers attitude when shopping occasionally.

P2: Situational characteristics- a) impulsive shopping; and b) occasional shopping will have an impact on online consumer attitude.

Web Characteristics

Web characteristics play very important role in online shopping business. It can include web site design and web services etc. Web site quality is usually interested in issues relevant to the salient design or usability attributes of web sites. Bell and Tang, (1998) have studied on the various web factors such as access to the web, content, graphics, structure, user friendliness, navigation, usefulness, and unique features. Apart from these factors so many factors have been studied or identified by different researchers in the previous studies but as we know that change is the law of nature and when we see online business marketplace, so many changes have been noticed since last few years. In that case it is very important to consider other crucial factors which may influence or effect consumers attitude towards online shopping. Some of them are discussed below;

- *Website localization:* It is the process of adopting an existing website to local language and culture in the target market. It is the process of adopting a website in to a different linguistic and cultural context- involving much more than the simple translation of text. This is the concept which has been adapted by different online business portal recently in order to reach to customers in every possible way. This factor can have an important influence over consumer's attitude towards online shopping.

- *Website personality:* Apart from other web characteristics, website personality includes the brand name or brand image of specific website. We can take an example of leading online companies like Amazon, Flipkart and Snapdeal etc. These are three different online portals and when any consumers want to have certain kind of products, there may be influence of these web brands on online consumer attitude.

P3: Web characteristics- a) site localization and b) site personality will have an impact on online consumer attitude.

Conclusion

Online shopping is rapidly changing the way people do business all over the world. In the business-to-consumer segment, sales through the web have been increasing dramatically over the last few years. Customers, not only those from well developed countries but also those from developing countries like India, are getting used to the new shopping channel. Understanding the factors that affect attitude/behavior is important for researchers and practitioners alike. Online shopping is gaining popularity among people specially the younger generation but in today scenario to become equally popular among all age groups, e-marketing will have to cover a longer distance. The attitude of consumers is changing with the time. In this paper, we therefore reviewed the papers based on online attitude models and proposed few research postulations in order to argument researchers' understanding of consumers' attitude, attitude formation or attitude change toward online shopping and their intention to shop on the Internet. The research postulations use the constructs from previously discussed models as a basis, extended by some other factors that were unexplored till now. Our review shows that attitude toward online shopping is not only affected by ease of use, usefulness, and enjoyment, but also by some other factors like consumer characteristics, situational characteristics and website characteristics. After going through with the different online attitude based models, we can conclude that the country like India, online experiences are still looked up as complex. Some of the papers that have been reviewed by us, was based on Indian settings only, which conveyed that Indian consumers are finding online shopping comfortable because of many variables like cash on delivery, customization or personalization of the websites, home delivery.

Implication

There are clear reasons why investigating on factors that influencing consumers attitude towards online shopping is important. From the marketer's perspective, they will better understand the attitude of the consumers towards online shopping as well as the factors influencing consumers to make e-commerce purchases. When any organization is operating in a specific country at that time it becomes very important to understand their consumers completely. A country like India where people come from different culture, society or religion, it becomes very crucial to know or explore all the dynamics consumers have and to understand about their behavior/attitude.

High rapid growth in e-commerce sector, has led to vigorous adoption of the online medium to reach to the target market. Understanding customer's need and disposition in adopting the online medium has become a challenge for marketers. Specifically, understanding the consumer's attitudes towards online shopping and subsequently making improvement in the factors that influence consumers to shop online will help marketers to gain the competitive edge. Therefore, our study has reviewed different online attitude-based research models to provide a review or a snapshot picture of the important and critical factors. This study helps to provide really meaningful insights for the online market practitioners and academicians as well.

Recommendation

This study has reviewed and investigated attitude towards online shopping and the factors that influencing consumers' attitude to make e-commerce purchases. Despite this study has strengths, it has certain limitations. Firstly, the research has only examined or reviewed few numbers of online consumer attitude-based research models. Secondly, it does not make an empirical validation of research postulations. However, this study identified a limited number of factors that influence consumer(s) attitude towards online shopping. Certain research postulations have been developed and future researchers may further scientifically validate the framed research postulations. This can be recommended to marketers that the factors that have been derived through reviewing the literature are really worthy to understand and will surely help to gain the competitive edge over others. These factors can prove their vital role in influencing online consumer attitude. It is expected that this study will be useful for the academicians in guiding future researchers who would like to study about the same topic.

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APPLE FARMING IN HIMACHAL PRADESH: AN ECONOMIC ANALYSIS OF PRODUCTION, PROFITABILITY, AND SUSTAINABILITY

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1. Introduction and Contextual Setting

Mountain agriculture represents a finely calibrated balance between fragile ecological conditions and high-value cash cropping. In the northwestern Himalayan state of Himachal Pradesh, horticulture has emerged as the primary engine of rural income growth and poverty reduction. Within the state's horticultural profile, apple (*Malus domestica*) occupies a commanding position. Introduced in its commercial 'Delicious' form by American missionary Samuel Evans Stokes at Thanedar (Kotgarh) in the early 20th century, apple farming transformed the agrarian landscape from subsistence cereal cultivation into a commercial orchard economy.

From an output of 1,200 tonnes in 1950–51, Himachal Pradesh's annual apple production has scaled past 600,000 tonnes, generating an estimated annual sector turnover of ₹6,000 crore. This economy sustains hundreds of thousands of farming households, seasonal agricultural labourers, transport operators, and packaging enterprises across key producing districts such as Shimla, Kullu, Kinnaur, Mandi, and Chamba.

Geographic Elevation Profile and Agricultural Characteristics:

Low Hill / Subtropical Zone (<1,000 m AMSL) • Cereal-dominated (Wheat, Maize, Paddy), Subtropical Fruits
Mid Hill Temperate Zone (1,000–1,500 m AMSL) • Off-season Vegetables (Tomato, Cauliflower, Beans), Stone Fruits
High Hill Wet Temperate Zone (1,500–2,500 m AMSL) • Commercial Pome Fruits (Apple, Pear, Plum) — Primary Apple Belt
Cold Desert / Dry Hill Zone (>2,500 m AMSL) • High-altitude Cash Crops (Peas, Potato, Barley, Exotic Apple)

Despite its historical expansion, mountain apple production faces an inflection point. Yields have plateaued around 9.0–10.0 MT/ha on conventional seedling rootstocks, well below international benchmarks of 25–35 MT/ha achieved under intensive high-density systems. Furthermore, mountain topography imposes structural cost penalties: steep slopes preclude mechanisation, fragmented terrace holdings limit economies of scale, and extreme weather events cause severe income instability. To evaluate these structural challenges, this chapter investigates the production economics, input expenditure patterns, supply-chain margins, and policy environment of apple agriculture in the core production belt of Shimla district.

2. Theoretical Framework and Empirical Methodology

2.1 Study Area and Sampling Design

This study investigates two adjacent tehsils of Shimla district: Rohru and Jubbal. These tehsils cover approximately 2,400 square kilometres within the Pabbar River basin and Giri-Sutlej watershed, representing the historic and commercial heartland of Himachal Pradesh's apple production:

- **Rohru Tehsil (1,300–3,200 m AMSL):** Centred around the Pabbar river valley, featuring active wholesale market yards managed by the Agricultural Produce Market Committee (APMC), public procurement infrastructure operated by the Himachal Pradesh Horticultural Produce Marketing and Processing Corporation (HPMC), and private cold storages.
- **Jubbal Tehsil (1,800–3,000 m AMSL):** Located on the high ridge overlooking the Pabbar valley, including historic cultivation tracts like Kotkhai and Hatkoti. The higher average elevation provides superior chilling hours, aiding fruit color and sugar concentration, but steep inclines increase cultivation and intra-valley haulage costs.

The empirical investigation utilised a two-stage purposive-cum-random sampling strategy. In the first stage, 10 apple-producing villages were selected from each tehsil (20 villages total), stratified across altitude gradients and road-connectivity tiers. In the second stage, 100 orchard-operating households were randomly drawn from village panchayat and state horticulture departmental registries (55 households in Rohru and 45 in Jubbal). Primary data collection was conducted via pre-tested, comprehensive questionnaires, triangulated by focus group discussions and semi-structured interviews with commission agents, cold storage operators, and local Horticulture Development Officers (HDOs).

2.2 Analytical Framework

To quantify cultivation economics, the study adopts the farm-cost accounting framework established by the Commission for Agricultural Costs and Prices (CACP):

$\{\text{Cost A1}\} = \Sigma \{\text{Seeds/Saplings, Fertilisers, Manures, Pesticides, Hired Labour, Machine/Bullock Charges, Irrigation, Packaging, Transport, Land Cess, Depreciation, Misc. Cash Outlays}\}$ [cite: 1]

$\{\text{Cost A2}\} = \Sigma \{\text{Cost A1}\} + \text{Rent paid for leased-in land} + \text{Interest on working capital @ 7\% p.a.}$ [cite: 1]

$\{\text{Cost B}\} = \Sigma \{\text{Cost A2}\} + \text{Imputed rental value of owned land} + \text{Imputed interest on owned fixed capital}$ [cite: 1]

$\{\text{Cost C}\} = \Sigma \{\text{Cost B}\} + \text{Imputed value of family labour}$ [cite: 1]

Economic viability was determined using the Benefit–Cost Ratio ($\{\text{BCR}\} = \text{Gross Returns} / \text{Cost C}$), where Gross Returns represent total marketable output multiplied by the weighted farm-gate

price. Supply-chain performance was assessed via price spread analysis, measuring Producer's Share in Consumer Rupee.

3. Demographic Patterns and Orchard Structural Characteristics

The socioeconomic characteristics of orchard managers influence technology adoption, financial decision-making, and marketing strategies.

Socioeconomic and Operational Profile of Sample Growers (N=100)

Socioeconomic and Operational Profile of Sample Growers (N=100)

Age Distribution PNG	Educational Attainment PNG
• 18–25 years: 38.4%	• Graduate / Post-Graduate: 68.0%
• 25–30 years: 16.2%	• Matriculate: 12.0%
• 30–40 years: 19.2%	• Senior Secondary: 9.0%
• >40 years: 26.3%	• Primary / Middle / Illiterate: 11%

Farm Size Classification PNG
• Marginal (≤ 5 bighas / ≤ 0.40 ha / ~ 1 acre): 57.0%
• Small (6–10 bighas / ~ 0.41 – 0.80 ha / ~ 2 acres): 28.0%
• Medium (10–20 bighas / ~ 0.81 – 1.60 ha): 12.0%
• Large (> 20 bighas / > 1.60 ha): 3.0%

The sample demonstrates significant participation from educated, younger generations: 38.4% of primary orchard managers are under 25 years of age, and 68% hold graduate or postgraduate credentials. This educational background correlates with growing interest in varietal diversification, digital price discovery, and modern canopy management.

However, landholdings are heavily fragmented. Over half of all respondents (57%) operate marginal holdings of up to 5 bighas (approximately 1 acre or 0.4 ha), while 28% manage small orchards between 6 and 10 bighas. Only 3% manage large holdings exceeding 20 bighas. This structural fragmentation limits fixed-capital investments, mechanised spraying, and farm-level cold-room construction, entrenching dependence on shared logistics and intermediary credit.

Varietal Distribution across Sample Orchards (% of Growers Cultivating, N=100)

Apple Variety PNG	Share (%) PNG	Commercial Market Profile PNG
Red Delicious	38.0%	Historic standard; mid-market
Royal Delicious	20.0%	Primary domestic staple
Golden Delicious	14.0%	High yield; polliniser use
Royal Gala	12.0%	Early harvest; premium price
Fuji	8.0%	Extended shelf-life; premium
Ambri (Indigenous)	5.0%	Niche aromatic; supply scarce

Varietal composition continues to reflect the dominance of conventional 'Delicious' lines, with Red Delicious (38%) and Royal Delicious (20%) together accounting for 58% of varietal selection. However, progressive orchardists are planting spur-type and high-density cultivars like Royal Gala (12%) and Fuji (8%) to secure early-season market entry and price premiums of 15% to 25% over conventional lines. The indigenous variety Ambri commands strong farm-gate realizations (₹55–80/kg), but accounts for only 5% of plantings due to alternate-bearing tendencies and longer juvenile periods.

4. Empirical Analysis of Cultivation Costs and Productivity

4.1 Cost Structure: The Rohru–Jubbal Disparity

Input expenditure was quantified using cost-recall accounting across all production phases, including dormant pruning, manual basin-clearing, chemical spray applications, harvesting, packaging, and local transport.

Cost Component	Rohru Tehsil (₹/ha)	Rohru Share (%)	Jubbal Tehsil (₹/ha)	Jubbal Share (%)	Spatial Difference (₹/ha)
Paid-out Hired Labour	33,790	20.1%	40,000	22.6%	+6,210
Plant Protection Chemicals	32,000	19.0%	34,500	19.5%	+2,500
Fertilisers and Organic Manure	19,500	11.6%	21,000	11.9%	+1,500
Packaging (Cartons, Trays, Liners)	16,200	9.6%	17,500	9.9%	+1,300
Farm-to-Mandi/Road Transport	12,000	7.1%	13,500	7.6%	+1,500
Irrigation Charges	10,500	6.2%	11,000	6.2%	+500
Imputed Land Rental Value	12,500	7.4%	13,200	7.5%	+700
Imputed Family Labour	13,580	8.1%	14,065	7.9%	+485
Depreciation on Implements	2,500	1.5%	2,700	1.5%	+200
Interest on Working Capital (7%)	9,100	5.4%	10,080	5.7%	+980
Land Revenue, Cess and Misc.	6,510	3.9%	6,520	3.7%	+10
Total Comprehensive Cost (Cost C)	1,68,180	100.0%	1,77,065	100.0%	+8,885

Paid-out hired human labour constitutes the single largest operational expenditure, representing 20.1% of Cost C in Rohru (₹33,790/ha) and 22.6% in Jubbal (₹40,000/ha). Chemical plant protection is the second-largest cost, accounting for 19.0% (₹32,000/ha) and 19.5% (₹34,500/ha) respectively. Growers apply between 8 and 14 pesticide and fungicide sprays annually to manage apple scab (*Venturia inaequalis*), premature leaf fall, and red spider mites.

CACP Cost Architecture Progression (Rohru vs Jubbal, ₹/ha)

ROHRU: COST A1 (₹1,30,000) —> COST A2 (₹1,39,100) —> COST B (₹1,54,600) —> COST C (₹1,68,180)

JUBBAL: COST A1 (₹1,44,000) —> COST A2 (₹1,54,080) —> COST B (₹1,63,000) —> COST C (₹1,77,065)

The difference in total production costs between the two tehsils is statistically verified. Jubbal's higher Cost C (+₹8,885/ha) stems from its physical topography and altitude. Orchards situated on steeper slopes require more manual labor for basin preparation, ladder-based spraying, and basket portage.

4.2 Altitude-Stratified Productivity

Productivity varies considerably across altitudinal zones:

Yield Realisations across Altitudinal Strata (Sample Average, MT/ha)

Altitudinal Stratum	Rohru	Jubbal	Combined Average
Low Altitude (<1,800 m)	7.2 MT/ha	7.8 MT/ha	7.4 MT/ha
Medium Altitude (1,800–2,400 m)	10.1 MT/ha	10.8 MT/ha	10.4 MT/ha
High Altitude (2,400–3,000 m)	8.6 MT/ha	9.1 MT/ha	8.9 MT/ha
Combined Tehsil Average	9.0 MT/ha	9.8 MT/ha	9.4 MT/ha

The medium-altitude zone (1,800–2,400 m) achieves the highest yields across both tehsils, averaging 10.4 MT/ha (10.1 MT/ha in Rohru and 10.8 MT/ha in Jubbal). This elevation provides optimal chilling accumulation (1,000–1,200 hours below 7°C) without the late-spring frost risks common to valley floors.

In contrast, lower orchards (<1,800 m) produce lower yields (7.4 MT/ha), affected by winter warming, inadequate chilling, and higher scab pressure in humid river basins. Higher-altitude sites (>2,400 m), while producing fruit with better pigmentation, show lower physical output (8.9 MT/ha) due to delayed spring budding, shorter vegetative growth periods, and recurring hail damage.

Yield also correlates negatively with orchard age as senescent trees older than 35–40 years exhibit declining yields (6.5–7.5 MT/ha) compared to prime-bearing orchards (11.0–14.0 MT/ha).

5. Size Asymmetries, Benefit–Cost Dynamics, and Intermediation

5.1 Landholding Size and Farm Viability

Evaluating returns against operational scale reveals sharp variations in farm-level profitability.

While the aggregate mean Benefit–Cost Ratio of 1.48 points to a solvent sector, this metric masks structural vulnerabilities among smaller producers. Marginal farmers (<0.5 ha) achieve a BCR of 1.08, generating a net return of ₹20,800 per hectare. For these households, production costs consume 92.6% of gross revenues. A single adverse shock—such as localized hail, unseasonal rain during fruit set, or a 10% decline in farm-gate prices—can push these holdings below cost recovery.

Conversely, large growers (>3.0 ha) achieve a BCR of 3.46 and net returns of ₹3,84,000 per hectare. Large growers benefit from bulk input purchasing, lower unit transport costs, improved access to high-pressure spraying equipment, and selective grading that commands price premiums of ₹45/kg, compared to ₹36/kg for marginal growers.

Farm-Size Category	Sample (n)	Mean Area (ha)	Mean Yield (MT/ha)	Realised Price (₹/kg)	Gross Returns (₹/ha)	Cost C (₹/ha)	Net Returns (₹/ha)	Benefit–Cost Ratio (BCR)	Economic Viability Assessment
Marginal (<0.5 ha)	18	0.38	7.8	36.00	2,80,800	2,60,000	20,800	1.08	Near Break-Even
Small (0.5–1.0 ha)	30	0.72	8.5	38.00	3,23,000	2,80,000	43,000	1.15	Vulnerable Margin
Medium (1.0–2.0 ha)	28	1.48	9.8	41.00	4,01,800	2,56,800	1,45,000	1.57	Moderately Profitable
Semi-Large (2.0–3.0 ha)	15	2.45	10.5	44.00	4,62,000	2,30,000	2,32,000	2.01	Economically Resilient
Large (>3.0 ha)	9	3.80	12.0	45.00	5,40,000	1,56,000	3,84,000	3.46	Highly Profitable
Sample Mean	100	1.52	9.4	40.40	3,79,760	2,56,400	1,23,360	1.48	Viable

5.2 Supply-Chain Structure and Intermediary Margins

Orchardists in the study area channel their harvest through six distinct marketing routes:

Marketing Channel Breakdown and Farm-Gate Price Realisations (N=100)

Channel Type	Share (%)	Avg Price (₹/kg)
Commission Agents (Mandi Arthiyas)	62.0%	₹36.00 / kg
HPMC Public Procurement Centers	14.0%	₹50.00 / kg
Primary Cooperative Societies	10.0%	₹47.00 / kg
Direct Regional Sales (Local Markets)	8.0%	₹62.00 / kg
Digital / E-Commerce Platforms	4.0%	₹70.00 / kg
Farm-Gate / Roadside Spot Sales	2.0%	₹30.00 / kg

Commission agents (*arthiyas*) dominate the market, handling 62% of harvest volumes. This dominance persists despite offering lower prices (₹36/kg) than direct sales (₹62/kg), public procurement (₹50/kg), or digital platforms (₹70/kg).

This reliance is sustained by pre-harvest advances. *Arthiyas* supply cash loans (₹20,000 to ₹2,00,000) during the lean spring months to fund fertiliser, chemical spray, and packaging materials. In return, farmers commit to marketing their entire crop through the creditor agent. These agreements involve implicit financing charges: agents recover their capital through unitemised deductions, mandatory trade commissions (6% to 8%), and off-invoice concessions.

Price Spread along the Commission Agent Channel (Rohru to Azadpur Mandi, Delhi)

Values in ₹ per kg for Standard Red Delicious:

Stage / Cost Component	Amount (₹)	Share (%)
Farm Gate (Farmer Realisation)	36.00	42.4%
└─► Primary Aggregation Costs and Commission	3.52	4.1%
Primary Aggregator Exit	42.00	49.4%
└─► Inter-State Mountain Freight	8.00	9.4%
└─► Terminal Mandi (Azadpur) Unloading and Fees	8.00	9.4%
Wholesale Terminal Price	58.00	68.2%
└─► Secondary Wholesale to Semi-Wholesale Margin	8.00	9.4%
Semi-Wholesale / Retail Acquisition	66.00	77.6%
└─► Retail Spoilage and Margin	19.00	22.4%
Final Urban Consumer Price (MRP)	85.00	100.0%

Tracing the price path of standard Red Delicious apples from Rohru orchards to terminal retail consumers in Delhi reveals that the primary producer captures only 42.4% (₹36.00) of the terminal price (₹85.00). Intermediary commissions, transportation, and secondary retail margins absorb the remaining 57.6% (₹49.00). This index highlights persistent structural inefficiency in the primary supply chain.

Itemised Farm-Level Marketing Costs (Sample Mean = ₹17.50 / kg)

Cost Component	Value (₹/kg)	Share of Cost (%)
Freight and Haulage (Farm to Mandi)	₹6.50	37.1%
Commission Agent Charges (6–8%)	₹3.20	18.3%
Packaging Materials (CFB + Trays)	₹2.80	16.0%
Seasonal Cold Storage Fees (Hired)	₹2.00	11.4%
Manual Headloading / Transshipment	₹1.50	8.6%
Mandi Cess and Taxes	₹0.80	4.6%
Miscellaneous Handling Expenses	₹0.70	4.0%

Transport costs of ₹6.50/kg reflect poor interior road conditions, while packaging costs (₹2.80/kg) continue to rise due to higher prices for corrugated fiberboard (CFB) cartons. In total, post-harvest logistics and intermediary fees consume 48.6% of the initial farm-gate price.

5.3 Supply-Chain Losses and Value Attrition

Post-harvest losses reduce marketable supply across each link of the mountain supply chain:

Post-Harvest Loss Distribution (% of Harvest Volume, Total = 18.2%)

Loss Stage / Cause	Loss (%)
Harvest / Bruising	3.2%
Farm-to-Road Portage	4.5%
Grading / Packing	2.8%
Cold Storage Decay	2.0%
Transit Vibration	3.5%
Mandi Handling	2.2%

Cumulative physical losses reach 18.2% of total harvested volume, equivalent to an economic loss of ₹68,000 per hectare at average market prices. For the 100 sample households, annual losses total approximately ₹68 lakh.

The primary cause of damage is farm-to-road portage (4.5%), where apples are carried manually or by pack animals along steep mountain paths in wooden boxes or bags. Long-haul transit on uneven roads accounts for a further 3.5% loss from mechanical bruising.

6. Credit Markets, Risk Management, and Institutional Policy

6.1 Credit Market Segmentation and Farm Earnings

Credit access directly shapes input investment and marketing autonomy:

Primary Credit Sources Utilised by Sample Orchardists (N=100)

Source of Production Credit	Rohru (%)	Jubbal (%)	Implied Cost
Commission Agent Advances	29.1%	35.6%	18.0–24.0% p.a.
Commercial Banks (incl. KCC)	30.9%	24.4%	8.0–9.0% p.a.
Primary Cooperative Banks	14.5%	13.3%	10.0–12.0% p.a.
Self-Finance / Family Retained	12.7%	11.1%	Opportunity
Informal Moneylenders	10.9%	8.9%	24.0–36.0% p.a.
NBFC / Microfinance	1.8%	6.7%	22.0–26.0% p.a.

Despite the expansion of the Kisan Credit Card (KCC) program, commercial and cooperative banks serve only 42% of sample respondents (28% commercial, 14% cooperative). Over 32% of growers rely primarily on commission agent advances, which carry implicit annual interest rates of 18% to 24% embedded in tied sales.

Access to formal institutional credit has a clear impact on farm profitability. Farmers with institutional bank financing achieved average net returns of ₹1,52,000 per hectare, compared to ₹95,000 per hectare for unbanked or informally indebted growers—a difference of ₹57,000 per hectare. An independent-samples t -test confirms this earnings gap is statistically significant:

This rejects the null hypothesis of credit neutrality (H_0). Institutional credit provides growers with liquidity to purchase inputs at competitive cash rates, while avoiding the tied-marketing obligations imposed by commission agents.

6.2 Climate Shocks, Production Risks, and Safety Nets

Survey respondents identify hailstorms as their primary operational risk (85% reporting major concerns), followed by low farm-gate prices (79.8%), chemical input costs (78%), and price volatility (67.7%).

During the 2023–24 season, 23% of surveyed orchards suffered measurable hail damage. Among affected farms, losses averaged 42% of total yield, translating to an income reduction of approximately ₹1,26,000 per hectare.

Risk Perception and Incidence (% Growers Impacted, N=100)

Primary Production and Market Vulnerabilities	Incidence (%)
Hailstorm Injury at Pre-Harvest Stages	85.0%
Depressed Farm-Gate Mandi Realisations	79.8%
Rising Cost of Plant Protection Agrochemicals	78.0%
Inter-Seasonal Price Volatility	67.7%
Peak-Season Harvest Labour Scarcity	65.7%
Late Spring Frost during Bloom / Fruit Set	65.0%
Deficit of Controlled Atmosphere / Cold Storage Facilities	58.0%

Despite this exposure, adoption of the Pradhan Mantri Fasal Bima Yojana (PMFBY) remains low at 28%. Orchardists cite several operational hurdles:

- **The "Area Approach" Disconnect:** Claims require block-level yield losses, which fail to capture localized hailstorm paths that damage individual valleys while leaving adjacent areas unaffected (cited by 48%).
- **Protracted Settlement Timelines:** 56% of uninsured growers noted past settlement delays of 12 to 18 months, reducing confidence in the scheme.
- **Administrative Burden:** 62% reported registration difficulties, particularly around land-title verification for joint holdings.

6.3 Policy Implementation Gaps

Comparing farmer awareness with actual scheme adoption highlights institutional delivery gaps across state and central agricultural programs:

Policy Awareness vs Utilisation Deficit (Sample %, N=100)

Program / Institutional Scheme	Aware (%)	Used (%)	Gap (%)
PM-KISAN (Direct Income Support)	88.0%	82.0%	6.0%
Mission for Integrated Horticulture (MIDH)	72.0%	38.0%	34.0%
State Anti-Hail Net Capital Subsidy	65.0%	30.0%	35.0%
HPMC Minimum Support Price Operations	58.0%	22.0%	36.0%
PMFBY Comprehensive Crop Insurance	45.0%	28.0%	17.0%
HP Digital Grower-to-Consumer Portal	32.0%	10.0%	22.0%
Agriculture Infrastructure Fund (AIF)	28.0%	8.0%	20.0%

While PM-KISAN achieves high uptake (82%) due to direct digital transfers, capital-investment programs show awareness-to-utilisation gaps of 34% to 36%. The anti-hail net subsidy program provides support for 50% to 80% of net costs, but only 30% of growers have accessed funds, despite 65% awareness. Key informant interviews identify bureaucratic application procedures, delayed disbursements, and limited annual block quotas as key barriers.

Public Extension Satisfaction Levels (Horticulture Department, N=100)

[Very Satisfied: 8%] — [Satisfied: 22%] — [Neutral: 30%] — [Dissatisfied: 28%] — [Very Dissatisfied: 12%]

These implementation issues are exacerbated by staffing pressures in public agricultural extension. With 40% of growers reporting dissatisfaction with extension services, key informant interviews show that individual Horticulture Development Officers often oversee 5,000 to 8,000 farm households. As a result, extension support remains largely confined to distributing routine spray schedules, offering limited advisory on canopy architecture, high-density rootstock management, or digital marketing options.

7. Strategic Pathways for Himalayan Apple Production

The empirical findings from Rohru and Jubbal point to systemic vulnerabilities: high input expenditures, smallholder margin compression, intermediary debt dependence, and escalating climate risks. Addressing these structural bottlenecks requires coordinated interventions across technology, finance, and supply-chain logistics.

Integrated Policy and Operational Framework:

1. Production Transformation

- Accelerated transition to High-Density Plantation (HDP) rootstocks
- Rejuvenation of senescent orchards (>35 years) via subsidized nursery propagation of climate-resilient cultivars (Gala, Fuji, Jeromine)
- Micro-irrigation adoption via targeted PMKSY subsidies

2. Post-Harvest and Cold-Chain Logistics

- Decentralised Controlled Atmosphere (CA) infrastructure via AIF credit
- Farm-gate grading and packing packhouses to eliminate transshipment bruising and reduce the 18.2% post-harvest loss margin
- Upgraded interior link roads to lower mountain freight costs

3. Financial Inclusion and Risk Mitigation

- Restructuring PMFBY toward high-resolution weather-station triggers and hyper-local automated damage assessment
- Expansion of institutional pre-harvest crop loans via KCC to break the informal advance debt cycle with commission agents
- Universal coverage of anti-hail protective netting

4. Market Intermediation and Collective Action

- Farmer Producer Organisation (FPO) development for direct contracts with retail and food-processing firms
- Upgraded local APMC auction facilities to improve price discovery
- Value addition: Processing culled/C-grade fruit into juice concentrates

A central priority is the managed transition from aging, low-density seedling orchards to High-Density Plantation (HDP) architectures on clonal rootstocks (such as M9 and MM106). International and domestic field trials demonstrate that HDP systems can achieve yields of 25–35

MT/ha within five to six years, compared to 9.4 MT/ha for conventional plantings, while facilitating canopy management and manual harvesting on mountain terraces.



