

MRP ₹ 499

ALGORITHM RENAISSANCE

From Data to Decisions

RNI: DLENG/25/A1645



VOL.1, ISSUE.1,
JUL-SEP 2026



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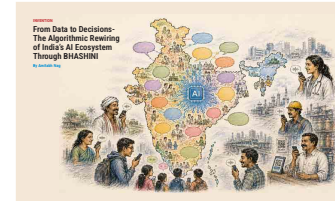


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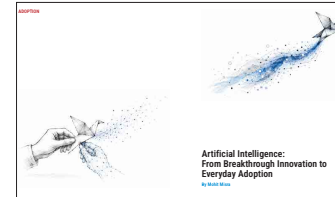


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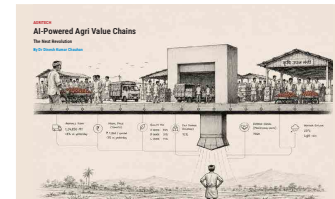


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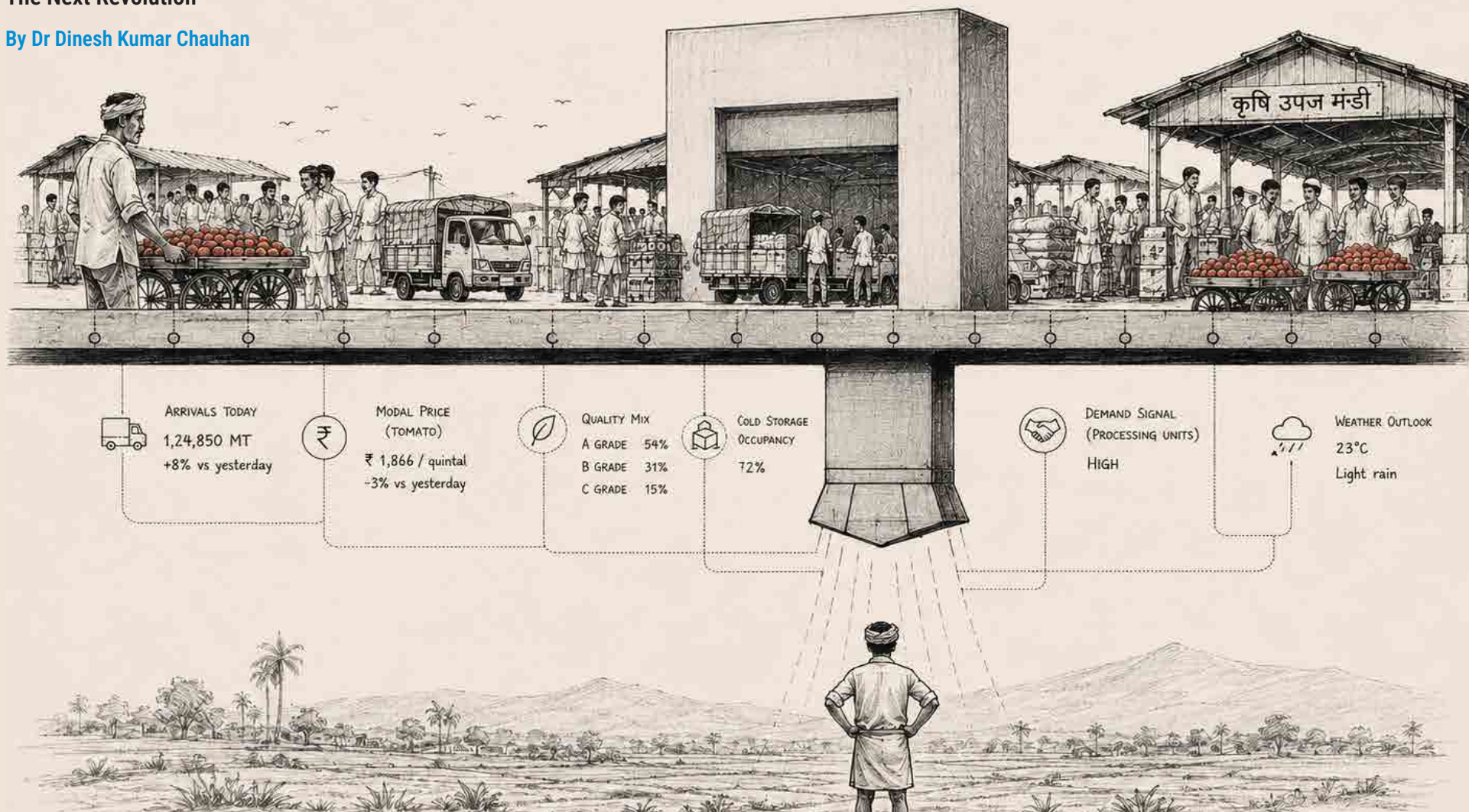
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AGRITECH

