

Human-Centric AI and the Future of Indian Business

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Abstract

India has adopted artificial intelligence (AI) when its economy is simultaneously was having the stage of very modern and very traditional. Digital payments, national identity infrastructure and a large pool of technical talent sit alongside millions of informal enterprises, uneven digital literacy and deep linguistic diversity. This paper argues that the long-term value of AI for Indian business will depend less on the sophistication of algorithms and more on whether they are designed around people: workers, customers, small entrepreneurs and communities. We call this approach human-centric AI. Using a qualitative, literature-based method, the paper builds a four-part framework (Augmentation, Inclusion, Accountability and Trust) and applies it to five sectors: financial services, retail and commerce, manufacturing and MSMEs, agriculture and agribusiness, and healthcare and education services. It then discusses the main barriers, including skills gaps, data quality, language coverage, cost and regulatory uncertainty, and offers recommendations for firms, policymakers and educators. The central conclusion is that Indian businesses that treat AI as a tool to extend human capability, rather than to replace it, are more likely to achieve durable growth, social legitimacy and global competitiveness.

Keywords: *human-centric AI, Indian business, responsible AI, digital inclusion, MSMEs, future of work, AI governance*

1. Introduction

Every major wave of technology has forced businesses to ask what exactly it is for. Steam power, electricity and the computer each raised productivity, but each also redistributed work, power and opportunity in ways that were not obvious at the start. Artificial intelligence is the latest, and perhaps the most sweeping, of these waves, because it automates physical effort. It also takes over parts of judgement, language, prediction and creativity, which were long considered distinctly human.

India's position in this wave is unusual. The country has built public digital infrastructure at a scale few others have attempted. The Aadhaar identity system, the Unified Payments Interface (UPI) and the Open Network for Digital Commerce (ONDC) have shown that technology is designed as a public good that private businesses build on. A very large share of Indian employment is in the informal sector and in micro, small and medium enterprises (MSMEs),

where capital is limited, records are often handwritten, and owners are more comfortable in a regional language than in English.

In such a context, a purely efficiency-driven approach to AI carries real risk. Systems trained mostly on English text or urban data serve rural users poorly. Automation that removes jobs faster than new ones appear deepens inequality. Opaque credit or hiring algorithms quietly reproduce existing social biases. On the other hand, AI that is designed to support a shopkeeper, a farmer, a nurse or a loan officer, and that speaks their language and respects their judgement, could raise productivity and income at the same time.

1.1 Objectives

The study has four objectives:

1. To clarify what human-centric AI means in the specific setting of Indian business.
2. To develop a practical framework that firms use when planning and evaluating AI adoption.
3. To examine how the framework applies across major sectors of the Indian economy.
4. To identify barriers and suggest actions for businesses, policymakers and educational institutions.

2. Literature Review and Conceptual Background:

2.1 From automation to augmentation

Economists have long debated whether technology replaces or complements human labour. Autor (2015) observed that automation substitutes for some tasks but raises demand for others, and that the overall effect on jobs depends on how tasks are bundled and how fast workers move between them. Acemoglu and Restrepo (2019) argued that the direction of technological change matters: technology that only replaces existing tasks tends to hurt workers, while technology that creates new tasks raises wages and employment. Brynjolfsson and McAfee (2014) described a similar "race" between technology and skills, in which the benefits depend heavily on how institutions and organisations respond.

These ideas are central to the human-centric view. The question is not whether AI will change work, but whether firms choose to deploy it mainly to cut headcount or mainly to expand what people can do.

2.2 Human-centred AI

Shneiderman (2022) proposed that AI systems should aim for high automation and high human control, rather than treating them as opposites. In this view, well-designed systems amplify human abilities, remain understandable and leave people responsible for important decisions. Related work in AI ethics has tried to translate such ideas into principles. Floridi and colleagues (2018) set out a framework built around beneficence, non-maleficence, autonomy, justice and explicability. A review by Jobin, Ienca and Vayena (2019) found that, across many published

guidelines, a small set of themes recurs: transparency, fairness, non-harm, responsibility and privacy.

