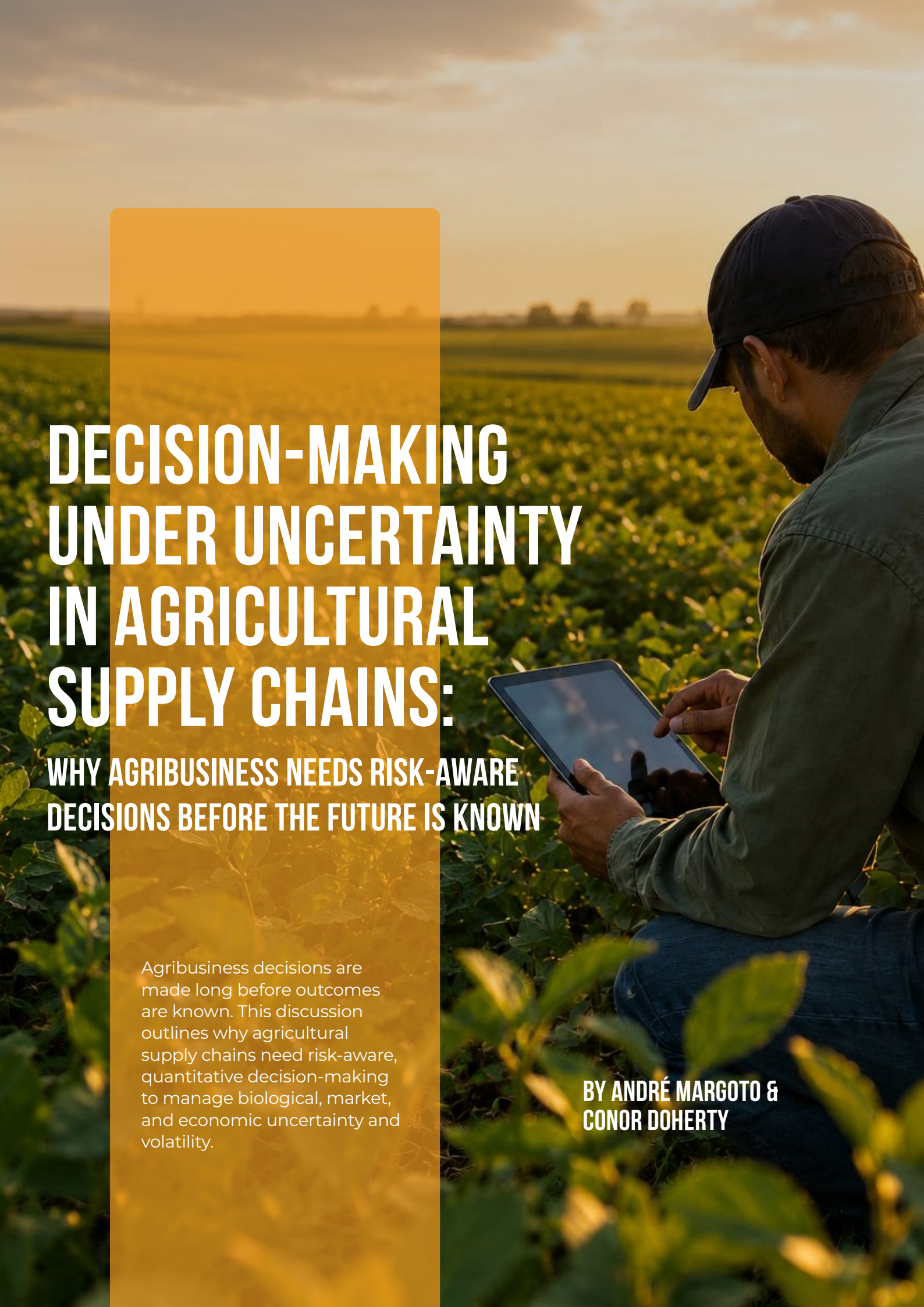


A man wearing a dark cap and a green jacket is kneeling in a field of green crops, using a tablet. The background shows a sunset over a field with trees in the distance. A large orange vertical bar is on the left side of the image, containing the main title and subtitle.

DECISION-MAKING UNDER UNCERTAINTY IN AGRICULTURAL SUPPLY CHAINS:

**WHY AGRIBUSINESS NEEDS RISK-AWARE
DECISIONS BEFORE THE FUTURE IS KNOWN**

Agribusiness decisions are made long before outcomes are known. This discussion outlines why agricultural supply chains need risk-aware, quantitative decision-making to manage biological, market, and economic uncertainty and volatility.

**BY ANDRÉ MARGOTO &
CONOR DOHERTY**

DECISION-MAKING UNDER UNCERTAINTY IN AGRICULTURAL SUPPLY CHAINS

Agricultural supply chains do not start with clean inputs and neat plans. They start with biology, and biology has an unpredictable risk profile.