To protect smallholder incomes, capital subsidy programs under the Mission for Integrated Development of Horticulture (MIDH) must simplify application procedures and prioritize marginal and small landholders. Supply-chain reform requires addressing the informal credit arrangements that tie growers to commission agents. Expanding Kisan Credit Card facilities, backed by pre-season disbursement schedules tailored to orchard operations, can provide growers with working capital independence. Concurrently, establishing Farmer Producer Organisations (FPOs) can aggregate purchasing power for packaging materials and plant protection chemicals, while supporting direct market sales and collective bargaining with commercial wholesale buyers.

Targeted investments in decentralized Controlled Atmosphere (CA) facilities, funded through the Agriculture Infrastructure Fund, would allow smallholder cooperatives to store fruit during peak harvest gluts and capture off-season price increases.

Reducing the 18.2% post-harvest loss margin also requires investments in aerial gravity ropeways, intermediate packhouses, and improved mountain road infrastructure to minimize handling damage during farm-to-road portage.

Finally, climate safety nets must transition from the broad "area approach" to high-resolution, index-based weather insurance models. Combining automated weather stations with satellite hail tracking can enable rapid claim settlement for localized weather events, providing Himalayan orchardists with the financial stability needed to support long-term, sustainable production.

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ANTECEDENTS OF UPI ADOPTION AMONG WOMEN IN SEMI-URBAN AND RURAL AREAS OF INDIA- BRIDGING THE GENDERED DIGITAL DIVIDE

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Abstract

The Unified Payments Interface (UPI) has emerged as one of the most significant innovations in India's digital financial landscape. Although UPI has reaped immense benefits for the Indian masses, women running Informal Micro Enterprises in semi-urban and rural areas experience numerous barriers associated with digital literacy, access to smartphones, fear of cybersecurity, connectivity and limited technological confidence. These challenges make gender and location important dimensions in understanding the adoption and sustained use of UPI among women managing micro businesses. This chapter examines the determinants driving UPI adoption among women managing IMEs in semi-urban and rural settings, with particular emphasis on the 2 districts of south eastern Bihar, India. The Unified Theory of Acceptance and Use of Technology (UTAUT) is the theoretical foundation of this study. Primary data were collected through a structured questionnaire from women above 18 years of age, and regression analysis was undertaken to examine the proposed relationships between Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions on Behavioral Intention and Usage Behavior. The empirical findings indicate that Facilitating Conditions is the strongest predictor of women's behavioral intention to adopt UPI, followed by Performance Expectancy. Behavioral Intention significantly influences actual Usage Behavior. The model explains 86.9% of the variance in Behavioral Intention and 83% of the variance in Usage Behavior. The chapter argues that for women managing IMEs in semi-urban rural India and generating a livelihood, UPI adoption requires more than technological availability; it requires conditions which enhance gender-sensitive digital literacy initiatives, accessible infrastructure, cybersecurity and user-centric design. Then only SDG goal of women empowerment can be achieved.

Keywords: Unified Payments Interface (UPI), Women Run IMEs, Rural and Semi-Urban India, Technology Adoption.

1. Introduction

The National Payments Corporation of India (NPCI) launched the Unified Payments Interface (UPI) in 2016. It revolutionized India's digital payment mechanism by allowing users to transfer funds real time between bank accounts through mobile devices over a user-friendly unified platform. According to NPCI reports, during the financial year 2025–26, India recorded 241.6 billion

transactions with value of ₹314 lakh crore. Latest monthly statistics UPI transactions for June 2026 reports 22.72 billion transactions. This reflects its massive adoption across rural and urban areas alike. Platforms like Google Pay, PhonePe, Paytm, and BHIM have become popular in all households demonstrating how the common man is eager to execute financial transactions.

Given the demographic setup of India, it is noteworthy that adoption of Unified Payments Interface (UPI) can be advantageous for the semi-urban population in several ways. UPI enables speedy, secure, and real-time transactions that reduces dependency on cash and making life easier for small businessmen and general public. There are limited ATMs in Semi-urban cities and towns and issues of cash shortage often arise. UPI effectively provides a reliable digital alternative. UPI is instrumental in enhancing financial inclusion by enabling people to access digital banking services with smart and even feature phones. This is especially beneficial in semi-urban regions where banking network may be inadequate. Local small and micro businesses are predominant in Semi urban regions. UPI is beneficial for the growth of these businesses by providing a low-cost, user-friendly payment solution. Small retailers, street vendors, and service providers can easily accept payments without POS machines, lowering operational barriers. It drives economic activity by simplifying financial interactions. Additionally, UPI ensures transparency and security, reducing the risk of theft or fraud prevalent in cash transactions. UPI has proven to be a viable solution for the government's drive towards a cashless economy. It also encourages both financial and digital literacy of the general public. Overall, UPI adoption strengthens the financial ecosystem and enhances the quality of life in semi-urban communities.

However, in semiurban and rural India, adoption of UPI is subject to challenges. The low levels of Digital Literacy make it difficult for users to install applications, generate PIN or undertake scanning of QR codes. There are concerns and trust issues regarding Cybersecurity on the grounds of fraud, phishing, and unauthorized transactions. Internet Connectivity and mobile network problems in these areas may disrupt seamless transactions. Women and Older generations are often resistant to change and prefer the conventional offline banking techniques due to habit and perceived reliability. Limited in-person Customer Support is another drawback of using UPI as compared to branch banking.

Women in India mostly lag behind men in digital use (Prakash and Das, 2020) which may be viewed in the context of multi-dimensional gender inequality This is a bigger problem in the semi -urban and rural parts of India (Kumar and D'Silva, 2019), due to connectivity issues, lower digital literacy, lack of economic independence and social constraints imposed on them. UPI can enable women in rural/ semi urban parts of a developing nation like India to participate in the digital financial economy.

Informal Micro Enterprises (IMEs) are micro-scale businesses that cannot register on the standard Udyam Registration Portal because it lacks a PAN or (GSTIN). Kirana and grocery

stores, street vendors and hawkers, artisans and craftspeople, home-based businesses like tailoring units, pickle- and snack-making, Self-Help Group (SHG) members running small income-generating activities and rural micro businesses all come within the scope of IMEs. Women in semi urban rural areas easily venture into IMEs as a source of livelihood.

This study is conducted in the 2 south eastern districts of Jamui and Lakhisarai and Sheikhpura in the Indian state of Bihar. Their predominantly rural settlement structure and relatively lower per-capita output compared with the state average provide an important socioeconomic context for examining UPI adoption among rural and semi-urban women who are managing Informal Micro Enterprises (IMEs).

The Unified Theory of Acceptance and Use of Technology (UTAUT) Model (Venkatesh, *et al.*, 2003) was the conceptual framework utilized to detect the key determinants influencing the behavioral intention and subsequent usage of UPI by the women IMEs in these districts. This study is relevant as it explores the psychology of the women in a semi urban setting in India with respect to adopting technological innovation in managing financial transactions of their enterprises.

Study of such semi-urban users aims to bridge the knowledge gap about their patterns of adaptation to digital finance. Moreover, this study's findings can guide the banking institutions to customize products/services for rural and semi-urban women customers. The governmental agencies, NGOs and policy makers can take use this study to formulate effective awareness and skill development programs on digital literacy and cybersecurity. The users themselves can gain insights into the benefits of using UPI.

Literature Review

Cornelli, *et al.* (2024) made a detailed study of the rapid growth in the adoption of UPI in India. They studied the UPI landscape from the perspective of digital payment infrastructure, market organisation, technological architecture, and regulatory policy framework. Devi (2025) investigated the impact of financial digitization and its effect on UPI adoption by small informal enterprises. She highlighted aspects of financial inclusion, increase in customer base, ease of transactions and success of the business. Recent research has increasingly relied on the UTAUT and UTAUT2 frameworks to explain the behavioural factors influencing the acceptance and continued use of Unified Payments Interface (UPI) services in India. In their empirical investigation, Kiran and Vedala (2025) utilized the UTAUT model to evaluate the determinants of consumers' intention to use UPI-based payment platforms among 416 users and found that performance expectancy, effort expectancy, social influence, facilitating conditions, and habit were significant drivers of behavioural intention. Manrai, Goel, and Yadav (2021), studied 568 semi-rural Indian women by extending the Unified Theory of Acceptance and Use of Technology 2 (UTAUT2) and incorporating constructs from Self-Determination Theory and

Perceived Credibility to examine the determinants which drive UPI adoption among them. The authors reported effort expectancy, habit, facilitating conditions and perceived competence drive technology usage. Habit and facilitating conditions partially mediated the link between intention and usage. Necessary infrastructure, user friendly interfaces and boosting women's confidence in using technology should be stressed upon. Gupta and Kiran (2024) deployed the UTAUT2 model to examine the Gender Digital Divide. They found that women's technology adoption is comparatively less driven by performance expectations and more sensitive to interface simplicity and structural support. This has direct implications for UPI design and communication strategies in rural areas. Bapat (2022), used TAM to examine the relationship between lifestyle, digital financial elements, and digital financial services experience and reported that perceived ease of use was the most dominant adoption driver for women belonging to low- and middle-income brackets in semi-urban India. The study highlighted how familiarity with digital interfaces through everyday apps, particularly the ones in vernacular languages reduced the psychological barriers to UPI adoption.

Haque *et al.* (2025), studied adoption of UPI in rural Uttar Pradesh using logistic regression on primary survey data from Aligarh district, identified younger age, male gender, higher education, specific occupational categories, and higher income as the most statistically significant positive predictors of UPI use, while caste, religion, and marital status were found insignificant. Swapna, and Kanthimathinathan (2024) studied UPI adoption among rural women in India by focusing on the socio-cultural, psychological, and structural drivers using an adapted Technology Acceptance Model (TAM). Perceived usefulness and ease of use were found to be primary enablers, and trust, anxiety and lack of ownership of smartphones were main barriers. Ghani, *et al.* (2023) surveyed respondents in rural and urban West Bengal and utilized demographic variables (age, income, education) to examine factors which predicts UPI usage. Devi (2022) focused on small informal businesses to study the impact of financial digitization and UPI on them. 427 rural women in Kerala were studied by Mini and Sasankan (2023) by utilizing an extended TAM model. Perceived Usefulness and Ease of Use were detected to positively affect attitude and trust and cost significantly impacted both attitude and usage. By focusing on simplifying user experiences, lowering costs and enhancing trust, mobile payment adoption rate could be improved among women in rural settings Similar urban-rural study was conducted by Dubey and Gupta (2024) across Madhya Pradesh where urban adoption of digital payment was higher compared to the rural ones. This differential was attributed not only to attitudinal reluctance but mainly to lack of reliable network connectivity, device ownership and functional banking correspondents. The finding corroborates the argument that infrastructure constraints are more significant than individual-level behavioural barriers in rural contexts.

Theoretical Framework- Venkatesh *et al.* (2003) proposed the Unified Theory of Acceptance and Use of Technology (UTAUT). The model was developed to explain users' intentions to adopt technology and their subsequent usage behavior. Subsequently, Venkatesh *et al.* (2012) expanded the framework to introduce UTAUT2. Since UTAUT framework is the most extensively used theoretical model for empirical research on the intention and use of technology, the present study adopts the UTAUT model as the theoretical foundation to examine the factors influencing the adoption of UPI among women run IMEs in the 3 south eastern districts of Bihar, India.

The UTAUT model identifies four principal determinants that influence technology acceptance and usage. In this study, the constructs are Performance Expectancy (PE), which reflects the perceived benefits derived from using UPI; Effort Expectancy (EE), which represents the degree of ease associated with UPI usage; Social Influence (SI), which captures the effect of social pressure and opinions of significant others on adopting UPI; and Facilitating Conditions (FC), which refer to the availability of resources and support necessary for UPI transactions. These constructs directly shape an individual's Behavioral Intention (BI), which in turn determines actual Usage Behavior (UB). In addition to these core determinants, the UTAUT framework incorporates four moderating variables—gender, age, experience, and voluntariness of use. Table 1 presents a concise description of the key constructs and dependent variables included in the UTAUT model, while Figure 1 illustrates the conceptual structure of the framework.

Table 1: UTAUT variables (Venkatesh *et al.*, 2003)

Core Determinants	
Construct	Description
Performance Expectancy (PE)	"The degree to which an individual believes that using the system will help him/her to attain gains in job performance"
Effort Expectancy (EE)	"The degree of ease associated with the use of the system."
Social Influence (SI)	"The degree to which an individual perceives that important others believe that he/she should use the new system".
Facilitating Conditions (FC)	"The degree to which an individual believes that an organizational and technical infrastructure exists to support the use of the system".
Dependent Variables	
Construct	Definition
Behavioural Intention (BI)	The intention of the individual to use the system
Usage Behaviour (UB)	The extent of usage of the system by the individual

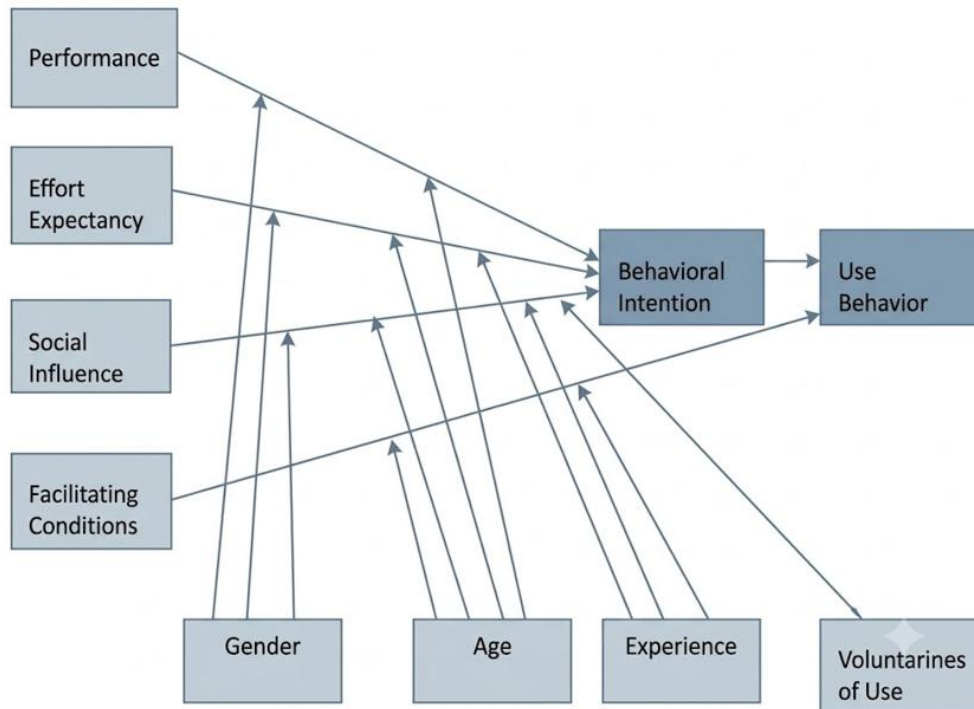


Figure 1: The UTAUT Model (Venkatesh *et al.*, 2003)

Methodology

An empirical research design, with a deductive research approach, was undertaken for this study, wherein a survey method was adopted for collecting primary research data:

- **Research Instrument-** The survey method was employed to solicit information to evaluate the conceptual model. The questionnaire was prepared after consulting academicians and government officials. The first section of questionnaire captured the demographic profile of the respondents with respect to Age, Occupation, Education, Income level and Usage Pattern of UPI payment applications. In the second part of the questionnaire, responses to all the constructs and their item statements were gathered using five-point Likert scale. Answers ranged from ‘strongly disagree rated as 1’ to ‘strongly agree rated as 5’.
- **Data Collection -**The target population of this study were women above 18 years in the 2 districts of Jamui and Lakhisarai and Sheikhpura of Bihar, India who were managing IMEs and currently using UPI or are potential users. The convenience sampling method was applied to collect the data utilising the structured questionnaire. The respondents were contacted in residential localities, markets and kirana shops. A total of 250 respondents were contacted for the survey, of which complete data was collected from 216 of them giving a response rate of 87%.
- **Data analysis-** Data was analysed using SPSS (ver 22.0). Descriptive statistics were calculated for determining the level of UPI adoption among these women IMEs. Multiple Regression analysis was undertaken to judge how the 4 constructs, PE, EE, SE and FC influence the BI. Linear Regression was conducted to study how BI affects UB

Data Analysis and Findings

Table 2: Respondents' profile

Profile Variable	Count	Percentage
Age		
Less than 25	68	31.5
26-40	84	38.9
41-60	36	16.7
Above 60	28	12.9
Education		
Below School level	62	28.7
School Passout	111	51.4
Graduate	31	14.4
Post Graduate	12	5.5
Occupation		
Student	46	21.2
Homemaker	118	54.5
Self employed	32	14.7
Salaried	21	9.7
Monthly family income		
Below 25,000	18	8.3
25,000–50,000	121	56.1
50,001–1,00,000	54	25
Above 1,00,000	29	13.5
Smartphone ownership experience (years)		
0-1 2.6 16.4 20.5	11	
1-3	20	
3-5	34	
More than 5	151	

From Table 2 it can be seen that the majority of the respondents are below the age of 40 years and are school passouts. The predominant occupation is that of a homemaker (54.5%) and monthly family income is in the range of 25000 to 50000Rs. Table 3 reports the Preference and Usage of UPI in India in general with special focus on adoption by women in semi urban/ rural areas.

Table 3: UPI preference and usage in India and semi urban /rural areas of India

Indicator	Statistic	Source
UPI preference among surveyed users	57%	DFS, Ministry of Finance (2026)
Cash preference among surveyed users	38%	DFS, Ministry of Finance (2026)
Users with multiple digital payments daily	65%	DFS, Ministry of Finance (2026)
UPI preference among 18-25 yr olds	66%	DFS, Ministry of Finance (2026)
UPI preference among women users	66%	DFS, Ministry of Finance (2026)
UPI as a preferred payment mode in semi urban/ rural area	38-40%	EY and CII (2024)
Women using UPI at least weekly in rural/semi-urban areas	38%	Paynearby (2026)
UPI adoption by rural women earners	54%	DBS report
UPI share of total digital transactions, 2021–2025	~80%	DFS, Ministry of Finance (2026)

Table 3 indicates that around 38-40% of individuals in rural and semi-urban regions prefer UPI for payments. This reflects increasing comfort with digital transactions. The PayNearby Women Financial Index 2026 reported that 38% of women in rural and semi-urban places utilize the UPI application at least once a week, primarily for payments of groceries, utility bills and mobile recharges. This establishes the increasing popularity of digital payment applications among the women in these areas. The report “The Digital Opportunity: Access, Adoption and Trust” by DBS Bank India, revealed that 54% of Indian rural women earners have adopted UPI for their financial transactions. Their expenses are primarily for day-to-day business operations, with 82% spending on purchase of raw materials, 47% for rent payment and 35% on transportation expenses.

Digital payments have gained in traction in the districts of Bihar too. Data collected with respect to the UPI adoption among the sample of women IMEs from these districts is presented in Table 4.

The data presented above is in sync with the reported data of UPI adoption in Semi-Urban/ Rural areas of India. Table 3 shows that adoption of UPI was prevalent amongst majority of the sampled women respondents although the frequency of usage did differ.

The descriptive statistics related to the constructs of the UTAUT framework are given in Table 4. The mean value for all 4 constructs, namely performance expectancy (PE), effort expectancy (EE), social influence (SI) and facilitating condition (FC) are exceeding 3. This means that majority of the respondents agreed or strongly agreed with the statements of UTAUT in the questionnaire.

Table 4: Observations on UPI adoption among sampled women in Bihar

Parameter	Percentage
UPI adoption	58%
Multiple UPI transaction per day	38%
Frequency of UPI transactions	
Daily	19%
Multiple times in a week	25%
Weekly	35%
Fortnightly	13%
Monthly	8%
Age group showing pronounced usage	18-30 years
Greater level of trust and confidence after usage of UPI	78%
Key motivation for usage	
Speed and Ease of transactions	70%
Incentives of cashback/ offers	48%

Table 5: Descriptive Statistics of the Responses on the UTAUT framework

Indicator	Mean	Std. Dev.
PE 1: I will find UPI useful in my work	4.05	2.36
PE 2: My productivity would increase by using UPI	4.01	2.23
PE 3: I can accomplish tasks quicker by using UPI	4.11	2.13
EE1: UPI is clear and understandable	3.59	2.36
EE2: I am skillful at using UPI	3.48	2.34
EE3: UPI is easy to use	3.77	2.49
SI 1: People who influence my behavior think that I should use UPI	4.26	2.10
SI 2: People who are important to me think that I should use UPI	4.30	2.24
FC 1: I possess the resources needed to conduct UPI	3.71	2.56
FC 2: I possess the knowledge necessary to use UPI	3.5	2.45
BI 1: It is my intention to use UPI in the next 12 months	3.94	2.31
BI 2: I predict I would use UPI in the next 12 months	4.05	2.41
BI 3: I plan to use UPI in the next 12 months	4.27	2.44
UB 1: UPI applications are frequently used by me	3.85	2.41
UB 2: On regular basis I make use of UPI	3.99	2.51
UB 3: Majority of my transactions are done through UPI	4.13	2.60

Table 6: Comparison of the mean scores of UTAUT constructs

Construct	Score
Performance Expectancy PE	4.06
Effort Expectancy EE	3.61
Social Influence SI	4.28
Facilitating Conditions FC	3.61
Behavioural Intention BI	4.09
Usage Behaviour	3.99

Regression analysis results with BI (Behavioral Intention) as the dependent variable and PE, EE, SI and FC as independent variables are given below:

Table 7: Model Summary of Regression analysis between BI and 4 Constructs

Statistic	Result
R	0.932
R ²	0.869
Adjusted R ²	0.866
Std. Error of Estimate	0.226
N	216

The four predictors together explain 86.9% of the variance in Behavioral Intention (BI) with an F statistic of 349.4 having p value < 0.001. Thus, the overall regression model is highly statistically significant.

Table 8: Coefficients of Regression Model

Predictor	β	t	p-value	Result
Constant	—	0.499	0.618	Not significant
PE	0.156	3.249	0.001	Significant
EE	0.074	1.223	0.223	Not significant
SI	0.182	4.297	<0.001	Significant
FC	0.607	14.774	<0.001	Significant

The results show that PE, SI and FC significantly and positively influence Behavioral Intention. FC is the strongest predictor of BI ($\beta = 0.607$, $p < 0.001$). EE also has a positive coefficient, but its effect is not statistically significant. So This indicates that respondents' perception of having the necessary resources, support and facilitating conditions has the greatest influence on their intention to use the UPI.

Regression analysis using UB (Usage Behaviour) as Dependent variable and BI (Behavioral Intention) as independent variable is given below.

Table 9: Model summary of regression analysis between BI and UB

Statistic	Result
R	0.911
R ²	0.830
Adjusted R ²	0.830
Std. Error of Estimate	0.358

It shows BI explains 83.0% of the variance in Usage Behaviour (UB) which has a high statistical significance level of < 0.001 .

Table 10: Coefficients of Regression Model

Predictor	β	t	p-value	Decision
Constant	—	-2.740	0.007	Significant
BI	0.911	32.523	<0.001	Significant

This means that increase in Behavioral Intention can lead to high Usage Behaviour.

Conclusion

In this research the antecedants of UPI adoption among women run IMEs in the semi urban/ rural settings in Bihar has been studied. The regression results provide strong support for the UTAUT-based model for UPI technology adoption. Behavioral Intention (BI) is significantly influenced by Performance Expectancy (PE), Social Influence (SI), and Facilitating Conditions (FC). Facilitating Conditions has the strongest influence on BI indicating that access to resources, support, and enabling conditions plays a critical role in influencing women run IMEs to adopt UPI. Also, there is a very strong positive relationship between BI and UB, suggesting if intention can be created it will transform into usage of UPI.

It was found that only 51% of the women respondents in this study have embarked upon UPI adoption. This stresses the need for creating conducive conditions with respect to enabling infrastructure, reliable internet connectivity and customer support to push for greater adoption of UPI and lesser focus on cash transactions in these IMES.

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DIGITAL TRANSFORMATION IN COMMERCE: OPPORTUNITIES, CHALLENGES AND FUTURE PROSPECTS

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Abstract

Digital transformation has materialised as one of the most magnificent contemporary trends influencing commerce and business management. The fast-pacing growth of technologies such as artificial intelligence (AI), cloud computing, blockchain, mobile applications, digital payments has dramatically changed the way of business operation and interaction style with customers. Digital transformation not simply mean adopting new technologies rather it involves redesigning and restructuring business process, customer experiences, marketing strategies, and organizational models through digital technologies. This chapter examines the concept of digital transformation in commerce, its major drivers, applications, benefits, challenges, and impact on businesses and consumers. It also discusses the role of digital transformation in Indian commerce, particularly in areas such as e-commerce, digital payments, online retail, and small businesses. Digital transformation boost efficiency, improve market reach, increase customer satisfaction, and bring give birth to healthy competition, but its implementation requires appropriate strategy formulation, infrastructure, skilled manpower, consider ethical issues such as data privacy and security, and overall effective management.

Keywords: Transformation, Materialised, Artificial Intelligence, Infrastructure, Implementation.

1. Introduction

Commerce has referred to exchange of goods and services between producers, sellers, and consumers. However, technological developments have transformed the traditional structure of commerce. Businesses now approach far away customers via digital platforms, accept electronic payments, analyse mass customer data to develop strategy, automate business processes, and operate across geographical boundaries.

Digital transformation refers to the blend of digital technologies into organization operation with the aim of improving business performance and efficiency. In commerce, it has marked its presence in every sphere e.g procurement, production, marketing, finance, delivery, customer service. The rapid growth of smartphones, affordable internet connectivity, social media, digital payment systems, and online marketplaces has accelerated this transformation. Now Customers expect quick, convenient, personalized, and digital experiences on the part of business. So digital

transformation is not a technological adoption rather it is core factor for business sustainable growth in long run.

2. Meaning of Digital Transformation

Digital transformation is the process of using digital technologies by business to improve its operations, products, services to provide unmatched customer experience. It need to understand the distinguish between different terms as consider same by public at large.

- **Digitization** means simply conversion physical form information into a digital form, such as converting paper records into electronic files.
- **Digitalization** involves using digital technology to improve existing processes, such as using accounting software instead of maintaining accounts manually.
- **Digital transformation** has a broader application such as change in organizational setup where technology helped in redesign processes, strategies, customer experiences, and business models.

3. Major Technologies Driving Digital Transformation

➤ **Artificial Intelligence**

AI is most well-known technology of present era increasingly being used in commerce for customer-service via chatbots, product recommendations as per preferences, demand analyse and forecasting, early fraud detection, inventory management, marketing, advertisement. AI able to process mass volume of data and make faster, data-driven decisions. It can also help businesses personalize customer experiences according to individual preferences. For example, when you search some product on internet, next time it will show up relevant ads as per your past search history.

➤ **Big Data Analytics**

Businesses collect mass data through websites, mobile applications, transactions, social media, and customer interactions. Big data analytics technology process it to identify patterns and trends in this data. It help business to understand consumer behaviour, forecast demand, fixing price, and improve marketing decisions.

➤ **Digital Payments**

Digital payment systems have become an important part of modern commerce which reduce the risk of carry physical cash. Now consumers can make large payments via mobile applications, smart cards, internet banking, QR codes at their own convenience. It makes transactions faster and also becomes electronic records of transactions for future reference.

➤ **Blockchain**

Blockchain provides a decentralized method of recording transactions. In commerce, it has potential applications in payment systems, supply-chain tracking, digital contracts, authentication, and transaction transparency.

➤ **Internet of Things**

The Internet of Things (IoT) connects physical devices to digital networks. In commerce and supply-chain management, IoT devices can be used to monitor inventory, shipments, warehouses, equipment, and product conditions.

➤ **Mobile Commerce**

The more use of smartphones has contributed significantly to mobile commerce. Now customers don't like to visit store for products rather they can search for products, compare prices, place orders, make payments, and track deliveries through mobile devices. This service is available for 24*7. It presents more choice to them for better purchasing experience.

4. Applications of Digital Transformation in Commerce

➤ **E-Commerce**

E-commerce is prime evidence of digital transformation in commerce. Online websites allow businesses to sell products and services to customers beyond their physical locations. It becomes easy for them to target large segment of society by reducing geographical barriers and offer wider variety of products. It opens new opportunities for companies to expand their business operation and increased customer base that ultimately put positive impact on revenue growth. Amazon, Flipkart are prime example of it.

➤ **Digital Marketing**

Digital transformation has changed marketing strategies of every business in current scenario to approach large public. Businesses use search engines, social media platform, email, websites, content marketing, and online advertising to communicate with consumers. Digital marketing techniques allows business to engaged customers into company offers and prompt them to take interest and make purchase.

➤ **Customer Relationship Management**

CMR is a long-term tool in business success which requires to maintain healthy relations with customers and keep them satisfied every time, to take care their needs. It allow business to collect and analyze customer information to identify demand patterns, behavioural factors, their sentiments which in turn helpful to provide personized services to improve customer loyalty.

➤ **Supply Chain Management**

Role of supply chain management is prominent in present time to fulfil order on time. Businesses can monitor inventory, track shipments, forecast demand, and coordinate with suppliers using digital systems.

➤ **Digital Banking and Financial Services**

Now commerce totally depends on digital financial services. Online banking, mobile banking, digital wallets, and instant payment systems have made financial transactions more accessible and convenient.

➤ **Online Customer Service**

AI generated Chatbots, automated support systems, social media communication, and online customer care centres allow businesses to handle customers queries, grievances and provide technical support beyond normal business working hours.

5. Impact of Digital Transformation on Commerce

➤ **Increased Market Reach**

Growth and popularity of digital platforms like Instagram, Facebook etc help business to approach vast customers across cities, states, and countries. Now business is not stick with local boundaries rather a small businessman can potentially sell to customers outside its local market without establishing physical stores in every location. It makes a whole universe a single market place for everyone. Anyone can sell his product or services just by sitting home with digital media.

