

How AI, Automation, and Infrastructure are Reshaping Coffee Businesses at Scale

Gerd Müller-Pfeiffer,
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Gerd Müller-Pfeiffer
Founder and CEO of
International Coffee Consulting

- 25+ years in the global coffee industry
- Former Nestlé coffee executive
- Managing €1B+ businesses
- Selected highlights of my career:



ZOËGA^S



“For me, coffee is and has always been more than just a profession - it is a lifelong passion and calling.”

How AI, Automation, and Infrastructure are Reshaping Coffee Businesses at Scale



Coffee as Global Phenomenon



Future Growth



How AI is Transforming Coffee



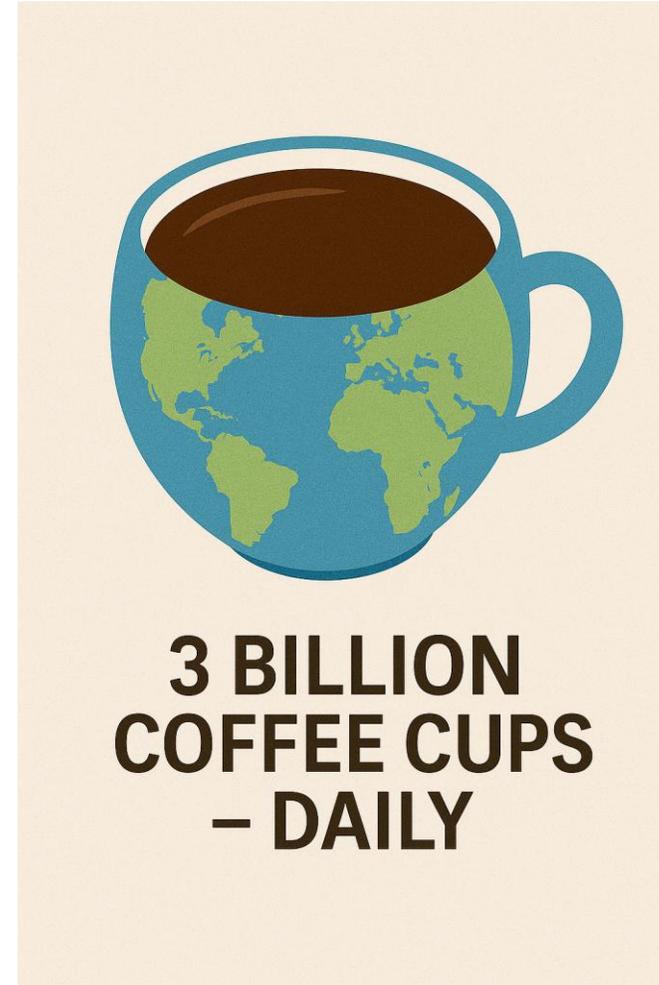
Key Learnings from Capsules



Summary and Outlook



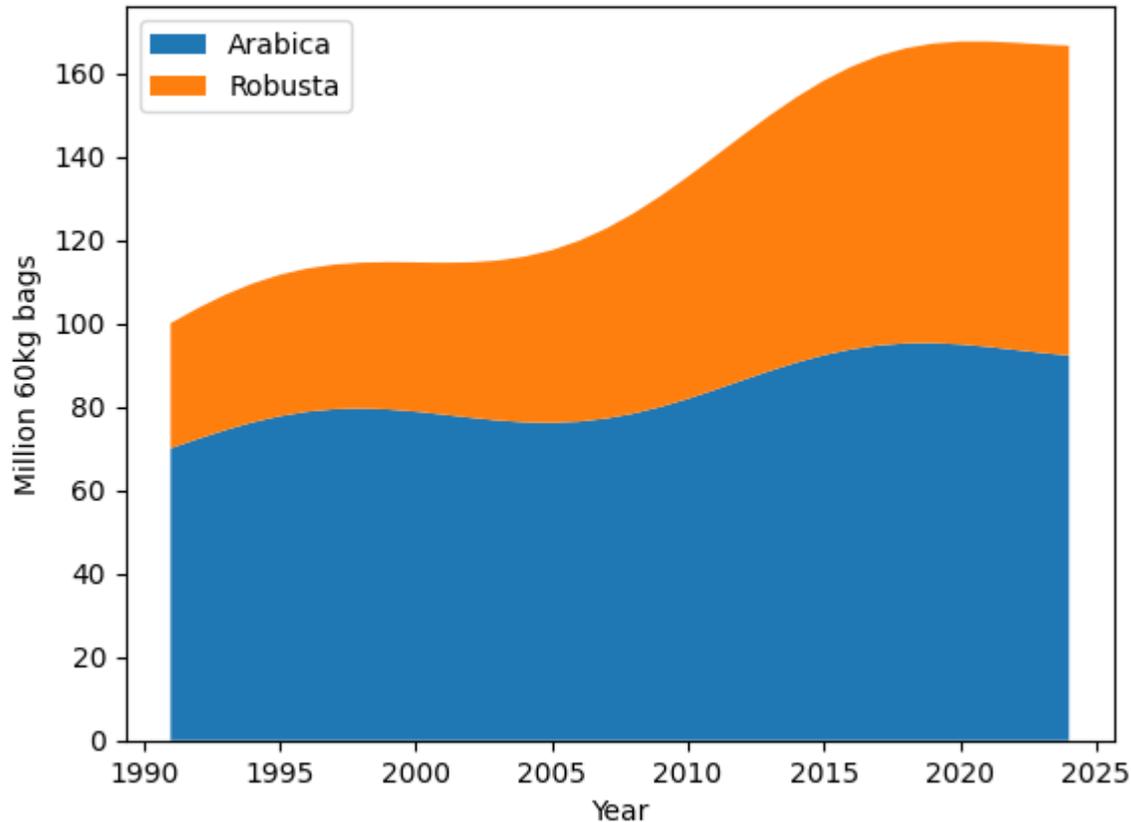
Coffee is a \$500+ billion industry running on systems built for a simpler world