Rain, drought, frost, disease, pests, maturity, crop quality, and yield curves all impact operations, and that is before demand, commodity prices, freight, storage, processing and transportation capacity, and market access also hit. Some of those forces are known months in advance. Others arrive late, usually when changing the plan is already expensive or impossible.

That is why agricultural supply chains need a different kind of planning conversation. The usual reflex is to ask for a better forecast, a cleaner dashboard, or another S&OP meeting. Those things can help, but they do not solve the deeper problem.

In agribusiness, the important question is not “what is the plan?” It is “which decision still makes economic sense, given the several possible future scenarios?”

I discussed this with André Margoto, Global Director of Supply Chain for Juices at Louis Dreyfus Company. André has spent years working in agribusiness supply chains, focusing on sugar and juices, citrus, logistics, procurement, S&OP, and digital transformation.

His view is clear: these supply chains are too long, too physical, and exposed to too much risk to be managed with one forecast, one average, and one enormous spreadsheet.

- Conor Doherty  L O K A D

ABOUT THE AUTHORS



André Margoto is Global Director of Supply Chain (Juices) at Louis Dreyfus Company, responsible for end-to-end planning and logistics operations for the Juice business unit. With more than 15 years in agribusiness, he focuses on applying optimization, analytics, and data-driven decision-making to complex supply chain problems.



Conor E. Doherty is Marketing & Communication Director at Lokad and Visiting Professor of Rhetoric at Sciences Po, Paris. He focuses on translating technical ideas in forecasting, optimization, and decision-making under uncertainty into clear business cases for practitioners and executives.

1. “WHY ARE AGRICULTURAL SUPPLY CHAINS DIFFERENT?”

Conor: When people hear “supply chain,” they often think about moving finished goods, reducing cost, improving service level, and making the plan more accurate. Why is that view too limited for agriculture?

André: Because in agriculture, you do not fully control the raw material. You can plan. You can invest. You can use technology. But the crop still has a biological nature. Weather, disease, maturity, quality, and timing all affect what you receive.

Also, many agricultural supply chains are long. Decisions can be made several months before the finished product is sold. By the time the raw material arrives, a lot of the cost is already committed.

So the problem is not only logistics. It is deciding how to manage economic risk over space and time.

Conor: So the supply chain is already carrying risk before the factory or warehouse does anything.

André: Yes. And the later you discover that risk, the fewer options you usually have.



2. LONG CHAINS CREATE LOCK-IN

Agribusiness planning is difficult because the commitment curve is brutal.

In sugar, fruits, vegetables, grains, oilseeds, coffee, cotton, meat, and rice, decisions are made long before the final commercial outcome is known. Planting, sourcing, harvesting, contracting, freight, storage, processing, and destination-market decisions all happen under partial information.

As time passes, the cost of changing the decision rises. Early on, you may still adjust sourcing, contracting, logistics, processing plans, or destination markets. Later, the raw material exists, the capacity is allocated, and commitments have been made.

At that point, the problem changes. You are no longer asking what would have been ideal. You are asking which remaining option protects the most value.

That is where traditional planning often struggles. It treats the plan as if it remains flexible for longer than it really does. In agriculture, flexibility expires quickly.

3. “WHY DO TRADITIONAL APPROACHES STRUGGLE?”

Conor: What is the practical weakness of traditional planning in these environments?

André: It simplifies the problem too early.

A traditional approach wants one number: one demand forecast, one expected yield, one expected price, one expected margin. This is clear and convenient, but it ignores the risk.

In agriculture, the average may not be the scenario that hurts you. You need to understand the range of outcomes and the decisions attached to them.

Conor: Because the average scenario is redundant the moment there is a deviation.

André: Exactly. The average may be useful, but it does not tell you what to do if yield drops, if price moves, if a market closes, if freight becomes expensive, if capacity becomes tight, or if quality changes.

“In agribusiness, your decisions need to be resilient across multiple future scenarios.” - André



4. PUSH, PULL, AND THE AWKWARD MIDDLE

Many agricultural supply chains are a hybrid of push and pull.

The raw material is pushed upstream into the system because the crop is harvested, the raw material arrives, or the commodity has been sourced and must move. The downstream side is pulled by markets, customer demand, price opportunities, certifications, freight availability, storage constraints, and commercial priorities. In the middle, there is an operational interface (think “buffer point”), usually a factory or warehouse, acting as a shock absorber for the deviations coming from both sides.

That creates an arbitration challenge.

- How much goes to which product?
- Which market should receive scarce volume?
- Which plant should process which raw material?
- Which customer commitment is worth protecting?
- Which lower-margin product is necessary to clear the chain?
- Which shipment should move now, and which can wait?

This is where the physical and financial realities meet. You cannot plan each function in isolation and expect a good total result. Commercial, logistics, production, procurement, risk, and finance are all touching the same decision, often with different local incentives.

The danger is “local optimization”: improving one KPI at the expense of another one. A quantitative approach optimizes systemically; finding a balanced answer across multiple constraints.

