LIONHEART FARMS (PHILIPPINES) CORPORATION

WHITE PAPER

Productivity is Sustainability

An Operating Model for AI-Native Tropical Agriculture

How Lionheart Farms is building the next generation of coconut farming in the Philippines — and what it means for the future of smallholder agriculture in the tropics.

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About this paper

> *This paper presents the operating model that Lionheart Farms (Philippines) Corporation is building for AI-native tropical agriculture, and advances the thesis that, in this sector, productivity is sustainability.*

This is a standalone white paper. It can be read on its own, by readers who have not previously encountered Lionheart's public work. It also functions as the formal long-form companion to two earlier pieces by the same author: an op-ed published in early April 2026, titled "AI, Productivity, and the Future of Coconut Farming," which set out the thesis in compressed form; and the keynote address delivered to one hundred and sixty students and faculty members at Far Eastern University in Manila on Tuesday, 28 April 2026, titled "AI, Productivity, and the Sustainable Transformation of Tropical Agriculture," which set out the operating model in lecture form, with three live demonstrations of the AI capabilities currently in production at Lionheart.

The intended audience is wide: media contacts who require a sourceable and evidence-based account; academic and research readers who will probe the framework against their own theoretical commitments; policy and government readers in the Philippines and elsewhere; investors evaluating where structural capital should go in tropical agriculture; and the next-generation readers — students, early-career professionals, young entrepreneurs — who are deciding what kind of future to build their working lives around.

We have chosen to include full operational detail on Lionheart's proprietary AI engine, Huginn, including its training-set composition, architectural posture and forward roadmap. We do this because thought leadership in this field is set largely by the willingness of practitioners to expose what they are actually building.

The paper is organised in five parts. Part I sets out the structural state of the global coconut industry and of the Philippine smallholder sector. Part II develops the core claim that productivity is sustainability and that traditional management cannot scale smallholder tropical agriculture. Part III sets out the AI-native operating system end to end, opening with a one-page "Operating System at a Glance" reference card. Part IV presents the company's Two-Track strategy and three operational proof points, and closes with a "Challenges and Mitigations" box that surfaces the open questions we hold live. Part V addresses the wider consequences for the Philippines and for the next generation, and the paper closes with reflections, an author note, and references.

Figures in this paper are drawn from the slide deck used at the FEU keynote on 28 April 2026 and reproduced here at the relevant chapter. References at the end point to the underlying frameworks and data sources cited.

Executive summary

> *This paper makes one argument and shows the operating system behind it. Productivity is sustainability. In tropical agriculture — and in Philippine coconut specifically — the productivity gap is the poverty gap, and closing it is now an engineering, technology and management problem as much as a social one. Our strategy is built around "Our Farm to You": connecting Filipino farmers and host communities directly to the world, on margins that fund meaningful livelihoods at home.*

The global coconut industry the world inherited is structurally broken. In the Philippines, the country with the world's second-largest coconut land base, smallholders typically yield 0.5 to 1.0 tonnes of copra-equivalent per hectare per year. Roughly 2.5 million coconut farmers cultivate approximately 3.6 to 3.65 million hectares of mostly senescent palms, on a value chain that captures most of the margin downstream of the farm gate. Coconut-farming households are consistently identified in Philippine policy literature as among the poorest agricultural groups in the country. Two decades of well-intentioned sustainability programming have not changed this trajectory in any material way, because sustainability narratives without productivity solutions produce dependency with better branding.

The state of coconut farming today is more difficult than the headline numbers suggest. Ownership has fragmented across generations and is often shared inside extended families; in many cases it does not, by itself, support a meaningful livelihood. The actual day-to-day work is done predominantly by tenant farmers and farm workers — the "kasama" relationship still common in the sector — who hold two and sometimes three other occupations because coconut alone covers only a fraction of household needs. Coconut farming, in plain terms, is no longer a single, meaningful, full-time occupation in much of the country. The big question that organises everything that follows is the one we hear in every classroom and every boardroom: where will the next generation of coconut farmers come from?

Our thesis is that productivity is the load-bearing variable in the sustainability chain. Productivity drives gross margin; margin drives equitable income; income drives reinvestment in the farm and household; reinvestment underwrites continuity into the next generation. Break the chain anywhere and the entire system collapses into dependency. The mistake of the last twenty years has not been ambition; it has been the assumption that a sustainability commitment can substitute for a productivity solution. It cannot.

What is new — and what makes the productivity equation now solvable for the first time at smallholder scale — is artificial intelligence acting as a management multiplier on top of a complementary technology stack of sensors, drones, mobile devices and increasingly capable field robotics. A small human team,

supervising fleets of domain-trained agents, can deliver management density that was previously the privilege of capital-intensive plantations. In our model, the time saved by the agents is reinvested deliberately into more human contact rather than spent on overhead reduction. AI in our model multiplies human touch points; it does not replace them.

Lionheart Farms is being built around that thesis. The operating model is distributed and AI-native, with roughly 89 per cent of value flowing through agents at the edge of the company and a thin 11 per cent core that sets standards, governs data and reflects continuously. Five elements, six governance rules, an explicit humans-in-on-and-above-the-loop doctrine, and a handholding principle that puts the worker, the farmer and the field operator at the centre of operating design. The full architecture sits on a single page in “Operating System at a Glance” at the start of Part III.

Commercially, Lionheart operates a Two-Track Strategy. Track One is the coconut-sap franchise — currently executing in our farm in Rizal, Palawan, in partnership with the Indigenous Peoples Community on whose ancestral land we operate, and extended through our Partner Farm Program across southern Palawan. Sap is a 24/7 raw material that has to be processed within hours of tapping; the farm and factory are tightly integrated for that reason. The brand pillar is our SLOW range of coconut-sap drinks, launched internationally at ExpoWest 2026 in California. Track Two — the longer-term programme to address the traditional coconut value chain, which has different economics, agricultural practices and a more domestic-B2B character — is currently in feasibility study, planned to conclude in mid-2027; subject to study findings, our intention is a southern-Palawan pilot with the potential to replicate elsewhere. Both tracks are part of Lionheart, led and managed by Lionheart, sharing one operating system and one set of values, while attracting different capital pools appropriate to their respective economics.

Three live demonstrations at our 28 April 2026 keynote at Far Eastern University in Manila showed the model in production: the Harvest Productivity Agent (workforce planning and per-tapper grading, in early trial); the Field Setup and Harvest-Readiness Agent (rented-palm audit and accountability, in early trial); and Huginn, our proprietary AI engine for cross-channel commerce, operational on Amazon today and being extended through eighteen Phase-1 storefronts prioritising the United States and China. Building on the Huginn experience and a decade of structured digitalisation, we are now in the early-design stage of what we expect to be our next proprietary engine — an agricultural one — subject to operational learning continuing to compound at the rate the early trials suggest.

The wider implications matter beyond a single company. The Philippines holds a rare combination of structural advantages: a young, English-fluent workforce; a deep IT-services sector; exceptionally high social-media usage and strong social-commerce readiness; and the world’s second-largest coconut land base. As major retailers open API-accessible operating models and accept supplier-led sustainability data through programmes like Walmart Luminate, Walmart’s Project Gigaton (now reporting roughly 6,800 participating suppliers), IBM Food Trust and EcoVadis (whose 2025 index covers nearly 89,000 companies

and approximately 159,000 ratings since 2020), AI-native operating companies that can plug into those channels at scale will be uniquely positioned. CSRD in Europe — even after the EU Omnibus simplification process — continues to anchor supplier sustainability-reporting expectations; in the United States, federal climate-disclosure rules remain legally uncertain, but investor, retailer, state-level and customer-driven demand for sustainability data continues to move in the same direction. Our Farm-to-You strategy is the answer to those rails.

The remainder of this paper sets out the problem, develops the thesis, presents the operating system, and shows how Lionheart Farms is putting it into production today.

PART I

The Inheritance

Part I · The Inheritance

> *The state of tropical agriculture, and Philippine coconut in particular, is not a question of effort. It is a question of architecture. To understand why productivity has stayed flat for fifty years — despite cumulative billions of dollars in technical assistance, donor programmes and government interventions — we have to look honestly at what was inherited, including the human reality of who actually farms the land today.*

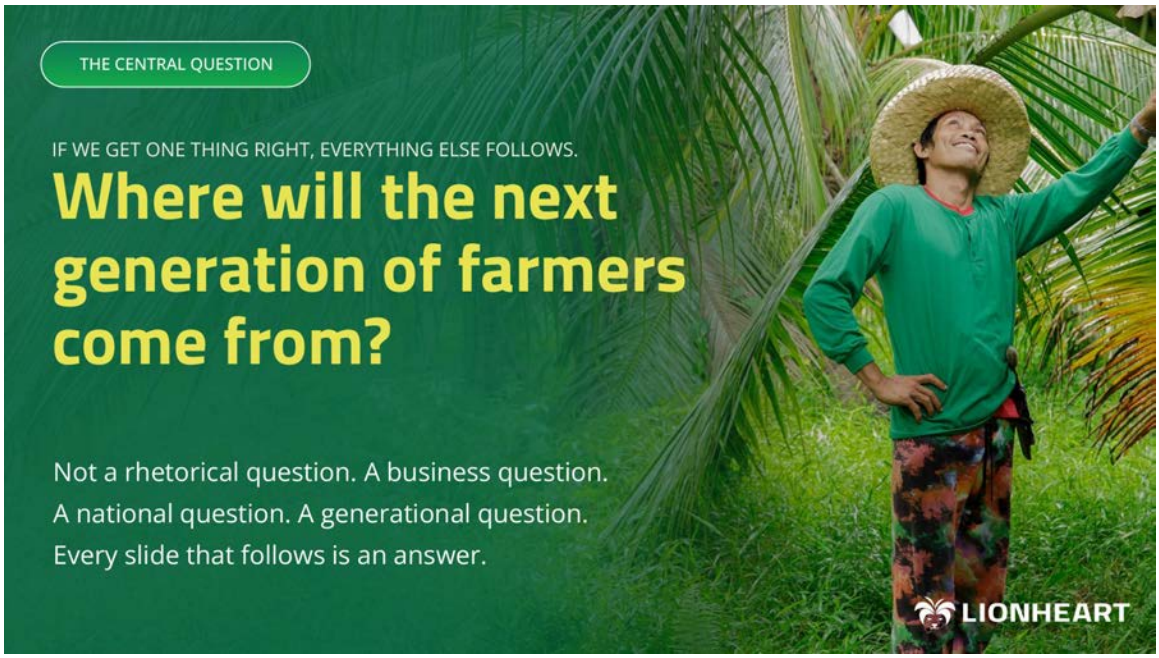


Figure — Why the inherited coconut sector cannot fund the next generation — the question this paper begins from. (Source: FEU keynote, 28 April 2026, slide 3)

1. The coconut industry the world inherited

Philippine coconut-sector sources commonly report roughly 2.5 million coconut farmers and approximately 3.6 to 3.65 million hectares under coconut cultivation — a land base second only to Indonesia. As many as 25 million Filipinos are often described as directly or indirectly dependent on the sector. The economic centre of gravity in the global coconut trade has, for most of the post-war period, sat in this country.

Commonly cited estimates put smallholder yields somewhere between 0.5 and 1.0 tonnes of copra-equivalent per hectare per year. Best-managed plantations under continuous capital investment reach 2.5 to 3.5 tonnes; experimental sites with full agronomy support and modern hybrids touch 4.0 tonnes. The gap is not a few per cent but a multiple. The technical frontier is also moving — modern genetics,

intercropping science and precision nutrition mean the achievable yield in 2030 will be higher again — but the smallholder average has barely moved in fifty years.

Behind the headline numbers is a harder truth that does not appear in most policy documents. Coconut palm ownership has fragmented across generations and is often held jointly within extended families. By itself that ownership stake rarely produces an income that can support any single household member full-time. The actual day-to-day work — climbing, harvesting, husking, hauling, drying — is done predominantly by tenant farmers and farm workers under the "kasama" sharecropping arrangement that remains widespread. The owners are typically not the farmers. The farmers are typically not the owners. Formal tenancy and informal share-work arrangements remain significant in many coconut-growing areas, although precise current shares vary by locality and source.

What this means in practice is that coconut is, in many parts of the Philippines, no longer a single meaningful occupation. Many rural households combine coconut income with wage labour, fishing, livestock, small trade and remittances from family members working overseas; in such households, coconut income is often only one component of a wider survival portfolio. The pattern is sector-observed and field-observed rather than precisely measured at the national level for coconut specifically. The big question that follows is the one we keep coming back to: where will the next generation of coconut farmers come from?