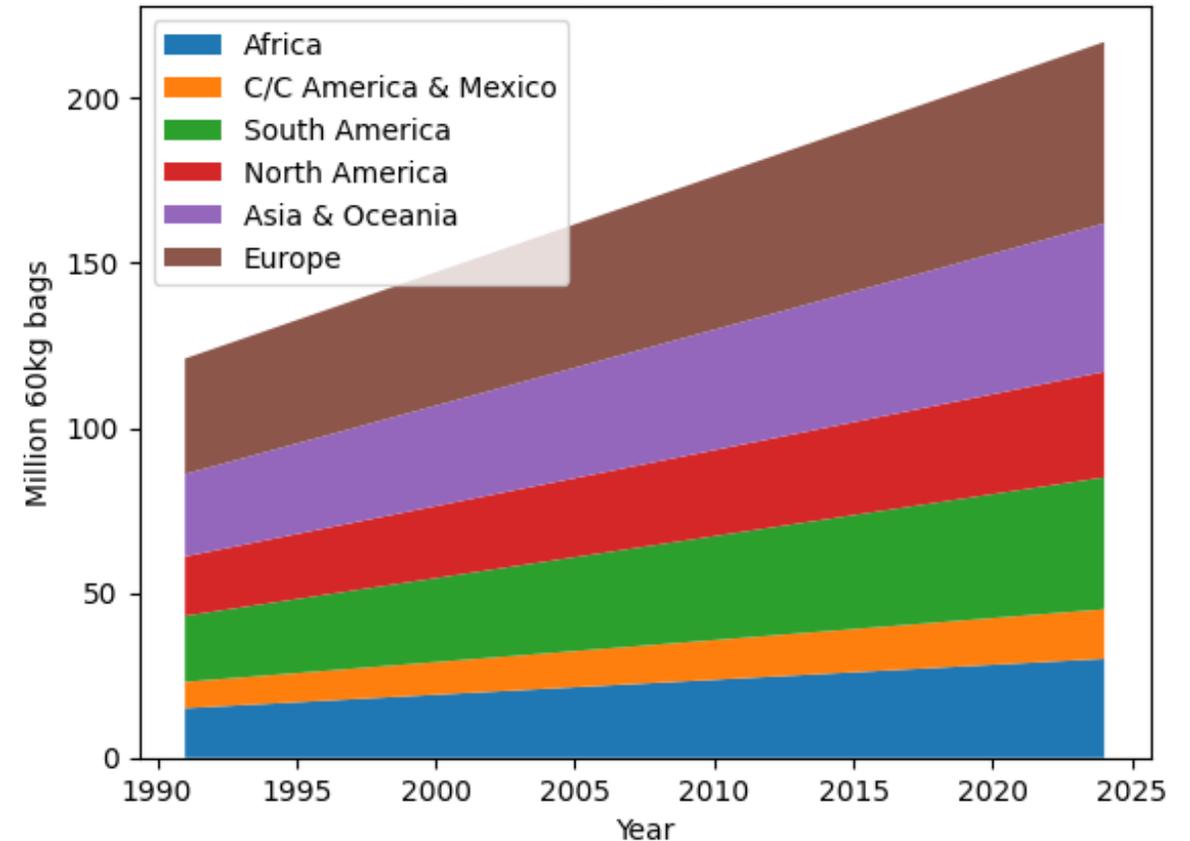


**Coffee today is a growing category ~ 3-5% per year
It has approximately doubled over the last 30 years**

Global Coffee Production (approx. ICO reconstruction)



