TREDENCE
Beyond Possible

Mondelēz International

Unlock the Potential of Digital Supply Chain

A Conversational Approach that Decodes the Future of Intelligent Supply Operations

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Need for Digital Supply Chain Transformation NOW

Corporation Inc. is a global industrial manufacturing company with revenues of more than USD 20 billion. The company has regional manufacturing and distribution units with import and export rights worldwide. Since the pandemic, the organization has faced major supply chain issues and is often unable to fulfill customer orders on time and sometimes even rejects orders. In addition, a lack of real-time visibility on product availability has forced large customers to look elsewhere.

Jane is concerned about the state of her company's supply chain and arranges a virtual meeting with Tom

Jane
Vice President of Global Supply Chain,
Corporation Inc.

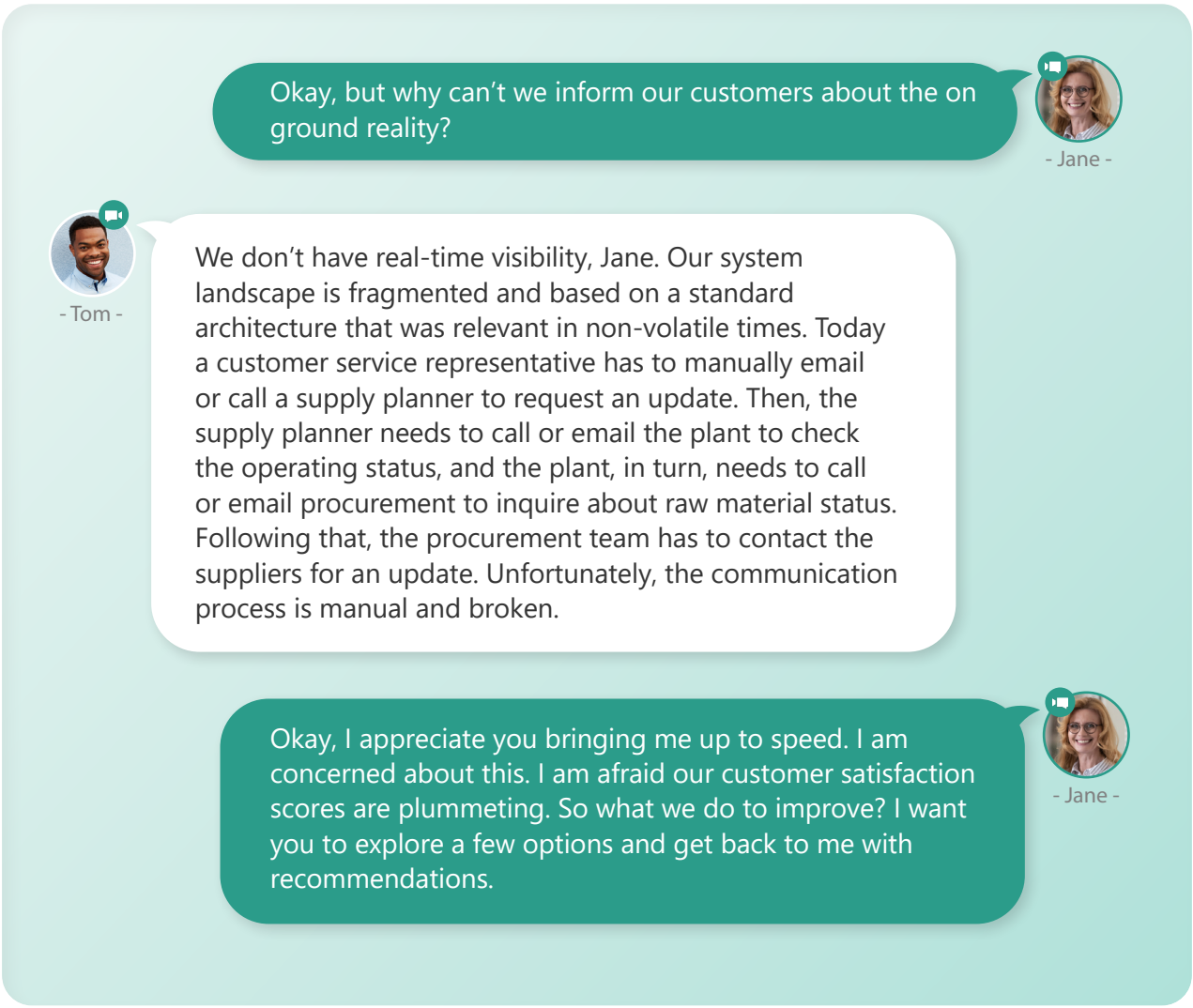
Tom
Director of Supply Chain Planning,
Corporation Inc.