➤ **Improved Customer Experience**

Digital transformation brings change in customer experience. They can browse products, compare prices, check rating and opinions, read reviews of others before actual buying, place orders, make payments, and track deliveries from a single digital device without going anywhere else. Digital transformation brings convenience and increased customer expectations.

➤ **Reduction in Operating Costs**

Digitalisation of every process and activity bring slight reduction in paperwork, transaction costs, and certain administrative expenses due to less requirement of human resources. It cut down unnecessary cost which chunk major part of revenue.

➤ **Faster Decision-Making**

In cut throat competitive environment managers want to stays ahead. For this quick and reliable decision are require to be taken and implemented. Digitalisation allows managers to process and analyse large data in accurate way to foster quick and informed decisions.

➤ **Greater Personalization**

Every customer is unique in nature. Businesses has to take care their needs, wants, preferences, so digital technology is use to interpreting customer data and further AI-based systems provide personalized recommendations, offers, and communications to win customer confidence and loyalty.

➤ **Increased Competition**

Digital transformation of commerce has open new opportunities to everyone. As a result, businesses face competition not only from traditional rivalry but also from new startups which purely operated via online platforms.

➤ **Changing Consumer Behaviour**

Traditionally consumers were totally depended on business for information need but now digitalisation change the scenario. Now consumers are tech savvy, digitally connected with each other's so they are more informed about what is happening in market. They can compare multiple products, prices, reviews, and alternatives before making purchasing decisions.

6. Advantages of Digital Transformation

The major advantages include:

- Access to Broader Market area
- Boast operational efficiency
- Speedy transactions
- Improved and satisfactory customer service
- Quick and reliable decision-making
- Personalized marketing
- Low need of physical infrastructure
- Improved supply-chain management
- New business and revenue models
- Flexibility in Business operations
- Promote healthy competitiveness

7. Challenges of Digital Transformation

Like every coin has two sides, so digital transformation also poses some challenges.

➤ **Cybersecurity Risks**

Heavy dependence on digital systems for business, banking transactions generate threats of cyberattacks, online fraud, sensitive data theft, and other security concerns. So, it becomes responsibility of business to adopt strong cybersecurity measures to protect customer and organizational sensitive data from hackers and other cyber attackers.

➤ **Data Privacy**

Business collects large amounts of customer information via social media applications, websites. It becomes ethical duty to responsibly collection, storage, processing, and sharing of data without compromising consumer trust, belief and complying with applicable laws of land.

➤ **High Initial Investment**

In spite of fact digitalisation reduce administration cost but adoption and implementation of technology require heavy monetary investment in software, hardware, cybersecurity mechanism, manpower training, IT infrastructure, and obtaining professional expertise. Small business finds it hard to afford such kind of investment so some viable idea dies at initial stage due to lack of funds.

➤ **Lack of Digital Skills**

Digitalisation requires updated tech skills on employees' part to operate new technologies efficiently but in reality, they don't possess the required skills. So sometimes they resist to adopt technology. To curb such situation business, need to impart training and skills.

➤ **Digital Divide**

Digitalisation of commerce divide the consumers and businesses in two distinct groups. Both groups don't have equal access to smartphones, reliable internet, digital infrastructure, or digital skills. Modern generation businessman and customers are technology oriented where old generation rely on traditional patterns. Old generation finds it hard to cope up with modern digital tools and channels.

➤ **Dependence on Technology**

Heavy dependence upon technological sometimes pose operational difficulties as when systems crash, non-availability of networks. This cause unnecessary delay in business operation and generate frustration.

8. Digital Transformation in Indian Commerce

Digitalisation touch whole universe and India is not a exception, It also experienced significant growth in digital commerce. The expansion of internet access, smartphones, digital payments, e-commerce platforms, has changed the participation style of all components in commerce. One of the greatest changes witnessed in everyday transactions is use of digital payments system. Now Small retailers or vendors are increasingly accepting electronic payments via google pay upi app. E-commerce website also create new opportunities for business to access and target customers beyond their local geographical markets. Digitalisation of commerce in India also facing some challenges related to digital literacy, cybersecurity, infrastructure, affordability. Government initiatives, affordable digital services, training programs, and awareness can help address these challenges. But still digital technology is emerging as key determinant in shaping future of commerce of India.

9. Future Trends in Digital Commerce

It seems future of commerce is likely to be technology-driven. Some important directions include:

➤ **Artificial Intelligence generated Content**

Now most of advertisement content with AI in content creation, forecasting, data interpretation, product innovation, fraud detection and prevention, and business decision-making.

➤ **Social Commerce**

Emergence of social media platforms give birth to influencer marketing and Gen Z consumers purchase decision is entirely based on influencer opinion, reviews in discovering, evaluating, and purchasing products.

➤ **Omnichannel Commerce**

Business is increasingly integrating physical stores, websites, mobile applications, social media, and other channels to provide a consistent customer experience.

➤ **Hyper-Personalization**

Advancement of technology assist in providing personalisation services and communication to consumers based upon their liking. In this environment consumer feel well treated by business and attach with brand on permanent basis.

➤ **Sustainable Digital Commerce**

Use of digital technology help businesses optimize utilisation of scare resources, reduce paper wastage, promote green commerce, protect environment by amending their operations in such a way to create sustainable digital commerce environment for future generation. In fact digital transformation has changed the traditional structure of commerce.

10. Suggestions

For better digital transformation of commerce some suggestion should be need to considered:

- **Clear digital strategy:** Technology adoption should not be an overnight phenomenon rather it would be consistent practices align with business objectives and vision.
- **Employee training:** Effective implementation requires initial investment in employees training to impart skills to handle digital tools, data management, cybersecurity challenges, and customers queries.
- **Strengthen cybersecurity:** Organizations should implement appropriate security controls, employee awareness programs, and data-protection practices.
- **Customer centric:** Digital transformation should improve customer convenience, accessibility, personalization, and service quality.
- **Regular innovation and updation:** In fast changing era technology is changing frequently so management should take care of it and to remain updated about latest technology innovation to keeps necessary adjustment in previous implemented system to stay ahead and provide valuable services to customers.
- **Digital inclusion promotion:** Businesses and policymakers should work toward reducing barriers related to digital literacy, infrastructure, affordability, and accessibility to popularise the concept of digital inclusion in India. Government should also pay attention on this side to provide business with all necessary provision to become tech savvy.

Conclusion

Digital transformation has become prime force in deciding future of commerce. Technologies has totally changed the businesses interaction style with customers as compare to past. Digital transformation provides number of opportunities in form of wide market reach, boast efficiency,

informed decision, better customer experiences, and the creation of new tech business models. At the same time, business should consider the issues related to cybersecurity, data privacy, employees' digital skills, initial investment, organizational resistance, and the digital divide. In India, digital transformation opens potential opportunities for business segment. Even small businesses, retailers, service providers, and entrepreneurs can use digital platforms to access new customers and improve business processes.

At last, successful digital transformation requires a integration of technology, business strategy, skilled man force, cybersecurity mechanism, and effective management. All these elements help to businesses to face competition and sustainable growth in digital economy.

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GENERATIVE AI IN COMMERCE EDUCATION: TRANSFORMING TEACHING, LEARNING AND ASSESSMENT PRACTICES

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Abstract

Generative Artificial Intelligence (GenAI) has emerged as a significant technological development in higher education, creating new possibilities for teaching, learning, evaluation, and academic facilitation. Commerce education, which encompasses disciplines such as accounting, finance, marketing, banking, human resource management, entrepreneurship and e-commerce, offers substantial opportunities for pedagogically meaningful applications of GenAI. At the same time, the rapid adoption of generative AI tools creates challenges related to academic integrity, overdependence on technology, inaccurate information, privacy, evaluation validity, and the development of learners' independent thinking skills. The present study examines the role of Generative AI in transforming teaching, learning and evaluation practices in Commerce education. The study proposes a quantitative research framework based on four substantial constructs: GenAI Integration, Teaching Transformation, Learning Enhancement and AI-Enabled evaluation Readiness. A structured five-point Likert-scale questionnaire is proposed for data collection among undergraduate Commerce learners. To demonstrate the statistical methodology, an illustrative dataset of 200 student responses is used. The proposed analysis includes frequency and percentage analysis, mean and standard deviation, Cronbach's alpha, Pearson correlation, independent sample analysis, one-way ANOVA, chi-square test, paired-sample t-test and multiple regression analysis. The illustrative findings suggest positive relationships between GenAI integration, teaching transformation and learning enhancement. Learners demonstrate favourable views of GenAI-supported explanations, personalised learning, idea generation, case analysis and immediate feedback. However, learners also express challenges regarding inaccurate AI-generated information, academic dependency, plagiarism and evaluation fairness. The study argues that GenAI should not replace faculty members or learners' cognitive effort; rather, it should function as a pedagogical assistant within a human-focused educational framework. The paper proposes an AI-aware Commerce Education Model that integrates teacher expertise, student agency, GenAI literacy, authentic evaluation and responsible technology use.

Keywords: Generative Artificial Intelligence, Commerce Education, Artificial Intelligence in Education, Teaching and Learning, Assessment, Academic Integrity, Higher Education, GenAI Literacy.

1. Introduction

The swift development of Generative Artificial Intelligence has introduced a substantial transformation in the educational environment. Unlike conventional educational technologies that generally perform predefined functions, GenAI systems can generate text, explanations, examples, questions, summaries, images, code and other forms of content in response to natural-language instructions. The emergence of systems such as ChatGPT and other large language model-based applications has significantly changed how learners search for information, prepare assignments, understand concepts and obtain feedback. Faculty members can similarly use GenAI for lesson planning, question generation, content development, evaluation design, feedback, and administrative facilitation.

The OECD's Digital Education Outlook 2026 emphasises that GenAI may facilitate education when it is guided by clear pedagogical principles. It also cautions that merely outsourcing cognitive tasks to general-purpose AI may improve immediate task performance without necessarily producing genuine learning gains.

This distinction is particularly notable in Commerce education. Commerce learners are expected to strengthen not only conceptual knowledge but also analytical, numerical, communication, decision-making and problem-solving abilities. A student studying financial accounting, for example, should be able to understand accounting principles and independently analyse transactions. Similarly, a marketing student should be able to evaluate consumer behaviour, strengthen marketing strategies and interpret market information.

GenAI can support these activities; however, excessive reliance on it may limit opportunities for students to strengthen independent reasoning.

Accordingly, UNESCO promotes a human-centred approach to GenAI in education that stresses ethical, safe, equitable and purposeful use, along with privacy safeguards, institutional readiness and sound pedagogical design.

The key question, therefore, is not whether GenAI belongs in Commerce education, but how it can be incorporated in an effective and responsible manner.

2. Problem Statement

The swift availability of GenAI tools has created a situation in which learners may use AI applications outside the direct control of educational institutions. While GenAI may offer explanations and generate instructional resources rapidly, the quality and reliability of generated information may vary. Learners may also submit AI-generated assignments without demonstrating adequate understanding.

Consequently, conventional assessment practices face growing challenges.

- Application-based tasks;
- Case analysis;

- Oral presentations;
- Viva voce;
- Project-based assessment;
- Reflective journals;
- Problem-solving activities;
- Process-based assessment; and
- evaluation requiring original data or personal interpretation.

The OECD similarly notes that GenAI creates opportunities for evaluation but also requires careful consideration of validity, reliability, human oversight and the distinction between task performance and actual learning. The present study therefore investigates whether GenAI can contribute positively to Commerce education while identifying the conditions required for responsible adoption.

3. Rationale for the Study

The significance of the study arises from several considerations.

3.1 Changing Student Learning Behaviour

Students are making greater use of conversational AI applications for academic work. Examining their perceptions and patterns of use can assist institutions in developing suitable policies.

3.2 Transformation of Teaching

GenAI can assist teachers in preparing examples, case studies, lesson plans, quizzes and learning resources tailored to differing learner needs.

3.3 Personalised Learning

GenAI has the potential to offer explanations that are adapted to individual learning requirements.

3.4 Assessment Transformation

Assignments centred mainly on knowledge recall are becoming increasingly susceptible to AI-assisted completion.

3.5 Academic Integrity

Institutions need explicit guidelines that distinguish permissible from impermissible uses of AI.

3.6 Future Employability

As AI becomes more common in workplaces, Commerce graduates will encounter AI-supported professional environments. Students therefore need both disciplinary competence and responsible AI literacy.

4. Objectives

The objectives formulated for the study are as follows:

- i. To assess the extent to which Commerce students use GenAI.
- ii. To evaluate learners' views regarding GenAI-assisted teaching.

- iii. To investigate how GenAI affects students' learning experiences.
- iv. To evaluate the utility of GenAI for academic activities related to Commerce.
- v. To assess students' views on AI-assisted evaluation.
- vi. To determine the principal challenges linked with GenAI use.
- vii. To establish the association between GenAI integration and learning enhancement.
- viii. To determine whether demographic characteristics affect students' views of GenAI.
- ix. To determine whether GenAI integration significantly predicts learning enhancement.
- x. To formulate a responsible framework for GenAI use in Commerce education.

5. Research Questions

The investigation is guided by the following research questions:

- RQ1: To what extent do Commerce students use GenAI?
- RQ2: What are students' views of GenAI-assisted teaching and learning?
- RQ3: Is GenAI integration significantly associated with learning enhancement?
- RQ4: Does GenAI integration significantly affect readiness for AI-enabled assessment?
- RQ5: Do students' views differ significantly among the academic-year groups?
- RQ6: Which principal advantages and challenges are associated with GenAI in Commerce education?

6. Hypotheses of the Study

- H01: There is no statistically significant association between GenAI Integration and Teaching Transformation.
- H02: GenAI Integration is not significantly associated with Learning Enhancement.
- H03: Teaching Transformation has no statistically significant relationship with Learning Enhancement.
- H04: GenAI Integration does not significantly explain variation in Learning Enhancement.
- H05: Students' perceptions of GenAI do not differ significantly by academic year.
- H06: Previous GenAI experience is not significantly associated with willingness to use GenAI for educational learning.

7. Literature Review

7.1 Generative AI and Education

Generative AI has expanded the possibilities for interactive educational facilitation. Unlike conventional search engines, conversational AI can respond to questions, explain concepts, generate examples and facilitate iterative interaction. The OECD's 2026 Digital Education Outlook concludes that GenAI may facilitate learning when used with clear pedagogical intent. It also emphasises that better task performance should not automatically be interpreted as better learning.

This distinction forms an important theoretical basis for the present investigation.

7.2 GenAI and Teaching

Teachers can use GenAI to develop:

- Lesson plans;
- Classroom activities;
- Case studies;
- Quizzes;
- Multiple-choice questions;
- Discussion prompts;
- Simplified explanations;
- Differentiated learning materials; and
- Feedback templates.

Nevertheless, teachers retain responsibility for checking the accuracy and suitability of AI-generated content. The OECD places particular emphasis on human agency and oversight within AI-supported education.

7.3 GenAI and Student Learning

GenAI may facilitate personalised learning by allowing learners to ask repeated questions without embarrassment and obtain explanations at different levels of complexity. The system may offer a simplified explanation and examples. This interactive learning process may facilitate conceptual understanding when used appropriately. However, learners who simply copy AI-generated answers may achieve task completion without developing equivalent knowledge.

8. Applications of Generative AI in Commerce Education

GenAI can be applied in a range of major Commerce disciplines.

Accounting	Transaction explanations, accounting problems, case analysis
Finance	Financial concepts, investment scenarios, ratio-analysis practice
Marketing	Campaign ideas, customer personas, content analysis
Human Resource Management	Interview simulations, HR case studies
Banking	Banking-service explanations and scenario analysis
Insurance	Policy concept explanations and case studies
Entrepreneurship	Business-model development and idea evaluation
E-Commerce	Digital-business strategies and customer journey analysis
Business Analytics	Interpretation of hypothetical datasets
Management	Decision-making cases and leadership simulations

GenAI is likely to provide greater educational value when treated as a partner in thinking rather than simply as a source of ready-made answers.

9. Genai and Learning Enhancement

The study considers the following dimensions as indicators of learning enhancement:

- Improved access to explanations.
- Faster clarification of doubts.
- Personalised learning support.
- Increased opportunities for practice.
- Support for brainstorming.
- Assistance with case analysis.
- Development of presentation ideas.
- Immediate feedback.
- Support for revision.
- Increased learner engagement.

However, the extent of these benefits depends substantially on the quality of pedagogical integration.

10. Methodological Framework

10.1 Research Design: A descriptive-analytical research design is adopted for the study. A quantitative survey method is proposed to assess Commerce students' perceptions regarding GenAI.

10.2 Population: The target population comprises undergraduate students enrolled in Commerce programmes.

10.3 Sample Size: To demonstrate the statistical procedures presented in this manuscript, an illustrative sample comprising 200 students is used.

10.4 Sampling Method: Proportionate sampling may be employed so that the different academic-year groups receive appropriate representation.

11. Illustrative Analysis of Data

The results below are simulated exclusively to illustrate the analytical framework proposed for the study.

11.1 Demographic Profile

Gender	Male	92	46%
Gender	Female	108	54%
Academic Year	I Year	68	34%
Academic Year	II Year	67	33.5%
Academic Year	III Year	65	32.5%
Previous GenAI Experience	Yes	156	78%
Previous GenAI Experience	No	44	22%

Interpretation

The illustrative sample indicates that 54% of respondents are female and 46% are male. Representation across the three academic years is relatively balanced. Approximately 78% of respondents are assumed to have prior experience with GenAI, indicating substantial exposure to AI-based learning tools.

11.2. Frequency of GenAI Usage

Daily	46	23%
Several times a week	72	36%
Weekly	48	24%
Occasionally	28	14%
Never	6	3%
Total	200	100

Interpretation

The illustrative results suggest that 59% of learners use GenAI either daily or several times a week. This suggests that GenAI has become a relevant component of learners' academic behaviour.

11.3. Descriptive Statistics

GenAI Integration	3.82	0.68
Teaching Transformation	3.74	0.71
Learning Enhancement	3.91	0.64
Assessment Readiness	3.86	0.67
Responsible AI Awareness	3.69	0.72

Interpretation

Among the constructs, Learning Enhancement has the highest illustrative mean (3.91), followed by Assessment Readiness (3.86) and GenAI Integration (3.82). Overall, the simulated scores indicate favourable student perceptions of GenAI.

11.4. Reliability Analysis

Cronbach's alpha is used as the proposed measure of internal consistency for the questionnaire constructs.

GenAI Integration	7	0.891
Teaching Transformation	7	0.876
Learning Enhancement	7	0.904
Assessment Readiness	7	0.887
Responsible AI Awareness	6	0.861
Overall Scale	34	0.932

Interpretation

All illustrative Cronbach's alpha values are above the commonly accepted 0.70 benchmark, suggesting strong internal consistency for the proposed instrument.

11.5 Pearson Correlation Analysis

GenAI Integration	1.000	.621**	.684**	.647**
Teaching Transformation	.621**	1.000	.712**	.593**
Learning Enhancement	.684**	.712**	1.000	.671**
Assessment Readiness	.647**	.593**	.671**	1.000

Note: $p < 0.01$; illustrative values.

Interpretation

The simulated Pearson correlation results show positive associations among the four constructs. The largest correlation occurs between Teaching Transformation and Learning Enhancement ($r = .712$), while the next strongest association is between GenAI Integration and Learning Enhancement ($r = .684$).

This pattern implies that GenAI use alone may not be adequate; the pedagogical changes accompanying its use may play a more important role in strengthening learning experiences.

11.6. Regression Analysis

A multiple regression model is proposed: Learning Enhancement = GenAI Integration + Teaching Transformation + Evaluation Readiness.

GenAI Integration	.286	4.31	<.001
Teaching Transformation	.421	6.27	<.001
Assessment Readiness	.197	3.08	.002

$R = .781$, $R^2 = .610$, Adjusted $R^2 = .604$

Interpretation

The illustrative regression model explains approximately 61.0% of the variance in Learning Enhancement. Teaching Transformation demonstrates the strongest standardized regression coefficient ($\beta = .421$), suggesting that pedagogically meaningful integration of GenAI may be more influential than simple frequency of GenAI use. The model therefore supports the argument that how GenAI is integrated into teaching is more notable than merely how frequently learners use it.

11.7. One-Way Anova

The study proposes testing whether students' perceptions vary across academic years.

Between Groups	2	4.83	.009
Within Groups	197	—	—
Total	199	—	—

Interpretation

The illustrative ANOVA result is statistically meaningful at the 5% level ($p = .009$). Therefore, the null hypothesis that learners across academic years have identical views of GenAI is rejected. This suggests that academic experience may influence learners' views of AI-supported learning. A post-hoc test would be required to determine which specific academic-year groups differ.

11.8. Chi-Square Analysis

A chi-square procedure may be applied to test the association between previous GenAI experience and willingness to employ GenAI for academic learning.

Pearson Chi-Square	9.684	1	.002
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Interpretation

The simulated result points to a statistically significant association between previous GenAI experience and willingness to use GenAI for academic learning. Hence, the corresponding null hypothesis is not supported.

11.9. Paired-Sample t-Test

A pre-test/post-test component may optionally be incorporated within a classroom intervention. Students could undertake a Commerce learning activity before and after participating in a structured GenAI-supported intervention.

Pre-Test	61.40	9.84
Post-Test	72.85	8.91

$$t = 13.42, p < .001$$

Interpretation

The simulated results show a statistically significant increase in post-test performance. However, such an outcome cannot automatically establish that GenAI itself caused the improvement. A stronger research design would include a control group and control for prior achievement.

11.10. Hypothesis Testing Summary

H01: GAI and TT are unrelated	Rejected
H02: GAI and LE are unrelated	Rejected
H03: TT and LE are unrelated	Rejected
H04: GAI does not predict LE	Rejected
H05: No difference across academic years	Rejected
H06: No association between prior experience and willingness	Rejected

12. Potential Benefits of GenAI in Commerce Education

The proposed investigation highlights several possible benefits.

12.1 Personalised learning: Students can seek explanations that match their current level of understanding.

12.2 Immediate feedback: GenAI can deliver preliminary feedback within a short period.

12.3 Learning flexibility: AI-supported learning can be accessed by students outside regular classroom hours.

12.4 Case-study development: Teachers can create hypothetical business scenarios for use in classroom discussions.

12.5 Practice opportunities: Students can create extra questions and engage in repeated practice.

12.6 Communication development: AI can provide students with feedback on language use and the organisation of presentations.

12.7 Support for teachers: Teachers may reduce the time required for routine preparation of instructional content.

12.8 Research support: Subject to appropriate verification, GenAI can assist with brainstorming, formulation of research questions, summarisation and initial organisation of information.

13. Key Challenges

13.1 Academic dishonesty: Learners may submit AI-generated work as their own.

13.2 Hallucinated information: AI systems can produce plausible but incorrect information.

13.3 Overdependence: Students may stop attempting problems independently.

13.4 Reduced critical thinking: Excessive cognitive outsourcing may reduce opportunities for independent reasoning.

13.5 Privacy: Learners may unintentionally enter personal or confidential information into AI systems.

13.6 Digital inequality: Learners may have unequal access to devices, connectivity or premium AI tools.

13.7 Assessment validity: Conventional take-home assignments may not accurately represent individual learning.

UNESCO's human-focused guidance and OECD's 2026 higher-education policy analysis both emphasise these broader challenges, particularly privacy, equity, integrity in academic work, reliability and human oversight.

14. Proposed AI-Aware Evaluation Model for Commerce

The study proposes five assessment principles.

Principle 1 – Assess application

Questions should require learners to apply concepts to business situations.

Principle 2 – Assess reasoning

Learners should explain how they reached their conclusions.

Principle 3 – Assess originality

Learners should use local, institutional or self-collected information wherever suitable.

Principle 4 – Require process evidence

Students may submit:

- Research notes;
- Drafts;
- Calculations;
- AI prompts where permitted;
- Verification records;
- Reflection statements.

Principle 5 – Include human interaction

Viva voce, presentations and classroom discussions can complement written submissions.

15. Example: AI-Enabled Accounting Assessment

Instead of asking: “Explain the meaning of depreciation.”

An AI-aware assessment may ask:

“A manufacturing business in Tiruchirappalli purchased machinery for ₹12 lakh. Using the information provided, calculate depreciation under the prescribed method, explain the accounting treatment, compare the result with an alternative method and defend your recommendation in a five-minute viva.”

This assessment requires:

- Calculation;
- Application;
- Comparison;
- Interpretation;
- Reasoning; and
- Communication.

GenAI may assist the student, but it cannot easily substitute for demonstrated individual understanding.

16. Example: AI-Enabled Marketing Assessment

Learners may be asked to strengthen a marketing strategy for a local business. The evaluation can require:

- i. Primary data collection;
- ii. Customer analysis;
- iii. Competitor analysis;
- iv. AI-assisted brainstorming;
- v. Verification of AI-generated ideas;
- vi. Development of the final strategy;
- vii. Presentation; and
- viii. Reflective explanation.

This approach converts GenAI from a threat to evaluation into a component of digital learning literacy.

17. Discussion of Findings

The illustrative findings suggest that learners may perceive GenAI positively when it is used to facilitate explanation, revision, practice and idea generation.

The positive association between GenAI Integration and Learning Enhancement is consistent with the broader evidence that GenAI can contribute to learning when guided by suitable educational principles. The OECD's 2026 analysis specifically distinguishes between GenAI use that supports learning and use that merely improves performance on a task.

The stronger illustrative relationship between Teaching Transformation and Learning Enhancement suggests that teacher-led pedagogical design is critical.

This finding has notable implications for Commerce education.

Simply permitting learners to use ChatGPT or another GenAI tool will not automatically create better learning. Faculty members need to redesign activities so that learners must:

- Question;
- Analyse;
- Compare;
- Verify;
- Interpret;
- Apply;
- Communicate; and
- Reflect.

The findings also suggest the importance of evaluation transformation.

If evaluation continues to focus heavily on reproduction of information, GenAI may undermine the validity of conventional assignments. If evaluation instead focuses on authentic application and reasoning, AI becomes one of several tools available within a broader learning process.

18. Implications for Commerce Faculty

Commerce faculty members should consider the following practices:

18.1 Develop AI literacy: Faculty members should understand the capabilities and limitations of GenAI.

18.2 Redesign assignments: Assignments should emphasise analysis and application.

18.3 Use authentic examples: Local businesses and real-world business problems can increase evaluation authenticity.

18.4 Encourage AI disclosure: Learners should suggest when and how GenAI has been used.

18.5 Verify AI-generated content: Teachers should encourage source checking.

18.6 Maintain human judgement: Notable academic decisions should remain under teacher responsibility.

19. Implications for Learners

Students should be trained to:

- Use AI responsibly;
- Verify information;
- Protect personal data;
- Avoid plagiarism;
- Disclose AI assistance;
- Develop effective prompts;
- Critically evaluate AI responses;
- Maintain independent thinking; and
- Use AI to enhance rather than replace learning.

20. Implications For Higher Education Institutions

Colleges and universities should strengthen institutional GenAI policies covering:

- Acceptable use;
- Prohibited use;
- Academic integrity;
- Student disclosure;
- Privacy;
- Assessment;
- Faculty development;
- AI literacy;
- Data security; and
- Responsible procurement.

The OECD's 2026 higher-education policy work highlights emerging system-level responses including responsible-use guidance, competency development, evidence collection, pilot evaluation and specialised AI tools.

21. Proposed Institutional GenAI Policy

A Commerce department could adopt the following principles:

Green Zone – Permitted

- Brainstorming;
- Language improvement;
- Concept clarification;
- Practice questions;
- Revision;
- Generating examples.

Yellow Zone – Permitted with Disclosure

- Assignment drafting;
- Data interpretation;
- Presentation preparation;
- Coding;
- Research assistance.

Red Zone – Prohibited

- Submitting AI-generated assignments as original work;
- Using AI during restricted examinations;
- Fabricating references or data;
- Generating false research findings;
- Entering confidential institutional information into public AI tools.

22. Limitations

The proposed investigation is subject to several limitations.

- First, the statistical outputs reported in this manuscript are illustrative and do not represent actual field observations.
- Second, the proposed sample is restricted to undergraduate Commerce students.
- Third, reliance on self-reported measures may introduce response bias.
- Fourth, perceived benefits may not necessarily translate into measured learning outcomes.
- Fifth, the rapid evolution of GenAI technologies means that findings may change as tools and institutional policies continue to develop.
- Sixth, the study does not undertake a direct comparison of alternative AI platforms.

23. Directions For Future Research

Future studies may examine:

- Longitudinal effects of GenAI on Commerce learning;
- Experimental comparison between AI-assisted and conventional teaching;
- Faculty perceptions of GenAI;
- GenAI adoption among postgraduate Commerce students;
- AI literacy among teachers;
- AI-supported accounting education;
- GenAI and entrepreneurship education;
- GenAI and financial literacy;
- AI-supported assessment;
- Academic integrity and GenAI;
- GenAI and employability skills; and

- Differences between rural and urban institutions.

Future investigations should preferably adopt mixed-method or experimental designs instead of depending exclusively on perception-based surveys.

Conclusion

Generative Artificial Intelligence represents a substantial opportunity for the transformation of Commerce education. Its applications extend across accounting, finance, marketing, banking, human resource management, entrepreneurship, e-commerce and business analytics.

The technology may facilitate personalised learning, swift feedback, content generation, case-based learning, practice and teacher productivity. However, the educational value of GenAI depends primarily on how it is integrated into pedagogy.

The principal conclusion is that GenAI should complement human teaching and learning rather than substitute for them.