Global Coffee Consumption by Region (approx. ICO reconstruction)





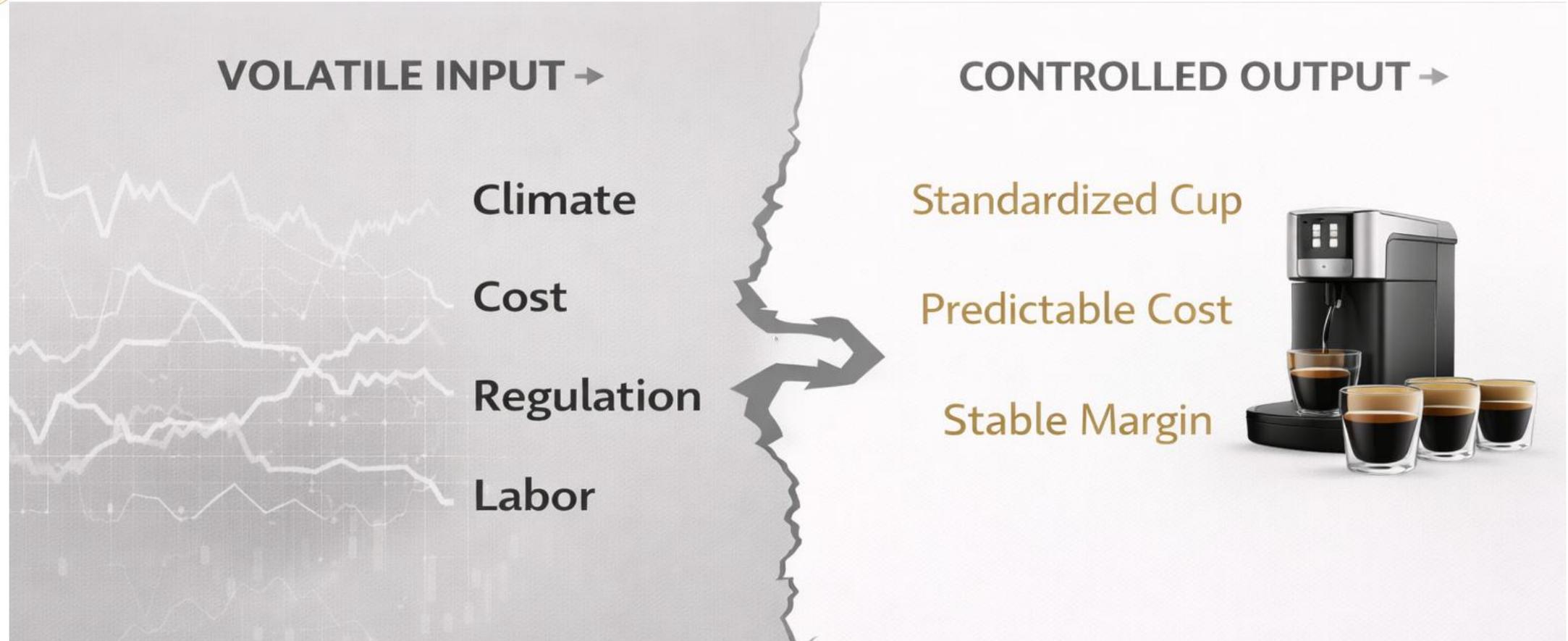
The last five years have been volatile for the global coffee industry.