It is worth surfacing the gendered shape of this pattern. In many coconut households, visible field work — climbing, harvesting, husking, hauling — is male-dominated, while off-farm income, small trade and remittance management often involve women's labour and networks. Any analysis of coconut household economics that misses this structure under-reads the system; any productivity programme that ignores it will under-perform on adoption.

The reasons the system arrived here are well understood by anyone inside it. The Philippine coconut estate is dominated by senescent palms; the median farmed palm is fifty to seventy years old, past the productive plateau, on a downward yield curve. Replanting is economically untenable for smallholders because the new palm takes five to seven years to come into bearing. Inputs are under-deployed, pest and disease pressure has been chronic, intercropping is practised on perhaps a fifth of farmed area, and the post-harvest chain captures most of the value at a price set by the prevailing CNO benchmark in Rotterdam — with limited transparency and almost no premium for quality, sustainability or traceability.

The result is a structurally low-productivity, low-margin, low-resilience system that is also presented to the world — in marketing materials, development reports, supermarket shelves — as a sustainability story. The dissonance between the lived economic reality of the coconut farmer and the sustainability narrative around the product is the single largest moral and strategic problem in the sector. It is also the problem this paper sets out to solve.

2. The productivity gap is the poverty gap — and the "single occupation" gap

The income arithmetic is worth doing explicitly, because the abstraction of "productivity" obscures a household-survival equation, and the multi-occupation reality changes how the arithmetic should be read.

A coconut smallholder operating two hectares at a yield of around 0.7 tonnes of copra-equivalent per hectare per year — a value within the commonly cited 0.5–1.0 tonne range — produces roughly 1.4 tonnes of copra annually. Sold at the prevailing farmgate price (over the past five years averaging between USD 550 and USD 750 per tonne), the gross income from coconut on those two hectares is in the order of USD 770 to USD 1,050 per year. Net of inputs, harvesting labour, transport and post-harvest losses, the household retains perhaps sixty per cent of that — a coconut income of roughly USD 1.30 to USD 1.70 per day for a household of five. In coconut-dominant regions of Mindanao, Bicol and Eastern Visayas, poverty levels are commonly reported above the national average.

Coconut-farming households are consistently identified in Philippine policy literature as among the poorest agricultural groups in the country. It also explains why the children of coconut farmers do not, on the whole, become coconut farmers. And it explains why, for the worker who climbs and harvests the palms, coconut is rarely the only occupation: two or three other jobs — wage labour on neighbouring farms, fishing, motorcycle-taxi work, small-scale trade — are typical. Each is a piece of the patchwork that lets a household survive month to month.

The system is also gendered. In many areas the tenant climber, husker and hauler is overwhelmingly male, while the off-farm income that subsidises coconut at the household level often involves women's labour, small trade and remittance networks alongside men's coconut work.

The strategic point is that the productivity question and the "single meaningful occupation" question are the same question. The minimum yield, margin and price stability at which coconut farming becomes a viable single occupation is the productivity threshold. Below that threshold, coconut is necessarily one job among several. Above it, it can support a household on its own and begin to fund the reinvestment the next generation requires. Closing the productivity gap is not merely income arithmetic; it is the difference between a sector that exists as a residual livelihood and a sector that exists as an industry. Lionheart's working definition of success is the second of those.

A sustainability story alone will not fix this. The premium that organic, regenerative and Fair-Trade-aligned certifications attract — which Lionheart has captured — is real and meaningful, but the order-of-magnitude problem is not a fifteen per cent premium on a low-yield system. The order-of-magnitude problem is a low-yield system. At three tonnes per hectare instead of 0.7, the same premium would be transformative. At 0.7, no premium is transformative.

The conclusion is operationally clear: in coconut, sustainability is downstream of productivity, and productivity is what allows the work to become a single, dignified, full-time occupation again. A farmer who is not solvent cannot afford to be sustainable. A farmer who is not productive cannot be solvent. And a sector in which farming is one of three part-time jobs cannot retain the next generation.



Figure — The Philippine coconut math — household income arithmetic at prevailing yields and farmgate prices. (Source: FEU keynote, 28 April 2026, slide 4)

PART II

The Thesis

Part II · The Thesis

> *If the productivity gap is the poverty gap, then the load-bearing variable in the sustainability chain is productivity itself. This part of the paper sets out that thesis and shows why traditional management approaches, regardless of effort, cannot deliver it at smallholder scale.*



Figure — The thesis in one line — productivity is sustainability; if we cannot provide meaningful livelihoods, there will be no next generation of farmers. (Source: FEU keynote, 28 April 2026, slide 5)

3. Productivity is sustainability — the chain

The thesis can be stated in one line: productivity is sustainability, because productivity is the only variable in the sustainability chain that, when solved, makes every other link feasible.

The chain is short. Productivity drives gross margin. Margin drives equitable income. Income drives household reinvestment. Reinvestment drives continuity into the next generation — children who study, who go to university, who choose to come back to the farm or to the agri-sector because there is something there to come back to, including the chance to make coconut farming a single, dignified occupation rather than one part-time job among several. Each link presupposes the one before it. Cut any link and the system collapses into dependency.

The strong corollary, sometimes uncomfortable, is that sustainability commitments by themselves do not break the dependency cycle. Certifications, fair-trade-aligned premiums, regenerative-practice protocols, ESG reporting frameworks — all are necessary conditions, and Lionheart maintains them rigorously. None

is a sufficient condition. The sufficient condition is a productivity uplift large enough to pay for everything else.

What changes the picture is not a new certification scheme or a new donor programme. What changes the picture is a structural increase — potentially a step-change in management density, with order-of-magnitude effect in selected workflows where the baseline is highly manual and fragmented — in the management density and operational granularity we can apply to a smallholder farm. That is what AI-native operating models, on top of a stack of complementary technologies, make possible for the first time. It is, in the most literal sense, what "productivity is sustainability" means in practice.

4. Why traditional management cannot scale smallholder tropical agriculture

Smallholder tropical agriculture is a high-variation, low-margin, geographically distributed system. Each farmer is different. Each parcel is different. Each palm is different. Each season is different. The variability is biological, not industrial — it does not lend itself to the standardisation logic that built modern manufacturing. Yet for fifty years the dominant management response has been to standardise: one fertiliser protocol, one spacing recommendation, one harvesting cadence, applied across millions of hectares of structurally heterogeneous farms.

Standardisation is administratively convenient. It is also yield-destructive — and unfair to the worker. A standardised fertiliser regime under-supplies the high-demand farms and over-supplies the low-demand ones. A standardised harvesting cadence misses optimal nut maturity on most palms most of the time. A standardised work-norm penalises the worker assigned to the harder palms and rewards the worker assigned to the easier ones for reasons that have nothing to do with effort or skill. The result is a yield distribution dominated by its low tail, and a workforce that experiences the system as arbitrary.

The alternative — bespoke management per farmer, per palm, per soil pocket, per harvest condition — has been understood since the early colonial-era plantation studies. In practical terms, the factor-three claim is the difference between prevailing smallholder yields of roughly 0.5 to 1.0 tonnes copra-equivalent per hectare and well-managed systems capable of roughly 2.5 to 3.5 tonnes per hectare; the uplift should not be attributed to management alone but to the combined package of management density, genetics, nutrition, pest control, replanting and harvest discipline. Done well, the change also dignifies the work, because the worker's effort and the work's difficulty become legible.

The reason it has not been deployed at smallholder scale is not a failure of insight; it is a failure of arithmetic. To deliver bespoke management at the country's coconut estate, the Philippine sector would need a professional agronomic and field-management capacity far larger than it currently has. The actual number deployed is a small fraction of what bespoke management would require, and the public

extension service is structurally under-funded — one extension agent per two to five thousand farmers is typical.

Even on the largest, best-capitalised plantation companies in tropical agriculture, the management-density wall is real. Once a company exceeds a few thousand hectares, per-palm decision quality degrades, no matter how many agronomists it hires. The wall is not an industry failure; it is a mathematical one. Human management does not scale linearly with biological variation, and biological variation is what coconut is.

Until now. What artificial intelligence — specifically, the new generation of agentic, multimodal, edge-deployable AI — combined with the broader technology stack of sensors, drones, mobile devices and increasingly capable field robotics, changes is the unit cost of management itself. A trained agronomic AI agent, deployed on a phone, advised by a small human team, can in principle hold the productivity-relevant state of every palm in a portfolio in working memory and act on it in near-real time. Management density that was financially impossible at any scale is now technically routine. That, and not anything else, is the point of inflection the sector has been waiting for.

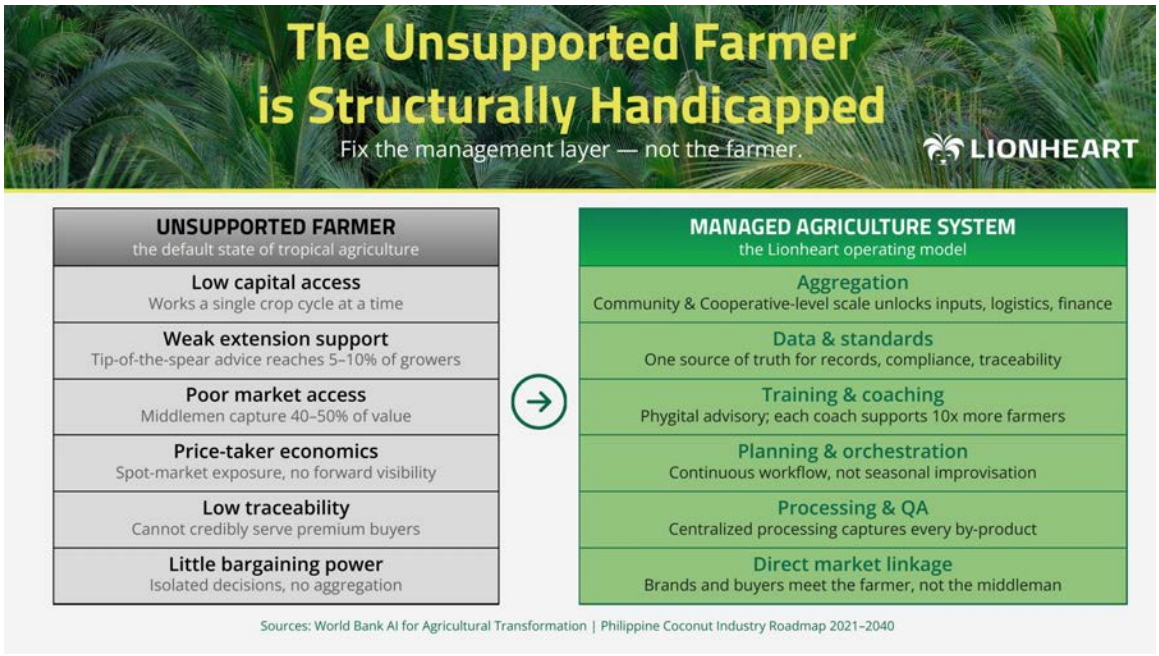


Figure — Why traditional management cannot scale smallholder tropical agriculture — the unsupported farmer is structurally handicapped. (Source: FEU keynote, 28 April 2026, slide 6)

PART III

The Operating Model

Part III · The Operating Model

> *If the productivity equation is now solvable, the question is what kind of company can solve it at scale, what kind of architecture that company runs on, and how the human-machine boundary is governed inside it. The chapters of this part set out the AI-native operating system end to end. The reference card on the next page summarises it on a single page; refer back to it as you read.*

OPERATING SYSTEM AT A GLANCE

A one-page reference card to the architecture described in this Part. Keep this page open while reading the chapters that follow.

FIVE OPERATING ELEMENTS	WHAT IT IS / WHO IT TOUCHES
Edge intelligence	AI capacity at every value-creating point — the palm, the farmer, the storefront — sitting on top of an appropriate stack of sensors, mobile devices, drones and increasingly task-specific robotics.
Domain-trained AI engines	Purpose-built engines per problem class. Huginn (commerce, operational on Amazon, extending across 18 Phase-1 storefronts). Palawan agents (early trial, on Gemini + BigQuery). Agricultural engine in early design.
Cross-platform data fabric	Single governed data substrate connecting farmer records, agronomy observations, supply-chain ledgers, marketplace performance and social-listening signals. Built on a decade of structured digitalisation discipline.
Governance layer	Six rules under an explicit doctrine of humans in / on / above the loop. Without it, the agent fleet drifts. With it, capability compounds.
Human supervisory layer	2–5 humans per cluster of 50–100 agents. Designers, stewards and guardians who reinvest agent-saved time into more contact with farmers and tappers — the handholding principle.