The future of Commerce education is unlikely to be a choice between faculty members and AI. Instead, it will involve a collaborative model in which faculty members offer professional judgement and pedagogical leadership, learners retain agency and responsibility for learning, and GenAI provides additional technological facilitation.

Evaluation requires particular attention. Traditional assignments based primarily on information reproduction need to evolve towards authentic, application-oriented and process-based approaches.

The OECD's latest evidence emphasises that effective GenAI use requires pedagogical intent, human agency and careful consideration of evaluation and skill development. UNESCO likewise advocates a human-focused, ethical, safe and equitable approach to GenAI in education.

Accordingly, a future-ready Commerce graduate should develop three complementary capabilities:

Commerce Knowledge + Critical Thinking + Responsible AI Literacy

Bringing these capabilities together can help higher education institutions prepare learners for an increasingly AI-enabled business environment while retaining the essential human dimensions of education.

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TEACHER COMPETENCIES IN THE DIGITAL AGE: EMERGING REQUIREMENTS FOR QUALITY AND INCLUSIVE EDUCATION

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Abstract

The rapid rise of digital technologies and artificial intelligence is transforming teaching practices and redefining teacher competencies. This chapter focuses on the conceptualisation of teacher competencies in the digital age and their role in quality and inclusive education. It explores conceptual foundations of teacher competencies, core digital competencies such as digital literacy, pedagogy, content creation, assessment, artificial intelligence literacy. The chapter also examines competencies for quality education including subject knowledge, learner-centred pedagogy, classroom management, assessment, communication, problem solving and reflective practice. In addition, it highlights competencies for inclusive education such as differentiated instruction, accessibility, assistive technologies, culturally responsive teaching and collaboration. The chapter further focuses on challenges in developing digital teacher competencies and strategies for continuous professional development. Future competencies such as artificial intelligence literacy, data literacy, human-AI collaboration, ethical technology use, adaptability and lifelong learning are examined. The chapter concludes that future ready teachers need to integrate technological proficiency, pedagogical expertise, professional skills, ethical decision-making and commitment to quality and inclusive education.

Keywords: Teacher Competencies, Digital Education, Inclusive Education, Artificial Intelligence in Education, Quality Education.

1. Introduction

The rapid rise of digital technologies is transforming education in unprecedented ways. Online learning, learning analytics, mobile technologies, and artificial intelligence are increasingly used in teaching, learning, and management. Such technologies create opportunities for enhancing access, engaging learners, and supporting teaching. However, they also present new challenges and demands. According to the UNESCO global education monitoring report [13], technology should be used in education according to specific pedagogical needs to complement rather than replace human interaction.

Teachers are at the centre of quality education, and their roles are continuously evolving. Their roles now go beyond transferring knowledge to facilitating learning, managing and curating

knowledge, assessing and analysing learners, mentoring, and collaborating. The United Nations Educational, Scientific and Cultural Organization (UNESCO) ICT Competency Framework for Teachers operationalizes digital competence as an integral part of pre-service and in-service teacher education, and professional development. It covers competency areas in teaching and learning, assessment, classroom organisation and management, administration, and continuing teacher education [11]. Teachers' digital competence is a comprehensive concept that goes beyond computer knowledge to include professional confidence in using technologies to support and transform learning.

The rise of generative artificial intelligence (AI) has added new demands to teachers' competencies. AI can be used in lesson planning, content creation, personalized learning, assessment, and professional development. Nevertheless, there are ethical concerns surrounding the use of AI in education, including accuracy, privacy, fairness, academic integrity, accountability and human agency. According to UNESCO's AI Competency Framework for Teachers, there are 15 competencies for teachers organized into five areas: human-centred mindset, ethics of AI, foundations of AI, applications of AI, and professional learning with AI. The five levels of proficiency are acquire, deepen and create [2].

According to the OECD Teacher and School Administrator Learning Survey (TALIS) 2024, there are significant disparities in teachers' readiness and use of AI across education systems. It also emphasizes the role of professional learning in supporting teachers' effective and ethical use of AI. The OECD Education Policy Outlook 2024 also recognizes the need to support teachers in rethinking professional practices in the face of disruptive technologies such as AI and robotics [6].

Digital competence is intrinsically linked to inclusive education. Teachers need to use technologies appropriately to meet the diverse needs of all learners. Making content accessible, using assistive technologies, providing flexible learning options and conducting assessments that consider multiple factors contribute to inclusive education. Nevertheless, the same technologies can be inaccessible and exclusionary, especially to resource-poor learners. Teachers need to be aware of such challenges and use their competencies to promote inclusion.

In short, the contemporary teacher needs to be multi-talented, with subject knowledge, pedagogical skills, digital literacy, assessment competence, inclusive education skills, communication proficiency and ethical decision-making abilities. Such competencies can be acquired through professional development. However, they cannot be attained through one-shot training due to the dynamicity of digital technologies and education. This chapter conceptualizes teacher competencies, explores the role of teachers in the digital age, core digital competencies, competencies for quality and inclusive education, challenges and strategies for continuous professional development.

2. Conceptual Foundations of Teacher Competencies

Teacher competency is a broad concept that comprises knowledge, skills, attitudes and values applicable in teaching and learning. The concept has evolved over time and covers different aspects of professional practice. The rapid rise of digital technologies and artificial intelligence is transforming teaching practices and redefining teacher competencies. The Organisation for Economic Co-operation and Development (OECD) observes that digital technologies are now integral to most professional activities, including teaching, learning, communication, collaboration and knowledge creation [5].

Meaning and Concept of Teacher Competency

Teacher competency refers to the ability or power to accomplish something successfully. It is a relational concept that goes beyond knowledge and skills to focus on professional practice. In short, competency is about achieving desirable outcomes through professional practice. It, therefore, encompasses what teachers know and do, including behaviours, attitudes, approaches, and actions. Teacher competency includes knowledge, pedagogy, assessment, leadership, digital competence and social-emotional skills. It also covers professional conduct, ethics, integrity and commitment to inclusive education.

It is critical to distinguish between teacher qualification and teacher competency. Qualification refers to formal accreditation that certifies that an individual possesses specific knowledge and skills. Competency, on the other hand, refers to the ability to apply knowledge and skills effectively to achieve desirable outcomes. In short, qualification is a certificate awarded to an individual who completes a specified programme of study, while competency is about actual ability. Teachers, therefore, need continuous professional development to gain competencies that help them achieve positive learning outcomes.

Major Dimensions of Teacher Competencies

Teacher competencies can be grouped into different dimensions, as discussed below.

- **Subject-matter competency:** This refers to knowledge of the subject to be taught. Content knowledge enables teachers to convey information effectively to learners. It also enables them to respond to learners' needs and questions appropriately and provide real-world examples.
- **Pedagogical competency:** This refers to knowledge and skills related to teaching and learning. It includes lesson planning, instructional strategies, classroom management, learner motivation and differentiation. Teachers need to understand how learners acquire knowledge and modify their practices to help students achieve positive learning outcomes.
- **Pedagogical content competency:** Shulman's Pedagogical Content Knowledge was an innovative way of understanding teacher competencies. It highlighted the need for

teachers to possess content knowledge and pedagogical knowledge and focus on the intersection. According to Shulman, effective teaching requires teachers to understand how to represent specific concepts and skills to foster deeper understanding. Such competency is critical for quality teaching and learning.

- **Technological competency:** This refers to knowledge and skills related to information and communication technologies (ICT). It includes using digital devices and software applications in teaching, learning, and managing educational institutions.
- **Assessment competency:** This refers to the ability to design appropriate assessment strategies, interpret learning data, and provide feedback to improve learning outcomes. With the rise of digital technologies, assessment competency also involves using digital tools and techniques.
- **Inclusive competency:** This refers to knowledge, skills, and attitudes that enable educators to respond to the needs of diverse learners in a classroom. It includes differentiated instruction, accessible instructional materials and assessment modifications.
- **Social-emotional competency:** This refers to social skills, emotional regulation, empathy and interpersonal abilities needed to build positive relationships with others. Such competencies include communication, collaboration, negotiation, assertiveness and active listening.
- **Ethical and professional competency:** This refers to professional standards and conduct, including integrity, confidentiality, and academic honesty. It also covers responsible use of ICT in teaching, learning and research.

Technological Pedagogical Content Knowledge (TPACK) as a Theoretical Foundation for Teacher Competency

Technological Pedagogical Content Knowledge (TPACK) is an important theoretical framework for understanding teacher competencies in technology-integrated instruction. Mishra and Koehler (2006) developed it by building on Shulman's Pedagogical Content Knowledge. The framework highlights the need for teachers to possess content knowledge (CK), pedagogical knowledge (PK) and technological knowledge (TK) and focuses on their intersections. According to the framework, teachers need to know the subject matter, teaching methods and how to use various technologies to teach specific topics [3].

TPACK comprises the following seven areas:

- **Content knowledge (CK):** This refers to knowledge of subjects that teachers need to teach, including facts, concepts, principles and theories.
- **Pedagogical knowledge (PK):** This refers to knowledge of teaching methods and strategies to facilitate meaningful learning.

- **Technological knowledge (TK):** This refers to knowledge of technologies, including software and hardware, that can be used in teaching and learning.
- **Pedagogical content knowledge (PCK):** This refers to the ability to combine CK and PK to teach specific concepts and skills.
- **Technological content knowledge (TCK):** This refers to knowledge of how to use different technologies to teach specific concepts and skills.
- **Technological pedagogical knowledge (TPK):** This refers to knowledge of how to use different technologies to facilitate diverse teaching methods and strategies.
- **Technological pedagogical content knowledge (TPACK):** This refers to knowledge of how to use different technologies to teach specific concepts and skills using diverse methods and strategies.

The main implication of TPACK is that teachers need to combine CK, PK, and TK to teach specific concepts. In short, it is not sufficient for teachers to simply know a topic, teach it using conventional methods or use digital technologies in teaching without considering the context and learners' needs. They need to think through how best to use specific technologies to teach certain concepts and achieve specific learning objectives. In recent years, TPACK has gained considerable attention for its applicability in teacher education and professional development.

3. Core Digital Competencies for Contemporary Teachers

Contemporary educators need a wide range of digital competencies to support and enhance teaching and learning. Such technologies as online learning platforms, learning management systems, mobile technologies, and learning analytics are now used in teaching, learning, and educational management. They are used for instructional delivery, communication, collaboration, assessment, and data management. The OECD highlights the importance of digital literacy, pedagogical proficiency, content creation, and assessment for effective teaching and learning in the digital age [5]. Below are some of the core digital competencies that contemporary teachers need.

- **Digital Literacy and Information Management Competencies:** Digital literacy is a critical competency that enables educators to operate digital devices and software applications. It also empowers them to locate, evaluate, organize, store, retrieve and share information efficiently and effectively. Such skills are essential for effective teaching, learning, and communication in the digital age.
- **Digital Pedagogical Competency:** Digital pedagogical competency refers to knowledge and skills related to using digital technologies and resources to support and improve teaching and learning. It requires educators to understand how different technologies can be leveraged to achieve specific learning objectives. It is important to note that digital technologies should be used to enhance learning rather than to 'digitize' traditional

practices. Thus, instead of using a digital platform to deliver lectures, teachers should consider how to use such technologies to engage learners and support their learning.

- **Digital Content Curation, Creation and Management Competency:** Digital content curation, creation, and management competency refers to knowledge and skills related to developing, organizing, presenting, sharing, distributing, and managing digital content. Such content includes information, data, images, audio, video and other media files. Teachers need to learn how to curate and manage digital content to support teaching and learning.
- **Digital Assessment Competency:** Digital assessment competency refers to knowledge and skills related to designing, developing, delivering assessment and providing feedback using digital technologies and resources. It entails using digital tools and resources to conduct and grade assessments and analyze and interpret assessment results to improve teaching and learning.
- **Artificial Intelligence Competency:** Artificial intelligence competency refers to knowledge and skills related to applying AI in education. It entails understanding how AI works, how it can be used in education, and the potential benefits and pitfalls associated with its use. UNESCO's AI Competency Framework for Teachers covers five areas: human-centred mindset, ethics of AI, foundation of AI, application of AI and professional learning with AI.
- **Digital Safety, Ethics and Citizenship Competency:** Digital safety, ethics, and citizenship competency entails knowledge and skills related to ensuring safety and security in the digital environment. It covers protecting personal data and privacy, safeguarding against cyberbullying and upholding ethical standards in using digital technologies and resources. It also entails protecting intellectual property and avoiding the spread of fake news and other harmful information. This competency is especially important in view of the increasing use of AI in education. Teachers need to understand how to use such technologies ethically and ensure that students use them responsibly.
- **Digital Communication and Collaboration Competency:** Digital communication and collaboration competency entails knowledge and skills related to exchanging information and working together using digital technologies and resources. It is essential for maintaining effective communication with students, colleagues, parents, administrators and other stakeholders. It is also important for collaboration and teamwork, especially in a virtual setting.
- **Digital Competency for Inclusive Education:** Digital competency for inclusive education entails knowledge and skills related to using digital technologies and resources to support and promote inclusive education. It covers such areas as providing accessible

content, using assistive technologies, providing flexible learning options and meeting diverse students' needs. Teachers need to be able to modify digital content and technologies to ensure that they are appropriate and effective for all students, including those with disabilities.

- **Digital Problem-Solving and Innovation Competency:** Digital problem-solving and innovation competency entails knowledge and skills related to identifying and solving problems using digital technologies and resources. It covers such areas as evaluating and adopting new technologies and innovating to improve teaching and learning.
- **Continuous Digital Professional Learning Competency:** Continuous digital professional learning competency entails knowledge and skills related to participating in continuous professional development to update and expand digital competencies. Since digital technologies are constantly evolving, educators need to engage in continuous professional learning to keep up with such changes. It is important for teachers to participate in workshops, seminars, conferences and other professional development activities to acquire new competencies and skills.

These competencies enable teachers to move from being basic users of technology to becoming informed, reflective, ethical and inclusive digital educators.

4. Competencies for Quality Education

Education quality calls for teachers' proficiency in curriculum content, pedagogy, assessment, learning and judgement to support quality education for all. Additionally, with technology being increasingly leveraged in education, professional competence also entails appropriate usage of technology to support teaching and learning processes. The below competencies are critical for quality education:

- **Strong Content Knowledge:** Teachers must have strong content knowledge and be able to teach their specialisation with ease. With good content knowledge, teachers can help students develop conceptual understanding and link new information to what they already know.
- **Pedagogical Competency:** Pedagogical competency is the ability of teachers to make instructional decisions, plan lessons, and deliver instruction based on student learning needs. It encompasses classroom instruction, questioning strategies, lesson planning, classroom organisation, classroom management and instructional models. Effective teachers have the pedagogical skills to teach diverse learners in varied contexts rather than relying on one teaching approach. The OECD Teacher Knowledge Survey identifies instruction, learning, classroom management and assessment as part of general pedagogical knowledge [9].

- **Learner-Centred Teaching Competency:** Teachers must demonstrate competence in learner-centred instruction to support student engagement and quality learning. They need to create learning experiences that arouse students' curiosity, encourage them to ask questions, solve problems, collaborate, discuss, think creatively and take responsibility for their learning. Additionally, teachers need to understand their students' cognitive, social and emotional development, as well as their learning interests and needs.
- **Classroom Management Competency:** Classroom management involves the practices used by teachers to organise, plan, lead and manage classrooms in ways that maximise learning time and encourage positive behaviour. Classroom management skills enable teachers to develop classroom routines, establish discipline, set expectations, maintain focus and handle disruptions. Effective teachers rely on positive classroom management to build good student-teacher relationships, foster student responsibility and increase student engagement and achievement.
- **Assessment and Feedback Competency:** Teachers need assessment competency to monitor student progress, provide feedback and adjust their instruction accordingly. They need to be skilled in designing diagnostic, formative and summative assessments. In addition, teachers need to interpret student assessment results and provide students with appropriate feedback.
- **Communication and Social-Emotional Competency:** Communication competency involves verbal, written, interpersonal and digital communication skills that enable teachers to deliver clear instructions, encourage positive relationships and convey information with clarity. Teachers can support student learning through good social-emotional competence by understanding their students' social and emotional needs, being sensitive and supportive, managing student-teacher relationships and encouraging positive interactions.
- **Competency for Inclusive and Equitable Teaching:** Teachers need to be competent in inclusive and equitable pedagogies to ensure quality and equitable education for all students. They need to understand diversity and be able to teach students with differing abilities, socioeconomic statuses and languages. Teachers should leverage technology to provide equal access to education by using appropriate digital tools and resources.
- **Digital and Technological Competency:** Teachers need appropriate digital competency to support quality education and enhance student learning. It is critical for teachers to be able to use digital technologies and resources effectively to support teaching and learning. Digital competencies also include developing digital content, using learning technologies and platforms, conducting digital assessments and engaging students in blended and online learning. Technology should be used to support and improve

pedagogy rather than the other way round. The UNESCO ICT Competency Framework for Teachers identifies teaching, learning, assessment, pedagogy, organisation and professional learning competencies related to digital technologies [11].

- **Critical Thinking and Problem-Solving Competency:** Teachers constantly encounter diverse teaching and learning-related challenges in their practice. As such, they need to have strong critical thinking and problem-solving skills to respond to teaching and learning challenges appropriately. Teachers also need to make evidence-based instructional decisions and adopt the best practices to improve their teaching and student learning. Additionally, teachers need to leverage technology to think critically and solve problems. For instance, they need to critically evaluate online information and leverage artificial intelligence (AI) to support teaching and learning.
- **Reflective and Continuous Professional Learning:** Teachers need to continually reflect on their teaching practices, evaluate student learning outcomes, seek peer feedback, engage in professional reading and participate in professional development to become better. Reflection and continuous professional learning also enable teachers to remain continuously updated on emerging trends and integrate new things into their practice.

Therefore, quality education requires teachers to have traditional professional competencies and digital, inclusive, assessment, communication and reflective competencies for quality education in the digital age. Teachers need to leverage technology appropriately to support teaching and learning. Good professional judgement plays a critical role in determining how and when technology can be used to improve education quality.

5. Teacher Competencies for Inclusive Education

Inclusive education calls for teachers to acquire competencies that enable them to respond to the individual needs of diverse learners. Teachers need appropriate knowledge, attitudes, pedagogical skills and digital competencies to teach diverse learners coming from different social, cultural and economic backgrounds and with varying needs and abilities. According to OECD, inclusive teaching requires knowledge, competencies and positive attitudes towards diversity [4].

- **Understanding Learner Diversity:** Teachers need an in-depth understanding of learner diversity and be able to adapt their instruction to address the varying needs of their students. Teachers must understand diversity and recognise that it is normal for students to come from diverse backgrounds, have differing learning interests, abilities and needs. Recognising diversity is the first step in addressing it. Understanding diversity enables teachers to plan their lessons in a way that addresses the needs of all their students.
- **Positive Attitudes Towards Inclusion:** Having positive attitudes towards inclusion is the best way for teachers to address it in their classes. Inclusive education requires

teachers to adopt positive attitudes, including empathy, acceptance, respect and high expectations for their students regardless of their background, gender, ethnicity, religion and needs. Teachers must reject negative attitudes, such as prejudice and stereotyping, and hold high expectations for all their students, including those with disabilities and those from low socioeconomic backgrounds.

- **Differentiated Instruction Skill:** Teachers need to acquire the skill to differentiate instruction based on students' abilities, interests, needs and learning profiles. Differentiated instruction enables teachers to create multiple ways of helping students learn the same material, allowing students to take different paths to reach the same learning goal.
- **Competency in Universal Design for Learning:** Teachers need to have a good understanding of universal design for learning and apply it when planning their lessons and teaching. The universal design involves providing appropriate learning resources and flexible learning methods to ensure that all students, including those with disabilities can access and succeed in learning. Teachers need to apply universal design principles in lesson planning, instructional delivery and assessment. The principles include providing various ways for students to engage with information, learn and demonstrate their knowledge.
- **Competency in Supporting Students with Disabilities:** Teachers need appropriate knowledge about students with special needs and effective strategies to teach them. They should also understand how to modify the curriculum, instruction, learning materials and assessments to address the unique learning needs of these students. In addition, teachers should work closely with special education teachers, counsellors, therapists and social workers to ensure they provide appropriate support to students with disabilities.
- **Assistive and Accessible Technology Competency:** Learners with disabilities can benefit from the use of assistive and accessible digital technologies. As such, teachers need to be able to utilise these technologies to facilitate teaching and learning processes. The competency also entails understanding the importance of various assistive technologies in supporting learning and being able to recommend them when needed.
- **Inclusive Digital Content Development Competency:** Teachers need competency in developing digital content that is accessible to all students, including those with disabilities and from different socio-cultural backgrounds. For instance, teachers can provide captions in videos and other multimedia resources to enable students with hearing impairments to access the information. Additionally, they need to use technologies that enable students with learning disabilities to engage with the content. Teachers also need to ensure that their instructional materials are compatible with screen

readers and other assistive technologies for students with visual impairments. They should also consider various social-cultural factors when developing digital materials and resources.

- **Inclusive Assessment Competency:** Teachers need inclusive assessment competency to ensure they utilise appropriate assessment methods and tools to measure student learning. Inclusive assessment also entails providing appropriate accommodations during assessments to enable all students, including those with disabilities, to demonstrate their knowledge and skills. In addition, teachers also need to consider factors such as language, time and alternate formats when developing assessments and choosing assessment tools and methods.
- **Social-Emotional and Interpersonal Competency:** Inclusive education requires teachers to have strong social-emotional and interpersonal skills to encourage positive student interactions and address discrimination and bullying in the classroom. Teachers' social-emotional skills also enable them to meet the social and emotional needs of their students, including those with disabilities and those from culturally and economically diverse backgrounds. They also enable teachers to respond appropriately to bullying, discrimination, and other social-emotional challenges. Teachers also need to develop positive relationships with their students to encourage social-emotional learning and boost student morale and engagement.
- **Collaboration and Professional Support Competency:** Teachers cannot address inclusion in isolation. As such, they need to collaborate with colleagues, special education teachers, school administrators, counsellors, parents and community members to address diverse needs in their classes. By collaborating with special education teachers, classroom teachers gain valuable insights into meeting the needs of students with disabilities. Parents and caregivers also play a critical role in supporting students with special needs. As such, teachers need to collaborate with them to ensure that they provide the necessary support at school and home.
- Therefore, competency in inclusive education requires more than just knowledge about students with special needs. It requires a comprehensive understanding and application of knowledge, skills and attitudes to address diversity. Additionally, teachers need to be able to collaborate with colleagues and caregivers and engage in continuous professional learning. These competencies can only be achieved by designing and implementing appropriate teacher education and professional development programmes.

6. Challenges in Developing Digital Teacher Competencies

- **Inadequate Digital Infrastructure:** The lack of adequate digital infrastructure and resources can be a big hindrance to developing digital teacher competencies. Reliable

internet connections, computers, smart devices, electricity, digital platforms and other resources are required for teachers to practice and hone their digital skills. In many cases, especially in remote and rural schools, these resources may not be readily available or may be faulty.

- **Gaps in Teachers' Digital Skills:** Not all teachers have the same level of digital skills, and many may lack the digital skills needed to utilise technology for teaching and learning purposes. Some may only be proficient in using certain digital tools but not others.
- **Limited Quality of Professional Development:** Most teachers require continued professional development to develop digital skills and integrate technology into teaching and learning processes. However, many teachers may not have access to quality professional development or may receive only short-term training before returning to their practice without further support.
- **Lack of Time for Learning and Practice:** Teachers have many responsibilities, including teaching, assessment, supervision, and participation in co-curricular activities. These responsibilities may limit the amount of time they have to learn new digital skills and gain proficiency in them. The TALIS 2024 report highlights lack of time and work-schedule conflicts as some of the major barriers to teachers' professional learning and development.
- **Technological Anxiety and Lack of Confidence:** Many teachers, especially those not proficient in using technology, may feel anxious about using technology. They may fear that their lack of skills or confidence can affect their performance, leading to negative consequences.
- **Rapid Technological Change:** Technology, including learning technologies and artificial intelligence (AI), is evolving at a very rapid rate, making it challenging for teachers to keep up with the changes. As such, teachers may find it hard to acquire new digital skills or utilise existing skills to address new challenges brought about by the changes.
- **Weak Integration of Technology with Pedagogy:** Teachers need to leverage technology to support and improve teaching and learning. However, many teachers may lack the pedagogical skills to integrate technology seamlessly into their practice. Knowledge of how to utilise technology is not sufficient; teachers also need to know how technology can add value to education.
- **Lack of Institutional and Leadership Support:** Teachers need institutional support and leadership to motivate and encourage them to adopt new approaches to teaching and learning. Lack of such support may discourage teachers from embracing new

technologies and trying out new teaching approaches. Additionally, teachers may lack the resources required to implement new practices.

- **Digital Divide and Inequality:** There are gross inequalities in terms of access to digital resources, including devices and the internet, between different schools and students. Students in disadvantaged schools and communities may find it hard to access online resources compared to their counterparts in privileged schools and communities.
- **Challenges Related to Artificial Intelligence:** The increasing use of AI in education brings about several challenges, including teachers having to acquire new competencies related to AI. Teachers also need to understand how to utilise AI effectively to support teaching and learning in the classroom. One of the major challenges associated with the use of AI is ensuring privacy, data protection and academic integrity.
- **Data Privacy, Cybersecurity and Digital Safety:** Most teachers interact with students through digital platforms, and as such, students' personal information and data may be vulnerable to cyber-attacks or other security-related issues. Teachers need to acquire digital competencies related to cybersecurity, data privacy, and online safety. This includes knowing how to protect themselves and their students from cyberbullying, phishing, unwanted messages, and other security concerns.
- **Resistance to Change:** Some teachers may be reluctant to adopt new approaches and tools due to various reasons. Teachers may resist change because they are comfortable with their current practices, do not see a need for change, are discouraged due to previous unsuccessful attempts at implementing change, or fear that change will bring adverse consequences.
- **Lack of Technical Support:** Technical support plays a critical role in addressing technical challenges that may arise when using digital devices and platforms for teaching and learning. Most teachers may not have the technical skills to address technical problems, and as such, may require institutional support. However, some teachers may not have access to the technical support they need, hindering their ability to use technology effectively.

Therefore, institutional support, leadership and technical assistance are critical for teachers to successfully develop digital competencies. Schools and institutions need to encourage teachers to embrace technology and equip them with the necessary skills and support to be able to utilise it effectively. By addressing these challenges, teachers will be able to develop competencies in digital education and utilise them to transform teaching and learning.

7. Strategies for Developing Teacher Competencies

Teacher competencies are paramount to achieving quality education. As such, it is of utmost importance that teachers are provided with the support and resources they need to develop their

professional skills and become more competent in their practice. Teacher competency development should focus on building knowledge, skills, attitudes and behaviours relevant to addressing education-related challenges. Various strategies that can be used to develop teacher competencies for quality education are as follows:

- **Strengthening Pre-Service Teacher Education:** Digital, inclusive, assessment, and AI-related competencies should be included in pre-service teacher education curricula. Student teachers should develop digital, inclusive, and assessment competencies as they prepare to become teachers. As a result, it will be easier to incorporate these competencies into their practice once they start working. In addition, pre-service teachers should be provided with opportunities to develop assessment, inclusive education and classroom management competencies so that they can utilise them effectively when interacting with their students.
- **Providing Continuous Professional Development:** Teacher competency development should be viewed as a continuous professional development process rather than something that occurs only once. Schools and institutions can invest in providing professional development for teachers by organising workshops and other training sessions that focus on competency development in specific areas. Schools and institutions can also provide online courses or other forms of continued professional development to support teachers' learning.
- **Adopting Competency-Based Training Frameworks:** Teacher education institutions and schools can adopt competency-based training frameworks to guide them in developing teacher competencies. The UNESCO ICT Competency Framework for Teachers identifies several areas of teacher competencies, including curriculum and assessment, pedagogy, digital skills, organisation and administration and professional learning. It also specifies the levels of proficiency for each competency. This framework can be useful in identifying the areas in which teachers need further development and addressing them [11].
- **Conducting Needs Assessment and Digital Competency Mapping:** A needs assessment can help institutions and schools determine the areas in which teachers need more support and resources to develop their competencies. As such, it should be conducted to identify the areas that require more attention and ensure that resources are allocated accordingly. Additionally, a digital competency audit or mapping can also help determine the strengths, weaknesses, opportunities and threats related to digital competencies.
- **Promoting Hands-On and Practice-Based Training:** Teachers need hands-on training to develop and hone their skills through practice. Institutions and schools can promote

practice-based approaches to help teachers develop their competencies. For instance, they can provide workshops and lessons where teachers can practice their skills in real-life settings and receive feedback. Teachers can also engage in collaborative activities and tasks, such as designing lessons, carrying out classroom assessments, and participating in classroom observations to help them practice their teaching skills.

- **Developing Peer Learning and Professional Communities:** Peer learning and professional communities can be utilised to help teachers learn from each other and develop their competencies. Schools can develop professional learning communities where teachers can come together to share their knowledge, experiences and practices to enhance their practice. They can also encourage peer reviews and observations to help teachers identify areas of improvement.
- **Strengthening School Leadership and Institutional Support:** School leadership plays a critical role in creating a conducive environment for teacher professional learning and competency development. School administrators should encourage and support teachers by providing incentives and rewards for professional learning. They can also create time for teachers to practice their new competencies or gain new skills. Additionally, school leadership should encourage and support teachers to utilise technology to improve teaching and learning.
- **Providing Continuous Technical Support:** Teachers require technical support to address various technical challenges that may arise as they try to utilise technology in teaching and learning. Institutions and schools need to provide such support to encourage teachers to adopt technology in their practice.
- **Integrating AI Literacy and Ethical Technology Use:** Teachers need to utilise AI to support teaching and learning. However, they need to understand how to use it appropriately and ethically. Institutions and schools need to provide training for teachers on AI literacy and ethical technology use. Teachers should be taught about topics such as copyright, privacy and academic integrity to ensure that they utilise AI appropriately. This will help them avoid using AI-generated content, including images, text and videos, inappropriately.
- **Promoting Inclusive Digital Competencies:** Teacher education institutions and schools need to incorporate inclusive digital competencies into their professional development programmes to support teachers in addressing diversity and ensuring that education is equitable and of high quality for all. Teachers need to understand how to utilise technology to support diverse learners and address their different needs. They also need to learn about accessible digital content, assistive technology and universal design for

learning. Digital competency development should be aligned with the goal of achieving equity and inclusion in education.