COVID-19





When volatility increases, automation becomes strategic





Global Value growth will be driven by:

In the U.S., automation and cold occasions are structurally more important than origin storytelling

more premiumization



- From mainstream to specialty.
- Higher value per cup

more automation



- Scaling quality
- Protecting margin

more occasions

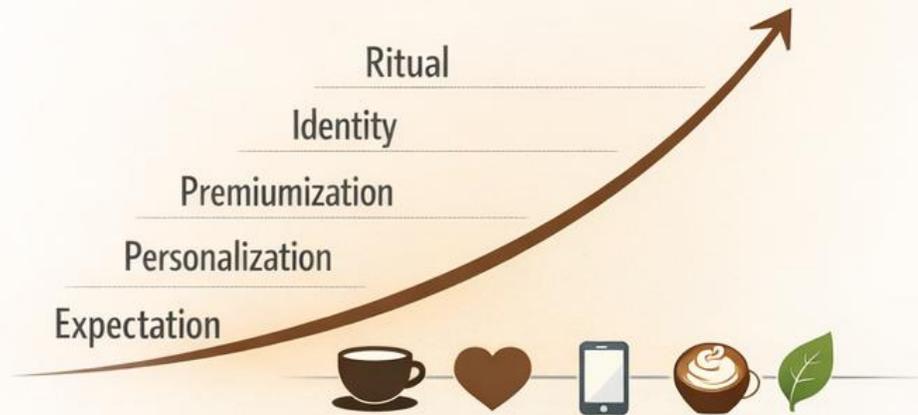


- Cold & RTD expansion.
- Incremental cups



Coffee has never been more emotional.

Coffee Culture Scaled Emotionally



Consumers expect more meaning, more choice, more quality.

Infrastructure Did Not Scale Economically

- Labor Intensity
- Operational Volatility
- Cost Pressure
- Fragmented Systems
- Margin Compression

Operating models stayed linear. Complexity did not.

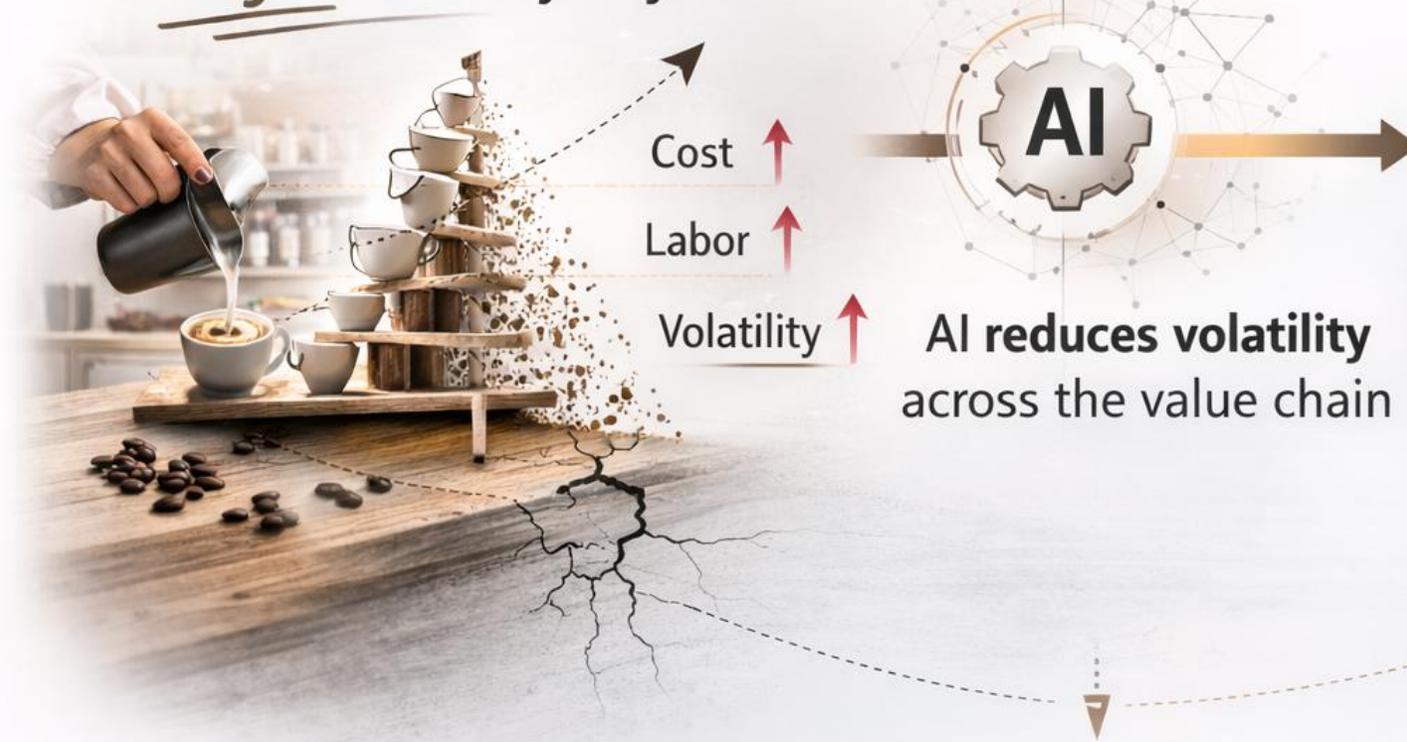
Culture scaled faster than infrastructure.

