Reimagining Consumers in the Era of Industry 5.0: Assessing Readiness and Trust in India's Digital Transformation

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ABSTRACT

Industry 5.0 reflects a human-centric evolution of digital transformation, integrating advanced technologies with human intelligence to create more adaptive and personalised systems. This study examines the relationships among consumer awareness, technological readiness, perception of human–machine collaboration, and future readiness within India's emerging digital ecosystem. A quantitative survey of 265 respondents was conducted using a structured online questionnaire. Reliability coefficients ranged from 0.75 to 0.93, confirming strong internal consistency across all constructs. General Linear Model (GLM) and mediation analysis revealed that both awareness and readiness significantly influence perceptions of human–machine collaboration. Perception strongly predicts future readiness and mediates the impact of both awareness and readiness on long-term digital trust. However, awareness alone did not directly influence future readiness, indicating the importance of experiential and perception-driven factors. The findings highlight the need for digital literacy initiatives, transparent AI communication, and human-centric interface design to improve consumer acceptance of Industry 5.0 technologies....

Keywords: Industry 5.0, Consumer Readiness, Digital Transformation, Human–Machine Collaboration, Digital Trust..
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2-INTRODUCTION:

2.1 Background

Industry 5.0 marks a shift from the automation-heavy focus of Industry 4.0 toward a more human-centric, personalised, and sustainable technological landscape. Unlike the earlier phase, Industry 5.0 prioritises meaningful collaboration between people and intelligent systems — such as AI, robotics, and IoT — to boost productivity while still respecting human values, judgement, and creativity.

In India, rapid digital growth has transformed commerce, governance, and everyday consumer interactions. Reports by Deloitte (2024) and MeitY (2023) note major advances in digital infrastructure but also highlight gaps in how prepared consumers are to adapt. Understanding consumer readiness and their views on emerging technologies is therefore essential for shaping a human-centred digital future.

This study examines how awareness, readiness, and perception influence future digital trust as consumers navigate AI-enabled ecosystems.

2.2 Tracing the Path of Industrial Evolution toward Industry 5.0

Industry 1.0 introduced mechanisation through steam power, shifting work from manual labour to machine assistance. Industry 2.0 advanced mass production through electricity and assembly lines. Industry 3.0 utilised electronics and IT to automate manufacturing processes. Industry 4.0 revolutionised digital connectivity using IoT, AI, cloud computing, and cyber-physical systems.

Industry 5.0 builds upon these digital foundations but re-centres the human being — prioritising empathy, creativity, personalisation, and sustainable technological harmony.

The journey can be explained through the five industrial revolutions, as presented in Table 1.

Industrial Phase	Period	Core Focus	Key Technologies
Industry 1.0	18th–19th Century	Mechanization	Steam engines, water power
Industry 2.0	Late 19th–20th Century	Mass production	Electricity, assembly lines

Indus try 3.0	Late 20th Centur y	Automati on	Electronics, computers
Indus try 4.0	Early 21st Centur y	Digitaliza tion	IoT, AI, Big Data, Cloud computing
Indus try 5.0	Emerg ing (prese nt– future)	Human– machine collabora tion	AI, Robotics, Quantum computing, Human intelligence integration

Table 1: Industrial Evolution from Industry 1.0 to Industry 5.0

3. Review of Literature

Recent discussions on Industry 5.0 increasingly emphasise that technology and human abilities must grow together, rather than separately. Hermawati (2025) describes this shift through the idea of "human-centricity," where efficient digital systems must be balanced with the need to strengthen human skills. Her work moves beyond the usual focus on machines and infrastructure by stressing that people also need to be emotionally and mentally prepared to work with advanced technologies—an aspect many earlier studies ignored.

A broader view of current research comes from Rejeb et al. (2025), who conducted a large bibliometric study on Industry 5.0 publications. Their findings show a rising interest in human–machine collaboration, sustainability, and personalised digital environments. Yet, they also note that while companies are rapidly adopting automation and smart systems, very little research examines how prepared consumers actually are to use these innovations. This reveals an important gap in the literature: the consumer perspective is still underexplored.

However, there are also studies that point towards the role of trust in the adoption of human–machine systems. According to Adel (2023), in smart city environments, users are likely to accept novel technologies if they feel that they are in control, their privacy is valued, and the system allows them to personalize the services. The study indicates that the level of adoption of the system will depend not only on its efficiency but also on the level of security and comfort derived from the interaction.