2.3 Responsible AI in the Indian policy context

India's own policy documents reflect similar concerns. NITI Aayog's *National Strategy for Artificial Intelligence* (2018) introduced the idea of "AI for All" and identified sectors such as healthcare, agriculture, education, smart cities and mobility as priorities for socially beneficial use. Later NITI Aayog papers on *Responsible AI* (2021) discussed principles such as safety, inclusion, privacy, transparency and accountability. The Digital Personal Data Protection Act, 2023 created a legal basis for the processing of personal data, which is the raw material for most business AI. The IndiaAI Mission, approved by the Union Cabinet in 2024, aims to expand national computing capacity, support Indian-language and foundation models, and encourage AI skills and startups.

2.4 Technology adoption and trust

Research on technology adoption has long shown that people use a system when they find it useful and easy to use (Davis, 1989). For AI, a third element is often added: trust. A loan officer who does not understand why a model rejected an applicant, or a farmer who cannot tell whether an advisory app is reliable, is unlikely to depend on it. Trust therefore acts as a bridge between technical capability and real-world adoption.

2.5 Business at the base of the pyramid

Prahalad (2004) argued that serving low-income consumers are both profitable and socially valuable if products are redesigned for their conditions. Indian businesses operate in exactly this environment. A human-centric approach to AI in India therefore has to deal with low bandwidth, shared devices, limited literacy and many languages, instead of assuming the conditions of a Silicon Valley user.

2.6 Research gap

Most existing work either discusses AI ethics in general terms or measures the technical performance of AI systems. Fewer studies connect human-centric principles directly to business strategy in India's mixed formal and informal economy. This paper tries to fill part of that gap by translating general principles into a practical, sector-aware framework.

2.7 Working definition

For the purposes of this paper, **human-centric AI** means the design, deployment and governance of AI systems so that they (a) enhance human capabilities and livelihoods, (b) are accessible to people across language, income and skill differences, (c) remain subject to human oversight and clear accountability, and (d) earn the trust of the people who use them or are affected by them.

3. Research Approach

This is a **conceptual, qualitative study** based on secondary sources. It draws on academic literature, government policy documents and publicly discussed industry practice. It does not claim to report new survey or experimental data. The method has three steps:

1. **Concept building.** Key ideas from the literature on automation, human-centred design, AI ethics and technology adoption were combined to construct the analytical framework presented in Section 4.
2. **Contextualisation.** The framework was adapted to Indian conditions using policy documents and well-known features of the Indian economy, such as its digital public infrastructure, its MSME base and its linguistic diversity.
3. **Sectoral application.** The framework was applied to five sectors by asking, for each, what AI can do, who is affected, what could go wrong and what a human-centric design would look like.

4. A Framework for Human-Centric AI in Indian Business

The framework has four pillars. They are intended to be used together; a system that is strong on one pillar but weak on the others is unlikely to be truly human-centric.

4.1 Pillar 1: Augmentation

The first question for any AI project should be: *whose capability does this extend?* An augmentation-first approach looks for tasks where AI can remove drudgery, add insight or speed up routine decisions so that people can spend more time on judgement, relationships and creativity. Examples include a drafting assistant that helps a small accountant handle more clients, a diagnostic aid that supports a rural health worker, or a demand-forecasting tool that helps a kirana store owner decide what to stock.

Augmentation does not mean that no jobs will change. It means that the design goal is to raise human productivity and value, and that displaced workers are supported through retraining and transition.

4.2 Pillar 2: Inclusion : In India, inclusion has several dimensions as:

- **Language.** Many users are more comfortable in Hindi, Marathi, Tamil, Bengali, Telugu or other languages than in English. Voice and text interfaces in Indian languages, including dialects, are therefore essential, not optional.
- **Access.** Tools should work on low-cost smartphones and unstable networks, and should allow shared or assisted use.
- **Skills.** Interfaces should assume little technical training and should not require users to write complex prompts or navigate dense menus.
- **Representation in data.** Models trained on data from big cities and formal firms perform badly for small towns, informal businesses, women entrepreneurs or marginalized communities. Inclusive data collection is therefore a design task, not an afterthought.