That gap is where AI, automation and systems matter.



The hidden tension: Culture vs. Economics

“You cannot scale *craft* manually anymore”



Cost ↑

Labor ↑

Volatility ↑

AI reduces volatility across the value chain

AI will not revolutionize taste.
It will revolutionize:

 Margin Stability 

 Labor Economics 

 System Control 

 Data Ownership 

 Competitive Structure 

From Fragile to **Scalable**



When complexity breaks the model, Automation and AI step in

The Pressure

- ⚠ Labor intensity
- ⚠ SKU & format explosion
- ⚠ Cost volatility
- ⚠ Regulatory burden
- ⚠ Execution inconsistency

The Structural Response

- ⚙ Stabilize margin
- ⚙ Decouple revenue from labor
- ⚙ Standardize execution
- ⚙ Increase decision speed
- ⚙ Build system intelligence

This is not a barista problem. It's an operating model problem.



Most AI value happens before the consumer ever sees the coffee cup

Value Chain AI

Where AI actually creates value





Where we really stand today: most companies are still piloting

AI in Coffee Is Already Real

Not experimental. Not theoretical. **Operational.**



ORIGIN

- ~ AI green grading
- ~ Yield prediction
- ~ Climate risk modeling

TRADING & RISK

- ~ Volatility modeling
- ~ Inventory optimization
- ~ Predictive hedging



MANUFACTURING

- ~ Vision-based QC
- ~ Predictive maintenance
- ~ Waste analytics



ROASTING

- ~ Automated profile control
- ~ Sensory prediction
- ~ Batch stabilization

AI is embedded across the value chain.

Not future. Present.



Enabling smarter Coffee Businesses

What can we do in offices?

Planning

- ~ Statistical demand forecasting
- ~ Inventory measurement
- ~ Efficient supply planning

Sales

- ~ Opportunity scoring
- ~ Customer segment analysis
- ~ Call and meeting optimization

Marketing

- ~ Campaign performance analysis
- ~ Lead scoring
- ~ Targeted promotions

Pricing

- ~ Dynamic pricing models
- ~ Competitor pricing analysis
- ~ Promotion automation

Statistical forecasting, measurement, and planning are key drivers.



Infrastructure Beats Innovation Theater

 Single pilots don't scale



Single pilots
don't scale



Dashboards without
decisions don't matter



AI without clean data
is just expensive guesswork.

 Winning companies invest in:



Data foundations



Integrated systems



End-to-end visibility

Infrastructure quietly outperforms **innovation hype**.