AGENT CHART	GOVERNANCE — SIX RULES	16-CONDITION PRODUCTIVITY MATRIX
2–5 humans : 50–100 agents Each agent has: • a named human owner • a written mandate • a defined escalation path **Three positions of the human:** • IN the loop — approves every consequential action (high-stakes) • ON the loop — monitors, intervenes only on flagged exceptions (steady-state) • ABOVE the loop — sets policy, mandates, governance rules	1. Every agent has a named human owner. 2. Every agent has a written mandate (what for, what not for, what to escalate). 3. High-stakes decisions stay human. 4. Data governance is mission-first; farmer trust is the operating ceiling, not the regulatory floor. 5. Audit trail by default — every agent decision is logged in reviewable form. 6. Reflection loops are formalised — weekly, monthly, quarterly review of agent behaviour.	**Cultivation conditions:** Soil moisture · Soil organic matter Leaf N, K, Mg Coconut-mite pressure Rhinoceros-beetle pressure Intercrop cover · Weed pressure Canopy density Replanting age cohort Tropical-storm exposure window **Harvest & labour conditions:** Harvest-readiness scoring Harvesting cadence Harvest-condition difficulty (height, slope, accessibility) Smallholder cash-flow position

Detailed treatment in Chapters 7 (five elements) · 8 (agent chart) · 9 (matrix) · 10 (governance).

5. Tech and AI as the management multiplier — and Lionheart's trajectory

It is worth being precise about what we mean by tech and AI as a management multiplier. We do not mean a chatbot bolted onto an existing process, or a forecasting tool consumed in dashboards by head office, or the automation of a single task. What we mean is a fleet of domain-trained AI agents, each with a defined mandate, running continuously inside an operating company on top of a stack of complementary technology — sensors in the field, drones for canopy and yield estimation, mobile devices in the hands of field operators, traceability-grade scales and ledgers in the post-harvest chain, and increasingly task-specific robotics. The agents observe, decide, act and report; the underlying tech stack supplies the eyes, the ears and increasingly the hands. The boundary between agent decisions and human decisions is explicit and is set by the company's governance rules. High-stakes decisions stay human. Critically, the time saved by the agents is reinvested deliberately into more human contact — more handholding, more coaching, more farmer-facing presence — rather than spent on overhead reduction.

What this changes structurally is the relationship between management quality and headcount. Before AI agents, every additional unit of management quality required an additional unit of headcount; the productivity ceiling of a farm or a brand was bounded by how many agronomists or e-commerce managers a company could afford. With AI agents in the operating layer, a doubling of management quality may require no additional headcount, because the marginal agent costs almost nothing to run. Headcount is replaced, in part, by model quality, supervision quality and the granularity of the underlying tech stack. The implication for tropical agriculture is direct: the constraint on smallholder productivity has always been management density, and AI-native operating models can deliver a step-change in management density — potentially an order-of-magnitude improvement in selected workflows where the baseline is highly manual and fragmented.

Lionheart's position on this is, candidly, unusual. We have been committed to digitalisation since the company was founded. The disciplined planning, process design, workflow definition, systems architecture and data accumulation we have done over the past decade — much of it long before the current AI cycle — is the substrate on which what we have built so far now sits. AI for us is not a sudden adoption; it is an evolution we have been preparing for. It is a game change, but one we are well placed to absorb because the digital plumbing was already there.

The discipline that built that digital plumbing was forged on the demanding ground of a 24/7 sap operation in Rizal, Palawan, in partnership with the Indigenous Peoples Community on whose ancestral land we operate. We run an internal programme — Lionheart Academy, of which weekly Learning Saturdays are the visible part — as the principal vehicle through which our team builds the agronomic, operational, digital and AI capability the company depends on.

It is worth saying more about that partnership, because it shapes the operating model in ways that are easy to miss. Lionheart Farms operates on ancestral domain land under a partnership with the Indigenous Peoples Community established through a completed Free, Prior and Informed Consent (FPIC) process — the formal recognition mechanism through which Indigenous Peoples in the Philippines consent to commercial activity on their ancestral domain. The partnership is managed in line with IFC Performance Standard 7 on Indigenous Peoples, the international benchmark for ancestral-domain operations adopted by major development finance institutions. We treat the partnership as integral to how the company runs each day rather than as a separate compliance function: governance, livelihood programmes, training and benefit-sharing arrangements sit inside the operating model, not next to it.

Lionheart Farms is being built AI-native from the operating model inward, on that foundation. The company is small enough to do this without unwinding decades of legacy process; that is, in this sense, a competitive advantage. The next chapters set out what the operating model actually looks like.

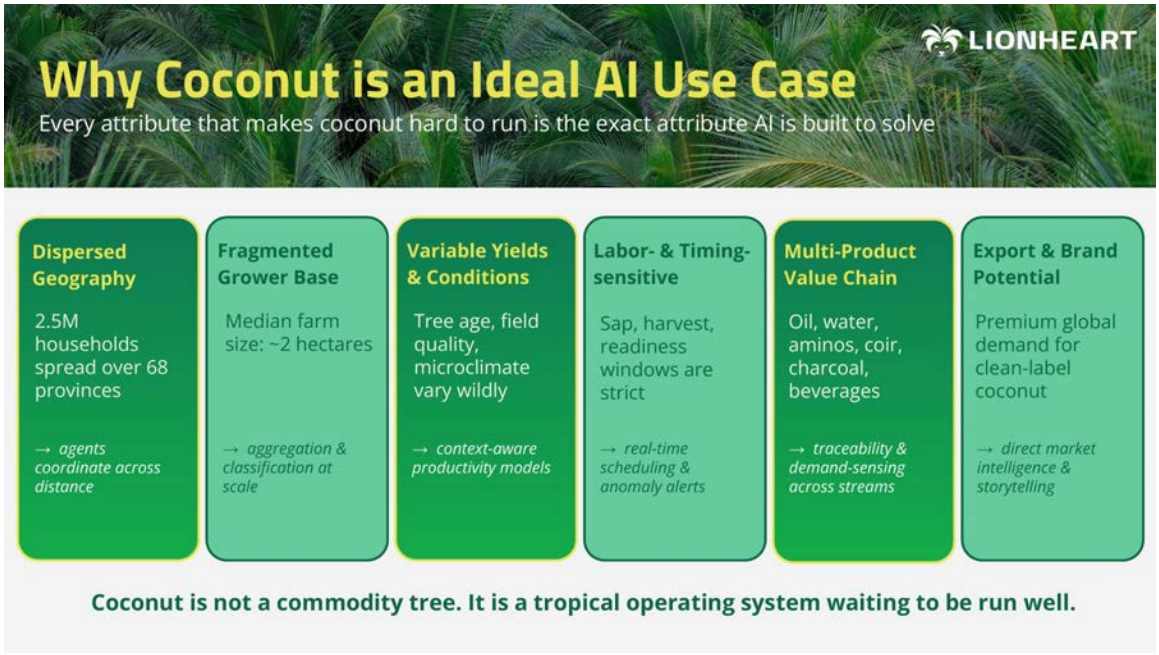


Figure — Why coconut is the perfect AI use case — high variation, high frequency, high information density. (Source: FEU keynote, 28 April 2026, slide 7)

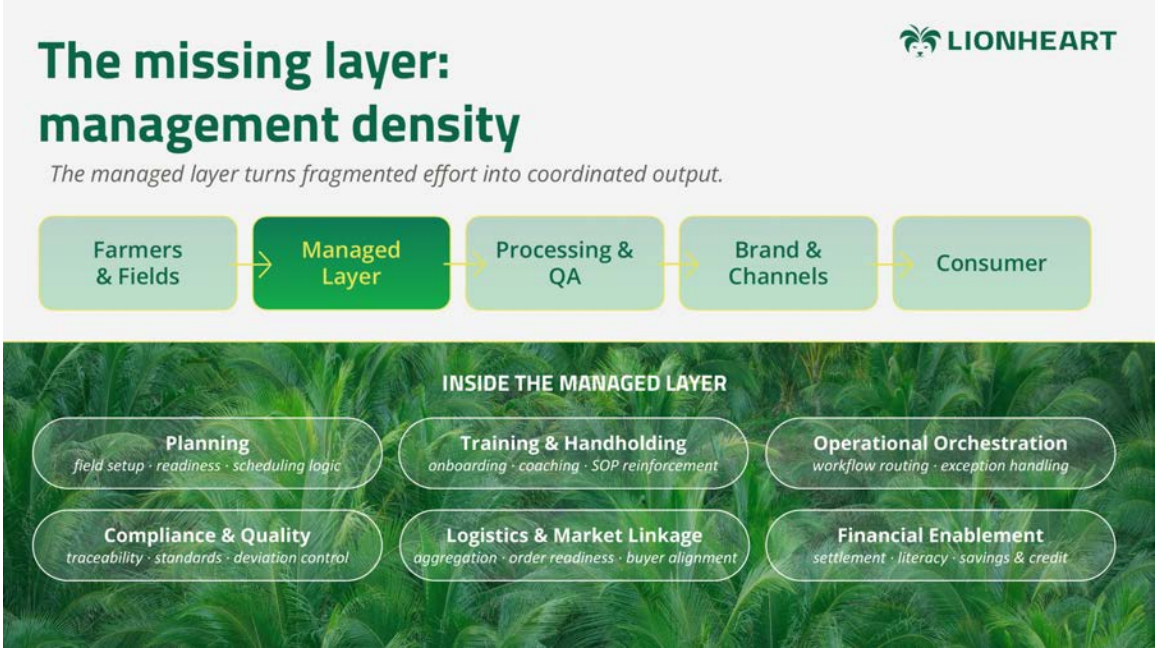


Figure — The missing layer — management density is the constraint AI now lifts. (Source: FEU keynote, 28 April 2026, slide 8)

6. Where Lionheart plays — and where we are heading

The MIT Center for Information Systems Research has published a four-quadrant framework — set out by Peter Weill and his co-authors at MIT CISR in their work on AI-era and future-ready business models — that we have found genuinely useful for situating Lionheart's strategic position. The framework maps a company along two axes: breadth of offering to end customers, and degree of control over its value chain. Four postures emerge: Existing+, Modular Curator, Customer Proxy, and Orchestrator.

Existing+ is the company that uses AI and digital tooling to do what it already does, slightly better. The vast majority of incumbents sit here. Modular Curator assembles reusable capabilities and modules across functions — the posture of platform players in adjacent industries. Customer Proxy acts on behalf of a defined end-customer segment across a curated set of products — the consumer-aggregator posture. Orchestrator acts on behalf of both the producer (the farmer) and the customer (the retailer and end consumer), coordinating outcomes across the full value chain.

We want to be honest about where Lionheart sits today and where we are heading. Today, Lionheart is best described as an Existing+ company that has done the digital and operational work to create an unusually clean platform on which the next quadrant can be built. We are now actively moving toward Modular Curator: building reusable, well-governed, well-documented operating modules — Huginn for cross-channel commerce, the Harvest Productivity Agent and the Field Setup and Harvest-Readiness Agent in early trial in Palawan, the Two-Track capital architecture, the data fabric beneath them, the Lionheart Academy that teaches them. Modular Curator is not the destination; it is the bridge. The

destination is Orchestrator: the entity that coordinates outcomes across farmers, processors, retailers and end consumers across the entire chain. We are planning and executing toward that destination, and we expect the move from Modular Curator into Orchestrator to be the work of the next several years.

The strategic point we want to make to investors, government partners and academic observers is that the prize on offer in tropical agriculture is not a better-managed CPG company. It is the orchestrator entity for an entire commodity chain. Most companies are using AI inside the old business model. The real prize is a new business model that AI makes possible, and the path to it is a sequence — Existing+, Modular Curator, Orchestrator — not a leap.



Figure — The MIT CISR four AI-era business models — Lionheart's trajectory: Existing+ today, Modular Curator next, Orchestrator destination. (Source: FEU keynote, 28 April 2026, slide 12)

7. The 89/11 distributed model and Lionheart's five operating elements

Once the strategic destination is set, the operating-model question is how to organise an enterprise that can credibly act, in time, as an orchestrator. The most useful framework we have found is the distributed-operating-model architecture set out by McKinsey & Company in their Reimagine series, particularly Chapter 13 of the 2025 edition.