Hey, Tom, help me out here. Why do we reject or delay so many customer orders? Why can't we accurately promise products to our customers? I thought we were using the most advanced methods to manage demand forecast and product availability.

- Jane -

- Tom -

Jane, it's a perfect storm out there. On the demand side, Covid has triggered massive changes in consumer buying behavior, making it difficult for our teams to accurately predict demand needs. On the supply side, scarcity of raw materials, capacity depletion in plants to comply with Covid regulations, shortage of warehouse labor and truck drivers, and global logistics congestion have made it challenging to supply the products on time, in full. The combination of the two is stretching our supply chain operations to extremes. We must take immediate and long-term tangible steps to better handle similar circumstances in the future.



Tom goes out in search of options, speaks with a few consulting firms, and discovers the following from publicly available data:

a. According to research by the IHL Group, shoppers encounter out-of-stock (OOS) issues every third time they shop.
b. IRI research found that 20% of OOS issues remain unresolved for more than three days.
c. Using AI agents, companies have improved their store-level forecasts by 25%.
d. Ninety-five percent of AI-assisted shipments are delivered on time, compared to 60% for those without the technology.
e. The digital divide is growing among the top, innovative supply chains and the bottom, overspecialized, rigid ones.

Tom also realizes that most companies in the industry are in a similar situation. If his organization does not figure out the issue now and ignores building a long-term solution, there is a significant risk of a rise in unhappy customers. Poor communication and siloed operations are creating a fundamental challenge to businesses and operations that needs to be addressed NOW.

Tom finds out that the best way to address these issues is an end-to-end supply chain digital transformation. He goes back to Jane.

Jane

Tom

Tom, what did you find? What are our options for resolving the problems?

- Jane -

- Tom -

Jane, the best option I have discovered after a high-level discussion with a few consulting firms is an end-to-end supply chain digital transformation. We have to convert many processes and tools from analog to digital, which requires an automated, systematic, and integrated approach. We also need to standardize and centralize our data. Many companies across industries are already doing this or planning to do it in the next 1-2 years.

I imagine this will require a lot of time and effort. I don't want to invest tens or hundreds of millions of dollars and wait for four to five years to get a return on the investment. So, what can we do to find a resolution quickly?