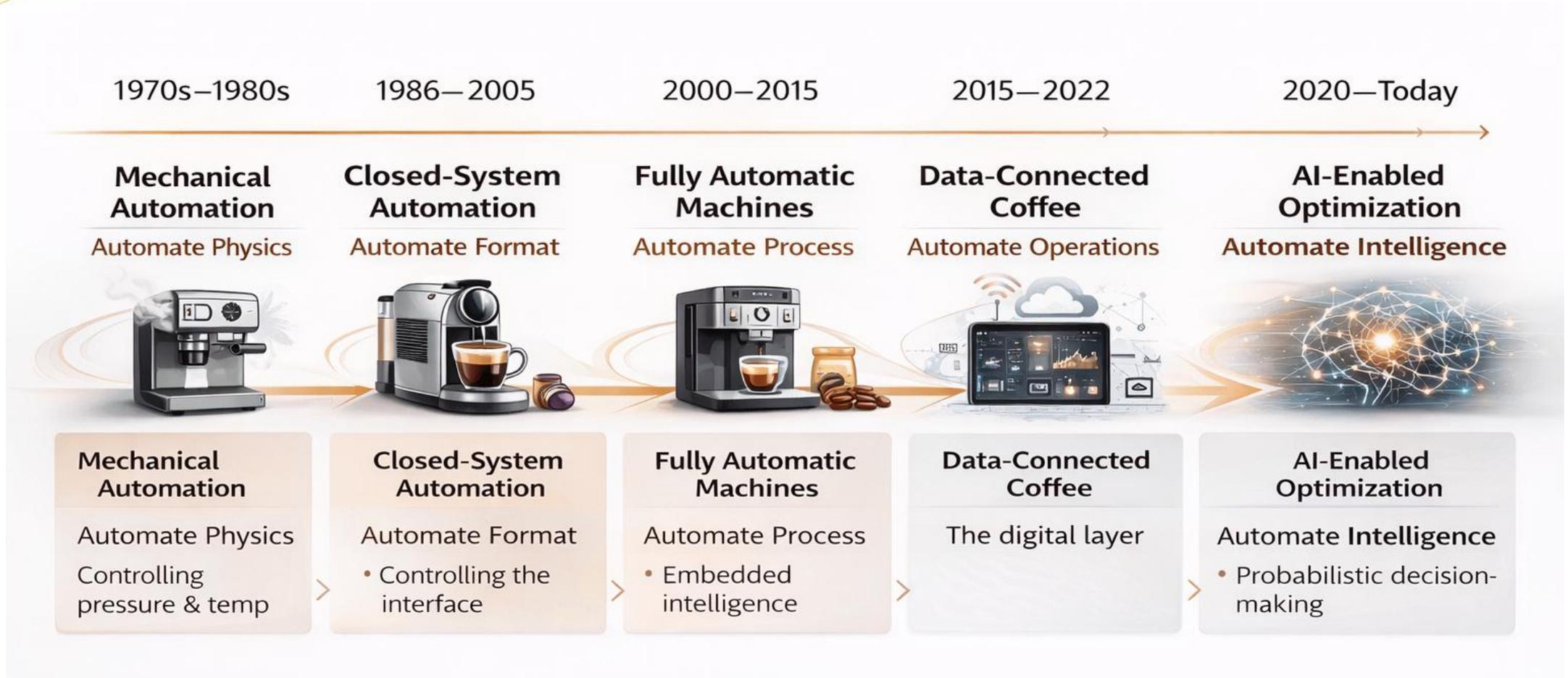


The café becomes an intelligence node





50 years of Automation in Coffee: From Mechanical Control to Machine Intelligence





The next structural shift in coffee: From format control to intelligence control

— 1986 - 2025 —

Infrastructure 1.0

Capsule & System Era



- Interface Ownership
- Closed Ecosystems
- Hardware-Driven Margins
- Format Control

Control the Interface → **Control the Margin**

POWER SHIFT

Interface → Intelligence

— 2025 - 2035 —

Infrastructure 2.0

AI & Automation Era



- Intelligence Layer
- Predictive Operations
- Compliance Architecture
- Integrated Value Chain

Control the System → **Control the Value**

Capsules scaled consumption. → **AI will structure the industry.**



40 Years of Capsules: From Appliance to Infrastructure

1986

Product Innovation

- Closed system
- Espresso focus
- Patent protection
- Premium niche

Control Shift

2026

Consumption Infrastructure

- Hundreds of millions machines ins
- \$30-35B capsules market
- Data & direct relationships
- Compatibility ecosystems
- Format > Origin
- System-driven margins



Capsules did not scale because of coffee.
They scaled because they controlled the interface.



40 years of capsules: The Power Shift Nobody Talks About:

(1986–2026)

1 Capsules Monetized Time

They didn't sell coffee.
They sold **control** over mornings.

2 Hardware Captured the Consumer

Owning the machine meant *owning the interface*.

3 Direct Relationships Beat Retail

Clubs, CRM, subscriptions —
data became the real margin driver.

4 Patents Built the Fortress

Expiry Scaled the Category.
Leadership moved from **protection**
to **ecosystem management**.

5 Compatibility Democratized Access

Private label didn't kill the category.
It multiplied it.

6 Branding Turned Coffee into Luxury

Capsules redefined price perception.
Affordable indulgence = structural premium.

7 Format Beat Origin

Espresso. Mug. Latte. Cold.
Usage moments drive value more than terroir.

8 Sustainability Became System Risk

Regulation now shapes strategy.
Compliance is no longer optional – it's competitive.

The winners didn't sell coffee. They **controlled** the cup.



From Capsules to Coffee Platforms

Platform Evolution 2026 (Strategic Expansion Areas)

Functional Drinks

Energy - Wellness - Performance



- + Structural growth driver
- + Higher price realization

Digital Personalization

App - Data - AI Brewing



- + Consumer lock-in
- + Usage optimization

Subscription & Replenishment

Auto-Delivery - Predictive Ordering



- + Recurring revenue
- + Direct-to-consumer margin

Ecosystems

Hardware + Refill + Loyalty



- + Platform economics
- + Lifetime value focus

- ▶▶ Capsules started the platform age.
- ▶▶ Winning players expand beyond the pod.
- ▶▶ Value shifts from unit margin → user lifetime value.