The core idea is straightforward. In an AI-native enterprise, roughly eighty-nine per cent of value-creating decisions and actions sit at the edge — in the field, with the farmer, at the digital storefront, in the customer interaction. The remaining eleven per cent sits in a thin coordinating core that sets standards, governs data, manages high-stakes decisions, and reflects continuously on the performance of the edge.

The ratio is not arithmetic precision; it is a posture. The core is small, sharp and indispensable; the edge is large, distributed and dominantly automated.

For tropical agriculture this is a particularly natural architecture, because the value really does live at the edge. A coconut farm produces value at the palm, a sap operation produces value at the bottle, an Amazon listing produces value at the search-result page. None of these moments is in head office. A distributed operating model recognises that and organises decision rights accordingly. The legacy alternative — decisions accumulating in head office while value is created at the field — produces both the latency and the standardisation problems we have already described.

Inside that 89/11 distribution, Lionheart's operating system rests on five elements that, taken together, define what we mean by an AI-native agri-operating company. The Operating System at a Glance reference page (preceding this chapter) summarises all five; what follows here is the substantive treatment.

The first element is edge intelligence. Every value-creating point in the system — the palm, the farmer, the storefront — has dedicated AI capacity directed at it, sitting on top of an appropriate stack of sensors, mobile devices, drones and increasingly task-specific robotics. That capacity is not generic; it is trained on the specific domain in which it is deployed.

The second element is a small portfolio of domain-trained AI engines. Each engine is purpose-built for a class of problem: agronomy, sap-franchise field operations, commerce. Huginn, described in detail later, is the commerce engine. The Harvest Productivity Agent and the Field Setup and Harvest-Readiness Agent currently in early-trial deployment in Palawan run on a Google Gemini and BigQuery foundation while we accumulate the operational learning we need to build a proprietary agricultural engine of our own. There will be more engines over time. Their training sets, evaluation criteria and update cadences are governed centrally and locally evaluated.

The third element is a cross-platform data fabric. Edge agents need a single, governed data substrate to work from — farmer records, agronomy observations, supply-chain ledgers, marketplace performance, social-listening signals. The fabric is what connects them and what prevents the agent fleet from fragmenting into silos. It is also what makes the next agent we deploy easier to build than the last. Our decade-long structured digitalisation discipline is what allows the fabric to be coherent today rather than a project for tomorrow.

The fourth element is the governance layer — six rules described in Chapter 10, sitting underneath an explicit doctrine of humans in, on and above the loop. Without explicit governance, the agent fleet drifts. With explicit governance, it compounds.

The fifth element is the human supervisory layer. In our model, two to five humans supervise fifty to one hundred agents. These are not low-skilled supervisors; they are highly trained operators who design the

agents, train them, escalate from them, and reflect on their behaviour — and who, critically, spend the time the agents free up on more contact with farmers, more coaching of tappers, more handholding of the people the system exists to serve. The supervisory layer is the company's working memory, its conscience and its connective tissue to the community. It is also where the next generation of agri-careers in the Philippines will be created.



Figure — Why management density is the real unlock — the McKinsey 89/11 distributed model. (Source: FEU keynote, 28 April 2026, slide 11)

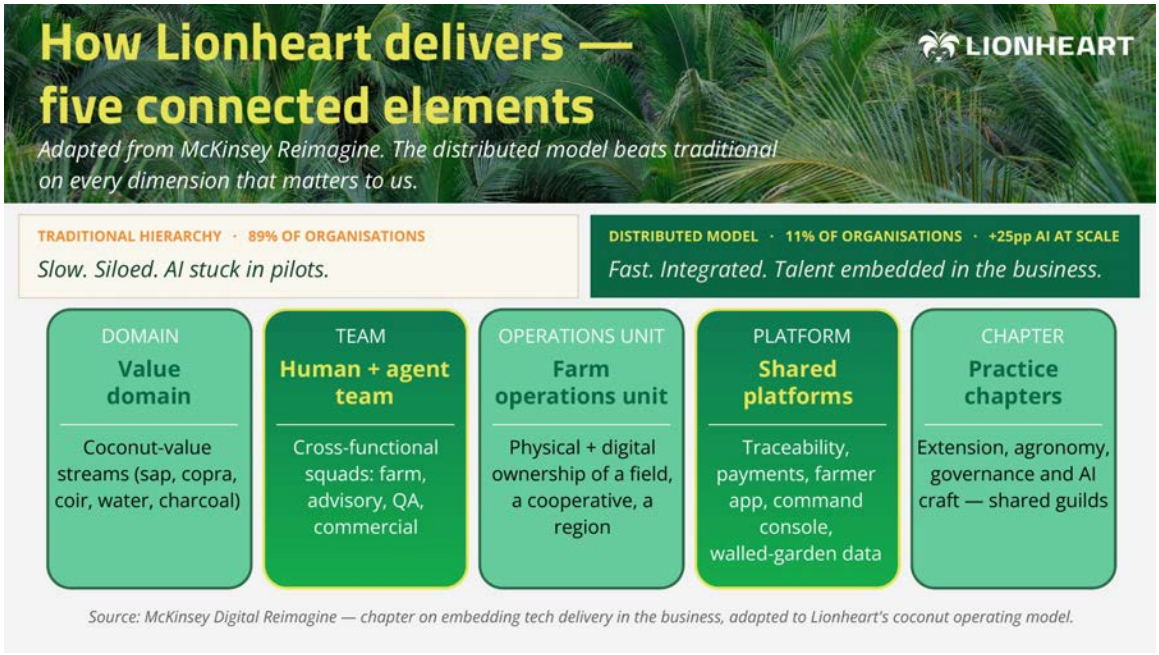


Figure — How Lionheart delivers — five connected elements of the distributed AI operating system. (Source: FEU keynote, 28 April 2026, slide 13)

8. From org chart to agent chart — humans in, on and above the loop

The conventional organisational chart of an agricultural company is a stack of boxes — people in hierarchies, reporting lines flowing upward, instructions flowing downward. This shape was inherited from the manufacturing era and the management consultancies of the mid-twentieth century. It is not a natural shape for an AI-native enterprise.

The natural shape is what we have begun calling, internally, the agent chart. Two to five humans sit at the centre of a cluster; around them, fifty to a hundred AI agents are deployed, each with a named owner (one of those humans), a written mandate and a defined escalation path. The chart is wide and shallow rather than tall and narrow. The reporting lines are not authority lines; they are supervision lines. The humans are not bosses; they are designers, stewards and guardians.

Where the design becomes interesting is in how the human sits relative to the agent. We adopt a three-position doctrine. Humans in the loop approve every consequential agent action before it is taken; this is the position used for high-stakes operations such as material pricing changes, agronomic interventions on at-risk palms, and any externally facing communication under crisis conditions. Humans on the loop monitor the agent fleet in real time and intervene only on flagged exceptions; this is the steady-state operating posture for routine work. Humans above the loop set the policy, the mandates, the boundary conditions and the governance rules under which the agents are allowed to operate at all; this is where leadership, ethics and the company's enduring values live, and it is where most of the work of running an AI-native company actually happens.

The implication for management density is direct. A traditional CPG marketing function staffed by twenty people might handle a single channel well and four channels poorly. A Lionheart marketing function staffed by five people supervising a Huginn-powered fleet across our consumer-facing channels handles many more channels in real time, with a clear ladder of human oversight that scales with the stakes of each decision rather than with the volume of the work.

The implication for talent architecture is more important. The company hires for designer-supervisor-guardian roles, not for executor roles. The skills profile we look for is a hybrid of agronomy or commerce domain depth, model literacy, data competence, judgement, and the temperament to supervise rather than to do. This is, very specifically, the skills profile that the Philippine IT-services sector and the country's top universities — FEU very much among them — already produce in volume.

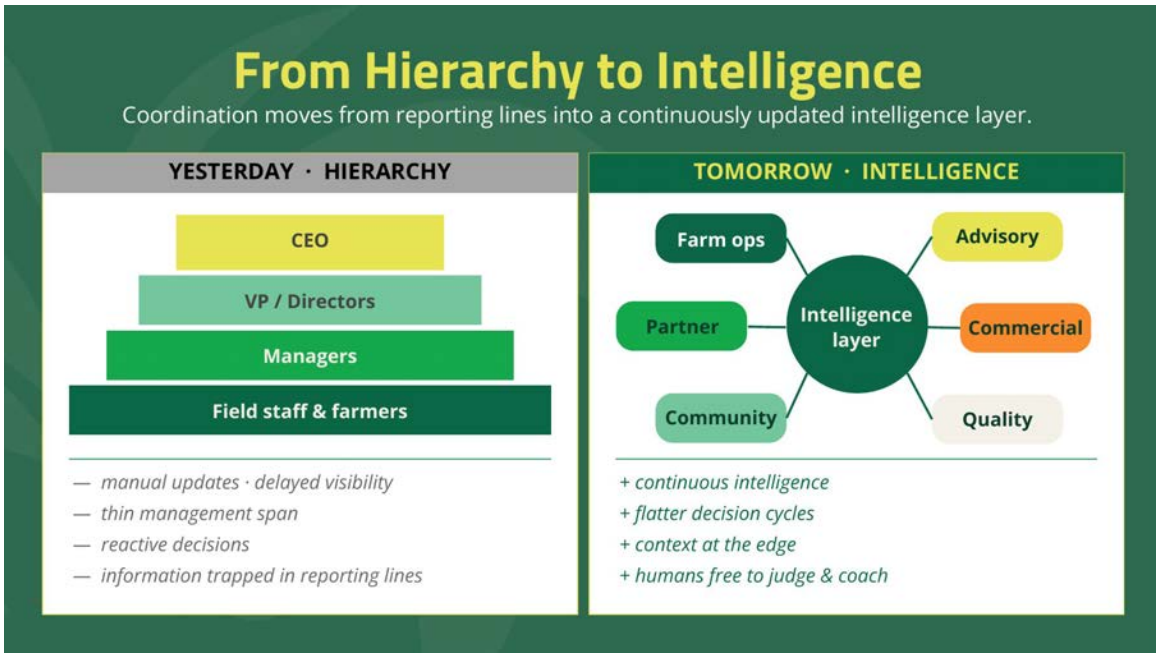


Figure — From hierarchy to intelligence — the agent chart, with humans in, on and above the loop. (Source: FEU keynote, 28 April 2026, slide 10)

9. The 16-condition productivity matrix and the handholding principle

Productivity in coconut, when broken into its operationally meaningful components, can be reduced to roughly sixteen conditions. The exact list varies by site and season, but the canonical version we work from spans both cultivation and harvest. On the cultivation side: soil moisture; soil organic matter; leaf nitrogen; leaf potassium; leaf magnesium; coconut-mite pressure; rhinoceros-beetle pressure; intercrop cover; weed pressure; canopy density; replanting age cohort; tropical-storm exposure window. On the harvest and labour side: harvest-readiness scoring; harvesting cadence; harvest-condition difficulty (height, slope, accessibility); and the smallholder's cash-flow position. Together they describe the operating state of the farm and of the work that has to be done on it.

Each condition, individually, is observable and actionable. The system-level problem before AI was that we could observe perhaps five per cent of palms across a useful subset of these conditions, at low frequency. The remaining ninety-five per cent were managed on the standardised assumption.

What we have built so far moves the matrix into operating reality: the same sixteen conditions are now observable at one hundred per cent of palms in our Palawan operation, at near-real-time frequency, with multimodal capture (photos, sensors, farmer-reported observations) and agent-side interpretation. Where we used to manage averages, we now manage conditions. Where we used to apply protocols, we now apply interventions. Where we used to react to failures, we anticipate them.

The consequences of this granularity run in two directions. The first is the cultivation gain — better-targeted nutrition, better-timed pest interventions, better intercrop matching, better replanting decisions — all of which lift yield. The second is the labour gain — better classification of harvest conditions translates directly into work that is more productive and more fairly distributed. A worker assigned to a difficult-condition palm should not be measured against the same nut-count norm as a worker assigned to an easy-condition palm. With the matrix, that classification is no longer a guess; it is data. The work itself becomes more dignified, because the variation in difficulty is recognised by the system, not absorbed silently by the worker.