Yield curves, quality variation, processing constraints, and market prices all affect what can be produced profitably. You should not ignore this uncertainty; you should price it into decisions.



5. DISASSEMBLY CHANGES THE PLANNING PROBLEM

Agriculture also has a production structure that many traditional planning systems handle poorly: disassembly.

A factory that assembles finished goods can often decide what it wants to make, then source the components required to produce it. Many agribusiness operations work the other way around.

In citrus, the fruit becomes juice, peel, pulp, oils, and animal feed ingredients. In oilseeds, the crop becomes oil, meal, hulls, and other streams. In sugar cane, the raw material can be turned into sugar, ethanol and by-products, each with its own economics.

This matters because the output mix is constrained by the input and its natural variability and seasonality, and you cannot decide the exact proportion of outputs as freely as you would in an assembly process.

6. “WHY IS A QUANTITATIVE PERSPECTIVE NEEDED?”

Conor: You have worked with optimization and quantitative methods for a long time. Why does this perspective matter in agribusiness?

André: Because the decisions are too large and too connected to be made only with intuition and gut-instinct. They are also too expensive and risky to be made purely by consensus.

Experience matters. Market knowledge matters. People who understand the business matter. But the number of variables is huge: raw material availability, quality, capacity, prices, logistics, demand, inventory, certifications, customer commitments, and risk exposure.

A person can understand the business, however a person cannot manually test every relevant scenario across the whole chain.

That is where a quantitative approach and decision-making models help. These do not replace the expert. Instead, they give the expert a better way to compare options.

Conor: What should the model answer?

André: Practical questions.

- What are we assuming?
- What can still be changed?
- What is already locked in?
- What is the expected return?
- What happens in a bad scenario?
- Which market should receive volume?
- Where should we process?
- At what price should we buy?
- At what point should we stop?

If the model cannot help answer those questions, it is probably the wrong tool.



7. DECISIONS NEED A SYSTEM OF INTELLIGENCE



A lot of supply chain technology stops at prediction. What will demand be? What will yield be? What will price be?

Those questions matter and better prediction certainly helps. Weather data, farm data, market data, freight data, customer data, and historical patterns can all improve the view of the future. But prediction alone does not decide.

A good forecast still needs a decision attached to it. If yield drops, what should we do? If demand shifts, where should volume go? If a plant is constrained, what product mix protects margin? If freight rates move, which shipment still makes sense? If raw material is scarce, which market should be prioritized?

8. “WHY DOES ‘STOP’ NEED TO BE PART OF THE MODEL?”

Conor: In operations, stopping often feels like failure. Why should “stop” be part of the decision logic?

André: Because sometimes stopping is the best available decision. If the market changes, if yield changes, if quality changes, if freight changes, or if the economics no longer make sense, continuing can become the emotional decision rather than the economical one.

“That is what a quantitative, risk-aware approach excels at. It provides concrete financial answers to questions regarding buying, processing, storing, allocating, selling, delaying, shipping, renegotiating, and stopping.” - Conor

The important thing is to define the trigger before the pressure arrives. If you wait until everyone is emotional, political, or under time pressure, the decision becomes harder.

Conor: So the value is in agreeing ahead of time what would make the decision change, and building tools to execute it?

André: Yes. If price reaches this level, if yield falls to this level, if capacity becomes constrained, if freight changes, if the market moves this way, then what do we do?

9. BETTER MODELS DO NOT REMOVE PEOPLE

A quantitative supply chain model does not replace the expert. In agribusiness, that is especially true. Local knowledge, supplier relationships, commercial judgment, crop knowledge, market reading, quality expertise, risk knowledge, and operational experience all matter.

The issue is that expert judgment needs a reliable, automated, and risk-aware system. Without a system, companies get inconsistent decisions. One person has a conservative risk profile; another is more aggressive. One team updates assumptions weekly. Another waits for the monthly meeting.

A good model takes those differences, tests them, and surfaces the ones that should be iterated and made part of the decision-making model. Then people can argue about the right things: assumptions, scenarios, constraints, risk appetite, and financial trade-offs.

10. “WHAT HAPPENS NEXT?”

Conor: When you say a new perspective is needed, what does that mean in practice?

André: It means moving the conversation from planning to decision-making. Planning is still necessary, but the real value is in the decisions that shape the plan. It helps to frame the key business questions to be answered, such as:

- What raw material do we buy? At what price?
- What do we process? Where do we process it?
- Which markets do we serve? How do we clear total production?
- When do we change the plan? When do we stop?

A modern quantitative perspective means accepting uncertainty, quantifying it, and connecting it to actions.

Conor: So the point is not to predict the future perfectly?

André: No. Nobody will predict the future perfectly. The point is to make decisions that stay financially relevant for a broad range of possible futures.

To continue the discussion, connect with [André Margoto](#) or [Conor E. Doherty](#) on LinkedIn, or reach them directly by email:

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