- **Encouraging Reflective Practice:** Teachers need to reflect on their practice and the impact of their decisions and actions on their teaching and student learning outcomes. This will help them identify practices that need improvement and make the necessary changes. Reflective practice can be encouraged by supporting teachers to engage in journaling, peer observations and reviews, classroom assessments and student feedback.
- **Ensuring Access to Open Educational Resources:** Teachers can benefit from accessing open educational resources (OERs) to obtain teaching and learning materials and resources, including professional development resources. Institutions and schools can encourage teachers to utilise OERs and invest in making their resources available to the public.
- **Monitoring and Evaluating Competency Development:** Teacher development programmes should incorporate systematic evaluation. Institutions can employ competency assessments, classroom observations, digital portfolios, student feedback, and evidence of classroom practice to investigate if professional learning has led to meaningful changes. Evaluation should focus on both participation in training and improvements in teaching quality and learner outcomes.

Thus, developing teacher competencies requires a long-term professional learning system. Teachers should be supported to progress from basic technology use towards pedagogically meaningful, inclusive, ethical, innovative and reflective use of digital technologies. Such an approach can strengthen both quality and inclusive education in the digital age.

8. Future Directions of Teacher Competencies

The future of teaching will be shaped by rapid developments in artificial intelligence, digital technologies, changing learner expectations and increasing emphasis on quality and inclusive education. Teacher competencies will therefore need to develop continuously. Future teachers will not only require technological skills but also strong professional judgement, ethical awareness, creativity, adaptability and the ability to work effectively with AI and other emerging technologies.

- **Shift from Digital Literacy to AI Literacy:** Future teachers will require competencies beyond conventional digital literacy. They will need to understand how AI systems work, how AI-generated information should be evaluated, and how AI can support teaching, assessment, content development and professional learning.
- **Human-Centred Use of Technology:** Technology should support teachers rather than replace their professional responsibility. Future teachers will need to make informed decisions on when technology is educationally appropriate and when human interaction is

more valuable. Human agency, accountability, empathy and professional judgement will remain essential as AI becomes increasingly integrated into educational processes.

- **AI-Enhanced Pedagogical Competency:** Teachers will increasingly use AI to personalise learning, generate learning resources, provide feedback, support assessment and analyse learning information. Consequently, future pedagogical competency will involve the ability to integrate AI into lesson planning and classroom activities while maintaining clear educational objectives.
- **Strengthening Inclusive Digital Competency:** Future teacher competencies should ensure that technological development does not increase educational inequality. Teachers will need to select accessible digital resources, use assistive technologies, design flexible learning experiences and respond to differences in learners' abilities, languages, backgrounds and access to technology. Inclusion should therefore remain a central principle of future digital teacher development.
- **Ethical and Responsible Technology Use:** As AI and digital technologies become more influential, teachers will require stronger competencies in privacy, data protection, bias, transparency, intellectual property, academic integrity, cybersecurity and responsible AI use.
- **Adaptability and Lifelong Learning:** The rapid development of technology means that teachers cannot depend on a fixed set of digital skills. Future teachers will need to continuously update their knowledge and adapt to new tools, platforms, pedagogies and educational policies.
- **Creativity, Innovation and Problem-Solving:** Technology will not eliminate the need for creative and critical teachers. Instead, teachers will increasingly need to design new learning experiences, solve instructional problems, evaluate emerging technologies and adapt resources to local contexts. Creativity and professional problem-solving will become particularly important when teachers work with technologies whose educational applications are still developing.
- **Collaborative Human-AI Professional Practice:** Future educational environments may encompass teachers working alongside AI systems, digital assistants, learning analytics and other intelligent tools. Teachers will need to understand the strengths and limitations of these systems and determine which responsibilities should remain under human control. This will create a more complex professional role in which teachers coordinate human expertise and technological capabilities.
- **Future-Oriented Professional Development:** Teacher education institutions and education systems will need to redesign professional development around emerging competencies. Training should combine digital and AI literacy with pedagogy, inclusion,

assessment, ethics, collaboration and professional reflection. Competency frameworks should also be reviewed regularly so that they remain relevant to technological and educational changes.

Thus, the future teacher will be more than a user of digital technologies. The teacher will increasingly function as an instructional designer, critical evaluator of technology, inclusive practitioner, ethical decision-maker, AI-aware educator, learning facilitator and lifelong professional learner. The central objective should remain the improvement of meaningful, equitable and human-centred learning. Emerging technologies should strengthen these goals rather than weaken the professional role of teachers.

Conclusion

Teacher competencies are central to ensuring quality and inclusive education in the digital age. The transformation of education has expanded the teacher's role from knowledge transmitter to learning facilitator, digital learning designer, inclusive practitioner, assessor, professional collaborator and lifelong learner. Effective teachers therefore require an integrated combination of subject knowledge, pedagogical expertise, digital literacy, assessment skills, inclusive practices, communication abilities and ethical judgement. The growing influence of artificial intelligence further expands these requirements. Teachers need AI literacy, data awareness, critical thinking and the ability to evaluate the accuracy, bias, privacy implications and educational value of AI-supported tools. However, competency development cannot depend solely on individual teachers. Adequate infrastructure, continuous professional development, institutional leadership, technical assistance, peer collaboration and equitable access to digital resources are equally important. Ultimately, future-ready teacher competency should combine technology with pedagogy, innovation with ethics and digital transformation with inclusion. Strengthening these competencies will enable teachers to use emerging technologies purposefully while preserving human agency, professional judgement and the fundamental goal of education: meaningful, equitable and high-quality learning for every learner.

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REIMAGINING INSURANCE MARKETING AT THE HUMAN-TECHNOLOGY FRONTIER: CONSUMER PSYCHOLOGY, DIGITAL TRUST AND SUSTAINABLE VALUE CREATION

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Abstract

The insurance sector and its marketing practices are undergoing rapid transformation due to cutting-edge developments in artificial intelligence, predictive analytics, digital platforms, Internet of Things, automation and data-driven technology. Nevertheless, insurance is not just a technology-based financial operation; it is also a human-centered service influenced by the broader perception of the notion of risk, emotions, trust and other elements related to financial literacy and individual personal situation. Hence this chapter explores the idea of insurance marketing from the human-technology perspective by exploring the interconnection between consumer psychology, digital trust and sustainable value creation. It presupposes that technological progress should complement the human-based understanding of insurance rather than replace it. The introduction of AI and advanced analytics can help improve customer intelligence, personalization, speed of service, customer engagement in risk management process and satisfaction. However, the challenges associated with privacy, algorithmic fairness, transparency, cybersecurity, digital exclusion and overautomation may influence customer acceptance. The recent statistics from the European insurance market show that new digital technologies and AI are being implemented more and more often in the sphere, while consumers still tend to prefer human communication and note the problems faced. There is suggested a Human Technology Insurance Marketing Framework with six interacting elements: consumer psychology, smart technology, responsible customization, digital trust, human involvement and sustainable value creation. In accordance with this framework, customer value is generated when technology competencies are united with customers' requirements, ethical practices with data, transparency in communication, and inclusiveness of the services rendered. The methodology applied in this study is a conceptual research methodology based on the extensive review and synthesis of the scientific literature, governmental publications, and industry evidence. It has been established that in future the insurance marketing will shift from product-centered marketing to human-centered and technology-based marketing.

Keywords: Consumer Psychology, Digital Trust, Personalisation, Sustainability, Insurance Marketing.

Introduction

The insurance marketing industry is experiencing a major change due to the impact of digital technology on the way insurers comprehend, communicate, and serve their customers. Various technological advancements including artificial intelligence (AI), forecasting, mobile applications, digital platforms, chatbots, and smart devices are paving the way for new possibilities in customer segmentation, personalization, risk communication, and service development. EIOPA has noted that digitization is becoming more pertinent in designing insurance products, their distribution, and interaction with customers, while AI is being implemented across the whole insurance value chain.

Nevertheless, the essence of insurance is still tied with human behavior to a great extent. The customers make insurance purchases in order to cope with uncertainty and protect themselves and their families, properties, and future financial situation. The process of decision-making depends on risk perception, emotions, trust, financial knowledge, past experience, and value perception.

Thus, technology by itself cannot decide on the future of insurance marketing. The main task is to find a balance between technological intelligence and human understanding. This chapter will explore the ways in which insurers can combine AI advantages with consumer psychology, digital trust, and sustainability principles.

Literature Review

In the increasing insurance marketing reference from product orientation to the customer experience, relationship marketing, and technology-enabled personalization, Lemon and Verhoef (2016) suggest that customer experience extends across various touch points during the customer journey. This point is critical for insurance since this industry has several instances when a customer interacts with the insurance company, namely in the course of the processes of awareness, purchasing, servicing, claiming, and renewing.

Consumer psychology matters because in making insurance decisions, the consumer is faced with uncertainty and risk concerning the future. It is impossible for the consumer to evaluate insurance only on the basis of rational economic reasoning, as aspects like risk perception, emotions, trust, and financial vulnerability may impact the process of purchasing and renewing insurance.

The advancement of digital technology has made it easier for the insurance industry to gather and process customer data. By using AI tools, insurers can improve their segmentation, forecasting, messaging, and service delivery. In its reports, EIOPA indicated that AI, online platforms, blockchain, and IoT play increasingly significant parts in the insurance markets.

However, being technologically advanced does not necessarily build up trust from the customers. OECD research results show that privacy, security, transparency, explainability, and

interpersonal communication are the major factors influencing the customers' attitude towards technology use in the insurance industry.

Therefore, insurers have to find an adequate definition of what the value of insurance might be. The value should also include financial protection, customer help, accessibility, fairness, ethical use of data, and social inclusion. The literature shows that there is a growing need for the integration of technology in line with human-centred and ethical marketing principles.

Objectives

The chapter has set the following targets:

- To look into the evolution of consumer psychology in insurance marketing.
- To look into the role of technological innovations in improving customer intelligence and insurance marketing.
- To assess the significance of digital trust in technology-driven insurance relationships.
- To evaluate the role of responsible personalisation in enhancing customer experience as well as perceived value.
- To create a framework that stands to merge human aspects and technological innovations making up insurance marketing.
- To highlight the challenges in the implementation of ethically responsible, inclusive and sustainable technology-driven insurance marketing.
- To define trends for the future of human-centred and sustainable insurance marketing.

Research Methodology

The current chapter uses a conceptual and empirical research methodology, characterized by a systematic review and synthesis of the relevant academic literature, regulatory reports and current evidence from practice. Indeed, this methodology seems suitable given that the chapter is about creating a conceptual framework rather than statistically testing a number of pre-established hypotheses.

The literature has been analysed based on six themes: the psychological experience of consumers, the marketing of insurance products, the application of AI in the insurance area, the importance of digital trust, customer experience, and the creation of value in a sustainable manner. Important academic literature was evaluated in the area of consumer psychology, digital marketing, AI, digital trust, customer experience, and the ethical approach to technology.

Moreover, the current evidence used in research refers to the reports published by the insurance regulatory authorities and international organizations. EIOPA states that the development of AI, blockchain technology, IoT, and digital distribution is important while at the same time focusing on consumer protection and digital exclusion as well as the role of physical and hybrid channels.

There were three stages to this analysis. The first step involved identifying the relevant concepts in the literature. The second step examined the relationships between the concepts through thematic synthesis. The third step integrated the relevant concepts into the Human-Technology Insurance Marketing Framework.

The framework proposed here is intended to be conceptual and, therefore, needs to be tested empirically in future using survey methods, interviews, structural equation modelling, or mixed methods approaches.

Conceptual Framework



Main Discussions

From Product-Centred to Customer-Centred Insurance Marketing

Traditional insurance marketing emphasizes products, premiums, benefits, and coverage. However, the human-technology approach begins with the understanding of customer needs, concerns, and expectations around risks. Technology is capable of processing customer behavior in order to draw conclusions; however, the purpose of technology should not be the establishment of recurrence.

Consumer Psychology and Risk Perception

Risk recognition, emotions, financial confidence, trust and past experience impact the decisions that customers take about insurance. Customers sometimes tend to underestimate risks, postpone purchases or consider insurance too complicated. With the help of AI, it is possible to map customers' behaviours, but marketing should combine data insights with educating customers about insurance and being open with them.

AI and Customer Intelligence

Customer segmentation, predictive analytics, recommendation systems, chatbots, sentiment analysis, and personalised communications are the various functions performed by the AI technology. According to the report released by EIOPA, almost fifty percent of non-life insurers surveyed in 2023 used AI followed by 24% of life insurers. However, responsible management is essential to ensure privacy, fairness and inclusiveness are observed.

Responsible Personalisation

Personalization makes communication relevant by adapting it to the requirements and situations of consumers. Nevertheless, insurance companies must ensure transparency, data minimization, consent, fairness, and the capability of explaining. EIOPA's Eurobarometer 2024 states that 60% of people can find personalized insurance solutions online but only 30% trust chatbots to provide the correct and full information about the purchasing process.

Digital Trust and Transparency

Digital trust is all about secure data handling, openness, justice, and responsibility. In some cases, customers should know how recommendations are made and how data is used.

Human Engagement

Technology should combine with people rather than replace them. Insurance claims may deal with illness, accidents, death, or money problems. Thus, using a combination of HR and technology is necessary.

Sustainable and Inclusive Value Creation

Marketing for sustainable insurance is aimed towards safeguarding the necessity of consumers, being socially responsible, practicing ethical use of data as well as ensuring that the ability of society and every person is maximally equal and being implemented without discrimination.

Findings / Key Insights

The conceptual analysis offers us seven key insights.

1. Technology should be considered a tool to create customer value instead of being an end goal in itself.
2. Consumer psychology is still extremely important as insurance decisions can be made based on how risks are perceived psychologically and which emotions, trust, and financial ability consumers possess.
3. Artificial intelligence is able to enhance customer intelligence thanks to proper use of segmentation, forecasting, and personalization.
4. Digital trust serves as a very important connection between what people can do technologically and what they are willing to accept.
5. personalisation has to be completely customer-oriented and must not be limited only to being based on an extensive use of copious amounts of data.
6. One of the most important aspects of insurance relations is that human involvement must be ensured in all complex and sensitive and emotionally important processes.
7. It is important to keep in mind that effective marketing of sustainable insurance products requires depending equally on value for the clients, company and society.

Thus, the key idea is that the future of marketing in the insurance sector is not in the choice of artificial intelligences and technology vs human context but rather in the successful connection of the two.

Challenges and Limitations

The framework may encounter some challenges during its implementation. First, there is concern over privacy and cybersecurity issues due to the large use of consumer data. Secondly, algorithms can have bias due to previous data. Thirdly, customers might be confused with AI recommendations as AI technology is not explained to them. The fourth point discussed in this section is that high automation brings a lot of negative emotions if people are having important conversations with businesses. The last concern is that there is a chance customers with poor level of digital skills will be left behind.

Another challenge is that risk assessment is very sophisticated which contradicts to the basic principle of insurance — pooling risks. EIOPA says that more data leads to better risk assessment but at the same time it is connected with the problems of price discrimination.

In addition, this chapter has some limitations from methodological point of view. It is theoretical and does not test the model empirically. Therefore, this framework cannot be treated as a validated empirical model. The empirical studies are needed to find the strength and direction of the correlations between customer psychology, digital trust, tailoring customer experience, and sustainable value.

Future Directions

In the future, researchers can explore the proposed framework through both quantitative and qualitative research methods. They can develop measurements that revolve around the factors of consumer behavior, AI acceptance, digital trust, responsible personalization, customer experience, and sustainable creation of value.

Structural equation modeling (SEM) techniques like the Partial Least Squares method of Structural Equation Modeling technique can be used to analyze the relationships among the constructs of the framework. Qualitative interviews with customers will provide researchers with more comprehensive insights into the way customers perceive the insurance services recommendations based on AI.

Future studies may analyze generational dependency by comparing younger and older customers, reactions from the urban population in contrast with the rural one, and the comparison of digitally savvy and digitally less-savvy customers for various types of insurance products.

Generative AI represents yet another area of research interest. Future studies can focus on whether these technological systems facilitate insurance comprehension; or whether they give rise to new issues related to trust among customers. Scholarly research must verify consider the importance of explainable AI and fairness in algorithms as well as the control gained by consumers over personal data. Furthermore, studies can explore the impact of digital medium on insurance and its actual contribution to the inclusion of people into finances.

To conclude, there is a need for research in the area of interaction between humans and machines because the studies usually narrow the scope of the research to machines only.

Conclusion

Recent changes in insurance marketing can be attributed to the growing interaction between human needs and technological possibilities. With the help of data analytics, artificial intelligence, digital platforms and the Internet of Things, insurance companies now have tools for tapping customer insights, providing personalized services and improving customer experience. Nevertheless, insurance is still a human-based service where consumers make decisions based on historical data and emotions. This chapter introduces the concept of Human–Technology Insurance Marketing Framework that combines consumer behaviour theories with responsible personalization, digital trust, human engagement, and sustainable customer value. The main implication of this is that it is not enough to have advanced technology to reach sustainable relationships with customers. Technology must be complemented with fairness, transparency, inclusion, and appropriate support.

The current evidence supports this idea. Consumers are using the information obtained from the Internet to take more informed decisions, but the issue of digital exclusion, privacy, and lack of human support still exist.

Consequently, the future of marketing in the insurance industry must shift away from being merely technology-based. The new approach must include human-centered technological innovation, whereby AI will help better understand and cater to customers' needs, personalization will increase the degree of relevance, digital trust will ensure acceptance, and sustainable practices will generate value over time. This approach will allow insurances to transit from a focus on product promotion to more important objectives, such as genuine protection of customers, empowerment of the clients, and creation of responsible value.

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A COMPARATIVE ANALYSIS OF THE FINANCIAL HEALTH OF HDFC BANK AND ICICI BANK

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Abstract

Financial health denotes the overall soundness of an institution's balance sheet and earnings profile, captured through liquidity, leverage, profitability and asset-quality indicators. This article undertakes a comparative examination of the financial health of India's two largest private-sector lenders, HDFC Bank and ICICI Bank, over the period FY2024 to FY2026, drawing on published quarterly and annual results, investor presentations, and regulatory disclosures. The analysis applies a structured framework comprising profitability ratios (net interest margin, return on assets, return on equity), asset-quality ratios (gross and net non-performing assets, provision coverage), capital-adequacy ratios (capital-to-risk-weighted-assets ratio, CET-1), and liquidity indicators (current account–savings account ratio, deposit and advances growth) to assess and benchmark the two banks. The findings indicate that HDFC Bank maintains a larger balance sheet, tighter asset-quality metrics, and a comparatively conservative capital cushion, while ICICI Bank exhibits a superior net interest margin, a stronger CASA franchise, and faster-improving return ratios following its post-2018 turnaround. The study concludes that both banks are fundamentally sound by regulatory and industry benchmarks, but that they represent two distinct strategic models — scale-and-stability versus margin-and-efficiency — with differing implications for investors, depositors, and policy observers. The article closes with a discussion of the limitations of ratio-based comparison and directions for further research.

Keywords: Financial Health, HDFC Bank, ICICI Bank, Comparative Financial Analysis, Profitability Ratios, Asset Quality, Capital Adequacy, CASA Ratio, Indian Banking Sector, Non-Performing Assets.

Introduction

The financial health of a bank is not a single number but a composite picture built from how it earns, how it funds itself, how prudently it lends, and how much cushion it holds against shocks. For an individual, financial health is commonly assessed through the ability to spend within one's means, save consistently, borrow sustainably, and plan for future goals. The same logic, translated into balance-sheet terms, applies to a banking company: a bank's 'spending' is reflected in its cost efficiency and provisioning discipline, its 'saving' in its capital and reserve position, its

'borrowing' in its leverage and deposit mix, and its 'planning' in the strategic choices that shape long-term growth and resilience. This article uses that framework to compare two of India's largest and most closely watched private-sector banks — HDFC Bank Limited and ICICI Bank Limited.

India's banking sector has undergone significant structural change over the past decade, marked by the resolution of a prolonged corporate non-performing asset (NPA) cycle, the rapid expansion of digital and mobile banking, the 2023 merger of HDFC Limited into HDFC Bank, and intensifying competition for low-cost current account and savings account (CASA) deposits. Within this environment, HDFC Bank and ICICI Bank have emerged as the two dominant private-sector lenders by balance-sheet size, market capitalisation, and retail franchise reach. A rigorous, ratio-based comparison of their financial health is therefore of interest not only to equity investors and credit analysts but also to depositors, regulators, and students of banking and finance.

This article proceeds as follows. Section 2 sets out the rationale and objectives of the study. Section 3 reviews the existing literature on bank financial-health assessment and prior comparative studies of HDFC Bank and ICICI Bank. Section 4 describes the research design, data sources, and analytical framework. Section 5 briefly profiles the two banks. Section 6 presents the comparative financial analysis across profitability, asset quality, capital adequacy, liquidity, and efficiency dimensions. Section 7 discusses the findings, and Section 8 maps the results onto a broader financial-health scorecard. Section 9 notes the limitations of the study, and Section 10 concludes with implications for stakeholders.

Rationale and Objectives of the Study

Bank failures and near-failures — whether in the Indian context (as with certain co-operative and small private banks in the past decade) or internationally — are almost always preceded by a deterioration in one or more of the core financial-health indicators discussed in this article: eroding asset quality, thinning capital buffers, or an over-reliance on costly, flighty wholesale funding. A systematic, comparative reading of these indicators for large, systemically important banks such as HDFC Bank and ICICI Bank therefore serves a purpose that goes beyond routine investment analysis; it offers an early, evidence-based view of institutional resilience.

The specific objectives of this study are to:

- Compare the profitability performance of HDFC Bank and ICICI Bank using net interest margin (NIM), return on assets (ROA), and return on equity (ROE).
- Evaluate and compare the asset-quality position of the two banks using gross and net non-performing asset ratios and provision coverage ratios.
- Assess the capital adequacy and solvency cushion of both banks against Reserve Bank of India (RBI) regulatory minimums under the Basel III framework.

- Compare the liquidity and funding profile of the two banks, with particular attention to CASA ratios, deposit growth, and the advances-to-deposits relationship.
- Synthesise these indicators into a broader financial-health assessment and draw out implications for investors, depositors, and policymakers.

Review of Literature

The assessment of bank financial health through ratio analysis has a long tradition in banking and finance research, and several strands of this literature are directly relevant to the present study.

Financial Health as a Multidimensional Construct

Financial-health frameworks, whether applied to households or firms, generally converge on four dimensions: the ability to meet current obligations (liquidity), the extent of reliance on external funding (leverage or solvency), the capacity to generate sustainable earnings (profitability), and the prudence with which resources are deployed (asset quality and efficiency). Applied to a bank, these dimensions map naturally onto standard prudential indicators: the current and quick ratios have banking analogues in liquidity coverage and the CASA ratio; the debt-to-equity ratio finds its counterpart in the capital-to-risk-weighted-assets ratio (CAR); and asset-management measures find their counterpart in gross and net NPA ratios and provision coverage. This study adopts that mapping explicitly.

Prior Comparative Studies of Indian Private-Sector Banks

A body of applied research in Indian finance and commerce journals has repeatedly used HDFC Bank and ICICI Bank as comparators, given their status as bellwether private lenders. Several such studies, examining the period from the late 2010s through the early 2020s, report that HDFC Bank historically posted a higher return on assets and a more conservative, steadily improving return on equity, attributing this to disciplined underwriting and a retail-heavy loan book. The same body of work generally finds that ICICI Bank's profitability ratios were comparatively weaker in the years immediately following its corporate NPA cycle of 2016–2019, but that the bank staged a marked recovery thereafter, with gross NPAs declining substantially and return ratios rising to match or exceed those of HDFC Bank by the mid-2020s. More recent comparative work, incorporating data through 2024 and 2025, reports a reversal of the earlier pattern on some metrics, with ICICI Bank recording a higher net interest margin, net profit margin, and return on equity than HDFC Bank, while HDFC Bank continues to lead on scale, deposit franchise size, and valuation multiples. This shift is consistent with the broader narrative of ICICI Bank's post-2018 turnaround under revised risk-management and governance practices, and with HDFC Bank's absorption of merger-related balance-sheet and margin pressures following its 2023 amalgamation with HDFC Limited.

Regulatory and Institutional Context

The prudential backdrop against which both banks operate is set by the Reserve Bank of India under the Banking Regulation Act, 1949, and the Basel III capital framework as adapted for Indian banks, which prescribes a minimum total capital adequacy ratio and a minimum Common Equity Tier-1 (CET-1) ratio, together with a capital-conservation buffer. Asset-classification and provisioning norms issued by the RBI further govern how non-performing assets are recognised and provided for, ensuring a broadly comparable basis for cross-bank comparison of GNPA, NNPA, and provision coverage ratios. This regulatory harmonisation is what makes a like-for-like comparison between HDFC Bank and ICICI Bank meaningful, notwithstanding differences in their loan-book composition and strategic emphasis.

Research Gap

While numerous student and practitioner studies compare HDFC Bank and ICICI Bank, many rely on data that is now several years old and pre-dates two significant structural events: the 2023 merger of HDFC Limited into HDFC Bank, which materially altered HDFC Bank's balance-sheet composition and margin profile, and the continued normalisation of ICICI Bank's asset quality through 2025–2026. This study addresses that gap by incorporating results through the financial year ended March 2026, offering a more current comparative picture.

Methodology

(i) Research Design

This study adopts a descriptive, comparative research design based on secondary financial data. It is analytical rather than experimental in nature: it does not test a causal hypothesis but instead systematically compares published financial indicators of the two banks across a common set of dimensions and time points.

(ii) Data Sources

Data for this study are drawn from publicly available secondary sources, including the audited standalone and consolidated financial results and investor presentations of HDFC Bank and ICICI Bank for the quarters and financial years ended March 2025 and March 2026, press disclosures accompanying quarterly results, and reputable financial and business-news reporting on the two banks' results. Figures are reported on a standalone (bank-only) basis unless otherwise indicated, consistent with the basis most commonly used for cross-bank regulatory ratio comparison in India.

(iii) Analytical Framework

Consistent with the financial-health dimensions outlined in Section 3.1, the study organises its comparison around five categories of indicators:

- Profitability: net interest income (NII) growth, net interest margin (NIM), profit after tax (PAT), return on assets (ROA), and return on equity (ROE).

- Asset quality: gross non-performing asset (GNPA) ratio, net non-performing asset (NNPA) ratio, provision coverage ratio (PCR), and credit cost ratio.
- Capital adequacy: total capital-to-risk-weighted-assets ratio (CAR) and Common Equity Tier-1 (CET-1) ratio under Basel III, benchmarked against RBI regulatory minimums.
- Liquidity and funding: CASA ratio, growth in total deposits, growth in advances, and the advances-to-deposits relationship.
- Operating efficiency: cost-to-income ratio.

Each indicator is compared across the two banks for the financial year ended March 2026 (FY26), with year-on-year reference points from FY25 used to establish direction of trend. Ratios are reported as disclosed by the respective banks; where sources differ marginally due to rounding or differing measurement dates within a quarter, the most recent and most widely corroborated figure is used.

Profile of the Sample Banks

HDFC Bank Limited

HDFC Bank is India's largest private-sector bank by assets and market capitalisation. Following its July 2023 reverse merger with erstwhile parent Housing Development Finance Corporation (HDFC Limited), the bank absorbed a large mortgage-loan book, which increased its balance sheet significantly but also diluted its historically CASA-heavy funding mix and compressed net interest margins in the near term as the bank worked to rebuild its low-cost deposit base. HDFC Bank's strategic identity has long rested on conservative underwriting, a retail-dominated loan book, and best-in-class asset quality among large Indian banks.

ICICI Bank Limited

ICICI Bank is India's second-largest private-sector bank. Having weathered a difficult corporate-NPA cycle between 2016 and 2019, the bank has, since 2018, pursued a publicly articulated 'One Bank, One RoE' strategy emphasising risk-calibrated, granular retail and SME lending, digital origination, and a strengthened CASA franchise. This strategy has been credited with the bank's sustained improvement in return ratios and asset quality through the mid-2020s.

Comparative Financial Analysis

I. Profitability

For the financial year ended 31 March 2026, HDFC Bank reported standalone net revenue of approximately ₹1,912.2 billion and standalone profit after tax of approximately ₹746.7 billion, an increase of 10.9 per cent over FY25; on a consolidated basis, profit after tax stood at approximately ₹760.3 billion. In the fourth quarter of FY26 alone, standalone net profit rose 9 per cent year-on-year to ₹19,221 crore, aided by lower provisions, while net interest margin for the quarter stood at approximately 3.38 per cent. ICICI Bank reported standalone profit after tax of ₹50,147 crore for FY26, an increase of 6.2 per cent over FY25's ₹47,227 crore; consolidated

profit after tax for FY26 was ₹54,208 crore, up 6.2 per cent year-on-year. Fourth-quarter standalone net profit rose 8.5 per cent year-on-year to ₹13,701.7 crore, with net interest margin reported at approximately 4.32 per cent for the quarter — markedly higher than HDFC Bank's comparable figure. Quarterly return ratios reported around the same period placed ICICI Bank's return on average assets near 2.1 per cent and return on equity near 14.7–18 per cent, while HDFC Bank's corresponding return on assets and return on equity were reported in the region of 1.9 per cent and 13.9–17 per cent respectively, with some variation across reporting quarters.