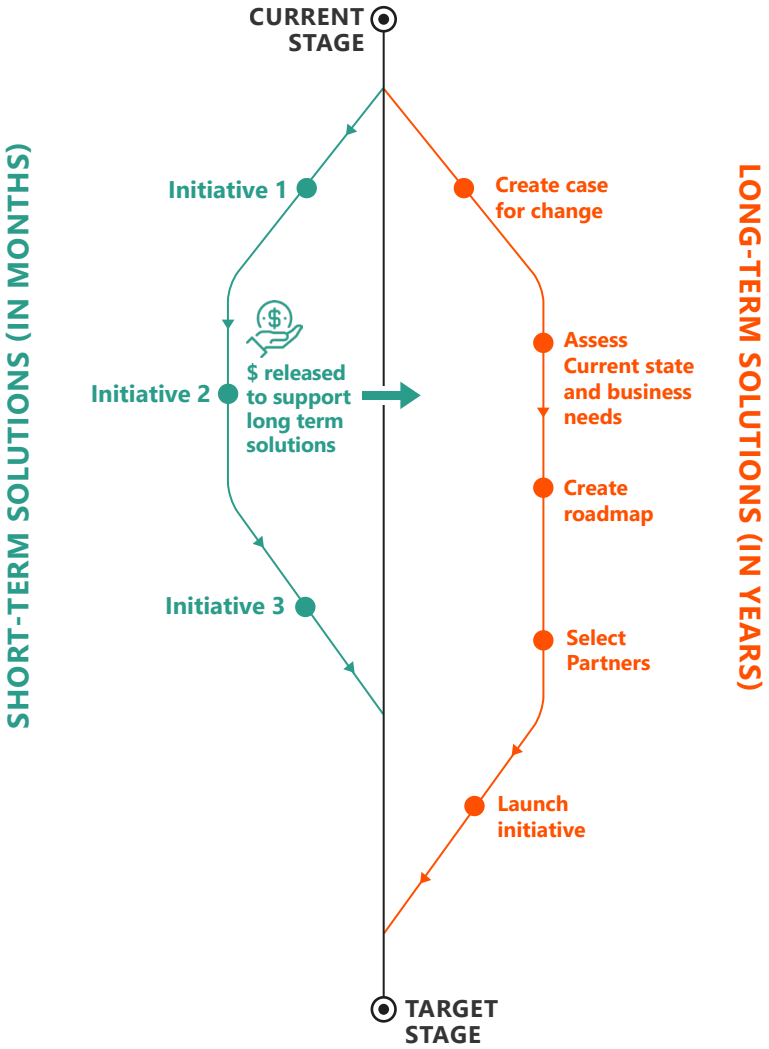
- Jane -

- Tom -

Jane, that's an excellent question. I was thinking about the same thing, and I looked into a few alternative possibilities. I found that a digital transformation does not necessarily have to start with the intention of "boiling the ocean." I believe we can work with a two-pronged approach: the first is to get a few basic elements in place and start benefiting from low-hanging fruit. Second, we can work with our commercial and finance teams to build a long-term sustainable digital transformation roadmap. If this sounds interesting, I can come back on the first option over the next few days, and for the second action, I'll need your support to start engaging the leadership about the need and priority of this issue.

- Tom -

Figure 1: Path to a digital future while simultaneously unlocking value.



Okay, interesting. Yes, please explore the option and let me know how to approach the transformation with minimal investment and fast time to value.

- Jane -

Basics for a Digital Supply Chain Transformation

Tom decided to learn more about digital transformations following his discussion with Jane. He spoke to many consulting firms that have successfully led similar transformations across large multi-national corporations, read publicly available information from various industry forums, university research centers, and research publications. He returned to Jane to share his findings.

Jane

Tom

- Tom -

Hi Jane, how are you doing? I spent the last four weeks learning more about supply chain digital transformation from various publicly available data sources and several consulting firms that have experienced working on similar problems and transformation. My goal has been to use this research to identify a few basic actions that will help us achieve faster results while also putting us on the path to building a long-term competitive digital supply chain.

- Jane -

Okay, I'd want to learn more about this option, but first, let's go over the required basics.

- Tom -

Let's start with what digital transformation means. It necessitates an automated, systematic, and integrated approach that enables us to gather real-time data while identifying valuable insights from a vast data set utilizing Machine Learning and Artificial Intelligence. We can streamline our processes, get real-time visibility, delegate the most routine jobs to the systems, freeing our workforce to focus on value-added tasks. Before we start this journey, we need to make sure that we carefully consider the following:

- Tom -

Business and Data Maturity

1. Do we have access to quality data within the organization?
2. Is the data, for example, centralized and/or easily accessible?
3. Are there any system-to-system duplicate problems (same customer ship-to with other names, etc.)?
4. Is there a possibility of manual errors in handling and collecting the data?
5. Do we have employees trained to work on AI/ML projects?

Understanding Unknowns

1. Do we understand the benefits that come with AI/ML?
2. Are we aware of the potential use cases in our line of business?
3. Will there be any security issues?
4. what are the risks involved? Do we have the necessary resources to tackle them?
5. What will happen to the tools we have already invested in, and will these solutions integrate with them?