AI-Powered Agri Value Chains

The Next Revolution

By Dr Dinesh Kumar Chauhan



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The Billion-Dollar Misdirection

The agritech industry has long assumed that production is agriculture's main challenge, with over \$50 billion spent testing this idea. However, advances such as higher yields, sensors, drone monitoring, and improved seeds have not changed the core economics of farming. Farmers in Andhra Pradesh and Zambia still face the same issues as two decades ago. Large harvests can lead to financial distress. Poor harvests can cause food insecurity. Technology exists, but real change has not happened.

This result does not mean technology failed; it means the main problem was misunderstood. By focusing mostly on growing more crops, the industry missed the bigger issue—working together. Good tools were made for farms, but they solved the wrong problem. That is why the discussion must move from production to coordination.

The main challenge is not low yield, but value chain inefficiencies. This complex chain runs from farm to consumer. During this process, 30–40% of food is lost due to multiple intermediaries, long distances, and lengthy transit times. Price information often arrives late and spreads informally. Risk builds up and mostly falls on small farmers, who are least able to handle it. Profits usually go to those who coordinate rather than those who improve nutrition.

“For artificial intelligence to really help farming, it must address these wasteful parts of the chain by using its strong data abilities. The main problem is not just in the seeds or the soil, but in the whole farm system. This shift in focus leads directly to the question of who actually holds the market together.”

Rehabilitating The Middleman — And Indicting The Architecture

A prevailing consensus exists within agricultural policy

circles, including development economists, NGO strategists, and agritech investors, that middlemen are the primary problem. Examples cited include commission agents extracting significant fees at mandis, aggregators underweighing produce at collection points, and traders manipulating prices by withholding supply. The prevailing argument suggests that eliminating these actors would enable farmers to secure a fairer share of the value chain.

This analysis is not only inaccurate but also detrimental, as it confuses symptoms with the underlying problem and leaves the core issue unresolved. To see why, it is necessary to understand what middlemen actually do in these markets. Middlemen remain in agricultural markets because they solve coordination problems that other actors cannot. They join scattered production into usable quantities and give unsecured credit when banks are absent. They take on price risks that smallholders cannot handle. These middlemen also know buyers, preferences, and the best timing, which helps markets function. Their inefficiency reflects their necessity, shaped by structural design and reinforced through information control.

A commission agent in an Indian mandi is powerful because he controls goods, owns social trust networks, and gives informal credit. Most of all, he has exclusive access to price information. If any of these weaken, his power drops. If all four change through a better system, the value chain transforms. The goal is not to remove the middleman, but to end the lack of transparency that made him necessary.

1. Too many small farmers work separately, each in a small market with no shared way to rate, measure, or price crops. A smart system cannot improve what it cannot measure consistently.
2. **Timing mismatch — Farmers choose what to plant months before harvest.** Buyers and sellers make deals every day, even every hour. What experts call ‘price swings’ mostly come from this timing mismatch.
3. **Risk shifting — Problems that start with the buyer or store move back up the chain and end with those who can handle them least: small farmers. The market does its job—for those who built it.**

What AI Changes — And what the Industry Refuses to Admit it Doesn't

The agricultural AI sector frequently portrays incremental digital enhancements as significant transformations. Examples include chatbots providing fertiliser advice, satellite imagery confirming existing farmer knowledge, or credit-scoring tools offering costly loans to reliable borrowers. These developments do not constitute genuine revolutions. Rather, they represent superficial changes to existing systems, often accompanied by new investment. The next question is what real change would require.