4.3 Pillar 3: Accountability

When an AI system affects a person's income, credit, health or job, there must be a clear answer to the question *who is responsible?* Accountability involves several practices:

- keeping a human in the loop for high-stakes decisions;
- documenting the data, assumptions and limits of each system;
- testing for bias and error before and after deployment;
- giving affected people a way to question or appeal a decision; and
- assigning named internal ownership instead of blaming "the algorithm."

4.4 Pillar 4: Trust

Trust is built over time through reliability, honesty about limitations, protection of personal data and visible respect for users. In India, where first-time digital users are common and fraud is a real concern, trust is especially fragile. A single widely reported failure, such as a wrongly denied benefit or a leaked database, set back adoption in an entire community. Firms should therefore explain in plain language what their systems do, what data they use and how people can opt out.

4.5 How the pillars interact

The pillars reinforce each other. Inclusion widens the number of people who benefit, which strengthens the business case. Accountability makes trust possible. Trust, in turn, encourages the adoption that makes augmentation real. If anyone pillar is neglected, the others weaken. Powerful models that are not explained (low accountability) will be distrusted; a trusted model that works only in English (low inclusion) will leave many customers behind.

5. The Indian Business Landscape for AI

5.1 Strengths

India enters the AI era with several advantages:

- **Digital public infrastructure.** Identity, payments and open commerce networks reduce the cost of building new services and make large-scale data-driven innovation possible.
- **Technical talent.** The country has a large base of engineers, data professionals and an established IT services industry that is now moving up the value chain into AI.
- **A large and young domestic market.** Scale allows firms to test and refine AI products on diverse users.
- **A growing startup ecosystem.** Entrepreneurs are building AI tools for sectors such as finance, health, agriculture and education.
- **Policy attention.** National initiatives, including the IndiaAI Mission, signal long-term commitment.

5.2 Structural challenges

The same landscape contains difficulties that a human-centric approach must address:

- **A dominant informal and MSME sector.** Many small firms lack digital records, working capital and technical staff, which limits their ability to adopt AI.
- **Uneven digital literacy and connectivity.** Urban–rural and gender gaps in device access and skills persist.
- **Linguistic diversity.** Building reliable AI for many languages, dialects and scripts is difficult and requires large, high-quality datasets that are still being built.
- **Data quality and availability.** Business data are often incomplete, unstructured or locked inside individual firms.
- **Concentration of compute and capital.** Training large models is expensive, and much of the underlying technology comes from a few global firms.

5.3 Why "human-centric" matters especially in India

Because so many Indians earn their living in small, informal or relationship-based businesses, the social cost of poorly designed AI is high. A system that quietly removes a middleman, a clerk or a local trader without offering an alternative affects entire family incomes. The potential gains are also high: a tool that helps a small manufacturer wins a better price or a farmer avoids a crop loss has an outsized effect on welfare. The stakes of getting the design right are therefore unusually large.

6. Sectoral Applications

The sections below apply the four pillars to five sectors. They are illustrative, not exhaustive.

6.1 Financial services

Opportunities. AI can support credit assessment using alternative data, detect fraud in real time, personalise advice and automate compliance. For first-time borrowers and small businesses with no formal credit history, such tools can widen access to finance. Conversational assistants in regional languages help customers understand products and resolve complaints.

Risks. Credit models reproduce social or geographic bias. Automated rejections without explanation leave applicants confused and unable to appeal. Aggressive data collection raises privacy concerns, and digital lending apps have previously drawn criticism for unfair practices.

Human-centric design. Lenders should use AI to *support* credit officers, not hide behind it. Explanations of decisions should be given in simple language. Models should be audited for disparate outcomes across gender, region and income group. Customers should have a clear route to human review. Data collection should be limited to what is needed and consented to under the data protection framework.

6.2 Retail and commerce

Opportunities. AI can improve demand forecasting, inventory management, pricing and customer service. Networks such as ONDC allow small sellers to reach customers without building their own platforms, and AI tools help them manage catalogues, translate listings and respond to buyers in local languages.