Starting Points

1. What benefits can we enjoy now without waiting for years of investments?
2. What financial requirements do we have? What resources will we use to fulfill them?
3. What will be our strategy for implementing AI/ML solutions?
4. Should this job be outsourced or developed in-house?
5. Where should we seek help to ensure a seamless transition?

- Jane -

This is a good list. Let me think about it for a while. I have to rush to another meeting, but the transition we discussed has piqued my interest. I'm relieved to learn that it doesn't require years of time and effort to come to fruition.

Yes, let's talk about that. I will set up more time with you tomorrow. If necessary, I am also happy to bring in industry experts from consulting firms who can share their learnings and challenges. Thanks for your time today.

- Tom -

A Unique Approach to Digital Supply Chain Transformation

To prepare for their upcoming meeting with Jane, Tom contacted a respectable consulting firm that has led several supply chain transformations across large multi-national corporations. The objective was to prepare a first discussion document with Jane and the leadership. The consulting firm has appointed 'John' as an expert on supply chain operations and technology.

John

Tom

Hey John, I spoke to Jane. She is interested in knowing more about how to digitally transform the supply chain. She has asked me to be pragmatic and follow a two-pronged strategy:

i. Launch short-term initiatives that quickly generate value
ii. Start laying the groundwork for a long-term transformation

She prefers to see results in a few months rather than years.

- Tom -

- John -

Tom, this is an excellent ask from Jane. Many companies embark on multi-million, multi-year transformations and don't realize the value until 3 or 4 years later. In reality, publicly available research shows that 70% of all transformations fail for various reasons, primarily due to a lack of patience from leadership or poor data quality. It's also expensive, time-consuming, and labor-intensive.

Wow, this is a scary metric. What steps should we take to ensure we are among the successful 30 percent?

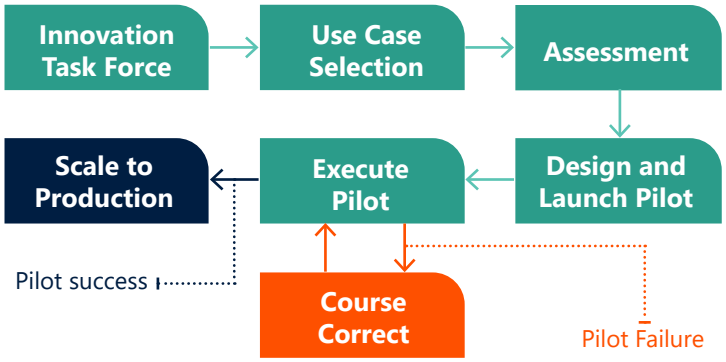
- Tom -

- John -

There is another way of transforming the supply chain that's effective and does not take a significant amount of effort or time to start generating value. There are seven steps to it:

- John -

1. **Innovation task force:** Form a two-person innovation task force with one member having business management experience and the other excelling in AI/ML and data science. These skills complement one other and are necessary for effective digital changes.
2. **Use case selection:** Evaluate various use cases from the use case library and select relevant ones for your organization. Create a future roadmap and prioritize the use cases based on complexity and potential impact. Start with low-complexity, high-impact use cases to prove value and generate momentum within the organization.
3. **Assessment:** Validate data availability, identify essential stakeholders, and understand the path for scaling the solutions to production.
4. **Design and launch a pilot:** Select the scope of the pilot, design the solution, and define success metrics.
5. **Execute pilot:** Run the pilot and measure the outcomes.
6. **Course correct:** If the pilot does not meet success criteria within the time frame, course correct and re-run the pilot. If the team believes there is no value, abandon the pilot and move to another use case.
7. **Scale to production:** If the pilot meets the defined criteria, build a project team with business and data science expertise, and scale the pilot to the rest of the organization.



Using this methodology, you will quickly realize value and slowly transform your supply chain at a rate acceptable to your organization. This improves the likelihood of adoption, thereby increasing the probability of success. You will also notice that we have published this approach publicly because we believe everyone can use this as a starting point in their digital transformation journey.

This is an excellent methodology. Where can I access the use case library?