Indicator (FY26)	HDFC Bank	ICICI Bank
Standalone PAT (₹ crore, FY26)	74,670*	50,147
Consolidated PAT (₹ crore, FY26)	76,030*	54,208
Q4 FY26 standalone PAT (₹ crore)	19,221	13,702
YoY growth in Q4 standalone PAT	9.0%	8.5%
Net Interest Margin (Q4 FY26)	~3.38%	~4.32%
Return on Assets (approx., FY26)	~1.9–2.0%	~2.1–2.3%
Return on Equity (approx., FY26)	~13.9–17%	~14.7–18%

* HDFC Bank's absolute PAT figures are expressed in ₹ crore for consistency (₹746.7 billion ≈ ₹74,670 crore; ₹760.3 billion ≈ ₹76,030 crore).

Taken together, these figures show HDFC Bank generating substantially larger absolute profits, consistent with its larger balance sheet, while ICICI Bank generates a higher margin and return per unit of assets and equity deployed — a pattern that recurs across several of the ratios discussed below.

II. Asset Quality

Asset quality remained a point of strength for both banks in FY26, though HDFC Bank continued to report the tighter absolute ratios. As at 31 March 2026, HDFC Bank's gross NPA ratio stood at 1.15 per cent and its net NPA ratio at 0.38 per cent, both improved on a year-on-year and sequential basis; the quarterly credit cost ratio was 0.35 per cent. ICICI Bank's net NPA ratio stood at 0.33 per cent as at 31 March 2026 — marginally better than HDFC Bank's net NPA ratio — with a provision coverage ratio of 75.8 per cent on non-performing loans, while its gross NPA ratio was reported around 1.4 per cent for the same period, having improved from levels near 1.5 per cent in the preceding quarter.

Indicator (as at 31 Mar 2026)	HDFC Bank	ICICI Bank
Gross NPA ratio	1.15%	~1.40%
Net NPA ratio	0.38%	0.33%
Provision coverage ratio	~high, undisclosed exact %	75.8%
Quarterly credit cost ratio	0.35%	n.a. (provisions moderated YoY)

Both banks' NPA ratios remain well below the broader Indian scheduled commercial banking system average, reflecting the generally improved asset-quality environment in Indian banking since the resolution of the 2015–2019 corporate stressed-asset cycle. On a net NPA basis, ICICI Bank held a marginal edge in FY26; on a gross NPA basis, HDFC Bank's book appeared marginally cleaner, indicating comparable underlying credit discipline at both institutions.

III. Capital Adequacy

Both banks maintained capital ratios well in excess of the RBI's regulatory minimum total capital adequacy ratio of 11.7 per cent (inclusive of the capital-conservation buffer) and the minimum CET-1 requirement of 8.2 per cent. HDFC Bank reported a total capital adequacy ratio of 19.7 per cent as at 31 March 2026, with Tier-1 capital at 17.7 per cent and CET-1 at 17.3 per cent. ICICI Bank reported a total capital adequacy ratio of 17.18 per cent and a CET-1 ratio of 16.35 per cent as at the same date, up from 16.55 per cent total CAR a year earlier.

Indicator (as at 31 Mar 2026)	HDFC Bank	ICICI Bank
Total Capital Adequacy Ratio (CAR)	19.7%	17.18%
Tier-1 ratio	17.7%	n.a. (CET-1 reported)
CET-1 ratio	17.3%	16.35%
RBI minimum CAR / CET-1	11.9% / 8.2%*	11.70% / 8.20%

** Minor variation in the quoted regulatory minimum across sources (11.7–11.9%) reflects differing treatment of the capital-conservation buffer add-on across reporting periods; both figures are consistent with RBI's Basel III minimum capital requirements for Indian banks.*

HDFC Bank's higher capital cushion is consistent with its historically conservative capital-management stance and with the additional capital retained following the HDFC Limited merger; ICICI Bank's ratio, while lower in absolute terms, remains comfortably above regulatory requirements and has been rising steadily over recent years.

IV. Liquidity and Funding Profile

Indicator (FY26)	HDFC Bank	ICICI Bank
Total deposits (₹ crore, 31 Mar 2026)	~31,05,300	~17,94,000
YoY deposit growth	14.4%	11.4%
CASA ratio	34.1%	38.6%
Total advances (₹ crore, 31 Mar 2026)	~29,60,000	~15,53,893
YoY advances growth	12.0%	15.8%

On the funding side, HDFC Bank's total deposits reached ₹31,053 billion as at 31 March 2026, up 14.4 per cent year-on-year, with a CASA ratio of 34.1 per cent of total deposits; advances stood at ₹29,600 billion, up 12.0 per cent year-on-year. ICICI Bank's total deposits stood at ₹17.94 lakh crore, up 11.4 per cent year-on-year, with an average CASA ratio of 38.6 per cent in the fourth quarter — notably higher than HDFC Bank's — and total advances of ₹15.53 lakh

crore, up 15.8 per cent year-on-year, indicating faster loan-book growth than HDFC Bank over the same period.

HDFC Bank's balance sheet remains substantially larger in absolute terms a legacy of both its pre-merger scale and the mortgage book absorbed from HDFC Limited — but ICICI Bank's higher CASA ratio and faster advances growth point to a comparatively stronger low-cost funding and lending-momentum position relative to its own asset base.

V. Operating Efficiency

On cost efficiency, HDFC Bank reported a cost-to-income ratio around 39.2–39.8 per cent through FY26, reflecting sustained cost discipline even as the bank integrated the erstwhile HDFC Limited's operations. ICICI Bank's cost-to-income ratio rose modestly year-on-year to around 40.8 per cent in the same period, reflecting continued investment in digital infrastructure, branch expansion (126 new branches added in the fourth quarter alone, taking the network to 7,511 branches), and customer-acquisition costs. Both ratios remain within the range generally considered efficient for large-scale universal banks.

Findings and Discussion

The comparative analysis in Section 6 points to a consistent and coherent pattern rather than an unambiguous verdict in favour of either bank. First, on scale, HDFC Bank remains substantially larger than ICICI Bank across deposits, advances, and absolute profit, a position reinforced by the 2023 merger with HDFC Limited. Second, on margin and return efficiency, ICICI Bank holds a consistent edge, with a higher net interest margin, a higher CASA ratio, and return on assets and return on equity that matched or exceeded HDFC Bank's in FY26 — a reversal of the historical pattern of the late 2010s, when HDFC Bank was typically regarded as the more efficient generator of returns per unit of assets and equity. Third, on asset quality, both banks are close to parity: HDFC Bank's gross NPA ratio is marginally tighter, while ICICI Bank's net NPA ratio is marginally better, and both banks' provisioning levels are comfortably ahead of regulatory expectations. Fourth, on capital adequacy, HDFC Bank carries a materially larger cushion above the regulatory minimum than ICICI Bank, suggesting a more conservative approach to capital deployment, though ICICI Bank's ratios have also strengthened steadily over recent years and remain well in excess of minimum requirements. These findings are broadly consistent with recent market commentary and comparative equity-research coverage of the two banks, which similarly characterise ICICI Bank's FY26 performance as reflecting a matured post-turnaround, margin-led growth model, and HDFC Bank's performance as reflecting a scaled, integration and consolidation phase following its landmark 2023 merger. From a financial-health perspective, neither bank shows evidence of the classic warning signs associated with deteriorating institutional soundness — namely, rising non-performing assets, thinning capital buffers, or shrinking margins funded by increasingly expensive deposits. Both banks instead

show improving or stable asset quality, capital ratios well in excess of regulatory minimums, and either stable (HDFC Bank) or expanding (ICICI Bank) profitability metrics.

A Financial-Health Scorecard: Mapping Bank Ratios to Health Dimensions

Returning to the four-dimension financial-health framework introduced in Section 1 — spend, save, borrow, and plan — the comparative results can be summarised as follows.

- Spend (cost discipline and provisioning): HDFC Bank's marginally lower cost-to-income ratio and lower quarterly credit cost ratio indicate slightly tighter expense and provisioning discipline in FY26, though the gap with ICICI Bank is narrow.
- Save (capital and reserve strength): HDFC Bank's materially higher capital adequacy and CET-1 ratios indicate a larger accumulated buffer against unexpected losses, analogous to a stronger "savings" position.
- Borrow (leverage and funding structure): ICICI Bank's higher CASA ratio indicates comparatively greater reliance on low-cost, stable retail funding relative to its total deposit base, a favourable leverage characteristic, even though HDFC Bank's total funding base is larger in absolute terms.
- Plan (strategic growth and returns): ICICI Bank's higher net interest margin, faster advances growth, and stronger return on assets and equity point to a more aggressive, returns-focused growth strategy, whereas HDFC Bank's results in FY26 continue to reflect a consolidation and integration phase following its 2023 merger, with margin recovery expected to be gradual.

This mapping illustrates that "financial health" is not reducible to a single leader-and-laggard comparison: HDFC Bank scores more favourably on capital strength and absolute scale, while ICICI Bank scores more favourably on returns, margin, and funding efficiency. Both profiles are consistent with a financially healthy institution, differentiated primarily by strategic emphasis rather than by underlying weakness.

Limitations of the Study

- The analysis relies on secondary, publicly disclosed data; it does not independently verify underlying loan-level or provisioning data held by either bank.
- Ratios reported across different sources for the same period occasionally show small variations due to rounding, standalone-versus-consolidated presentation, or differing quarter-end reporting conventions; where such variation existed, the most consistently corroborated figure has been used.
- The comparison period Financial year 2025 - 2026 coincides with an unusual phase for HDFC Bank following its 2023 merger, which may understate its "steady-state" post-integration profitability and margin profile relative to ICICI Bank.

- Ratio analysis captures financial outcomes but does not directly measure qualitative dimensions of financial health such as governance quality, cybersecurity resilience, or macroprudential exposure to specific borrower segments.

Conclusion

This comparative study of HDFC Bank and ICICI Bank across profitability, asset quality, capital adequacy, liquidity, and efficiency indicators for the financial year ended March 2026 finds both banks to be financially sound by regulatory and industry benchmarks, but structurally distinct in how that soundness is achieved. HDFC Bank leads on absolute scale, deposit base, gross NPA ratio, and capital cushion, consistent with a conservative, consolidation-oriented strategy following its 2023 merger with HDFC Limited. ICICI Bank leads on net interest margin, CASA ratio, advances growth, and return on assets and equity, consistent with the continued maturing of its post-2018 turnaround and its retail- and SME-led growth strategy. For investors and depositors, the practical implication is that neither bank can be characterised as unambiguously "healthier" than the other; the appropriate choice between them depends on whether the priority is capital strength and scale (favouring HDFC Bank) or margin and return efficiency (favouring ICICI Bank). For policymakers and regulators, the consistent finding across both institutions — improving asset quality and capital ratios well above Basel III minimums — offers a broadly reassuring signal about the health of India's largest private-sector banks as the sector continues to digitise and consolidate. Future research would benefit from extending this comparison over a longer post-merger window for HDFC Bank, and from incorporating segment-level (retail, SME, corporate) asset-quality and margin data as it becomes available in subsequent disclosures.

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ARTIFICIAL INTELLIGENCE AND THE MAKING OF RETAIL INVESTORS' INVESTMENT DECISIONS IN CORPORATE SECURITIES: A BEHAVIORAL FINANCE PERSPECTIVE

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Abstract

Artificial intelligence is transforming the environment in which retail investors form beliefs, interpret information, and act. Robo-advisors, algorithmic trading assistance, and generative AI tools are now prominent sources of guidance for investors who trade corporate securities, in addition to brokers and financial advisors. But the introduction of AI to retail investing does not take place on a blank slate - a slate preloaded with investors' overconfidence, herding, loss aversion, anchoring, and other empirically established biases influencing every decision an algorithm guides.

This chapter offers a conceptual framework for understanding when and how AI-based investment guidance will reinforce, attenuate, or catalyze retail investors' behavioral biases in their decisions to buy, hold, and sell corporate securities.

Building on the behavioral finance literature, as well as the literature examining AI in finance and emerging work on explainable AI (XAI), this chapter concludes that AI's impact on investor biases will vary depending on three moderators: the transparency of the underlying model, the level of financial literacy and algorithmic trust held by the investor, and the human-AI interface through which the advice is delivered. The chapter concludes with policy implications for designers and users of new financial technology, regulators, and financial educators, and suggests avenues for future empirical research.

Introduction

Participation by retail investors in the corporate securities markets has grown quickly in the past ten years, thanks to cheap trading apps, mobile brokerages, and, more recently, artificial intelligence (AI). AI is now involved at nearly every step of the retail investment lifecycle-reviewing stocks, producing investment research summaries, allocating portfolios, identifying risk, and executing trades. Cao (2021) describes this as part of an even wider adoption of AI-including machine learning, natural language processing, and other techniques-in all things financial, transforming not just institutional investing, but the available set of investment options for everyday savers. At the same time, a large, well-established literature in behavioral finance has shown that individual investors behave far from the rational actor implicit in classical

portfolio theory: they overweight recent information, chase top performers, hang on to losing bets too long, and imitate the trades of others. The focus of this chapter is not on the existence of these biases (which is largely taken for granted), but how they are affected when an AI is introduced into the decision process: does AI correct behavioral biases with a disciplined, data-based advice; or does it create new biases, such as uncritical trust in algorithmic recommendations or an illusion of objectivity? Chua *et al.* (2023) find that the answer is, unfortunately, complicated: the key factors that determine if people are willing to follow an AI-enabled investment recommendation are not related to the accuracy of the recommendations, but rather to perceptions of risk, the framing of the AI advice, and general trust in the system. This chapter is conceptual, not empirical. It takes selected fragments of the AI-in-finance literature and fragments of the behavioral finance literature, and integrates them into a single framework that describes how AI-based tools relate to retail investors' psychologically motivated decision-making for corporate securities – corporate bonds, and equities (stocks), and related products (derivatives), issued by firms rather than the government. The structure of this chapter is as follows. The next section introduces, summarizes, and synthesizes the key behavioral biases affecting retail investors. Section 3 introduces the rise of AI-based investment tools, which has occurred in parallel with discussions around their design and the importance of explainability. Section 4 puts together the previous sections to sketch an overall conceptual framework. Section 5 discusses implications for corporate securities decisions. Section 6 puts it all together and concludes.

Theories Behind Behavioral Finance and Decision-Making of Investors

Behavioral finance challenges the assumption that investors incorporate all information rationally into their belief system according to the Bayesian rule. It instead investigates identifiable patterns of predictable departures from rational behavior. These departures can be attributed to heuristics and emotional responses. In this chapter, five types of cognitive biases come to the fore because they are consistently revisited across the literature on AI in finance as having the potential to be benefited – or indeed harmed – by algorithms.

Overconfidence and Illusion of Control

It is common for retail investors to be overly confident of their information and thus underestimate the risk of their investments. Overconfidence inevitably manifests itself in too much trading, too little diversification and too little consideration of the possibility of loss. An AI product that issues a highly confident recommendation either keeps the bias in check by using the tool as an anchoring device, or worsens it by giving it a shiny veneer of tech brain.

Herd Behavior

Another danger of social trading A common reason investors flock to copy traders is that it is often easier than performing your own analysis when you're uncertain of the outcome. Market

signals – such as social trading leaderboards, sorted lists of "hot stocks," and sentiment dashboards – can create the illusion of herd behavior.

Loss Aversion and the Disposition Effect

Investor losses are more painful than gains of the same magnitude, leading to a bias to exit winning positions prematurely and to retain losers too long-the disposition bias. Portfolio dashboards that prominently display the magnitude of a portfolio's gains or losses will either take advantage of or reinforce this bias. They will either lead to rules-based rebalancing or loss aversion that causes panic selling.

Anchoring and Availability Heuristics

Anchor As soon as you open the box of information, a dangerous phenomenon takes hold in investors' minds. Investors tend to anchor to salient reference points -- a stock's purchase price, its 52-week high, or some article you recently read and can easily recall -- and overweight what is readily available in memory. Well, look no further for the most salient reference point in the world of stocks.

Trust, Algorithm Aversion, and Algorithm Appreciation

A number of decision-science studies chronicle two paradoxical phenomena: algorithm aversion, where people start to have less faith in algorithmic recommendations after they have witnessed it produce error, and algorithm appreciation, where people excessively overweight algorithmic suggestions just because it's an algorithm. Chua *et al.* (2023) show that willingness to adopt AI-enabled investment recommendations is influenced by these exact perceptions of trust, not the actual correctness of recommendations, highlighting that the behavioral impacts of AI on investors are mediated by perception and not solely model accuracy.

AI Transforms Retail Investing

Robo-Advisors and AI-Enabled Advice

Robo-advisors use computer algorithms to design and rebalance a portfolio according to an investor's risk preferences, time-frame, and goals, often at a significantly lower cost than human advisers. Banerjee (2025) investigates factors influencing retail investors' - in that study, in an emerging-market setting - decision to use a robo-advisor, concluding that perceived usefulness, trust, and social influence are the primary factors that motivate adoption, drawing more inspiration from the technology-acceptance literature than portfolio theory. Kulkarni *et al.* (2025) draw inspiration from behavioral finance by posing that robo-advisors influence investor decisions not simply by advocating to investors a better portfolio composition but rather by influencing their psychological experience of investing, including experience of control, confidence, and risk.

Explainable AI (XAI) in Finance

As the finance-specific ML models have become more sophisticated, concern has grown that their outputs are not understood even by experienced practitioners, let alone retail investors. This has underpinned a dedicated stream of research into xAI in finance to develop explanation methods that do not harm the predictive performance of these models. Weber *et al.* (2024) offer a systematic review of the academic literature on xAI in finance, information systems and computer science, noting a fast growth of interest but also highlighting a lagging gap between the technically optimal explainability methods and explanations that are more usable by end users, a point reaffirmed by deeper systematic and bibliometric reviews (e.g. "Explainable Artificial Intelligence (XAI)", 2023; "Explainable Artificial Intelligence in Finance", 2023). Later bibliometric and problem-mapping reviews (Haj Ammar *et al.*, 2026; "Explainable Artificial Intelligence in Finance", 2026) show the turn towards, on one hand, end-user trust and, on the other hand, AI charter compliance, on which retail-investor behavior is contingent. Overall, this literature lays the groundwork for our chapter. First, AI is not a unitary phenomenon shaping retail investors; its behavioral impact is mediated by the particular instantiation of the AI (the modeling paradigm, data input, delivery channel, etc): a robo's portfolio recommendation, a chatbot's plain English explanation, a sentiment score associated with a stock, an alert issued by a classification model. And second, explainability is not an optional technical detail; it is a behaviorally significant design decision because the reasonability of its explanatory output moderates biases like anchoring and overconfidence or their opposite, halo and algorithm appreciation.

Theoretical Background: AI in the Context of Biases in Behavior

In this chapter, I suggest that AI's impact on whether a retail investor decides to purchase, hold, or sell a corporate security is not direct but contingent upon the interaction of three conditions: (a) AI system transparency, (b) investor financial literacy and attitude toward algorithm, and (c) interface design. A figure-level visual of the framework is described narratively below since this chapter takes a conceptual rather than empiric format.

Transparency as a Double-Edged Moderator

For instance, when an AI system justifies a recommendation (by mentioning such factors as valuation, earnings momentum, or a comparison to peer companies), it can bias towards the underconfident investor by making transparent the basis (and the ambiguity) of the recommendation. On the other hand, explanations that are too technical may lead to another type of failure: uncritically accepting the recommendation on the grounds of an inability to actually understand the explanation, in line with Weber *et al.* (2024), who find a "discrepancy between technically-complex explainability and users' needs for understandable explainability."

Financial Literacy and Trust in Algorithms as Moderators of Investorlevel Effects

The same recommendation from the AI could have 2 different impacts on behavior depending on the investor's pre-existing characteristics. For example, investors with higher pre-existing financial literacy (or a mental default towards angel investor disposition) are more likely to regard output from AI as just one factor, weighed and cross-verified with their own analysis—delaying herding and dampening overconfidence. But investors with less pre-existing AI familiarity (or angel investor disposition, or a default towards algorithm distrust) would treat the output from AI as a close-to-tablet-from-heaven recommendation, either suppressing overconfidence and herding (such as reducing panic-driven angel investor disposition with an AI rules-based investing balancing rule), or reinforcing it (e.g. Deeper herding due to crowd or sentiment-based inputs to AI).

Design of User Interface and Choice Architectures

The way that AI output is formatted and presented (a specific solitary confidently recommended action, a ranked list, a distribution of probabilities, or an array of scenarios) impacts which biases come into play. A solitary "buy" or "sell" recommendation, presented in a vacuum, would be just like any other immediately visible salient anchor and could lead to herd behavior if it is seen along with other traders' activities. A promised comparison of competing scenarios, delineating a range of uncertainty, would more strongly encourage the System-2 deliberative reasoning associated in behavioral finance with more sober decisions.

Thus the theoretical position of this chapter is that AI does not have a fixed behavioral valence; the same base model may be biasing or de-biasing depending on transparency, end-user, and framing. That shifts the central FT design question from "how accurate is the model" to "in what circumstances will a model's prediction interact with the recipient's psychology?" What retail investors should think about in corporate securities what retail investors should know about in corporate securities?

Corporate securities are a natural fit for the application of this scheme, as the prices of these instruments are influenced by firm-specific information (earnings releases, governance developments, analyst revisions, legal proceedings, management guidance) that is partially nor readily available, and partially not easily interpretable by retail investors. AI applications that, for instance, synthesize corporate disclosures, translate analyst research into accessible words, or highlight atypical trading or trading sentiment around a stock try to intervene at the locus where information asymmetry and behavioral bias used to reinforce each other. Three implications follow. First, AI summarizers of corporate news can mitigate the bias of retail investors to place undue weight on the most recent or emotionally charged headline, but only if the summarizer is resistant to click-driven optimization – that is, learning behavior that amplifies popularity and potential as the most recent or emotionally gripping brand. Second, robo-advisors'

rebalancing instructions to a portfolio of corporate securities can neutralize the disposition effect in individual investors if they are driven solely by prescribed rules for sale or purchase in specific scenarios, so that investors are not somehow overly committed to holding a position that the rules would otherwise just sell, but only if a crashworthy individual investor has not been provided with an override button to sell and buy that investor back in at the moment of maximum need. Third, sentiment-analysis or social-signal feature functionality such as that offered by a growing number of retail platforms that allow users to view the activity of fellow investors in specific corporate securities is most likely to be placed closest to the herd and therefore should be viewed with caution, as it can turn the individually rational decision of "what is the market thinking" into a dangerous common pattern of imitation in the case of small, thinly-traded corporate securities.

2.01 Kulkarni et al (2025) and Banerjee (2025) both highlight a somewhat related though distinct implication: use of AI-based investment tools is itself behaviourally conditioned. Investors do not adopt robo-advisors and AI assistants merely because of their expected investment performance, but because of trust, ease of use and social proof - thus the behavioural biases in this chapter take effect not only on investment but in the initial question of whether to use an AI tool at all. This has immediate implications for designing your platform and ethically marketing AI investment capabilities to retail investors.

Challenges and Directions for Future Research

There are several reasons, both conceptual and empirical, why the framework above is not an easy sell. Conceptually, the line between an AI system "correcting" a bias and "substituting" one bias for another is never very clear - such a rules-based rebalancing assistant that reduces the disposition effect might also at the same time induce a new type of overconfidence if investors stop monitoring the portfolio altogether. Empirically, the vast majority of existing AI adoption and trust in retail investing literature (including those we reviewed above) are based on cross-sectional survey data or on bibliometric mapping of the research literature rather than on behavioral or trading-outcome data that relates to the use of AI tools.

Future avenues of research 25. In addition to the avenues of research discussed in Section 7, researchers could further strengthen the evidence base of the proposed effect on retail investor decision-making by carrying out experimental research, for example, that varies the level of explanation transparency and the framing of recommendations from machine learning systems while holding the accuracy of the model constant. This approach would help parse out the proposed effect from that of recommendation accuracy, as described in Section 4. Researchers might also look longitudinally at whether actual retail trading in corporate securities before and after a retail investor has adopted an ML tool is debiased in the ways proposed here, and for how long. Furthermore, as explainability research in finance remains in its early days (Weber *et al.*,

2024; erneviiien and Kabainskas, 2024), the space is ripe for experiments to determine what explanation formats work best at reducing bias in investors with different levels of financial literacy, rather than assuming that an explanation alone improves decisions. Also, there is a need for regulatory and regulatory commentarial research on the intelligibility obligations of AI-enabled brokerage and advisory platforms, especially where social or sentiment signals are made available in a way that increases herd-like trading around individual corporate issuers.

Conclusion

AI is now a standard intermediary between retail investors and the corporate securities markets in which they operate, but its behavioral effects are neither exclusively positive nor exclusively negative. This chapter has shown how the impact of AI on these classical biases of behavioral finance (overconfidence, herding, loss aversion, anchoring, and itself) depends on transparency of the system, the role of the user, and the design and application of the AI output. Corporate securities trading, with its asymmetries of firm-specific information, is an especially relevant context.

Moving forward, the key design and research question will not merely concern the accuracy of AI tools for retail investors, but whether the transparency, presentation, and interface design of those tools are aligned with the psychology of the retail investors who use them.

Behavioral finance and AI explainability are promising avenues for addressing this question.

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DIGITAL ACCOUNTING AND FINANCIAL REPORTING

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Abstract

The basic function of language is to serve as a means of communication. Digital Transformation refers to integrating digital technologies into all aspects of business operations. Accounting professionals are now expected to deliver timely, transparent and accurate financial information. Accounting professionals must adopt continuous learning.

Keywords: Digital Transformation, Accounting Professionals, Continuous Learning.

Introduction

Accounting is the language of business. Every business should know about the result of any business. The accounting records are maintained based on accounting concepts and conventions. The results of the business can be known by preparing profit and loss account and balance sheet. Digital Transformation refers to integrating digital technologies into all aspects of business operations, fundamentally changing how companies deliver value to their clients and stakeholders.

Accounting professionals are now expected to deliver timely, transparent and accurate financial information while ensuring adherence to complex regulatory requirements such as SEC reporting.

Discussion

Accounting serves the purpose of communicating the results of business operations to all the interested parties such as owners, managers, shareholders, creditors etc. Accounting includes the designing of suitable accounting system, preparation of financial statements, cost studies etc.

The traditional accounting cycle in any business consists of the following sequences like Journalizing, Ledger preparation, Trial balance and preparation of final accounts during the year end. The accounting profession has always been a cornerstone of business, providing critical insights and records that drives decision-making and ensure financial stability. As we are into the 21st century, staying abreast of emerging trends and technologies is vital for accountants who wish to be competitive and relevant.

Digital Transformation in Accounting

Traditional methods of data entry and financial reporting are being replaced by automated platforms, advanced analytics and AI-powered tools, allowing accountants to focus on strategic decision-making and compliance.

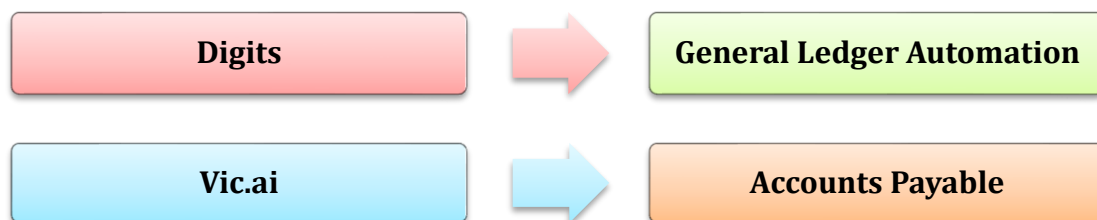
- **Automation in Accounting**

One of the most impactful trends in accounting is the growing use of automation. Transactional tasks such as data entry, payroll processing and invoice management are increasingly being automated. Automation tools reduce human error, increase efficiency, and allow accountants to focus on more strategic activities such as financial planning and analysis.

Accounting automation uses software, AI to handle repetitive, manual financial tasks like data entry, reconciliations, invoice processing and report generation. By streamlining these workflows, businesses increase accuracy, reduce costs and allow finance teams to focus on value added services.

- **Artificial Intelligence in Accounting**

Accounting AI integrates machine learning and natural language processing to automate tasks like book keeping, invoice processing and financial reporting.



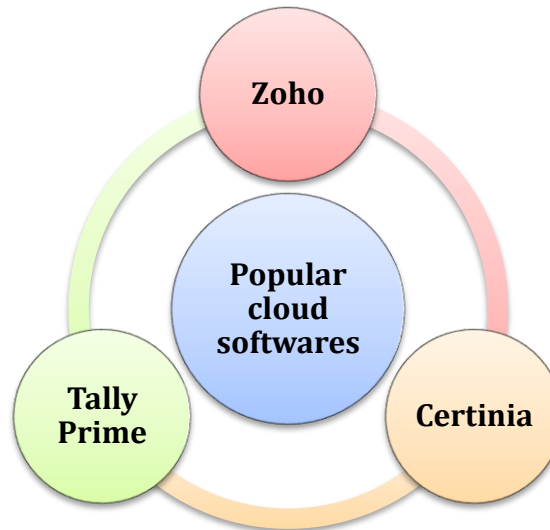
AI takes automation a step further by adding a layer of intelligence. AI-driven software can analyze large sets of data to identify trends and anomalies, aiding in fraud detection and risk management. It also helps in predictive analytics, allowing accountants to forecast financial performance with greater accuracy.