The readiness of consumers has also been explored in the context of digital transformation in the paper by Paul et al. (2024). In their work, they see the process of digital transformation as a multi-layered approach. They valorise the point that the technological platform itself may not be the only factor guaranteeing the adoption of the transformation because the psychological needs of individuals must also be taken care of through various digital literacy initiatives.

Likewise, Bakator (2024) extends the concept of Industry 5.0 to the marketing field through the concept of 'Marketing 5.0'. The author suggests that AI-based marketing software can be truly effective only when the software creates trust and emotional bonding with the users—that was the shortcoming of the previous marketing automation. This reflects the growing role of the harmony of humans and machines in consumer engagement platforms.

Global insights also show the complexity of this shift. PwC (2023) reports that nearly 40% of consumers worldwide remain unsure about how automated systems handle their data, signalling a major trust issue. Meanwhile, Statista (2025) notes that smartphone penetration in India has reached about 74%. Although this shows strong digital access, it also reveals a contradiction: the infrastructure exists, but many users still feel unprepared or hesitant about deeper digital engagement, especially in AI-driven contexts.

Taken together, these studies suggest that while the technological base for Industry 5.0 is strong, the real challenge lies in how consumers understand, accept, and emotionally relate to these systems. Awareness, trust, and digital empathy emerge as crucial factors in shaping engagement with human–machine collaboration. This means consumer readiness is not just about technical skills but also about psychological comfort and personal experience. These insights highlight the need to combine consumer-level evidence with broader digital transformation trends to bridge the gap between rapid technological progress and human adaptability.

4. Research Gap

Although Industry 5.0 is widely discussed, most studies still emphasize technology, automation, and organizational adoption, with limited attention to how everyday consumers perceive and adapt to these changes. Existing literature often treats digital readiness as a purely technical issue, overlooking the emotional, psychological, and trust-related factors that shape acceptance of human-aligned technologies. While secondary reports showcase rapid digital growth, they reveal little about how individuals actually experience or respond to this transformation. This gap highlights the need for research that integrates primary consumer insights with broader digital trends to understand how people interpret, evaluate, and prepare for the Industry 5.0 environment.

5. Conceptual Framework

As illustrated in Figure 1, The conceptual model proposes that consumer awareness and readiness influence perceptions of human–machine collaboration, which subsequently affects future readiness and digital trust. Perception is also posited to mediate the relationships between awareness, readiness, and future trust.
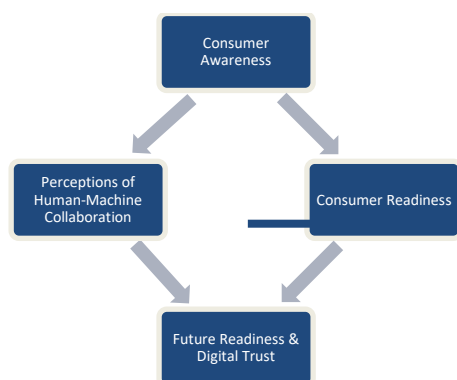
Figure 1: Conceptual Framework of the Study

6. Objectives of the Study

6.1 To measure consumer awareness about digital transformation and Industry 5.0.

This objective allows for the assessment of the level at which the concept of digital transformation and Industry 5.0 are known to the consumer. It shall highlight what they know about emerging technologies like AI, IoT, robotics and automation, and how these aspects have come to influence today's lifestyle and business ecosystem.

6.2 To evaluate the consumer readiness levels pertaining to the adoption of new technologies.

This research objective will aim at finding consumer readiness levels concerning the adoption and application of new digital tools, systems, and platforms. This research objective will target understanding the factors of digital skills, awareness, adaptability, and readiness to change that can impact the consumer's seamless shift toward the Industry 5.0-driven environment.

6.3 To understand perceptions toward human–machine collaboration.

This objective investigates consumers' attitudes and beliefs in relation to the integration of human intelligence with smart technologies. It seeks to explore perceptions that relate to benefits offered by efficiency, convenience and personalization and concerns linked to job displacement, privacy, and ethical implications of human-machine synergy in the context of Industry 5.0.