Coffee Platforms 2026

From Format → Infrastructure Layer



THE NEXT 10 YEARS WILL BE DEFINED BY:



CONTROL OF FORMAT

Owning the usage moment.
Espresso. Mug. Cold. Functional.
Format defines value creation.



CONTROL OF COMPLIANCE

Owning regulatory capability.
EPR. Sustainability. System accountability.
Compliance becomes competitive advantage.



CONTROL OF DATA

Owning the relationship.
CRM. Subscriptions. Replenishment.
Usage insights become margin drivers.



CONTROL OF INTERFACE

Owning the consumer touchpoint.
Machine as platform.
Capsule as gateway.
Cup as controlled output.

“Capsules are no longer packaging.
They are infrastructure.”



AI Landscape in Coffee

The Real Economic Applications CEOs Should Focus On



Stability

- AI Grading
- Roast Stabilization
- Vision QC



Labor Decoupling

- Proficient Espresso Systems
- AI Scheduling Process Automation



Predictive Operations

- Inventory Optimization
- Demand Forecasting
- Predictive Maintenance



Data Ownership

- Connected Machines
- Usage Monetization
- Subscription Algorithms



Compliance Infrastructure

- Traceability Tech
- ESG Tracking
- Digital Documentation

AI Is Not a Technology. It Is Becoming Operating Architecture



Leadership Design Questions



Where are we still dependent on heroics instead of systems?



Where does inconsistency cost us margin invisibly?



What must become automated—and what must remain human?



Where do we control the interface—and where the intelligence layer?



THE BIG 5-YEAR REALITY

The Biggest AI Impact Will NOT Be:

- Robots replacing baristas
- AI inventing new flavor universes

It Will Be:

 Forecast Accuracy

 Inventory Optimization

 Margin Stability

 Trade Spend Control

 System Integration

Quiet. Operational. Financial.



From Data to Decisions: The AI Operating Stack

*AI does not work as a tool. It works as an **operating layer**.*

1 Data Foundation *(Clean & Connected)*



- Master Data *(Products, Origins, Machines)*
- Event-Level Data *(Roasting, Demand, POS)*
- Integrated Systems *(ERP, CRM, IoT)*

2 Intelligence Layer *(Models & Prediction)*



- Demand Forecasting
- Quality Prediction
- Price Optimization
- Supply Risk Modeling

3 Workflow Automation *(Decisions Embedded)*



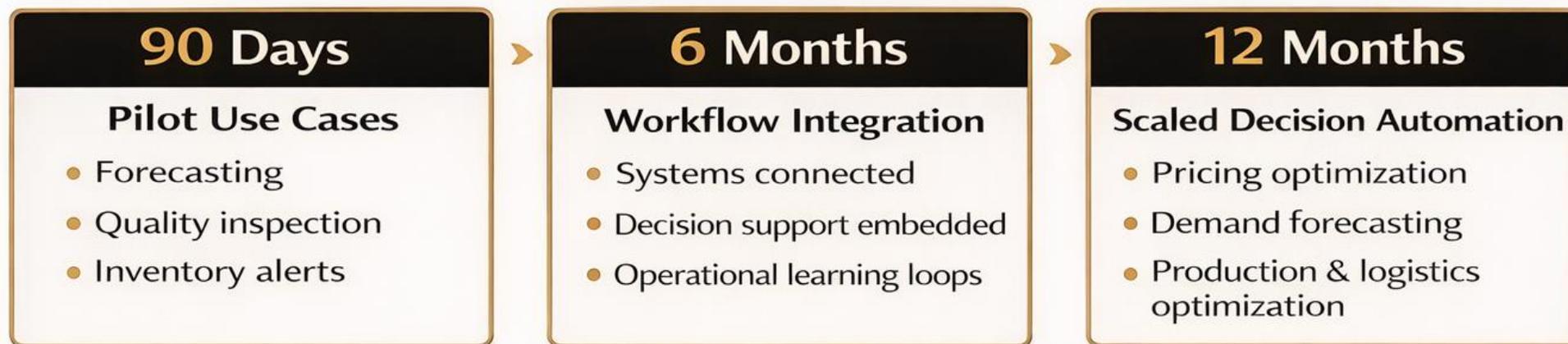
- Automated Ordering
- Roasting Optimization
- Dynamic Pricing
- Inventory Allocation