Real change looks different: it shifts who has the information, who sets the price, and who takes on the risk. This kind of transformation happens across the whole value chain at once, using what could be called connective intelligence. Here, AI works as a shared system, not just as a single tool.

The Demand Signal That Never Reaches the Farm Gate

Today, demand forecasting in agriculture is mostly done by retailers. Supermarkets and online platforms use advanced models to predict what consumers will want in the next few weeks. But this information stays with them. It never reaches the farmer, who made planting decisions months earlier and cannot act on them.

A breakthrough would send demand signals upstream to farmers. Real-time retail data, festival calendars, income trends, weather forecasts, and supply estimates could guide harvest timing and volumes, well before peak seasons. Ninjacart has tried this to some degree in India. Still, there is no national system that links buyers' needs to farm planning. Such a system would change how prices are set, using better information instead of relying on policy.

The most underexamined function of the traditional agricultural intermediary is trust. He lends without paperwork because he knows the borrower's family. He guarantees

payment without contracts because his reputation is his capital. He resolves disputes without going to court because both parties will transact with him again next season.

AI can make personal favours less important in normal business. Digital contracts with automatic payments, automated crop-quality checks, and smart transport matching can all reduce the need for special relationships. The goal is not to keep people out, but to remove the secrecy that forces farmers to depend on personal favours rather than clear, open systems.

Market Intelligence Without Optionality Is a Cruelty, Not a Service

If a farmer in Maharashtra knows Mumbai will soon have a tomato surplus, that helps only if options are available. These could be delaying harvest, using cold storage, arranging processing, or finding new buyers. Most smallholders cannot do this quickly. As a result, platforms record engagement, but farmers face losses.

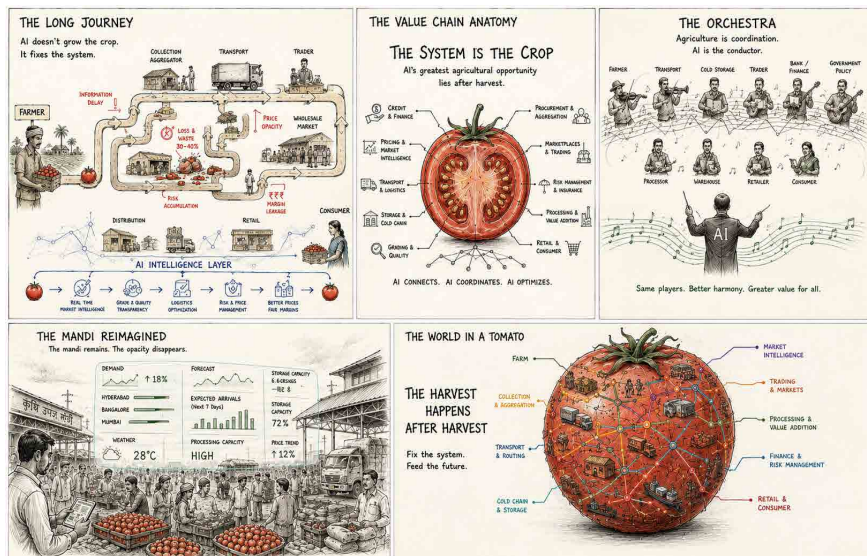
Information platforms only help when they link up with transport, buying systems, and farm finance. Advice apps alone, even if they are advanced, don't do much. They often just show off technology.

The Architecture no one has Built

A main mistake in agritech is focusing too much on individual parts rather than the whole value chain. Many firms have built strong tools for input delivery, advice, finance, and digital auctions, but these tools remain limited. Each tool's value depends on its connection to others. This is often blocked by different owners, goals, and data systems.

What this industry really needs is a Farm Information System. This is not just another app but a shared system for everyone to see and understand what is happening right now across the chain.