6.4 To identify the ways of improving consumers' digital literacy and confidence.

This document also suggests certain strategies through which consumers can develop their trust and capability in the digital environment. The significance of awareness programs, education initiatives, ethics, and government support has been explained in the context of developing a secure environment that will allow Industry 5.0 to be a success.

6.5 To examine the mediating role of perception between readiness and future readiness.

This hypothesis states that consumers' perception helps bridge the consumer's readiness at a particular point in time and readiness at a later date regarding the readiness of Industry 5.0 technology. The hypothesis states that consumers may be ready technologically but that their positive perception of the combined work of humans and machines can be the factor that increases their readiness

to accept the technological innovations of Industry 5.0 at a later date.

7. Hypotheses Development

Based on the conceptual framework, the study proposes seven hypotheses that capture both direct and indirect relationships among consumer awareness (Aw), readiness (Re), perception of human–machine collaboration (Pe), and future readiness/trust (Fu). Prior literature suggests that awareness and readiness shape how individuals perceive emerging technologies, while perception further influences long-term acceptance and trust.

H1: Readiness for emerging technologies significantly influences consumer perception of human–machine collaboration.
H2: Awareness of Industry 5.0 significantly influences consumer perception of human–machine collaboration.
H3: Perception of human–machine collaboration significantly influences future readiness and digital trust.
H4: Readiness for emerging technologies significantly influences future readiness and digital trust.
H5: Awareness of Industry 5.0 directly influences future readiness and digital trust.
H6: Perception of human–machine collaboration mediates the relationship between readiness and future readiness.
H7: Perception of human–machine collaboration mediates the relationship between awareness and future readiness.

These hypotheses collectively examine how cognitive awareness and technological readiness translate into trust toward the human–machine ecosystem envisioned in Industry 5.0.

8. Research Methodology

8.1 Research Design

The study adopts a quantitative, cross-sectional research design using a structured questionnaire distributed through Google Forms. The design is appropriate for capturing consumer attitudes, perceptions, and behavioural readiness toward Industry 5.0 technologies.

8.2 Sampling Technique & Sample Size

A non-probability convenience sampling method was used, targeting digitally active consumers. A total of 265 valid responses were collected and analysed.

8.3 Instrument Design

The questionnaire consisted of four constructs:

Awareness of Industry 5.0

Readiness for Emerging Technologies

Perception of Human–Machine Collaboration

Future Readiness & Digital Trust

All items were measured on a 5-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree).

8.4 Reliability Testing

Cronbach's alpha values ranged from 0.752 to 0.928, indicating acceptable to excellent internal consistency.

8.5 Data Analysis Tools

Descriptive statistics (mean, frequency)

Reliability (Cronbach's Alpha)

General Linear Model (GLM) / Mediation Analysis

Path analysis interpretation

These analyses evaluate both direct and indirect relationships for H1–H7.

9. Data Analysis

9.1 Reliability Analysis

As shown in Table 2, All constructs demonstrated strong reliability:

Construct	α	Interpretation
Awareness	.752	Acceptable
Readiness	.783	Acceptable
Perception	.829	Good
Future Readiness & Trust	.928	Excellent

Table 2: Reliability Statistics for All Constructs

9.2 Descriptive Analysis

The demographic profile of respondents is summarised in Table 3.

Variable	Category	Percentage (%)
Age Group	18–24	63.0
	25–34	12.5
	35–44	13.6
	45 and above	10.9
Gender	Female	52.1
	Male	47.9
Occupation	Students	63.8
	Working Professionals	24.5
	Self-Employed	6.0
	Homemakers	2.3
	Others	3.4
Digital Platform Usage	Daily	46.8
	Weekly	19.6
	Occasionally	20.4
	Rarely	13.2

Table 3: Demographic Profile of Respondents (N = 265)

Overall, consumers showed:

Moderate familiarity with Industry 5.0

High readiness to engage with digital tools

Positive perception of human–machine collaboration

Strong support for digital literacy and transparency initiatives

10. Hypothesis Testing & Mediation (GLM Summary)

As shown in Table 4, the GLM-based mediation analysis presents the direct, indirect, and total effects for all hypothesised relationships.