The Real Value of AI in Coffee

*The biggest value will not come from replacing humans.
It comes from automating thousands of micro-decisions across the value chain.*

AI Implementation Reality



**AI does not replace operators.
It scales decision quality across the system.**



The Rise of the Hybrid Coffee Model

❌ The future is not:



❌ Fully manual



❌ Fully automated

✅ The future is hybrid:



Machines handle repetition, precision, volume



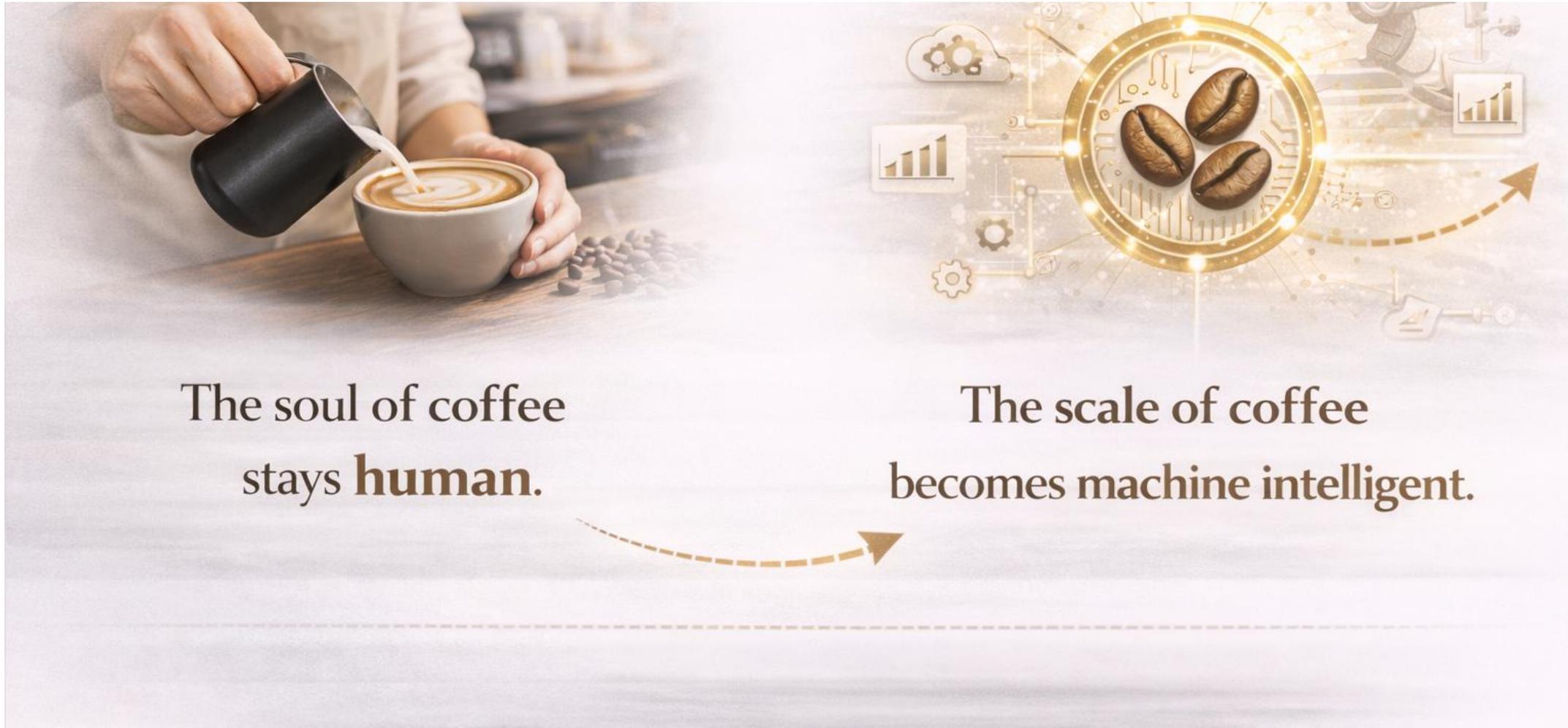
Humans deliver emotion, judgment, hospitality



Technology protects the **human experience** — it doesn't replace it.



The next decade will not reward the best roasters. It will reward the best system architects



The soul of coffee
stays **human.**

The scale of coffee
becomes machine intelligent.



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