Machine learning algorithms continually improve by learning from each transaction, making the process smarter over time.

- **Blockchain Technology in Accounting and Auditing:** This is poised to revolutionize accounting and auditing practices by providing a decentralized and immutable ledger system. Transactions recorded on a blockchain are transparent and cannot be altered without consensus from all network participants, thus significantly reducing the risk of fraud and error.
- **Smart Contracts:** Smart contracts are self-executing contracts with the terms directly written into code. These can automate various accounting tasks, such as agreement execution and payment releases, without the need for intermediaries.

Cloud Accounting

Cloud computing has made significant inroads in the accounting field, providing accessible and scalable solutions for businesses of all sizes. Cloud accounting software allows accountants and business owners to access financial data in real-time from anywhere, facilitating more timely and informed decision-making.

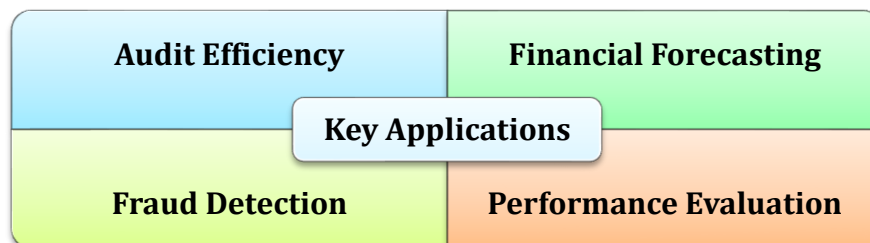


Data Analytics in Accounting

By using technologies like Python and SQL to analyze large financial datasets to move beyond traditional, historical reporting into predictive forecasting. It is essential for auditing, fraud detection and enhancing strategic decision making.



Data analytics is another pivotal trend shaping the future of accounting. Advanced analytical tools enable accountants to go beyond traditional financial reports and gain deeper insights from financial data. They can analyze past trends, forecast future performance, and even identify



Sustainability Accounting

As businesses and investors become increasingly focused on sustainability, there's a growing demand for environmental, social and governance reporting. Nowadays, accountant are integrating ESG metrics into their financial reports to provide a more holistic view of a company's performance.

Regulatory Technologies

The regulatory measures are continually evolving, resulting in a constant challenge for accountants. This regulatory technology uses AI and big data to streamline compliance processes. These tools can automatically update regulatory requirements, track changes, and even show potential compliance issues in real-time.

Businesses and accounting professionals are embracing digital tools and advanced technologies to streamline processes, enhance accuracy, and meet growing regulatory demands. As the accounting sector shifts from manual, spreadsheet-driven tasks to be automated, software-enabled workflows, the future of financial reporting is being redefined. This transformation is driven by advancements in artificial intelligence, cloud accounting and data analytics, enabling firms to manage financial information with utmost efficiency and precisions.

The Drivers Behind Digital Transformation in Accounting

Regulatory complexity: The increasing complexity of financial reporting regulations, including the various types of SEC filings, necessitates precise, timely and transparent reporting.

- **Stakeholder Expectations:** Investors and stakeholders demand real-time access to financial data. Digital accounting solutions provide instant insights into financial performance, empowering better decision-making.
- **Competitive Pressures:** To stay ahead, firms must embrace digital technology to improve efficiency, reduce costs and enhance the quality of their financial reporting.
- **Data Explosion:** The volume of financial data continues to grow, making manual accounting processes difficult. Big data tools enable firms to manage, analyze, and balance huge volume of financial data efficiently.

Financial Reporting

Financial reports are the mechanism to share the information of the company to its stakeholders like investors, creditors, bankers, etc. It reflects the progress of the company. These are prepared in accordance with the established standards like GAAP, IFRS etc to ensure uniformity in all countries. Nowadays, for financial reporting Companies make use of technologies and AI techniques for collection, analysis and interpretation instead of manual operations.

Typically, financial reports include the following-

- Income statement
- Balance sheet
- Cash flow statement
- Disclosures, notes and schedules
- Other reports

Impact on financial reporting and SEC Compliance Accounting professionals and firms now rely on technology to streamline the financial close, enhance transparency and ensure compliance with regulatory mandates

- **XBRL Integration:** Technologies simplify the tagging and standardization of financial statements for SEC filings, improving accuracy and accessibility.
- **Audit Readiness:** Advanced tools provide detailed audit trails, ensuring compliance with regulations like SOX while reducing the risk of restatements.

Redefining the Role of the Accountant

Digital transformation is redefining the roles and responsibilities of accountants, shifting their focus from repetitive tasks to high-value activities. Automation now handles transactional tasks, allowing accountants to take on strategic advisory roles.

Modern accounting professionals must also master data analytics tools to interpret financial trends, identify opportunities and mitigate risks. This shift demands a strong understanding of technology and analytics.

Additionally, accountants now play a pivotal role in cross-functional teams, working with marketing, operations, and leadership to align financial goals with overall business strategies. This collaboration ensures financial insights are integrated into decision-making processes.

Overcoming challenges in Digital transformation

- Firms must navigate several hurdles to ensure a smooth transition.
- Resistance to change is common because people often fear new systems.
- Addressing this requires clear communication about the benefits of digital tools, such as improves efficiency, reduced errors, and enhanced compliance.
- Many organizations face difficulties when integrating new technologies with existing financial systems.
- Training and support are equally important.
- Phased implementation offers an effective strategy for managing these challenges.
- A gradual rollout of digital tools-starting with pilot programs-allows organizations to refine process, address challenges, and build confidence among users before full scale adoption.
- This approach reduces risks and ensures a more effective transformation.

Conclusion

The accounting profession is undergoing a significant transformation driven by emerging trends and technologies. To stay relevant and competitive, accountants must embrace these advancements and continually update their skill sets. By inculcating technologies, accounting professionals can not only enhance their efficiency and accuracy but also provide more strategic and valuable insights to their clients or organizations. Upskilling is essential to thrive in a digital-first accounting environment.

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WOMEN IN THE MODERN WORKPLACE: CHALLENGES, RESILIENCE AND CAREER DEVELOPMENT

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Abstract

The involvement of women in the contemporary labour force has noticeably increased. The presence of women in the workplace allowed companies to expand, innovate and grow the economy. Nonetheless, female employees have to cope with many problems in the workplace. They experience obstacles like work-life balance issues, lack of career opportunities, work-induced stress, poor representation at the highest decision-making levels in the organization, organizational stereotypes, interruptions in their careers, and contradictions in terms of balancing between work and family. In the context of a rapidly evolving digital world, these problems have acquired new forms due to the introduction of the hybrid work model and technological transformation in the contemporary labour force. Nevertheless, women manage to overcome obstacles by altering their approach to coping with various situations at work.

The text of this chapter refers to main obstacles for women in the workplace and the importance of their persistence in overcoming these obstacles and factors affecting women's career evolution. This chapter also mentions organizations' policies aimed at forming an inclusive and friendly work environment capable of providing women with sustainable career advancement.

Keywords: Women Employees, Modern Workplace, Workplace Challenges, Resilience, Career Development, Work-Life Balance, Gender Diversity, Employee Well-Being, Career Advancement.

Introduction

The modern workplace has significantly changed due to globalization, technical progress, digitalization, changes of employment relations and evolution of workers' needs. Women have become a crucial part of modern workforce being employed in many areas such as education, healthcare, finance, information technologies, production, services, entrepreneurship, and public administration. Women's employment benefits individuals and organizations. This employment gives women financial independence, professional identity, personal development opportunities and enables them to make decisions. On the organizational level, diversity of workforce leads to diversity of thoughts, creativity, problem-solving skills and better understanding of the various needs of the customers and stakeholders. Even with the advancements being made, women are still facing struggles which can negatively impact their experiences in the workplace and hinder

their career growth. The reasons behind these struggles might be the organizational structures, the culture at work, the obligations stemming from family life, the expectations from society and the specifics of each individual career.

The modern workplace has also brought new possibilities and issues. The flexible and hybrid work arrangements allow for the independence of working; however, the presence of technologies might cause the lines between working and personal life to be blurred. At the same time, the introduction of new technologies means that people have the chance to improve their skills, but this also means that a person has to keep learning as new technologies come into play. Therefore, the term "resilience" can be considered to be quite relevant when speaking about women's career experiences. Resilience indicates the ability to deal with challenges and moments of failure as well as operate effectively in adverse situations. In terms of female workers, resilience is important in order to deal with tensions at workplaces.

Even with these advances, women continue to face challenges that can have an impact on their careers and career progress. These challenges can stem from the organizational environment, culture, family duties, social requirements and the career situation of each individual. The contemporary setting creates new events too and thus requires new approaches to tackle them. The phenomenon of flexibility and hybrid work gives a chance to work more independently, but at the same time, connection technologies can blur the border between personal life and work. The same applies to technological changes that open new chances to develop skills but at the same time require perpetual learning and updating of different knowledge. As a result, it is very important to talk about one of the important concepts of women's careers – resilience. Resilience means the ability to adjust to difficulties, recover from losses and keep working in spite of difficult circumstances. In the case of female workers, resilience is a great opportunity for them to relieve stress from workplace, interruptions in their career, and changes happening in organization and family duties. Another vital aspect is career development. Career development includes career planning, skill gaining, networking, promotions, leadership opportunities and long-term career growth. But individual resilience alone does not help to overcome the structural obstacles. Thus, organizations have a great part in supporting women's careers.

Changing Role of Women in the Modern Workplace

The position of women in the workforce has changed dramatically. Women are not just involved in a small category of jobs anymore; they work at different jobs and positions including executive, managerial, technical, and entrepreneurial roles.

There are many reasons for this change:

- The rise of educational options
- More women completing education
- Economic and social progress

- The rise of the service sector
- Development of IT technology
- Changes in the structure of the family
- Introduction of flexible working conditions
- Government and private efforts to assist women in the workforce
- Growth of female entrepreneurship

The development of the workplace has allowed women to work at home, collaborate with global teams and gain experience in careers without geographical boundaries.

But getting the job is only part of the equation; equal employment does not reflect equal experience on the job. Women may have different experiences at work because of the culture of the organization, style of leadership, type of job, responsibility for children and family, as well as the network of contacts.

Major Challenges Faced by Women in the Modern Workplace



Understanding Resilience among Women Employees

Resilience refers to an individual's ability to cope with hardships as well as maintain a good level of performance in difficult conditions. When talking about resilience in the workplace, we do not mean that an employee has to endure pressure all the time, but we rather deal with the combination of such personal qualities and features of the organization.

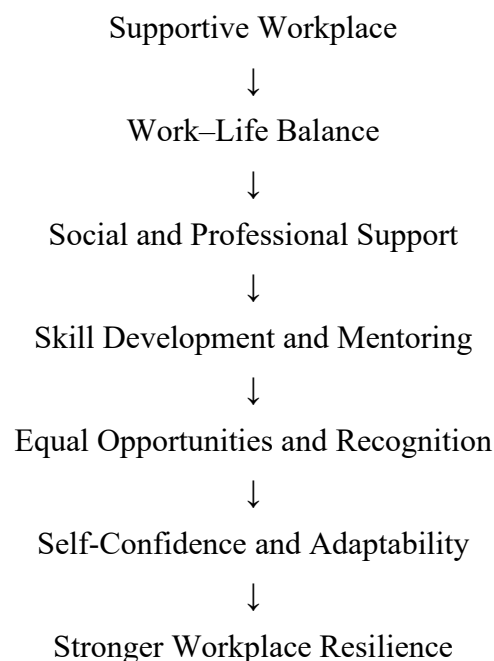
When it comes to women in the workplace, resilience can be demonstrated through:

- Flexibility in the face of organizational changes
- Effective coping with job stress
- Skills of problem-solving
- An ability to control emotions
- Self-confidence when dealing with problems
- Ability to ask for help from others
- Ability to learn from failures
- Ability to set career goals
- Ability to get new skills
- Ability to draw the line

Thus, resilience serves as a pillar of successful career.

At the same time, it would be unfair to lay all the blame for the difficulties they encounter at their workplace on the shoulders of employees. Even the most resilient person can have a hard time if the organization is not supportive.

Factors Strengthening Women's Workplace Resilience



Women's Career Development in the Contemporary Workplace

Career development is a continuous process that includes planning, learning, experience, networking, and progression.

There are several factors for women employees that affect career development.

Education and Professional Qualifications

Qualifications are a prerequisite to achieving professional success, while in this day and age literacy in technology is crucial in most spheres of work.

Mentoring

Mentoring enables professionals to receive advice related to career planning, practices in companies, and skills related to professions and leadership. Formal mentoring programmes allow specialists to find out useful guidance from the mentors, as informal channels may not work effectively.

Networking

Professional networks open doors to various information opportunities and interactions. Women can benefit from internal organizational networks as well as external associations.

Leadership Development

Women can be prepared for managerial and executive positions through leadership development programs.

The training may include the following areas of competencies:

- Decision-making ability
- Strategic thinking ability
- Ability to communicate
- Negotiation skills
- Conflict management ability
- Ability to lead a team
- Financial literacy
- Digital skills

Career Planning

Through individual career planning employees develop an understanding of their development goals and necessary skills. Organizations can assist with the career planning process by conducting performance reviews or implementing the internal mobility processes.

Work–Life Balance and Women's Career Development

Work-life balance is related to career development because high levels of work-family conflict may have an impact on career decisions. Employees suffering from constant difficulties in balancing their professional life and personal life may decide to reduce their working hours, refuse to take on extra responsibilities or change their plans concerning career development.

Organizations may help resolve the issues related to work-life balance by means of:

- Flexible working hours
- Hybrid work models
- Leave policy
- Support for child rearing
- Staff assistance programs
- Workforce management
- Regular scheduling
- Support from managers

Role of Human Resource Management

Human Resource Management is a key subsystem in making the work environment inclusive for women. HR departments can help create an inclusive workplace through recruitment, training, performance assessment, salaries, professional development, engagement, and leadership.

Table 1: HRM practices supporting women employees

HRM Practices	Contribution
Equal opportunity recruitment	Keeps the employment process unbiased
Transparent policies for promotion	Facilitates advancement along the career path
Mentorship	Offers advice on professional matters
Leadership development	Establishes future leaders
Flexible work arrangements	Plays a role in work-life balance
Creation of new skills	Increases employability
Policies against discrimination	for promoting inclusive workplaces

An integrated HRM functioning is more effective than separate initiatives because the career journey of women depends on many organizational systems.

Technology and Women's Career Opportunities

The transformation in digital technologies has provided women with more chances to take part in different fields of employment. Jobs with flexible hours, remote jobs, and other diverse forms of employment in technology contribute to greater opportunities for women to work.

Through technology, women can also benefit from:

- E-learning courses
- Counselling programs available remotely
- Multi-media platforms for learning
- Networking possibilities
- The chance to work in distant mode

However, the development of technologies may create problems such as difficulties with work-life balance and information overload.

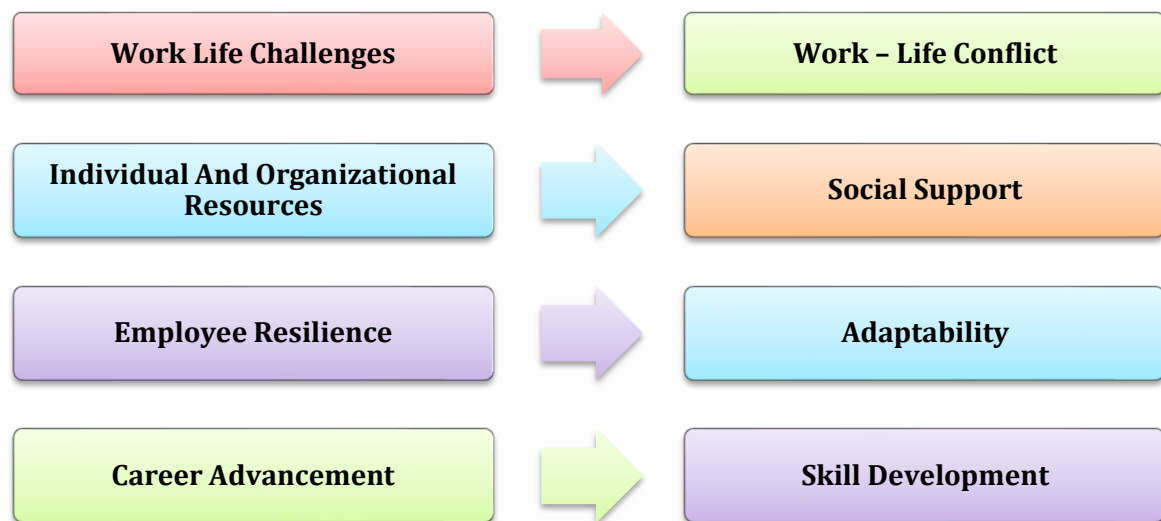
Thus, organizations need to implement digital transformation in compliance with proper training measures, reasonable workloads, and transparency in communication.

Organizational Culture and Women's Career Advancement

The importance of organizational culture in women's career advancement can hardly be overestimated; they can shape the career opportunities, workplace support, and professional development of women in the workplace. Supportive, inclusive, and fair cultures which aim to ensure equal opportunities for employees through flexible working conditions, mentoring systems, fair promotion procedures, and elimination of discrimination may facilitate women's promotion to positions of leadership. On the contrary, organizational cultures characterized by gender discrimination, unequal work burden, too little networking, and lack of support from the leaders may slow down the career development of women. For this reason, organizations that promote diversity and inclusiveness should foster more a supportive environment for women in their careers.

Conceptual Framework

We can illustrate the connection between workplace difficulties, resilience and career advancement with the following diagram:



The model shows that rather than hindering career progress individual resilience and support from their organizations help employees deal with the obstacles they face in their professional pursuits.

Strategies for Supporting Women in the Modern Workplace

- Encourage equal opportunity
- Develop flexible work arrangements
- Enhance coaching and mentoring
- Provide equal pay
- Build inclusive cultures

- Focus on development of leaders
- Invest in career development opportunities
- Promote work–life balance
- Help employees to stay healthy
- Create safe work environments
- Acknowledge contributions of women
- Enhance representation of women in decision-making processes

Future Directions

Women in jobs are likely to be highly affected by technological advances, changing forms of work and new workforce expectations. Artificial intelligence, automation and virtual platforms will change job descriptions. This means that being ready for lifelong learning and adaptability will become more and more relevant.

Organizations of the future may have to go beyond traditional approaches to gender initiatives and rather employ some alternative instruments:

- Skills-oriented career growth
- Flexible employment
- Digital accessibility
- Wellbeing of employees
- Inclusive management
- Leadership agility
- Lifelong education
- Family-sensitive policies
- Fair talent management

Research may be conducted to analyse how different groups of women experience different challenges at work in different occupations and sectors, levels of career evolution, and socio-economic conditions.

Conclusion

Women are playing an important role in the contemporary labour market and making contributions to growth of economy and organizations. Nonetheless, the processes affecting women's careers are still determined by difficulties related to work-life balance, stress at work, stereotypes based on gender roles, interruptions in their careers, unequal chances of gaining opportunities, and changing qualification requirements.

The ability of being resilient can be of a help for women to deal with the difficulties they face in the workplace and achieve success in their careers. However, resilience should not be treated only as an individual obligation. The systems of the organizations, practices of leadership, and

the culture in the workplace have great influence on the development of women and on their professional growth.

The ways the organizations can support women's careers are flexible work practices, mentoring, supporting leaders, the process of reskilling, creating transparent promotion systems, programs that improve well-being of workers and inclusive culture in an organization.

Thus, it is needed to change from just increasing women's involvement to creating the situation in which they are able to use their skills and reach their potential.

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ALGORITHMIC PERSONALIZATION AND CONSUMER DECISION-MAKING IN ONLINE FASHION RETAIL: EVIDENCE FROM BENGALURU

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Abstract

The algorithmic personalisation has turned into an essential attribute of online fashion retail. These digital platforms are based on recommender systems for recommendation, such recommendations are based on the consumers' past purchases, browsing behaviour and interests. This conceptual study investigates the relationship of the independent variable—algorithmic personalisation—as the dependent variable—consumer decision making—in online fashion retail with the contextual variable—Bengaluru. The algorithmic personalisation is assessed by the precision of the recommendations, perceived usefulness, conceptual personalisation and perceived relevancy. Consumer decision making is conceptually represented as information evaluation, consideration of alternatives, purchase intention and purchase decision. Earlier research refers to the role of recommendation system on product decisions and the impact it has on consumers' search and evaluation processes for products. However, the studies specifically on the association between algorithmic personalization and consumer choices in the context of online fashion retailing in Bengaluru are limited. Conceptualizing the relationship between algorithmic personalization and consumer decision making, the study also lays the groundwork for empirical studies with online fashion consumers in Bengaluru.

Keywords: Algorithmic Personalization, Consumer Decision-Making, Recommender Systems, Online Fashion Retail, E-commerce, Personalized Recommendations, Consumer Behaviour, Bengaluru.

1. Introduction

The retail sector has undergone a digital revolution, and the Internet has allowed for the alteration of shopping spaces based on information gathered about each consumer. Interactive decision aids and recommendation systems can help consumers to understand options and select products. Häubl and Trifts (2000) have shown that online decision making can be improved in terms of efficiency and quality through the use of interactive decision aids. Algorithmic personalisation takes this one step further and makes recommendations that are tailored to the preferences and behavioural data of a consumer. This is especially true for fashion retailers,

where customers are exposed to large inventories of products that vary in style, colour, size, brand and price. Pereira *et al.* (2022) noted that customer models and recommender systems are among the key elements of personalisation in the context of fashion e-commerce and can be supported by AI techniques. Sénécal and Nantel (2004) found that exposure to recommendations resulted in increased frequency of recommended product selection, and Li *et al.* (2022) demonstrated that recommender systems can have an impact on purchase decisions, in part due to shifts in consideration sets. Hence, the current study is conducted on algorithmic personalisation and consumer decision making of online fashion retailing in the context of Bengaluru.

2. Review of Literature

Sénécal and Nantel (2004) identified that those consumers who saw the recommendations were more likely to choose the recommended products.

Häubl and Trifts (2000) also demonstrated the effectiveness of interactive decision aids to enhance decision quality and decision effort.

Pereira *et al.* (2022) also pointed out the importance of customer models and recommender systems in fashion e-commerce, leveraging AI. The algorithmic personalization is therefore a link between consumer information, recommendations, and online decision support.

2.1 Recommendation Systems and Consumer Choice

Recommendation systems can help minimize information search costs and help consumers locate appropriate products. Sénécal and Nantel (2004) found experimental evidence that recommendations impact on online product selection. Li *et al.* (2022) also concluded that the recommender systems affect purchasing decisions by altering consumers' consideration sets. This suggests that algorithmic personalisation can have an impact on decision-making without even buying the final product, as it can affect what people initially consider and assess.

Personalization is an important context in fashion retail because products are assessed by the customers based on various criteria such as style, colour, size, brand and price. Pereira *et al.* (2022) have determined that AI-driven customer models and recommender systems are crucial elements in the realm of fashion e-commerce. Jasim *et al.* (2026) and Lo *et al.* (2026) also conducted analyses on AI-enabled personalization and personalized recommendation systems for the online fashion shoppers. They examined perceived value, trust, complexity, recommendation quality and purchase intention in their studies. The insights reveal the increasing importance of personalization in the fashion industry.

2.2 Consumer Decision-Making in Online Fashion Retail

Consumer decision-making includes the processes of: recognizing alternatives, gathering information, comparing options, eliminating alternatives, and choosing products. For online environments, digital interfaces and digital recommendation systems can affect this process.

Decision aids have been shown to help with screening and comparison (Häubl and Trifts, 2000). Sénécal *et al.* (2005) found online shopping differences related to recommender use and Li *et al.* (2022) found recommender systems can impact purchase via consideration-set changes. Thus, consumer decision-making is not just the purchase itself but a process that goes beyond the purchase.

3. Objective of the Study

To understand the correlation between algorithmic personalization and consumer decision making in online fashion retail from consumer perspective in Bengaluru.

4. Research Methodology

This study is a conceptual research study using secondary research approach. It reviews the literature related to recommender systems, personalization, consumer decision making and AI fashion retail. The independent variable in this study is algorithmic personalization as measured by perceived relevance, recommendation accuracy, personalisation fit and perceived usefulness. Consumer decision making is the dependent factor which is represented by information evaluation, consideration of alternatives, purchase intention and purchase decision. The geographical region is Bengaluru and the targeted population for the future empirical validation is the online fashion consumers in the region. Future studies can be conducted using questionnaires, reliability analysis, correlation, regression or structural equation modelling (SEM) as quantitative techniques. The following methods are suggested for the future empirical testing but not presented as findings of the present conceptual study.

5. Identified Problem

Online fashion retailers offer consumers ever greater product mixes, which can make finding and assessing the right alternatives potentially difficult. This is the goal of recommender systems and algorithmic personalization, which aim to show the products based on information about the user's preferences and behaviour. Past studies have shown that recommendation systems have the potential to impact a consumer's choice and consideration set. The role algorithmic customization plays in consumer decision making, however, is not just the presence of algorithmic personalized recommendations. One customer might think a recommendation is relevant and helpful while another customer might think it is not accurate or helpful. Fashion research in recent years also shows that customers feel they can benefit and have concerns related to AI-powered personalization, such as value, complexity, trust, and perceived risk. Thus, the identified problem is to understand the conceptual relationship between algorithmic personalization and consumer decision-making process in internet-based fashion retail in the context of Bengaluru. Whether consumers buy recommended products is not just the problem; it is also apparent that algorithmically personalized information has the potential to affect how consumers identify, evaluate, compare and choose fashion alternatives.

6. Conceptual Framework for the Study

Independent Variable

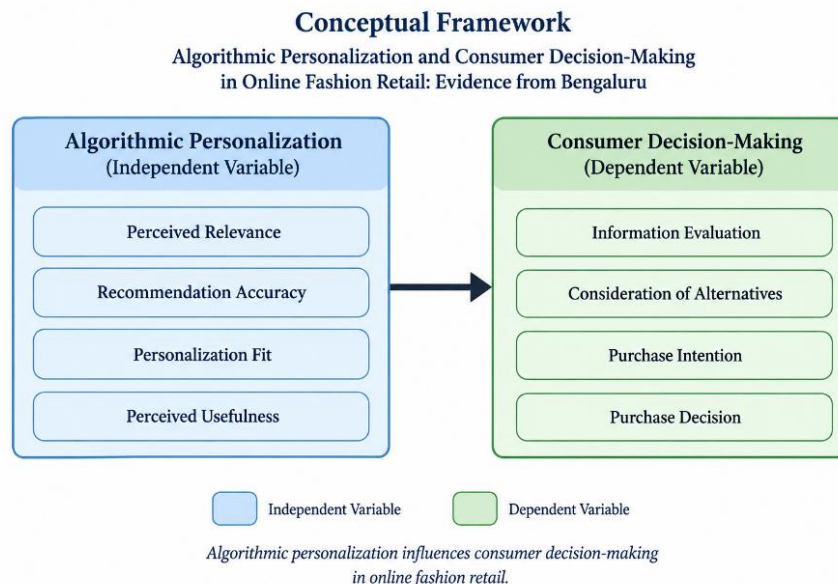
Algorithmic Personalization

- Perceived Relevance
- Recommendation Accuracy
- Personalization Fit
- Perceived Usefulness

Dependent Variable

Consumer Decision-Making

- Information Evaluation
- Consideration of Alternatives
- Purchase Intention
- Purchase Decision



Explanation of the Conceptual Framework

The conceptual framework suggests that algorithmic personalisation is the independent variable affecting consumer behaviour as the dependent variable. It is not meant to imply that all the algorithm generated suggestions are purchases. Rather, it sees personalization as a mechanism that provides information and decisions support for the consumers to find the products they think they prefer. Perceived relevance is defined as how consumers see the recommended products relate to their needs or preferences. Recommendation accuracy refers to the belief that the recommendations accurately reflect the consumer's judgment of what is appropriate for him or her. Personalisation fit describes the sense that the recommendation matches the consumer's personal taste or shopping needs. Perceived usefulness is how useful the personalized recommendations are perceived to be to the shopping task. These dimensions are all about what

the consumer thinks of algorithmic personalisation, and not just the technical quality of the algorithm according to the platform itself. This is significant because it may be technically well-constructed but a recommendation system does not guarantee that a consumer will find its recommendations useful or relevant. Consumer decision making is the dependent construct, which is the consumer's process of handling with the fashion alternatives. Information evaluation and consideration of alternatives are thus important parts of the process before purchase intention and purchase decision are addressed. This notion is in line with studies that found that online recommendation systems and decision aids can affect consideration sets and buying behaviour. The framework then moves beyond mere recommendations to purchases to a more comprehensive “personalized information → consider alternatives → decision-making”.

7. Research Discussion

This literature offers conceptual foundations to study algorithmic personalisation as a factor in consumer decision-making. The relationship between recommendations and online choice: Sénécal and Nantel (2004) have examined this relationship in their research, which was conducted with consumers consulting recommendations and their selection of the recommended products. Häubl and Trifts (2000) demonstrated that interactive decision aids can affect consumer search, screening and evaluation of alternatives. Additionally, Li *et al.* (2022) showed that recommender systems can also influence the purchases by altering the consideration sets of the consumers, which means that the impact of recommender systems can happen before the actual purchase. Pereira *et al.* (2022) emphasized the importance of new fashion customer models and recommender systems based on AI in fashion e-commerce. AI-driven fashion personalization also takes into account perceived value, trust, complexity, and perceived risk, as demonstrated by recent research. Based on this, the concept of algorithmic personalization in this study is considered as a decision support system to affect overall evaluation and selection of online fashion alternatives. These proposed relationships need to be validated among consumers of Bengaluru.