We call the philosophy that follows the handholding principle. The company is responsible for setting up the work — the tools, the data, the granularity of the matrix, the agent support — so the worker, the farmer and the field operator can perform at their best. We do not blame the farm worker or the farmer when productivity falls short. We treat that gap as evidence the operating system around them has not been adequately designed. The matrix is, in this sense, as much a labour philosophy as an agronomic one — the operationalisation of a belief that a coconut industry built on dignified, well-supported, full-time work is the only one worth building.

The same logic supplies the answer to a question we often hear from outside the sector: doesn't AI threaten to remove the human touch points from a smallholder-agriculture company? In our model the answer is the opposite. The agents handle the work that used to absorb the supervisor's time without producing community value — the spreadsheet reconciliation, the routing list, the diagnostic triage — and the supervisor's time is reinvested where it always should have been: with the farmer, with the tapper, with the cooperative, in person. AI does not replace the human touch in our work; it scales it.



Figure — The 16-condition productivity matrix — fair productivity-pay requires conditional classification, on the handholding principle. (Source: FEU keynote, 28 April 2026, slide 18)

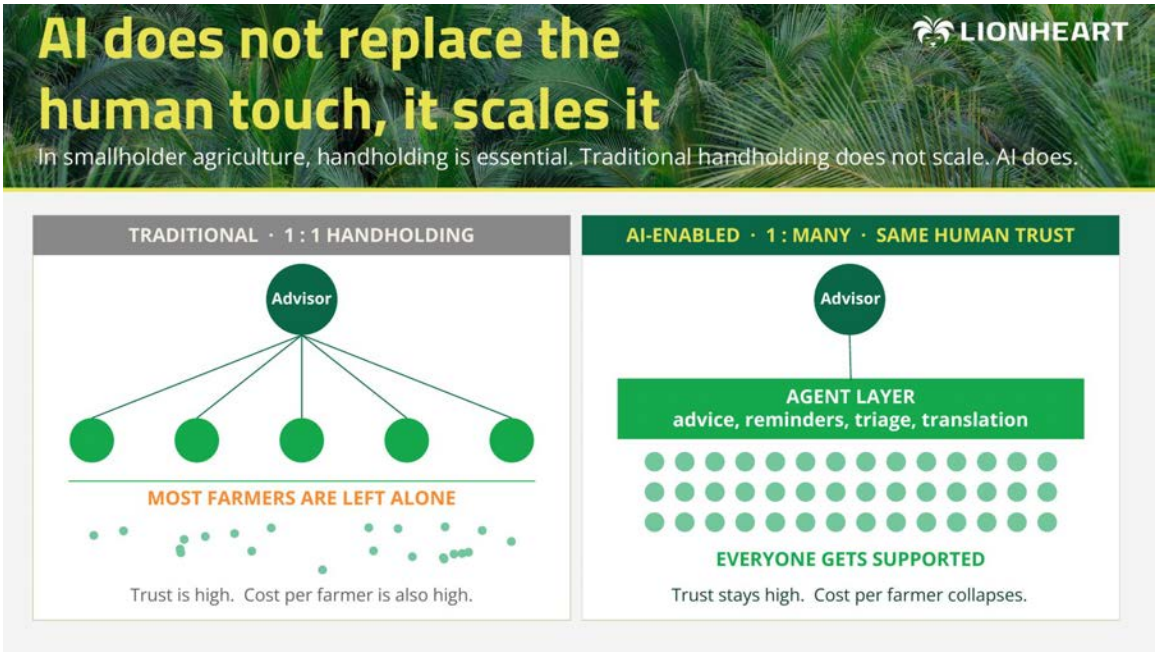


Figure — AI does not replace the human touch — it scales it. The handholding principle, operationalised. (Source: FEU keynote, 28 April 2026, slide 17)

10. Governance — six rules for the agentic enterprise

An agent fleet is only as good as the governance regime that contains it. Without explicit governance, agents drift, accumulate authority by accident, hide bad decisions from supervisors, and corrode farmer trust. With explicit governance — written down, audited, refreshed — they compound the company's capability quarter on quarter. Sitting underneath the three-position doctrine of humans in, on and above the loop, we have settled on six non-negotiable rules. The Operating System at a Glance reference page lists them as one-liners; the substantive treatment follows.

Rule one. Every agent has a named human owner. The owner is accountable for the agent's training, behaviour and retirement. There is no ownerless agent in production.

Rule two. Every agent has a written mandate that specifies what it is for, what it is not for, and what it must escalate. Mandate drift is treated as a critical incident.

Rule three. High-stakes decisions stay human. Pricing changes above defined thresholds, contractual commitments, agronomic interventions on at-risk palms, communications under crisis conditions — these are explicitly out of agent scope, and the agents are designed to escalate rather than act.

Rule four. Data governance is mission-first. Farmer trust is the operating ceiling, not the regulatory floor. Lionheart treats farmer-derived data as held in trust, not as an extractable asset. The implications run from on-device processing where feasible to explicit consent flows for any cross-system data movement.

Rule five. Audit trail by default. Every agent decision — inputs, model used, action taken, outcome — is logged in a form reviewable months later. The system is not allowed to operate as a black box, even where the agents themselves use opaque models.

Rule six. Reflection loops are formalised. Weekly, monthly and quarterly reviews examine agent behaviour for drift, error and emergent patterns. Reviews feed directly into model retraining and mandate revision. The agent fleet is a learning organisation, not a set-and-forget capability. Humans above the loop own these reflection cycles.

These six rules are simple to write and difficult to maintain. The discipline of maintaining them is what we believe will distinguish the AI-native operating companies that endure from the ones that get into trouble.



Figure — Governance — how people and agents work safely together. (Source: FEU keynote, 28 April 2026, slide 14)

PART IV

Lionheart in Practice

Part IV · Lionheart in Practice

> *The operating model is in production today. This part presents the Two-Track commercial strategy, the three live demonstrations shown at the FEU keynote, the next engine — agricultural and now in early design — and a "What we are watching carefully" box of open challenges and live questions.*

11. The Two-Track Strategy — one operating philosophy, two coherent capital structures

Lionheart operates a Two-Track Strategy, which is the commercial expression of the operating model set out in Part III. We want to set out each track precisely, because they are differently mature, differently structured and differently financed — even though they share a single operating system, brand and set of values.

Track One — the coconut-sap franchise — is the business model we are currently executing. Our farm in Rizal, Palawan has been built and optimised for sap harvesting and production. The harvest hierarchy is sap first; then plant material to support replanting programmes; and finally any nuts we cannot direct into sap or plant material, which we treat as surplus. The sap operation is the spine. Coconut sap is a remarkable raw material — nutritionally rich, functionally versatile — but it is also volatile in the literal sense: once tapped, it has to be processed within hours or it spoils. That single fact organises the entire operation. We run twenty-four hours a day, seven days a week, with farm and factory tightly integrated. The brand pillar of Track One is our SLOW range of coconut-sap drinks, launched internationally at ExpoWest 2026 in California, with parallel formats in sap sugar, sap concentrates and ingredient-grade sap derivatives now being introduced into priority markets.

Inside Track One sits our Partner Farm Program, which extends the Lionheart sap model into existing coconut farms across southern Palawan, integrating those farmers and their land into the same disciplined sap-and-quality system that our own farm runs on, with the same agronomy support, harvest scheduling, quality protocols and payment terms. The Program is how we scale Track One without simply consolidating land. It also begins to do something the traditional coconut sector has never managed at meaningful scale: align the smallholder, the brand and the international consumer on a single value-capture chain.

Track One is not just our revenue line; it is the operating school in which the rest of the company has been forged. A 24/7 sap operation with hours-to-process raw material does not tolerate ambiguity in scheduling, quality, traceability or supervision. The disciplined operating model described throughout this paper has been built on the unforgiving ground of that operation. Every operating capability we will deploy in Track Two has been earned, and is being earned, in Track One first.

Track Two is the longer-term programme to address the traditional coconut value chain. The economics are different. The agricultural practice is different — traditional whole-nut harvesting on cycles measured in months, not the daily sap-tapping rhythm of Track One. The community structure is different — a denser web of multi-generational ownership, kasama tenancy and existing cooperatives and farmer associations, into which any new operating model has to integrate respectfully and slowly. The market posture is different — predominantly domestic and B2B, in the shape of better-managed cooperative production, better-graded and better-priced copra and value-added derivatives sold into the existing Philippine processing chain. Track Two is, simply, a different operating problem.

Track Two is currently in feasibility study, which is currently planned to conclude in mid-2027. The study is engaging farmers and cooperatives, validating the agronomic and commercial assumptions, mapping the integration with existing institutions, and stress-testing the unit economics under realistic capital structures. Subject to the study findings, our current intention is to operationalise Track Two as a southern-Palawan pilot, with the potential, contingent on pilot outcomes, to replicate elsewhere in the Philippines. None of this is committed today; the feasibility study is precisely the vehicle through which the commitment, the scope and the timing will be set.

The two tracks are positioned differently in the market. Track One is direct-to-consumer and brand-led, designed to bring Filipino-made, farmer-anchored coconut products to international shelves on margins that flow back to the farmer and the host community. The brand is the engine of shared value: the consumer pays for a story that is verifiable, the retailer is offered sustainability data they can stand behind, the farmer earns a price that supports a meaningful livelihood. Track Two is more domestic, more business-to-business, more cooperatively integrated into the existing coconut industry. The two are designed to be complementary, not competitive — different doors into the same long-term mission.

An important part of building market and brand for Philippine coconut is the move away from selling on FOB Manila terms — selling cocoa-style ingredients in bulk to international buyers, or producing private-label products for someone else’s brand without the Philippine DNA in the bottle. That model has its place, but it is not how livelihoods, host communities or country-of-origin equity get built. Brand and market access — owned, controlled, told from the Philippines — are what build long-term stability, livelihoods with purpose and meaningful lives in the host communities. That conviction is the organising thesis of Track One, and over time will inform Track Two as well.

Both tracks are part of Lionheart, led by Lionheart and managed by Lionheart. They share a single AI-native operating system, a single data substrate, a single set of farmer relationships, a single brand and a single governance regime. They are not separate companies; they are two coherent expressions of one operating philosophy. At the same time, they have meaningfully different return profiles, time horizons and risk characteristics, and they will accordingly attract different capital pools — equity, debt, mission-

aligned investors, blended-finance facilities — over the coming years. Each track will raise capital appropriate to its own economics, while operating inside a shared platform.

Both tracks are being executed deliberately. Much of this is greenfield work, particularly Track Two, and we are realistic about the time required to learn the work properly before scaling it. Lionheart Academy and the operating discipline are how we give that learning room to compound.

12. Demo 1 — the Harvest Productivity Agent (Palawan, in early trial)

The first of the three live demonstrations at the FEU keynote on 28 April 2026 was the Harvest Productivity Agent, a workforce-planning and performance-evaluation agent currently in early-trial deployment with our Track One sap operation in Palawan.

To understand what we have built so far, it helps to picture the work the agent serves. Before the sun fully rises on a typical morning at our Rizal farm, a group of workers we call tappers begin their day. Their job is to climb coconut palms — short ones, tall ones, hundreds of them across a workforce of more than a thousand active tappers — cut into the unopened flower bud, and collect the sap that drips out. Sap does not wait. There are specific windows in the day during which the bud has to be cut, the tap made, the collection vessel emptied, or the yield is lost for that palm on that day. The operational question is daily and unrelenting: who goes to which palm, in what sequence, in which window, given each tapper's speed, skill, and the conditions of their assigned area.

Pre-agent, that question consumed a recurring four-person, four-hour daily commitment from the planning team. They reconstructed yesterday's work, evaluated the count of palms tapped against the count expected, identified gaps, and built today's assignments by hand. Even with that effort the result was approximate, because some tappers were faster, some more consistent, some newer to the work, and assigning them by hand introduced variation that had nothing to do with their performance. Underneath the planning sat an evaluation problem: how do you fairly grade a tapper who works a difficult cluster against one who works an easier one? Pre-agent, you could not — at least not with the consistency that fairness in operational work requires.

The agent we have deployed addresses planning and evaluation together. It looks at each tapper's record — palms covered, consistency over time, output against a normalised standard for the conditions they were operating in — and grades each tapper on the same set of criteria, every day. The grading then drives the next day's plan: who covers which palms, in which sequence, in which window. The agent surfaces three things to the supervisor on a single screen: the top performers, the patterns of underperformance broken down by tapper and cluster, and the distinction between effort that is genuinely lacking and conditions that are genuinely difficult. The supervisor's job is then to coach.