Effect Type	Hypothesis	Path	Estimate	SE	95% CI	β	p	Decision
Direct Effects	H1	Readiness → Perception	Significant across most contrast levels (Estimate = 4.12–7.30)	—	CIs exclude zero for Re3–Re12	β = .17–.54	< .05	Supported
	H2	Awareness → Perception	0.3708	0.0943	[.186, .556]	.2523	< .001	Supported
	H3	Perception → Future Readiness	0.7951	0.047	[.703, .887]	.6912	< .001	Supported
	H4	Readiness → Future Readiness	Significant for most contrasts (Estimate = 4.19–6.32)	—	CIs exclude zero	β = .17–.32	< .05	Supported
	H5	Awareness → Future Readiness	–0.0359	0.0743	[–.181, .110]	–.0212	.629	Not Supported
Indirect Effects	H6	Readiness → Perception → Future	3.27–5.81	—	Many CIs exclude zero	β = .05–.37	< .05	Supported
	H7	Awareness → Perception → Future	0.2948	0.0770	[.144, .446]	.1744	< .001	Supported
Total Effects		Readiness → Future Readiness	6.89–11.48	—	CIs exclude zero	β = .11–.58	< .001	
		Awareness → Future Readiness	0.259	0.1043	[.0546, .463]	.1532	.013	

Table 4: Summary of Mediation and Direct Effects Using GLM (N = 265)

11. Structural Model (SEM)

The structural relationships among the study variables are illustrated in Figure 2
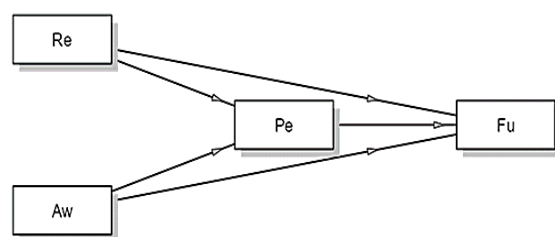

Figure 2: Structural Path Model Showing Direct and Mediated Effects

A generalized linear mediation model was estimated to examine the role of Perception of Human–Machine Collaboration (Pe) as a mediator between Readiness for Emerging Technologies (Re), Awareness of Digital Transformation & Industry 5.0 (Aw), and Future Readiness & Digital Trust (Fu). A mediation model using contrast-coded predictors revealed strong support for the hypothesized relationships. Perception emerges as the most influential construct, with the highest direct effect on Future Readiness ($\beta = .6912$, $p < .001$). Readiness shows both direct and indirect effects, whereas Awareness contributes predominantly through indirect influence via Perception. Collectively, the model explains a substantial proportion of variance in Future Readiness, suggesting consumer perceptions are central to Industry 5.0 adoption.

Overall, six of the seven hypotheses were supported. The results indicate that while informational awareness of Industry 5.0 is beneficial, emotional and cognitive perceptions of human–machine collaboration are the strongest drivers of future readiness. Readiness contributes both directly and indirectly, whereas Awareness affects future readiness only through perceptual pathways.

12. Discussion

The findings bring out the significance of perception as an integral psychological factor promoting the acceptance of new technological innovations in the coming years. Although the consumers display a moderate level of awareness, it has been observed that their readiness plays a significant role in their perception and trust levels. The awareness of the consumers does not play a direct role in their readiness in the coming years.

All the above results support the global findings that emphasize the principles of Industry 5.0 in terms of empathy, trust, and personalization.

13. Conclusion

The results of the study suggest that consumer readiness and perception play a vital role in the success of the shift towards Industry 5.0. This readiness and awareness shape consumer perception, which in turn has a strong predicting effect of trust in the collaboration of humans and machines. Awareness alone is insufficient; positive perceptions and trust must accompany it to strengthen future readiness. The study suggests the significance of being human centric in the acceptance of Industry 5.0 technologies.

14. Suggestions

Enhance Digital Literacy Programs

Improve Transparency of AI Systems

Promote Human–Machine Interaction Experiences

Design Human-Centric Technology Interfaces

Strengthen Digital Policies and Guidelines

15. Limitations

Non-probability sampling restricts generalisability.

Self-reported data may contain response bias.

Study focuses only on Indian consumers.

Cross-sectional design limits causal interpretation.

16. Future Scope

Future research might focus on longitudinal research models, target various demographic groups, and benefit from sentiment analysis through the application of machine learning algorithms. Cross-national research could also help to improve the understanding of the readiness of Industry 5.0 globally....

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