8. Future Scope of the Study

The proposed framework can be tested with the primary survey data of online fashion consumers of Bengaluru in future research. A questionnaire based on an algorithmic framework, which captures the dimensions of algorithmic personalization and customer decision making, could be used to statistically investigate the relationships between them. Further research might also consider the mediating factors of trust, perceived value, perceived usefulness, and perceived relevance to explore how personalization influences consumer decisions. Based on recent research on fashion personalization, the perceived value, perceived risk, trust and shopping experience are areas to be considered when analysing consumer reactions to AI personalization. Comparative analysis could be conducted to assess if the correlation varies among age groups,

gender, how often they shop for fashion online, income brackets, or how much they know about the AI-generated recommendations. Studies across cities could then be carried out and compared with other major cities in India. Future studies could also explore how personalization works at the limits of its acceptance, such as privacy concerns, perceived surveillance, algorithmic transparency, the decline of interest in the recommendation and consumers' expectations for control over the recommendations they receive. Previous studies have already found that personalization can be related with positive and negative perceptions at the same time (i.e. positive and surveillance/privacy violation perceptions). Lastly, longitudinal or experimental studies could be conducted to investigate if personalized recommendations impact not only purchasing behaviour, but satisfaction after the purchase, return of the product, and platform engagement.

Conclusion

The significance of algorithmic personalisation in online clothes retail lies within its potential to customise product information and suggestions to particular customers by way of recommender systems. Previous studies demonstrate that recommendations have an impact on product choice, consideration sets, information search, and purchasing behaviour. This concept paper aims to discuss a possible relationship between algorithmic personalization and consumer decision making in the context of online fashion retail business in Bengaluru. Perceived relevance, recommendation accuracy, personalization fit and perceived usefulness are the algorithmic personalization elements, while information evaluation, alternative consideration, purchase intention and purchase decision are the consumer decision making elements. The framework signifies that personalization is actually part of the information environment that influences the fashion product evaluation and selection of online fashion consumers in Bengaluru, and calls for empirical testing of the same.

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GENDER MAINSTREAMING IN AGRICULTURAL PRODUCTION AND DEVELOPMENT: APPROACHES, CHALLENGES AND POLICY RESPONSES IN INDIA

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Abstract

Agriculture remains as one of the most important and largest sources of income across the globe. At most times, agriculture is deemed to be considered as a profession only for males due to what the existing female farmers are tend to face various barriers including unequal access to land, credit, inputs, training and decision-making power. Thus, gender mainstreaming in agriculture is essential. The present chapter illustrates that how gender mainstreaming could help in fulfilling gender equity in agricultural production and development. It follows on discussions on why gender mainstreaming matters for building fairer societies, enabling effective development, and sustaining project outcomes. The chapter also reviews some of the major Indian agricultural policies and schemes that has incorporated gender-sensitive considerations and reserve allocations for women community. Combating gender stigma related to women in agricultural sector is thus important so that women have an equal participation for achieving a gender-fair society.

Keywords: Gender Mainstreaming, Women Farmers, Gender Equality, Rural Development, Agricultural Policy

1. Introduction

Gender refers to the socially crafted qualities, roles, and responsibilities assigned to men, women, girls, and boys (World Health Organization, 2026). Gender is a socially constructed concept that defines expected behaviours and roles for men and women, influenced by cultural, economic, and political factors (Wagle *et al.*, 2020). Unlike biological sex, gender is not fixed for any individual, rather it is learned and it differs from culture to culture and is subject to change. A gender perspective, is a way of looking at gender issues, demands, and impacts that result from the power dynamics and different social roles that men and women play in many areas of society, including institutions, programs, laws, and organizations. Adopting such a perspective is essential in developing of initiatives to extend fair advantages to women, girls, and all other marginalized groups, irrespective of gender. Gender mainstreaming is the strategy through which gender perspective is institutionalized. It has been embraced internationally as the

principal route towards gender equality. To promote equality between men and women and combat prejudice, it entails integrating a gender viewpoint into the planning, designing, implementing, monitoring, and evaluating of policies, regulatory measures, and expenditure programs. Gender mainstreaming emphasizes the importance of equal participation of both genders in decision-making processes, which is crucial for achieving true equality and it advocates for the recognition of women's rights as human rights, promoting their visibility and empowerment in all societal spheres (Dhuli *et al.*, 2023). Gender mainstreaming was adopted as a major strategy for promoting gender equality at the Fourth World Conference of Women in 1995. It called for mainstreaming in all Critical Areas of Concern at the conference which included poverty, human rights, economy, violence against women and armed conflict (UN Women, n.d.).

The United Nations Economic and Social Council's definition of gender mainstreaming is the most frequently recognized and utilized term: “Mainstreaming a gender perspective is the process of assessing the implications for women and men of any planned action, including legislation, policies, or programmes, in all areas and at all levels. It is a strategy for making women’s as well as men’s concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programs in all political, economic, and societal spheres so that women and men benefit equally and inequality is not perpetuated. The ultimate goal is to achieve gender equality” (UN ECOSOC, 1997). Gender equality is incorporated into central or local policies, national public and commercial organizations, services, and sectoral programs through the process of gender mainstreaming. Over time, it seeks to change laws, cultural norms, and community behaviours that discriminate against women, such as those that restrict their access to public spaces or their property rights.

2. Gender Mainstreaming in Agriculture

Within agriculture, gender mainstreaming is the process of ensuring that the issues and experiences of both men and women are treated as a vital component of the development, implementation, regulation, and evaluation of agricultural policies and programs. Gender equality, or the equal rights, responsibilities, and opportunities of men and women in all spheres of life, including the agricultural industry, is the ultimate aim of gender mainstreaming in agriculture. Globally, women contribute substantially to agricultural production, yet they are usually targeted as victims of prejudice and have less access to opportunities as compared to males. Women have less access to land and credit, which restricts their ability to invest in productive activities (Agarwal, 2015). As a consequence, the women farmers have often lesser income and productivity which has a corresponding effect on their families and communities in having weaker food security. Kawarazuka *et al.* (2022) found that restrictive gender norms and domestic responsibilities limit women's mobility and agency, further constraining their

agricultural roles. Muchiri *et al.* (2025) highlighted that empowering women can enhance community resilience and food stability, as they are pivotal in food production and management. By guaranteeing that women have equal access to resources, opportunities, and decision-making, gender mainstreaming in agriculture can aid in addressing these issues with improvement in women's working circumstances.

2.1 Importance of Gender Mainstreaming in Agricultural Sector

➤ Gender mainstreaming can contribute in creating an equitable society

Every individual in a society has an inherent right to economic and social participation and the benefits of development, regardless of gender, ethnicity, or social status. However, many rural women still experience discrimination, and are at disadvantaged in their community and society due to their gender, and are unable to realize their full potential. In agriculture, gender mainstreaming is thus essential in building a society where both men and women can claim their rights, realize their potential, and live with dignity. Empowering women in agriculture can lead to sustainable development and food security, as their contributions are recognized and valued (Fretel-Carrera *et al.*, 2025).

➤ Gender mainstreaming can enhance the effectiveness of development

Successful development in agriculture as well as of the community depends on an environment in which women can participate securely and fully in active social roles. Despite their contributions, women often lack decision-making power and face gender discrimination in land ownership and access to credit (Sharma *et al.*, 2020). The agricultural output of developing nation uplifts when the women are freed from disproportionate burdens and are able to make use of their expertise and experience, take part in the decision-making process, and employ productive inputs on equal terms with men. From this vision, the gains of the women extend beyond the farm with a rise of women's earnings that could facilitate their involvement in domestic economic decisions enhancing family welfare more broadly, including food security, healthcare, and children's education. Paroda (2018) also found that in India, women contribute 55-66% of total agricultural labor, playing vital roles in food production and household nutrition.

➤ Gender mainstreaming can improve sustainable project outcomes

With the advancement of technologies there comes the question of sustainability. Even where the new technologies and processes have been introduced successfully, their long-term sustainability cannot be assumed if they are unable to meet women's needs or if they increase the burden of women's workload. Therefore, to enhance the sustainability of a project outcome, it requires an explicit understanding of gender roles and needs, incorporated into project design through gender perspective lens from the outset.

3. Approaches to Gender Mainstreaming in Agricultural Production and Development

Gender mainstreaming in agricultural production and agricultural development is the process of ensuring that the issues and experiences that affect both men and women are considered while designing, implementing, monitoring, and evaluation of policies and programs related to agriculture. This implies that every facet of agricultural production and agricultural development, including land ownership, input accessibility, financing, markets, infrastructure, research and extension should be planned and executed with consideration for the unique requirements and circumstances of men and women. It seeks to address gender inequities and empower women in this industry, acknowledging that both men and women are vital participants in the agricultural process. Women in Nigeria constitute an active and reserve labour force in acknowledgment of the role they play in the agricultural sector, but they are rarely the owners of the means of production (Rahman, 2008). According to Shamsodini *et al.* (2011), practically all tasks such as hoeing, weeding, harvesting, transporting, storing, processing, marketing, and household chores are performed almost exclusively by women. This enhances their capacity to contribute to the food security of the household and gives them additional opportunities to earn income. Abali *et al.* (2014) stated that the significance of gender mainstreaming lies in its ability to assess the effects of gender disparities on the accomplishment of all planned agricultural programs and ensuring their consideration in all facets of project or program design, implementation, monitoring, and evaluation.

In agricultural practice, gender mainstreaming is crucial since it may help in:

- Expanding the possibilities and resources available to women, including markets, loans, land, inputs, and training;
- Lessen the workload for women and enhance their working environment;
- Reinforce women's participation in decision-making process at all levels of the agricultural sector;
- Improve food security and overall agricultural output; and
- Boost the welfare of women, their families, and their communities.

3.1 Core Strategies

Gender mainstreaming may take several forms in the agricultural production and development. Some key strategies include:

- **Collecting sex-disaggregated data:** This is essential to comprehend the distinct responsibilities of men and women in agriculture, along with the different obstacles each group encounter. Mishra (2022) also found that collecting sex-disaggregated data is important for identifying gender-specific roles and contributions in agriculture.
- **Conducting gender analysis:** This involves figuring out and assessing how gender differs in agriculture in terms of access to opportunities, resources, and constraints. Through this,

it identifies barriers to women's participation and control over agricultural resources (Ayele and Gebretsadik, 2024).

- **Designing and implementing gender-responsive agricultural policies and programs:** This involves ensuring that the differing needs and experiences of men and women are met and taken into consideration in all agricultural policies and initiatives. Gender-sensitive initiatives can lead to improved food security and sustainable practices and it requires collaboration across sectors to ensure equitable access to resources (Jamal, 2023).
- **Building the capacity of stakeholders:** This involves implementing gender mainstreaming in agricultural production and development through government officials, extension agents, and farmers themselves. Engaging farmers in gender mainstreaming efforts fosters inclusive agricultural development (Ayele and Gebretsadik, 2024).

3.2 Illustrative Interventions

Following are some specific interventions of gender mainstreaming in agriculture development and production:

- **Providing women farmers with access to land and credit:** Women's capacity to farm and produce food may be hampered by their frequent lack of access to land and financing compared to males. By giving women access to these resources, gender mainstreaming can assist in addressing this issue.
- **Providing women farmers with training and support:** Training and assistance about better farming methods are frequently unavailable to women farmers. Gender mainstreaming can aid in addressing this challenge by giving women access to these resources.
- **Supporting women farmers' cooperatives and other organizations:** Women can have access to resources and assistance, as well as have their views amplified, through women farmers' cooperatives and other groups. Supporting these groups can be facilitated by gender mainstreaming.
- **Investing in agricultural infrastructure and services that benefit women farmers:** Accessing agricultural infrastructure and services, including childcare and transportation, can be difficult for women farmers. Gender mainstreaming can assist in addressing this issue by funding services and infrastructure for agriculture that are beneficial to female farmers.
- **Promoting women's participation in agricultural decision-making:** In decision-making, women are frequently underrepresented in the agricultural sector at all levels. Women's involvement in decision-making may be encouraged via gender mainstreaming.

4. Barriers to Gender Mainstreaming in Agriculture

The strategies and interventions that has been discussed above operate against a set of structural barriers. Recognising these barriers is itself is a part of gender mainstreaming.

- **Land tenure and inheritance customs:** In most of the rural India and across the developing agrarian societies, males of the families tend to inherit the farm land and register themselves. As the access to formal agricultural credit, insurance and government schemes is frequently tied to land title, women who actually cultivate the land do not legally own it and remain invisible to the institutions. Motwani (2024) found that in rural India, women frequently do not inherit land, leading to a lack of formal recognition as farmers. Even when women do own land, they often face inequities such as smaller, lower-quality holdings, which do not translate into economic empowerment (Jain *et al.*, 2023).
- **Unequal access to extension services and technology:** Generally, extension workers are engaged with the head of the household which is usually assumed to be male. For that, new techniques, mechanised equipment and inputs often reach women farmers later. This gender bias in agricultural support systems reinforces existing inequalities and hinders women's productivity and economic independence (Namubiru-Mwaura, 2014).
- **Unpaid care work and time poverty:** Domestic care responsibilities fall disproportionately on women including cooking, childcare, etc, which further competes directly with the time needed to attend trainings, travel to markets and participate in cooperative meetings. Parkes (2021) found that time poverty restricts women's ability to engage in economic activities, such as attending training or participating in cooperatives
- **Social stigma and harassment:** When women involve themselves in roles which are traditionally reserved for men including operating machinery, managing hired labour, and negotiating directly with buyers, may face social disapproval. This is supported by the findings of Lara and Flores-González (2024) which highlighted that social disapproval could discourage the participation of women in these areas. Further in some cases even harassment that acts as an informal but powerful deterrent independent of any formal policy barrier.
- **Allocation-implementation gaps:** Fund earmarking as seen in the National Policy on Farmers and the National Horticulture Mission sets a floor for women's inclusion, but earmarked funds are not always fully tracked or utilised and without gender-disaggregated monitoring data at the point of implementation, it becomes difficult to establish whether the allocated resources actually reach women farmers on the ground.
- **Gender discrimination in the recognition of women as farmers:** Despite women's primary involvement in agricultural activities, their identity as 'farmers' is frequently left unrecognized. For this, it limits their visibility to extension functionaries and reduces their

access to schemes related to agriculture. A study by Bharadwaj and Bora (2025) found that awareness of government schemes related to agriculture was uneven among the rural women of Assam. These reflects the weaker institutional visibility of women as farmers, whereby the scheme outreach continues to be structured around the household rather than reaching the women cultivators directly.

5. Agricultural Policies and Programs in India Concerning Gender Mainstreaming

The Government of India has taken different initiatives in formulation of agricultural policies and programs concerning gender mainstreaming to empower women. Some of the examples of gender mainstreaming in Indian agricultural policies are:

❖ The National Policy on Farmers, 2007

It has included “mainstreaming the human and gender dimensions in all farm policies and programmes” as one of the major policy goals. Thereby, the Department of Agriculture, Cooperation and Farmers Welfare (DAandFW), Ministry of Agriculture and Farmers Welfare, is promoting gender mainstreaming initiatives by strengthening their capacities and enhancing their access to inputs, technologies, and other farming resources. Mainstreaming of gender concerns is being addressed by

- (i) earmarking 30% of funds for women under various major schemes/programmes and development interventions;
- (ii) taking pro-women initiatives to help women derive the benefits of beneficiary-oriented components of various programmes/ schemes and missions.

❖ Mahila Kisan Sashaktikaran Pariyojana (MKSP)

Mahila Kisan Sashaktikaran Pariyojana is a sub-component of Deendayal Antyodaya Yojana – National Rural Livelihoods Mission (DAY-NRLM) implemented under the Ministry of Rural Development with the goal of empowering women by making systematic investments to increase their involvement in agriculture-based livelihoods. The State Rural Livelihoods Missions, acting as Project Implementing Agencies, are responsible for implementing this demand-driven program in project mode.

❖ The National Mission for Sustainable Agriculture (NMSA)

To encourage sustainable agriculture in India, the government runs the National Mission for Sustainable Agriculture, another flagship government program. The Paramparagat Krishi Vikas Yojana (PKVY) and the Sub-Mission on Agricultural Extension (SMAE) are two of the NMSA's components that are specially designed with women farmers in consideration.

❖ Kisan Credit Card (KCC) Scheme

The Kisan Credit Card Scheme was launched in 1998 with the intention of giving farmers timely and sufficient finance for their farming activities. The scheme encourages women farmers to

engage in agricultural operations by giving them equal access to credit and financial services as males.

❖ **National Horticulture Mission (NHM)**

The National Horticulture Mission (NHM) is an Indian horticulture scheme promoted by the Government of India which was launched under the 10th five-year plan in the year 2005-06. It includes components that address gender-related issues in horticulture. It promotes the active participation of women in horticultural activities and provides support for their skill development. Through this scheme it tries to provide for a pro-women allocation of at least 30%.

❖ **Sub-Mission on Agricultural Mechanization (SMAM)**

Sub-Mission on Agricultural Mechanization aims to promote mechanization in agriculture to reduce drudgery and improve productivity. It conducts training programmes on gender friendly equipment for women farmers. Under this mission, beneficiary is provided and at least 30% allocation of the fund is to be made for women farmers.

❖ **National Mission on Oilseeds and Oil Palm (NMOOP)**

National Mission on Oilseeds and Oil Palm is a scheme by the Indian government to boost the nation's output of edible oils. By giving access to resources, financial assistance, and training, the project aims to empower women in agriculture. Under this scheme, women are receiving training in a variety of oilseed and oil palm farming topics, including as seed selection, planting methods, managing pests and diseases, and harvesting. Additionally, they are receiving financial support to buy inputs like herbicides, fertilizers, and seeds.

6. From Policy to Practice: A Case Study from Jorhat, Assam, India

The policy provisions take on their full meaning only when set against the lived experience of the women they are meant to serve. Like much of the parts of rural India, in Jorhat, Assam as well, agriculture is a profession that has been long regarded as a sector dominated by males, with the increasing number of male farmers achieving self-sufficiency through new agricultural activities far outstripping that of women. Against this backdrop, the story of Nabaneeta Das of Jorhat, renowned as '*Pothar Konya*' (daughter of the field), illustrates both the possibilities that gender-responsive agricultural development can bring up and the social costs that women who claim them may still have to bear. Before turning herself into agriculture sector, Nabaneeta Das worked as a nurse. The year 2010 became her turning point due to the unattended family's fields, she left her government job to take up farming as a full-time profession. Without receiving any formal vocational training on farming, she self-taught the skills required in agriculture including trade, planting varieties of paddy and vegetables, and build a self-reliant organic farm that today extends into poultry, broiler rearing and fisheries. She has also taken on some tasks that are conventionally reserved for men like operating tractors and ploughing her own fields. The path she had taken was not easy and was with various resistance. In the beginning years, Nabaneeta

faced criticism for taking up a work reserved for men. Even in her own household, her family pressurized her to abandon farming, but due to her genuine interest in farming, she led on the profession. This marks as a reminder that although India's social attitudes toward working women shifted considerably, the incidence of physical and mental harassment they face remains high. Her perseverance was ultimately recognised at the national level. The Government of India has awarded her the title of 'Best Women Farmer of the Country' and also nominated her to teach new agricultural systems in Vietnam in recognition of her achievements.

The story of Nabaneeta Das in broader sense captures what gender mainstreaming in agriculture is meant to achieve, and how both men and women can succeed in agriculture and in doing so strengthen the social and economic factors of their communities. Her example is now cited as an inspiration for other women out there in her community who are considering agriculture as an independent livelihood.

Conclusion

Gender mainstreaming in agriculture has moved from an international policy commitment to a working feature of agricultural governance in India, visible in fund earmarking, mission-mode programmes and scheme design across many agricultural-related policies and programmes. Collectively, these could serve as a way of expanding farming women's access to land, credit, training, and decision-making, and in doing so it can also address the disparities in terms of income, productivity, and food security that unequal access has historically produced. Though there are many policies, these alone cannot dissolve the social norms existing in the society that continue to cast agriculture as men's work, and the harassment the women face who cross that boundary may still encounter. Realising the full potential of gender mainstreaming in agriculture will depend upon the sustained investment in sex-disaggregated data, gender analysis, and stakeholder capacity-building, paired with the kind of community-level recognition that allows individual women farmers to become visible models for others.

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ARTIFICIAL INTELLIGENCE IN INDIAN COURTROOMS FOR SOCIAL JUSTICE: PROSPECTS AND CHALLENGES

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Abstract

Indian Judiciary stands out as a prominent pillar inculcating constitutional democracy aiming to safeguard fundamental rights of the citizens and consistently serving the nation with a well-defined rule of law. The nation has been facing rise in social and economic challenges, one of the major reasons for long pending civil and criminal cases together with continuing judge vacancies in all the layers of the judiciary. As an initiative to address some of the routine laborious administrative tasks, and courtroom workflows, the judicial administration system have been automated to a certain extent and notably judicial research platform SUPACE is enabled in the Supreme Court.

The swift implementation of Artificial Intelligence (AI) in several facets of Judiciary in developed countries including US and Europe renovates the justice system by progressively reshaping investigation, crime exposure, evidence examination, and judicial pronouncements. In India, the pervading nature of AI enabled technologies namely facial recognition, digital forensics, automated document analysis, algorithmic tools offer notable opportunities for improving the efficacy and receptiveness of the judiciary. National Judicial Data Grid is a significant milestone towards solving pendency issues. Around 83 percent of the cases are criminal litigations ageing more than 10 years and forming 9 per cent of the cases pending till date (e-Committee, Supreme Court of India, n.d.). Simultaneously, AI application in criminal proceedings does not address crucial features including evidentiary dependability, procedural fairness, confidentiality, accountability and transparency, and the constitutional rights of accused individuals. With this background, this study examines the rise of AI in Indian Judiciary, evolving associations among AI, crimes, evidence, conviction and the performance of the Judiciary system and challenges ahead.

Keywords: Artificial Intelligence, Judiciary, Rule of Law, Social Justice, Constitutional Rights.

Introduction

Around 54 million cases were pending across all the three level of judiciary namely, district and subordinate courts, High Courts and the Supreme Court, till the end of 2025 (Bokil, 2026). A noticeable change in the litigation behavior over years is seen, and increasing litigants approach

the Supreme Court every year compared to the previous year Arulmozhiselvi (2025). There is an increase in the pendency of cases in Supreme Court despite of the highest number of disposals, as of May 2026 (Vora, 2026).

In the present era of digitalisation and digitisation, AI has proven to be of increasing potential in enhancing the efficiency and effectiveness of the judicial system (Soni *et al.*, 2025). The Council of Europe's European Commission for the Efficiency of Justice (CEPEJ) recognized 125 AI-related tools intended at improving judicial efficiency and accessibility, using machine learning, natural language processing and generative AI (European Commission for the Efficiency of Justice, 2025). A global survey finding released by UNESCO indicated that 44 per cent of the judicial operators in 96 countries have been using AI tools for work related tasks and just 9 per cent obtained training in AI. The UNESCO's 2025 guidelines for the Use of AI Systems in Courts and Tribunals emphasise for accountability, transparency, protection of human rights (UNESCO,2025).

Artificial Intelligence (AI) comprises of computer systems enabled to perform tasks which require human intelligence to the extent of tackling complex problems involving human logic and reasoning. The training algorithm in AI learns from the data fed in, using which it predicts and makes decisions. Joshi (2022) stated that Algorithmic Decision Making (ADM) is a milestone in the application of AI in Indian legal system, as it is just data based, containing no human emotion. As digital technologies enormously involve in data generation, organising such data and using them in large scale is possible now, which never happened before. Such a datafication make deployment of AI in legal and judicial system highly promising.

Objective of the Study

The study attempts to outline the extent of AI adoption in judicial system worldwide, and with special reference to India, focusing on Indian Rule of Law, and also to examine its prospects and challenges for the equitable administration of justice.

AI and Judicial System

The integration of AI into the legal systems is being active ongoing process across the globe, primarily making it assistive and to reduce time involved in legal research, automate administration tasks, and to facilitate citizen's accessibility to court services. The major role is seen in document processing and court administration. The routine tasks namely e-filings, scanning of petitions for procedural lapse, scheduling of hearings are the predominant areas where machine learning models are used. Automated Speed Recognition software is used to generate transcription of oral arguments and Natural Language Processing (NLP) models are used for translation of complex judgement into various languages. While AI-Legal suites are used in developed countries in every stage of litigation and judicial proceedings, it offers great advantages in analysing earlier case precedents, summarising past judgements and cross-

referencing statutory amendments. Due to the inherent nature of AI exhibiting hallucination and citing non-existent case laws, it is lawfully barred from determining innocence or guilt, evaluating credibility of the witness, passing sentences and rulings.

AI and Indian Judicial System

Though AI is in the beginning stage of development and deployment, it has limited applications in Indian judicial system, rendering its capabilities to majorly court office automation, rather than to courtroom for rendering justice. In the Supreme Court, AI and Machine Learning (ML) based Supreme Court Vidhik Anuvaad Software (SUVAS) is used for translating judgements into various Indian languages. AI assisted module, Supreme Court Portal Assistance in Court Efficiency (SUPACE) has been developed as a prototype for identifying cases and searching of precedents. AI is tried for implementation to enhance translation, transcription, processing of documents, and case administration. Therefore, the role of AI is assistive and not substitutive, in order to minimize procedural delays, manage enormous amount of information and to handle complex workloads.

In the context of increasing pendency of cases in all courts across India, long processing duration is observed due to procedural formalities (Agarwal & Behera, 2024). AI based software including optical character recognition (OCR) can quickly search voluminous databases of judgements, pick up pertinent precedent, mine significant information from documents and encapsulate lengthy case materials. This saves time for the stakeholders including judges, and lawyers in the legal ecosystem and hence interpretation and application of law alone remains with judiciary for rendering justice in relatively lesser time. Some of the recent initiatives undertaken are in speech related functionality, in pilot phase of AI implementation called SHRUTI and PANNINI for translation in assisting judges in judgement dictation.

However efficient the AI is, its applicability is restricted to the principles of constitutional democracy.

Rule of Law and AI

The fundamental guiding legal principle namely the rule of law is the fundamental feature of Indian Constitution and the country is administrated by law and not by any other authority. The judicial pronouncements in *Kesavananda Bharathi vs. State of Kerala*, *Indira Gandhi vs. Raj Narain*, *ADM Jabalpur vs. Shivkant Shukla*, and *Maneka Gandhi vs. Union of India* upheld the doctrine of 'Rule of law' referring to Articles 14, 19 and 21. The rule of law is a comprehensive system of all laws, institutions, standards, transparent governance, accessible and impartial justice.

The digital technologies may impact Rule of Law certainly and also deleteriously. Though AI can augment the efficacy of legal system, offer effective and faster justice, it may be harmful

injuring human rights, declining accountability and responsibility, and increase subjectiveness and discrimination.

Prospects of AI in Judicial System

The digitised data can be shared, stored and used in multiple locations. This requires data ownership and data usage by respective individuals based on intellectual property and other applicable rights. AI has high potential in making legal research faster, document and case information management efficient, access to legal information and justice better, coupled with pattern identification in pendency and case duration. Suitably designed AI-Legal and Justice system may help to reach out to relevant precedents and applicable legal provisions supporting judicial reasoning. The integration of AI with policing and law enforcement, predictive policing, surveillance and investigation, FIR filing, crime tracking are prospective areas for timely justice to the litigants and common public (Ministry of Law and Justice,2025).

Though prospects are of great help in reducing pendency, the full-fledged applicability AI in legal context raises many questions and challenges.

Challenges of AI in Judicial System

If the data is found to be innately subjective and unfair, then the algorithms trained using this data might produce outputs reflecting the same subjectiveness. This is a challenge especially, in criminal justice system, as it may affect the fundamental rights. If a skewed data showing a particular category of people related to crimes and punishments, then the algorithm taking this data may repeat it in its future outcomes including recommendations. As complex algorithms are involved, it may be difficulty for law interpreters and enforcers to understand the reasoning. This challenge together with inadequately secured AI systems may create risks of misuse, misinterpretation and leakage of crucial information.

The notable risks in legal research include fake case citations and improper legal facts generated in GenAI. A human versification is essential before any such material is placed before the court. Adverse outcomes due to incorrect information generated, may lead to problems in uncovering responsibilities and accountability. The most significant shortcoming is not all the court staff, lawyers, judges, and litigants have access to AI knowledge and infrastructure. A procedural challenge may be in place if affected individuals are not explained or provided an understandable basis for the outcome in cases relating to bail, sentences, criminal liabilities and fundamental rights. A high probability exists in AI failing to account subtle factual or constitutional concerns which may require human judgement. Cybersecurity risks may incur higher costs to individuals and the nation.

Conclusion

AI has become an emerging technological tool in transforming judicial systems all over the world. In India, recent initiatives including e-Courts programme depict a gradual transition

towards a tech oriented judicial framework. However, several challenges from social, legal, environmental, ethical and institutional perspectives need to be considered in integrating AI in to the judicial system, with intuitive thoughts on predictive analysis and risk assessments. A careful initiative is required to inculcate quality controls including check lists and critical criteria for usage of data. Data governance must be in place as major resource by framing suitable principles and policies, approaches and strategies, rights and responsibilities and a set of institutional networking based the environment, type and worth of data. AI literacy and training must be provided to the stakeholder of the legal and judicial system, who are entrusted with a responsibility to render justice to a common man. The confidentiality of the judicial records and personal information must be protected by instituting a safe and strong data protection, and cyber security mechanism.

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