What we showed at FEU was the agent answering operator questions in plain language. The first prompt asked for the top-performing tapper for March 2026 by average score. The second asked for an individual analysis of a specific tapper — Jomel Gustam — for the same month: consistency, daily scores, performance against grading parameters. The third asked the same of another tapper, Alberto Magpiong, whose profile was deliberately different. The point of running the demonstration with named individuals was to make tangible something that matters operationally and morally in equal measure. Both Jomel and Alberto are evaluated by the same criteria. There is no favouritism, no manager bias, no hand-pulled-record gap, nobody slipping through because there was not enough time in the day to review everyone. Recognition becomes data-derived; coaching becomes targeted; reward becomes defensible.

The four people, four hours a day previously absorbed by planning and evaluation can now be reinvested. They are reinvested, deliberately, into more time with the tappers themselves — coaching, training, accompanying, problem-solving. This is the handholding principle of Chapter 9 in operational form: the agent handles the cognitive grind that produced no community value; the supervisors spend the recovered hours on the human touch points that produce all of the community value. The yield consequence — more palms tapped at the right windows, with sap collected before it is lost — is the second-order effect of getting the first-order operational discipline right.

The Harvest Productivity Agent runs on Google Gemini, with BigQuery and BigQuery ML as the underlying data and learning substrate. We have not, deliberately, built our own agricultural AI engine yet; the operational learning the early-trial agents are accumulating today will be what we train the next engine on. We are working toward an indicative target of roughly one hundred agents of this and similar types operational across the Palawan operation by year end, subject to operational milestones and the rate at which the early-trial learning compounds, supervised by a small human team under the humans-in, humans-on and humans-above-the-loop doctrine.

It is worth flagging, because Fair Trade and academic reviewers will rightly do so, that the tapper workforce in coconut is overwhelmingly male, while women hold a meaningfully larger share of the processing, quality, supervisory and commercial roles inside Lionheart. The handholding principle and the management-density argument apply across both.



Figure — Live Demo 1 — the Harvest Productivity Agent (Palawan, in early trial; condition-normalised tapper grading, daily workforce planning, coach-ready output). (Source: FEU keynote, 28 April 2026, slide 15)

13. Demo 2 — the Field Setup & Harvest-Readiness Agent (Palawan, in early trial)

The second live demonstration showed the Field Setup and Harvest-Readiness Agent in action. Where the first agent organises the daily work of the tapper team, this second agent organises the data integrity that everything else in the Track One sap operation depends on.

The problem the agent addresses is, on its surface, an audit problem. Like every commercial sap operation, Track One taps a portfolio of rented palms — palms whose sap rights we have leased from the farmer-owners who hold the land — and we pay for those rights on a per-palm basis. The sap-yield figures we report downstream are calculated from how many of those rented palms are operationally productive in any given week. Two numbers therefore have to be right at all times, every week: the count of palms in the rental contract, and the count of palms actually being tapped. They have to match across the live monitoring sheet, the rented-palm masterlist and the factory intake records, field by field, code by code, supervisor by supervisor. The bill we pay, and the yield we report, are only as defensible as the chain of evidence underneath them.

Pre-agent, the audit cost two full eight-hour days each week. Two people cross-referencing hundreds of field codes against three or four data sources, asking the same questions: which field is this, which supervisor owns it, is the discrepancy a one-time error or has it been wrong for three weeks. Even with two days, the result was approximate, because data ambiguity built up faster than human reviewers could resolve it. Reviewers filled gaps with educated guesses; they moved on when something was unclear.

Every guess compounded: a wrong palm count in week one became a wrong yield figure in week two became a wrong invoice in week three. We learned, painfully, that a wrong audit is operationally worse than no audit.

The agent does four things. First, it scans palm-count data across all harvest zones and flags any palm uncounted or uncategorised, placing every field code into a clear accountability status. Second, it traces each discrepancy to the responsible field supervisor, distinguishes one-time errors from recurring patterns, and quantifies the variance against the master capacity. Third, it builds the audit trail end to end — linking each palm-level field record to the factory intake batches that depend on it — so every sap-yield figure reported downstream can be traced back to a verified palm count at the source. Fourth, it acts on the findings: supervisors are notified of specific field codes where their gaps sit, work corrections are triggered, and management has the option to accept, escalate or override the agent's accountability assignments. The human decision stays human; the agent does the underlying work that used to consume two human days every week.

One design choice is worth surfacing, because it captures something important about how AI agents should be built for serious operational work. The agent refuses to guess. If a query is ambiguous — which week, which supervisor, which column — the audit does not start. The agent pauses and asks for clarification. We took that decision deliberately, after watching how human reviewers, under fatigue and time pressure, tended to do the opposite. A wrong audit is worse than a delayed audit.

What we showed at FEU was the agent answering two operator questions in real time. The first asked which field codes had uncounted palms for the most recent week, and which supervisors were accountable for each gap; the agent pulled from the live monitoring sheet and the rented-palm masterlist simultaneously and produced, in seconds, the answer that had previously absorbed a morning of manual cross-referencing. The second asked whether any field codes had carried recurring uncounted palms across multiple weeks, and which supervisor showed the most consistent gap. The second answer is the one that matters most: it is the difference between catching a mistake and catching a habit.

The downstream consequences are exactly what one would expect when data integrity is repaired at the source. Palm count is verified against the masterlist rather than recalled from memory. Every gap is assigned to a specific accountable supervisor. Two days of weekly audit work compress into a process that runs in minutes. The same criteria are applied to every field code, every week, without fatigue and without drift. Most importantly, the billing becomes defensible: every sap-yield figure can be traced, palm by palm, field by field, week by week, back to the source.

As with the first agent, the Field Setup and Harvest-Readiness Agent runs on the same Google Gemini and BigQuery foundation, and we are working toward the same indicative year-end target across this class of agents, subject to operational milestones. Should the feasibility study support it, the Track Two operation, when it moves into pilot in southern Palawan, will require its own audit and accountability infrastructure

— quite different in shape, because traditional whole-nut harvesting cycles, cooperative-integrated supply, and the longer cadence of intervention all demand a different audit model. The principle, however, transfers directly. Data integrity is the precondition for everything else.



Figure — Live Demo 2 — the Field Setup & Harvest-Readiness Agent (Palawan, in early trial; rented-palm audit, supervisor accountability tracing, defensible billing chain of evidence). (Source: FEU keynote, 28 April 2026, slide 20)

14. Demo 3 — Huginn, our proprietary AI engine for cross-channel commerce

The third live demonstration was the most ambitious, and it is the part of the Lionheart operating model that we believe will be of greatest interest to the academic, investor and government readers of this paper.

Huginn is Lionheart's proprietary AI engine for consumer-facing commerce, named for the raven of thought in Old Norse; a paired memory layer, Muninn, is in design. The naming captures the architecture: an active reasoning layer must be paired with a durable memory layer for the system to compound over time.

Huginn is built on open-source technologies and tools throughout. This is a deliberate posture. It keeps the architecture portable, auditable and resistant to single-vendor dependency in a domain where vendor cycles run faster than agricultural-investment cycles. It also keeps the platform legible to the engineering talent we recruit and develop ourselves through Lionheart Academy.

Huginn is currently operational on Amazon, the most demanding marketplace and the one in which the Lionheart brand has international footprint. Our current plan is to extend Huginn progressively across the

eighteen Phase-1 consumer-facing storefronts identified in our roadmap, which we expect to roll out over the coming year subject to channel readiness and integration timelines. Phase 1 is prioritised deliberately around the two markets that anchor our near-term commercial strategy — the United States and China — and around the channels through which Filipino-made, farmer-anchored coconut products can be brought to consumers and partners in those markets at scale.

Concretely, the Phase-1 channel mix Huginn is being designed to manage spans three categories. The first is major marketplace channels: Amazon (US and EU), where we are operational today, and Walmart Online, our second strategic marketplace target. The second is our direct-to-consumer infrastructure — four Shopify-based storefronts running on a global fulfilment platform that, in a single integration, unlocks B2C, B2B and agent functionality. We think of the Shopify rail as our guerilla marketing layer, in the sense that it democratises market access for small batches and emerging products, lets the Our Farm to You story be told at the SKU level, and gives smaller B2B buyers and brand agents a clean way to transact with us without heavy onboarding overhead. The third is the social-commerce surface: Facebook, Instagram and TikTok, where the brand narrative is built and where commerce is increasingly transacted natively.

For Amazon specifically, Huginn has been trained on a deliberately curated knowledge base — 189 YouTube videos featuring named domain experts in Amazon strategy (listing optimisation, advertising mechanics, A+ content design, brand-store architecture, ranking-signal interpretation), plus the publicly available Amazon Academy curriculum. The training set was assembled to give Huginn what we call the Amazon-flywheel mental model — an explicit, machine-legible understanding of how listings, reviews, advertising spend, ranking signals and customer-journey design interact to drive sales velocity. It is the mental model that an experienced Amazon strategist holds tacitly. We have made it explicit, and we have made it operational.

Strategically, Huginn does three things at once. It converts marketing and sales operations from labour-bound to model-bound — the labour ceiling on channels and SKUs is replaced by a model ceiling that improves with training. It creates a defensible piece of intellectual property: the trained engine, the data substrate and the iteration history together constitute an asset a competitor cannot replicate by buying off-the-shelf software. And it positions Lionheart as an AI-native operating company that happens to ship Filipino-made coconut products from the host communities that grew them — a category position we believe will matter more than any specific product positioning over the next ten years.

The forward roadmap for Huginn sits on top of a deeper trend in the global retail sector. Major retailers are opening their operating models to suppliers in ways that did not exist five years ago. Walmart Luminate, the supplier-facing retail intelligence platform, exposes SKU- and consumer-level signals to participating suppliers. Walmart’s Project Gigaton now reports roughly 6,800 participating suppliers and functions as a major supplier-facing sustainability reporting and recognition rail. IBM Food Trust, historically adopted by major food and retail groups including Walmart, Carrefour, Unilever and Nestlé, is

a production-grade traceability infrastructure built on the GS1 standard. EcoVadis, whose 2025 index covers nearly 89,000 companies and approximately 159,000 ratings since 2020, has become a de facto rail for supplier-level sustainability data exchange across Walmart, Target, Carrefour, Tesco and Ahold Delhaize. Amazon's Climate Pledge Friendly programme is a parallel rail in marketplace context, highlighting products recognised by approved sustainability certifications and now covering more than two million products. Together they constitute a production-grade supplier-to-retailer data fabric that did not exist a decade ago.

The regulatory direction-of-travel is real, even if the path is more uneven than it appeared twelve months ago. CSRD in Europe — even after the EU Omnibus simplification process and the Stop-the-Clock deferrals for later waves — continues to anchor supplier sustainability-reporting expectations and remains legally active for first-wave companies; the directive's scope and depth for later cohorts are being narrowed and simplified, but the structural posture set in 2022 is still in place. In the United States, federal climate-disclosure rules remain legally uncertain — the SEC's March 2024 climate-disclosure rule was stayed in April 2024 pending litigation, and in its final form did not require Scope-3 disclosure (Scope-3 was dropped from the proposal before adoption) — but investor, retailer, state-level and customer-driven sustainability-data expectations continue to move in the same direction. Walmart, Tesco, Target and others have set hard upstream emission-reduction targets — Walmart's public goal is one gigatonne of CO2-equivalent reductions by 2030. Retailers cannot meet those obligations without supplier-level sustainability data flowing to them in machine-legible form. That demand creates the rail; the rail creates the opportunity for AI-native suppliers to differentiate themselves on the depth and verifiability of the sustainability data they share.

The forward design of Huginn, and the strategic posture of Lionheart, follows directly. We are building Huginn toward two complementary capabilities. The first is bidirectional data integration with major retailers — inbound, real-time signals on SKU performance, search rank, inventory and advertising attribution; outbound, automated content publishing, pricing adjustments, campaign management, and verifiable sustainability and farmer-impact data published into the retailer's own sustainability infrastructure. We call the strategic posture this enables our Farm-to-You model: the same farmer record, the same agronomy event, the same Fair-Trade-aligned production batch, surfaces all the way through the chain to the retailer's shelf and to the end consumer's screen, in a form the retailer can use to back its own sustainability claims.