Layer	Function	Primary Beneficiaries
Data Commons	Standardised satellite, soil, weather, price, and transaction data — open and interoperable	All actors
Intelligence Engine	Forecasting, supply-demand optimisation, risk scoring	FPOs, corporates, traders, lenders
Decision Interface	Vernacular recommendations, alerts, price signals — adapted by actor type	Farmers, field agents, cooperatives
Transaction Rail	Digital procurement, payment settlement, quality certification, contract enforcement	Corporates, retailers, exporters
Policy Cockpit	Market monitoring, subsidy targeting, anomaly detection	Governments, regulators, development institutions



The absence of such a system is due to institutional barriers rather than technological limitations. Private companies are reluctant to develop open systems due to concerns over competitive advantage and profitability. Public agencies frequently lack either the capacity or the motivation to undertake this task. Development funders often favour projects that offer visible credit rather than investing in the complex process of constructing shared digital infrastructure for collective benefit.

India's FPO eNam has over 10,000 registered Farmer-Producer Organisations (FPOs), many of which are backed by NABARD and SFAC. These groups connect with farmers and can pool produce and bargain for better market access. But they lack strong data systems, analytics, and buyer links. Investing in technology for FPOs can accelerate adoption and more equitably distribute benefits, rather than building new platforms.

India and Africa: The window is Narrowing

It is important to clarify that, over the past decade, agritech

investments in India and Africa have primarily benefited investors and platforms rather than farmers. This observation reflects system design rather than a moral judgment and should inform the development of future systems. The electronic national agricultural market (eNAM) was introduced as a major policy innovation. Its limited impact is not due to farmer resistance or technological shortcomings, but rather the inability of software to replace essential physical infrastructure. When produce is transported to a single mandi, weighed on unreliable scales, and graded subjectively, digital price displays do not address the fundamental issues. The software was effective, but system integration was lacking.

In Africa, Twiga Foods in Kenya, Hello Tractor across West Africa, and Pula's agricultural insurance model represent genuine structural innovations. But they operate at fractions of the scale required to shift aggregate outcomes. The dominant agri value chain across most of sub-Saharan Africa remains oral, relational, and opaque. This is not because Africans are resistant to technology, but because the logistics, cold chain, and market infrastructure on which AI-powered systems depend have not yet been built to the required density.

"AI cannot compensate for the absence of physical infrastructure. The proliferation of mobile phones did not replace inadequate road networks. Rather, it highlighted the deficiencies in existing infrastructure."

An ideal opportunity for both India and Africa is specific and time-limited: build the coordination architecture before the extraction architecture locks in. India and Africa retain the rarer opportunity to establish open data commons, interoperable logistics rails, and farmer-centric governance models before a handful of platform companies acquire the data monopolies that will define market power for the next generation. That window will not remain open indefinitely.

Three Policy imperatives and the comfortable evasions surrounding them

In numerous developing countries, agricultural ministries routinely commend new agritech startups that secure funding, issue press releases on digital agriculture, and

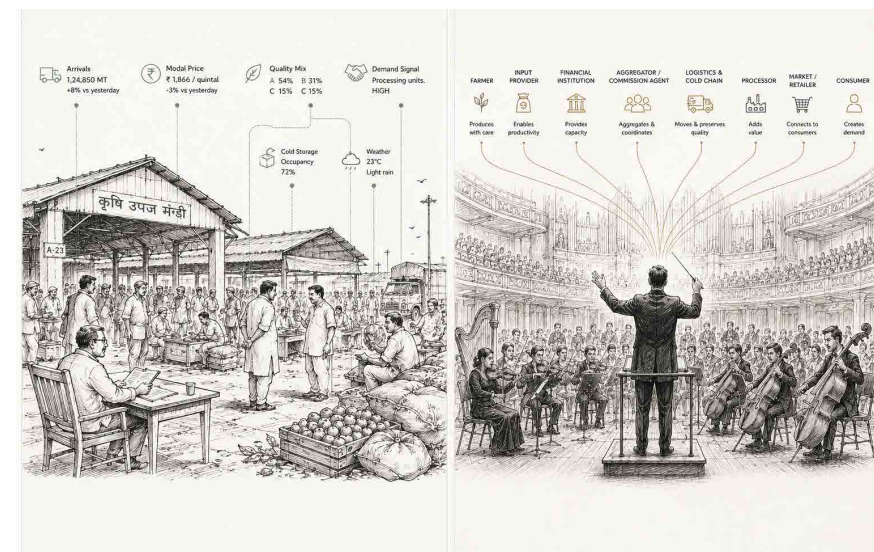
defer substantive structural reforms by referring them to committees. Such actions do not constitute genuine governance; they create the appearance of progress while entailing minimal political cost.