Risks. Recommendation and pricing algorithms favor large sellers, nudge customers toward unnecessary purchases or exploit behavioral weaknesses. Automation of warehouses and customer support reduce entry-level jobs.

Human-centric design. Platforms should be transparent about how products are ranked. Small sellers should receive affordable, simple AI tools that raise their competitiveness. Retail firms should plan reskilling for staff whose roles change, for instance from manual stock-checking to supervising automated systems or advising customers.

6.3 Manufacturing and MSMEs

Opportunities. Predictive maintenance, quality inspection using computer vision, energy optimisation and supply-chain planning lift productivity and reduce waste. For MSMEs, even modest tools, such as automated bookkeeping, GST filing assistance or machine-downtime alerts, matter greatly.

Risks. Smaller firms may be unable to afford customized systems, widening the gap between large and small producers. Workers may fear that monitoring tools are meant to replace or punish them.

Human-centric design. Shared or subscription-based AI services, cluster-level platforms and industry association initiatives lower costs for MSMEs. Shop-floor workers should be involved in designing and testing tools so that the technology reflects real work practices. Worker monitoring systems should be introduced openly and used for improvement, not surveillance.

6.4 Agriculture and agribusiness

Opportunities. AI can support crop advisory, pest and disease detection from images, weather-based planning, market price prediction and farm-to-market logistics. Voice-based advisory in local languages reach farmers with limited literacy.

Risks. Poorly localized advice lead to financial loss. Farmers may not trust recommendations that ignore local knowledge. Data about land and yields are misused by intermediaries or buyers.

Human-centric design. Advisory tools should be tested in real field conditions and combined with extension workers and farmer groups, not treated as replacements. Traditional and local knowledge should be respected and, where appropriate, incorporated. Farmers should retain control over their own data and be informed about how it is used.

6.5 Healthcare and education services

Opportunities. In healthcare, AI can assist with screening, triage, record management and appointment scheduling, and can help scarce specialists reach more patients through telemedicine. In education and training, adaptive learning tools offer personalized practice and support teachers in large classes. Businesses in these areas, including hospitals, diagnostic chains, edtech firms and training providers, are growing quickly.

Risks. Errors in medical AI cause serious harm. Learning tools reflect biased content or widen gaps between students who have devices and those who do not. Sensitive personal data are at stake.

Human-centric design. AI should support, not replace, doctors, nurses and teachers. Clinical tools must be validated on Indian populations and used with clear human sign-off. Educational tools should be available in multiple languages and offline modes, and student data should be strongly protected.

6.6 Cross-sector summary

Sector	Main human-centric opportunity	Main risk to manage
Financial services	Wider access to fair credit and advice	Bias and unexplained decisions
Retail and commerce	Empowering small sellers	Unfair ranking, job displacement
Manufacturing and MSMEs	Affordable productivity tools	Cost barriers, worker surveillance
Agriculture	Localised, voice-based advisory	Poor localisation, data misuse
Healthcare and education	Extending scarce expertise	Errors, privacy, unequal access

7. Challenges and Barriers

7.1 Skills and the future of work

AI changes the mix of skills that businesses need. Routine clerical, data-entry and basic customer-support roles are most exposed, while demand grows for roles that combine domain knowledge with data and AI literacy. India's large workforce is both an asset and a risk: if reskilling does not keep pace, the benefits of AI is concentrated among a small, highly skilled group. Firms, training institutions and government need to treat lifelong learning as a shared responsibility.

7.2 Data, language and bias

Good AI needs good data. In India, much useful data is scattered, informal or in languages for which digital resources are limited. Bias enter at every stage, from who is represented in the training data to how outcomes are measured. Continuous testing and diverse development teams are practical safeguards.

7.3 Cost and access to technology

Advanced AI requires computing power, talent and capital that many Indian firms, especially MSMEs, lack. Without shared infrastructure, subsidised access or simple low-cost products, adoption will remain concentrated in large firms.