The second capability is on-device inference. Today, Huginn's reasoning largely runs in the cloud. The architectural direction we are committed to is one in which the model can run at the edge — on the phone of a field operator, on the tablet of a storefront supervisor — with the cloud only for training and reflection. The architectural reference point for this design is Tesla's Full Self-Driving stack: the vehicle runs the model in real time, without round-tripping decisions to a server, while the cloud handles training

and reflection. We use Tesla as an architectural analogue rather than as an experiential validation. The posture — cloud trains, edge runs inference — is, in our judgement, the right one for any operating environment where latency is unacceptable and connectivity is unreliable. In tropical agriculture, that means on the phone in the field. In commerce, it increasingly means on the device of the supervisor or, in some cases, the customer.

Huginn, in short, is not a chatbot, not a forecasting tool, and not a workflow automation. It is a piece of operating infrastructure built AI-native from the start, on open-source foundations, by our own team rather than by external integrators.

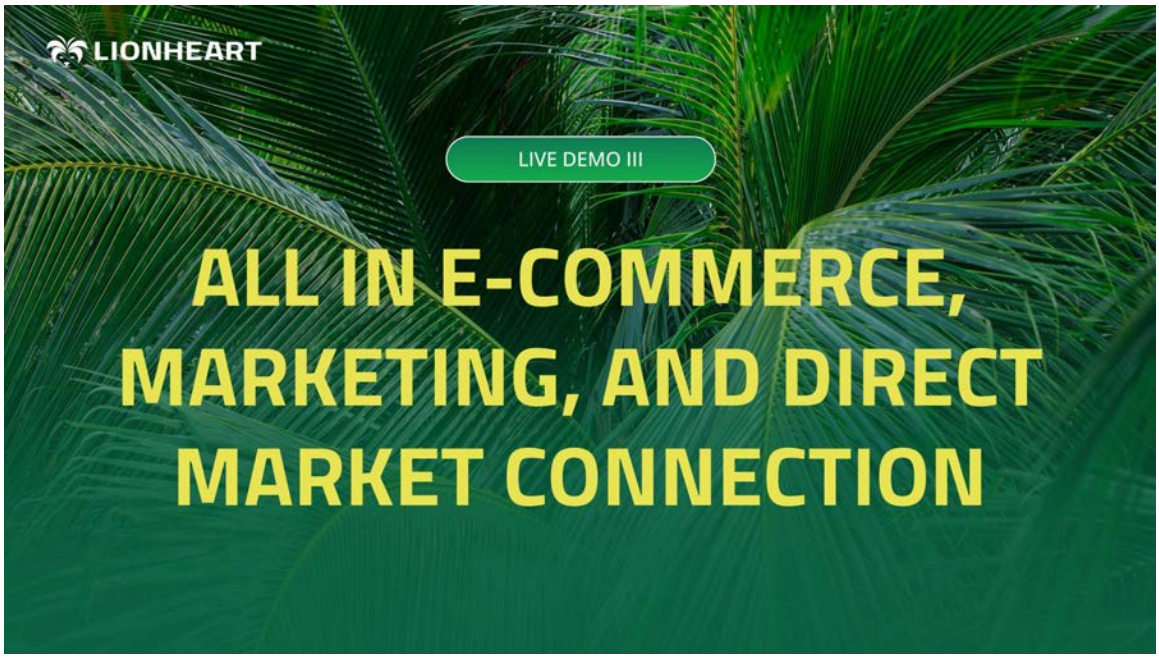


Figure — Live Demo 3 — Huginn in action: AI in e-commerce, marketing and direct market connection. (Source: FEU keynote, 28 April 2026, slide 24)

15. The next engine — Lionheart's agricultural AI in development

Huginn is the first engine we have built. It is not the only engine we will build.

The lessons of the Huginn build, taken together with the early-trial learning from the Harvest Productivity Agent and the Field Setup and Harvest-Readiness Agent in our Track One operation in Palawan, point toward the next engine. It will be agricultural rather than commercial. It will be trained on the body of best practice in agriculture, in coconut farming specifically (with deliberate care to keep the agronomy of sap and the agronomy of traditional nut harvesting clearly distinguished), and in the community-engagement and farmer-relationship work that small-holder tropical agriculture demands as a condition of doing the rest at all. It will also be trained on Lionheart's own ten years of operating experience and on

the unusually deep and structured data substrate we have accumulated through our long-running digitalisation discipline.

The reason we have not built this engine yet is that we have not been ready to. The first principle of building proprietary AI engines is that they should be built only once enough operational learning, structured data and process discipline have accumulated to make the engine genuinely better than what general-purpose foundation models can do on the same problem. With Huginn, that threshold was crossed for cross-channel commerce. With agriculture, we believe we are approaching that threshold, though we will only commit to building the engine once the operational learning makes the case definitively. The early-trial Palawan agents on Gemini and BigQuery are doing the operational learning that will, if it continues to compound at the rate the early trials suggest, become the training substrate for the next engine. We expect the agricultural engine, when we commit to building it, to be built with the same internal-build posture that produced Huginn.

When the agricultural engine is built, the strategic implication is significant. It will, like Huginn, become a defensible piece of operating intellectual property. It will give Lionheart a position in agricultural AI that is not rented from a foundation-model provider but owned by us and trained on data that no competitor has. It will be the second pillar — alongside Huginn — of the operating-system layer we believe is the prize in this sector. And it is the natural extension of the doctrine that has organised Lionheart from the beginning: that productivity is sustainability, that management density is the constraint, that human touch points are what justify the work, and that the company's job is to build the operating system that lifts that constraint and multiplies those touch points.

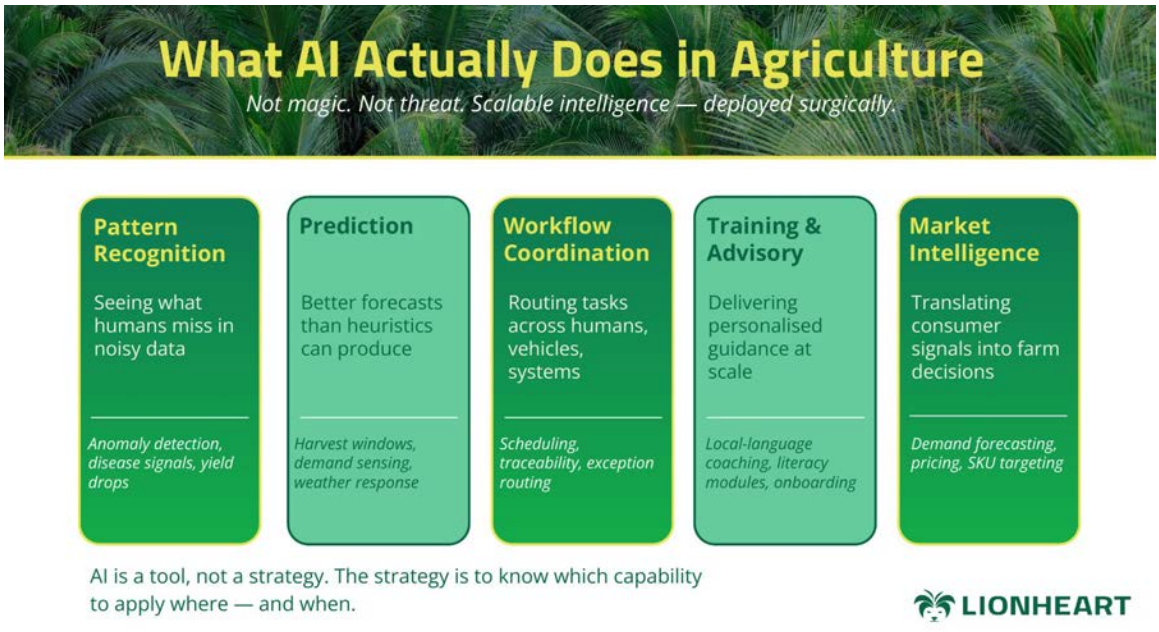


Figure — What AI actually does in agriculture — the five capabilities the next agricultural engine will operationalise at depth. (Source: FEU keynote, 28 April 2026, slide 19)

CHALLENGES AND MITIGATIONS

We are confident in the operating model. We are not naïve about the things that could go wrong. The list below is what we hold open as live questions.

WHAT WE ARE WATCHING CAREFULLY

Challenges, risks and live questions we hold open — surfaced because anticipating them honestly is part of the operating discipline.

Early-trial agent maturity

What we have built so far in Palawan is in early trial. Diagnostic accuracy in fairness-grading and rented-palm audits is improving but is not yet at the level we will accept for full production. We are watching error patterns weekly and refusing to scale past the rate at which the operational learning compounds.

Track Two feasibility risk

Track Two is in feasibility study, not pilot. The economics, the cooperative-integration model and the unit costs of working with traditional whole-nut harvesting are all still being validated. We are explicitly not committing to a Track Two pilot until the feasibility study finishes; if the answers come back negative, we will say so.

Capital structure across the two tracks

Each track has a different return profile and will attract a different capital pool. We are watching the cost-of-capital differential carefully — if Track Two cannot raise patient capital on terms that respect the long horizon, we will reshape rather than force the timeline.

Climate exposure

Palawan is typhoon-exposed and coastal coconut land has long-horizon sea-level-rise exposure. We treat both as live operational risks rather than communications problems, and we are watching insurance, reinsurance and siting decisions on the same cadence as we watch yields.

Data integrity and farmer trust

The agent fleet only works if the data is right and the farmer relationship holds. Data integrity is the precondition for everything else; farmer trust is the operating ceiling, not the regulatory floor. We are watching consent flows, on-device processing decisions and the audit trail closely.

Regulatory uncertainty

CSRD post-Omnibus and the U.S. SEC climate rule are both in flux. The customer-, retailer- and investor-driven demand for verifiable supplier sustainability data continues to grow, but the precise compliance shape is moving. We are designing Huginn to produce data that travels well through whichever rails the next two years actually consolidate around.

Skills pipeline

An AI-native operating model needs designer-supervisor-guardian operators, not executors. Lionheart Academy is the principal vehicle through which we develop them inside the company; we are watching the pipeline carefully because a shortage here is the binding constraint on how fast we can scale the agent fleet.

PART V

Implications

Part V · Implications

> *The implications of an AI-native operating model in tropical agriculture extend beyond a single company. This part addresses what they mean for the Philippines as a country — including the structural comparison with the Netherlands that came up at the FEU keynote — and for the next generation of Filipinos who will build, supply, finance and inherit this sector.*

16. Implications for the Philippines

The Philippines is, in our view, structurally well placed to be where the global coconut industry is rebuilt rather than the country from which raw material is extracted. The combination of attributes the country brings is rare and not replicable on any short timescale.

It has the world's second-largest coconut land base. It has a young population with a median age in the mid-twenties. It has an English-fluent, university-educated workforce of growing scale and the world's largest concentration of IT-BPO services. It is widely recognised as one of the world's most socially connected and social-commerce-ready consumer markets — which means the consumer-side conditions in which Huginn-class operating systems thrive are already in place. It has world-class agronomy capacity at institutions like UP Los Baños, the University of the Philippines Visayas and the Philippine Coconut Authority, and a deep computing-talent pipeline at universities including FEU, De La Salle, Ateneo, the University of Asia and the Pacific, and the major state universities. Each attribute exists in other countries; the combination, at this scale, with this demographic profile, exists nowhere else.

The coconut sector can also be read through the multi-level perspective on socio-technical transitions: a long-stabilised regime facing pressure from landscape-level forces such as climate risk, rural poverty, regulatory disclosure, retailer traceability demands and digital commerce, while AI-native operating models emerge as niche innovations capable of reconfiguring how the regime works. Durable industry transformations rarely happen by changing one layer of the value chain at a time; they require simultaneous, coordinated change across production, distribution, regulatory and consumer-facing layers. The Tesla case is the cleanest contemporary illustration: Tesla's electric-vehicle transformation was achievable only because the company rebuilt the manufacturing layer, the software layer, the battery layer, the charging-network layer, the retail layer and the brand layer simultaneously, while the legacy industry, organised around horizontal supply, could not. The reason Lionheart is built vertically — farm to factory to brand to direct consumer — follows from the same logic.