One: Declare Agricultural Data a Public Good — and Enforce It

A farmer's soil health record, crop history, market transaction log, and input purchase pattern constitute an extraordinarily valuable data asset. In the current institutional environment, that asset belongs to the platform that collected it—not to the farmer who generated it. India's AgriStack framework gestures toward correcting this, but its consent mechanisms remain structurally weak, and its interoperability mandates carry no teeth for enforcement. Every month of delay is a month.

Two: Invest in Institutional Capacity Before Technology

The principal obstacle to AI adoption in agriculture within emerging economies is not the scarcity of smartphones or internet access. Rather, there is a shortage of personnel within FPOs, cooperatives, or commodity boards who possess the expertise to interpret AI forecasts, manage digital contracts, or hold platforms accountable. Employing a skilled field manager in an FPO yields greater value than introducing



additional applications for farmers. Things go wrong. Having a skilled field manager in an FPO brings more value than another app for farmers.

Three: Preempt Platform Monopolies Through Mandatory Interoperability

Regulatory intervention typically occurs after a company has achieved market dominance; however, this approach is ineffective in digital markets, where network effects reinforce the position of large players before regulators can act. The optimal time to mandate open APIs, data sharing, and standards is before dominant firms emerge. While the EU's Data Act provides a partial model, emerging economies require tailored frameworks to prevent small farmers from becoming dependent on platform monopolies.

AGI and the Data Debt that will come due

The global conversation about Artificial General Intelligence has not yet reached the agricultural policy community in any serious form. This is a consequential oversight.

If AGI systems — or sufficiently capable narrow successors — begin operating within agricultural supply chains within the next decade, they will make consequential decisions: about what gets planted, where production is directed, how procurement is priced, which logistics routes are selected, and which farmers are deemed creditworthy. These are not peripheral functions. They are the operational core of food systems.

The risk that receives almost no attention is this: AGI systems will be trained on the agricultural data that exists, not the data that should exist. Current global agricultural datasets are overwhelmingly skewed toward large-scale commercial farming in North America, Brazil, Western Europe, and Australia. Smallholder farming systems in India, sub-Saharan Africa, and Southeast Asia — which together encompass the majority of the world's farming population — are structurally underrepresented in the training corpora that will shape next-generation models.

An AI system predominantly trained on large-scale corn farms in Iowa is unlikely to provide appropriate recommendations for small, diversified farms in Bihar. Although such systems may present advice confidently, their guidance may be inaccurate in context-specific ways that users without specialised knowledge may not detect. This issue is not merely a future risk; it is already evident in current AI models deployed for farm advisory in regions outside their training data.

The corrective action is urgent and not flashy: we need to collect, organise, and standardise data from small farms in emerging economies and add it to AI training before the models become too big and locked in to change. This is a public good problem and cannot be fixed by the market alone.

Conclusion : The Pilots are not the Point

Artificial intelligence will change agriculture. That is certain. What remains unknown is who will benefit most—will it be the 1.3 billion people who depend on farming, or the platforms, companies, and investors already in a strong position?

Who benefits will not be decided by how advanced the algorithms are. It will depend on decisions made over the next three to five years: who owns the data, who controls the platforms, what rules govern systems between farmers and markets, and whether public institutions are willing to build open infrastructure that private companies will not.

The agritech sector frequently highlights achievements such as enrolling farmers, securing new funding, or conducting pilot programs. While these milestones facilitate fundraising, they may divert attention from substantive systemic change. A platform that enrolls a million farmers without altering price-setting mechanisms has not transformed agriculture; it has merely digitized existing processes without effecting genuine reform.

“We already have the knowledge and the systems needed. The real challenge now is whether we have the will.”

The essential transformation is structural. Achieving this requires establishing an operational Agri-Intelligence System as shared public infrastructure, investing in personnel capable of managing advanced systems, and formulating data governance policies that recognize farmers as decision-makers rather than mere data providers. Crucially, political will is necessary to implement these changes before the opportunity for open development is lost. The chance to do it openly is gone.