7.4 Privacy, security and misuse

AI systems depend on large amounts of personal and business data, raising risks of leaks, surveillance and manipulation. Deepfakes and AI-assisted fraud are growing concerns for consumers and firms alike. Strong security practices and compliance with data protection law are basic requirements for trust.

7.5 Regulatory uncertainty

AI regulation is evolving worldwide. Indian businesses must navigate existing laws on data protection, consumer rights and sector-specific regulation while awaiting further clarity on AI-specific rules. This uncertainty discourages investment or lead to cautious, box-ticking compliance. Balanced, predictable and proportionate regulation would help firms plan.

7.6 Organisational culture

Technology projects often fail not because the technology is poor but because people resist, misunderstand or are excluded from the change. Leaders, who communicate honestly, involve employees early and share the gains from productivity improvements are more likely to succeed.

8. Recommendations

8.1 For businesses

1. **Start with a human problem.** Identify a specific task or customer need before choosing a tool, and ask who will benefit and who may be affected.
2. **Adopt an augmentation-first policy.** Where possible, aim to enhance employees' productivity and value, and commit to retraining before restructuring.
3. **Keep humans responsible for high-stakes decisions.** Create clear escalation and appeal routes.
4. **Design for Indian realities.** Support regional languages, voice interfaces, low bandwidth and shared devices.
5. **Audit regularly.** Test systems for bias, accuracy and security, and record the results.
6. **Communicate openly.** Tell employees and customers what AI is used for, what data it uses and how to raise concerns.
7. **Share the gains.** Link productivity benefits to wages, training or improved services, so that AI is seen as a shared opportunity.

8.2 For policymakers

1. **Expand shared digital and compute infrastructure** so that MSMEs and startups use AI without prohibitive cost.

2. **Invest in Indian-language datasets and open resources**, with fair consent and ownership arrangements.
3. **Provide clear, proportionate guidance** on responsible AI, building on existing data protection law and sector regulators.
4. **Support workforce transition** through reskilling programmes, portable skill credentials and social protection for displaced workers.
5. **Encourage inclusive procurement and pilots** that test AI in real Indian conditions, including rural and low-income settings.

8.3 For educational institutions

1. **Integrate AI literacy** across disciplines, including commerce and management computer science.
2. **Teach ethics, critical thinking and communication** alongside technical skills, since these are the areas where humans keep a comparative advantage.
3. **Partner with industry** on live projects, internships and research that address Indian problems.
4. **Offer short, flexible courses** for working professionals and small business owners.

8.4 For industry bodies and civil society

Industry associations create shared standards, toolkits and training for member firms. Civil society and researchers can monitor outcomes, represent affected groups and help communities understand their rights and options.

9. Limitations and Future Research

This study has several limitations. First, it is conceptual and based on secondary sources; it does not test its propositions with primary data. Second, the sector coverage is selective, and other sectors such as logistics, tourism, media and public services would also merit attention. Third, AI technology and policy are changing rapidly, so some details may become outdated.

Future research could address these gaps in several ways:

- **Survey and interview studies** of MSME owners, employees and customers to measure awareness, adoption, perceived benefit and trust.
- **Case studies** of Indian firms that have introduced AI, comparing augmentation-oriented and cost-cutting approaches.
- **Field experiments** testing whether regional-language, voice-based tools raise adoption and income among small businesses or farmers.
- **Quantitative modelling** of employment and skill shifts at sector and state level.
- **Comparative studies** of how India's approach differs from that of other large emerging economies.

A suggested way to test the framework empirically would be to build a simple index for each pillar (for example, language coverage and affordability for Inclusion; availability of human

review and audit practice for Accountability) and examine whether firms with higher scores report better employee retention, customer loyalty or financial performance.

10. Conclusion

AI will shape the next phase of Indian business, but it does not have a single predetermined path. The same technology is used to cut costs and sideline workers, or to extend human skill and open opportunity to people who were previously left out. The difference lays in the choices that firms, governments and educators make now. India has an opportunity to show that large-scale AI adoption can be built around people rather than at their expense.

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