It is worth addressing directly a question that came up sharply at the FEU keynote. A student asked, in effect: the Netherlands is well known for implementing technology and AI in agriculture; how does the Philippines compare? The honest answer is that they are two very different problems requiring two very

different strategies. The Netherlands — one of the world's largest agricultural exporters by value, with Dutch agricultural and horticultural exports reported at roughly €128.9 billion in 2024 and €137.5 billion in 2025 — operates on a high-labour-cost, capital-intensive, automation-mature model. The country is widely recognised as a leading adopter of high-tech, data-driven and precision approaches in horticulture and intensive agriculture, with average farm size around thirty-five hectares and approximately 4.1 thousand hectares used for the four main greenhouse vegetables alone. The Dutch strategy is to displace labour because labour is expensive and scarce. The Philippines is the opposite: more than seventy per cent of farms under two hectares, fewer than twenty per cent with mechanical equipment access, average rural schooling of six to nine years, less than fifty per cent 4G coverage in the deepest rural areas, and labour costs at three to five US dollars a day. Trying to retrofit the Dutch automation playbook to Philippine smallholder agriculture would be a category error. The Philippine path is not labour displacement. It is labour empowerment — using AI and tech to make the smallholder farmer and the field worker more productive, better supported and better paid, on the handholding principle of Chapter 9, with more human touch points per unit of effort, not fewer.

A note on climate risk. The Philippines, and Palawan specifically, sits in one of the most typhoon-exposed regions of the world; coastal coconut land is also exposed, on a longer time horizon, to sea-level rise. Both exposures are real and are factored into our operational design — siting of farm and factory, cultivar mix, harvest hedging, insurance and reinsurance arrangements, and the diversification implicit in the Two-Track structure. We make no claim to be insulated from these risks; we claim only that an AI-native operating model with the data and management density we describe is better positioned to anticipate, absorb and recover from them than the smallholder system it is built alongside.

There is one more dimension of this country argument we want to surface, because it is the strategic point on which Lionheart's commercial strategy turns. For most of the past forty years, the Philippines has participated in the global coconut economy primarily as a supplier of raw material — copra and CNO sold FOB Manila — or as a low-cost private-label producer of unbranded ingredients for international brands. The economics of that model are well known: low margin, no country-of-origin equity, no consumer-brand value, no farmer-side reinvestment. Filipino DNA does not appear in the bottle the consumer holds. Building brand and direct market access from the Philippines — as Track One is now doing through SLOW and the wider Our Farm to You strategy — is the alternative. It is a slower, harder, more capital-disciplined path than FOB-Manila bulk supply. It is also the only path on which long-term stability, livelihood with purpose, and meaningful lives in host communities are reachable. The country, not just the company, has an interest in that path being built.

What the country has lacked, until now, is a credible model for assembling its structural advantages inside an AI-native agri-operating company that respects this distinction. That is the gap Lionheart is trying to

fill, and it is the gap that we believe will be filled by a small number of similar companies over the next ten years.

We do not lay out specific policy asks; the most useful conversations tend to share a problem definition and an operating model and let partners draw their own implications. Four implications are nevertheless worth surfacing. First, the skills base for AI-native agri-operating companies already exists in the Philippines, currently absorbed by the IT-services sector; the bottleneck has been domestic demand for those skills inside agriculture. Second, the social architecture for cross-channel commerce already exists here, in some ways more advanced than in the markets Huginn currently serves; the country in which to build the next generation of operating systems like Huginn is the Philippines. Third, the retail-rail trend described in Chapter 14 favours AI-native Philippine producers with the data, discipline and engine to plug into channels that ten years ago were closed to all but the largest multinationals. Fourth, and most consequential, the infrastructure of trust for AI-native agriculture — data standards, consent frameworks, traceability protocols, certification chains — is the largest unfilled gap in the system today; whoever sets those standards in the next three to five years will define the rules for the rest of the sector.



Figure — Where Philippine policy is already heading — the conditions are aligning. (Source: FEU keynote, 28 April 2026, slide 21)

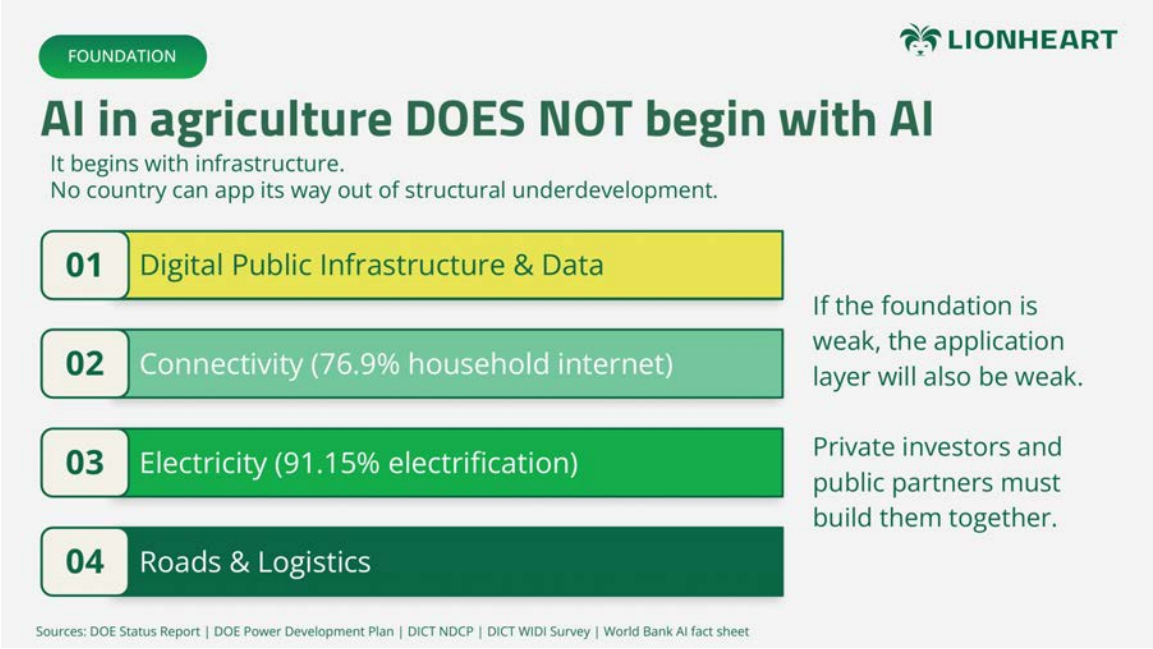


Figure — AI in agriculture does not begin with AI — the infrastructure of trust still needs to be built. (Source: FEU keynote, 28 April 2026, slide 22)

17. Implications for the next generation

The most important conversation at FEU on 28 April 2026 was not the keynote. It was the question-and-answer session that followed it. One hundred and sixty students and faculty members had stayed in the room for a session that had nominally ended; the questions ran for an additional half hour and would have run longer if the schedule had allowed it. They were not abstract. They were operational. How does one build an AI engine like Huginn? What is the career path inside an AI-native agri-company? What does it mean to work with farmers in this kind of architecture? How do partnerships with international markets actually get formed? How does the Philippines compare to the Netherlands? And — the question that sits underneath all of those — how did you, as a company, learn to do this?

The texture of those questions is, for the author of this paper, the most useful piece of evidence about what comes next. The next generation of Philippine students — in business, in computer science, in agriculture, in design — wants a career path in agriculture that is intellectually serious. Until very recently, that career path did not exist. Agriculture was, in the public imagination of the country's young, what their grandparents did. AI-native agriculture changes that frame entirely. The work of running an Orchestrator-quadrant agri-operating company — even from the Existing+ starting point, as Lionheart is today, on the Modular Curator path — is engineering, design, model training, data governance, partner orchestration, brand building, international commerce, community work, and, yes, hands-on agronomy. It is not subsistence. It is one of the most cognitively demanding careers a young Filipino can choose.

If the architectural argument of this paper is correct, the most consequential implication is therefore this. The big question — where will the next generation of coconut farmers come from? — does not have an inevitable answer. It has the answer that we, as a country and as a sector, decide to build for. The next generation of Philippine farmers, owners, supervisors and operators can look nothing like the last. They can manage technology, not just trees. They can own equity in cooperatives, not just provide labour to them. They can build careers in coconut as a single, dignified, full-time occupation rather than as one part-time job among several. They can be better educated, better connected, and better paid. None of that happens automatically. It happens only if companies like Lionheart, the wider ecosystem of operators, investors, academics and government partners around them, and the next generation of students themselves succeed in building AI-native agri-operating models at meaningful scale, on the Our Farm to You principle that connects host communities directly to the consumer who pays for the work. The opportunity is real and it is tractable. The work is in front of us.



Figure — Youth, skills, and the next generation of farmers — the FEU classroom evidence. (Source: FEU keynote, 28 April 2026, slide 23)

Closing reflections

Productivity is sustainability. We have advanced that thesis throughout this paper not as rhetoric but as the load-bearing claim of an operating model currently in production at Lionheart Farms. The full architecture is set out in Part III, with the one-page Operating System at a Glance reference card; the open challenges are surfaced in the Challenges and Mitigations box at the end of Part IV.

I want to close on a personal note, because the most honest thing I can say about Lionheart is that the part of this work that has surprised and satisfied me most has not been the technology. It has been the people. We have built what we have built in Rizal, Palawan, in partnership with the Indigenous Peoples Community on whose ancestral land we operate, and in the company of a team that few outside observers would have expected to rise to the kind of opportunity this work demands. They have. I have watched them learn week after week — at Learning Saturdays, in the field, in the factory, in our digital and AI deployments — and I have come to believe, more strongly than I did when we started, that the most underrated asset in Philippine coconut is the capacity of Filipinos to learn and to build, given the time and the framework to do so. The line we keep coming back to inside the company is simple: if we don't do it ourselves, it probably won't happen. We say it about agronomy, about digitalisation, about the engines and the agents, about the brand. The same words, every time. They are not a slogan. They are an answer — the same answer we gave to a Far Eastern University student who asked how we had built what we had built, and the same answer we give to the senior executives of much larger companies who periodically ask who is helping us. Nobody is. We are doing it ourselves. It takes longer; it builds the muscle and the muscle memory that the next decade will demand of us; and it is the only way we know to keep the work honest.

We have written this paper for a wide audience: the academic readers who will probe the framework against their own theoretical commitments; the media readers who want a clear and well-evidenced description of where tropical agriculture is going; the policy and government readers who are weighing the country's options for the agri-sector's next decade; the investor readers who are evaluating where structural capital should go; and, most importantly, the next-generation readers — students at FEU and elsewhere — who are deciding what they will build their working lives around. To each of those audiences we offer the same posture. We are not asking anyone to take the thesis on faith. We are showing the operating system, and we are inviting examination, partnership, critique and contribution.

If the productivity gap in Philippine coconut is the poverty gap, the demographic gap and the "single occupation" gap all at once, then closing it is one of the most important pieces of structural work this country can take on in the next decade. It is also one of the most operationally tractable. The tools exist. The talent exists. The land base exists. The market exists. The retail rails exist and are opening. What is needed is the operating model that connects them — and the patience, the discipline and the human

touch points to put that operating model into the hands of the people who will run it. That is the work in front of us at Lionheart Farms, and we look forward to doing it in the company of the readers of this paper.



Figure — Build the managed layer — together. (Source: FEU keynote, 28 April 2026, slide 25)



Figure — Productivity is sustainability. Sustainability is productivity. (Source: FEU keynote, 28 April 2026, slide 27)

About the author and Lionheart Farms

Christian Eyde Moeller is the Co-Founder and Chief Executive Officer of Lionheart Farms (Philippines) Corporation, a vertically integrated coconut products company headquartered in Rizal, Palawan, with operations spanning farming, processing, brand and international distribution, and offices in Manila and partner geographies in the United States and Asia. Christian has built his career at the intersection of international business, sustainability commitments and operational execution. He can be reached at cem@lionheartfarms.com.ph.

Lionheart Farms (Philippines) Corporation is the operating company under the Lionheart Agrotech holding structure. It has been committed to digitalisation since its founding and is now extending that posture into AI-native operations end to end. Its Track One sap operation in Rizal, Palawan runs in partnership with the Indigenous Peoples Community on whose ancestral land the company operates, and its Partner Farm Program extends that operating model into existing coconut farms across southern Palawan. It practises organic regenerative farming and holds the principal international certifications for ethical and sustainable supply, including SMETA, BRCGS food safety and organic certification, with a public commitment to Fair Trade principles and Fair Trade certification expected mid-2026. Its consumer brand portfolio is led by SLOW coconut-sap drinks, launched internationally at ExpoWest 2026 in California. The company runs Lionheart Academy, including weekly Learning Saturdays, as the principal vehicle through which its team builds the agronomic, operational, digital and AI capability the company depends on. Its mission is to build the operating system for the next generation of Philippine coconut farmers — and, by extension, for the sustainable transformation of tropical agriculture, on the Our Farm to You principle.

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