- Tom -

- John -

We have several such used cases on a library platform called 'Consonance,' where all these use cases can be switched on or off modularly. It is important to note that we cannot share confidential information about any clients and the information will be useful yet generic.

How long does a pilot usually last?

- Tom -

- John -

It depends on the use case, but it's generally eight to 14 weeks. That's the beauty of this methodology. Either you succeed fast, or you fail fast, and you learn. We follow an agile development approach to ensure that we are able to use the incoming information during project execution to reassess the course and make changes if needed.

What's the success rate and adoption rate of this methodology?

- Tom -

- John -

I'm aware that a few clients have already started using this approach, and the results have been encouraging.

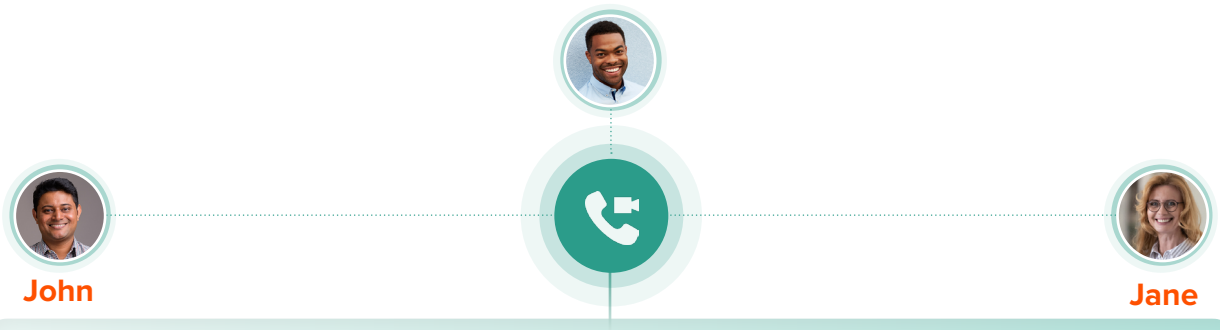
This is great, John. Let me schedule a meeting with Jane. You can walk her through this methodology.

- Tom -

John met with Tom and Jane, who were fascinated by the methodology, and requested him to come back and demonstrate some of the use cases from the library.

Practical Examples of AI/ML Use Cases

Tom invited John to the follow-up meeting with Jane. She prefers a two-pronged approach to transformation that can not only quickly demonstrate value but also set up the organization for long-term sustainable change. Further, John warned her that according to publicly available data, 70% of large-scale transformations fail, which she wants to prevent at Corporation Inc.



Jane, thank you for taking out the time today. John brought in some illustrative use cases to explain how a digital transformation can be done step by step using AI and machine learning.

- Tom -

Excellent! I'm excited to learn more.

- Jane -

Thanks, Jane and Tom. You must be familiar with the SCOR supply chain model, which splits the supply chain into four pillars: Plan, Source, Make and Deliver. I've used the same model to organize my use cases. Let me go through a few examples of AI/ML use cases in each section.

- John -

Plan

- Smart SKU Segmentation Using Clustering
- Intelligent Demand Forecasting (0-2 years)
- Smart Demand Sensing (0-13 weeks)
- Constraint Scenario Planning

Source

- Smart Negotiation Platform
- Supply Risk Assessment and Risk Prediction Using ML and Knowledge Graphs

Make

- Downtime Reduction
- Predictive Asset Maintenance
- Quality Stabilization

Deliver

- Intelligent Allocation
- Dynamic Sourcing

- John -

1. Plan

a. **Smart SKU Segmentation Using Clustering:** Use automated clustering and let the machine determine which parameters (sales, profit, margin, volume, volatility, customer segment, etc.) are essential for the organization, then segment the SKUs automatically.

b. **Intelligent Demand Forecasting (0-2 years):** Use advanced ML algorithms to generate accurate long-term forecasts. Utilize external factors such as market intelligence, macroeconomic factors, weather conditions, geopolitical factors, global industry trends, and more.

c. **Smart Demand Sensing (0-13 weeks):** Apply advanced ML algorithms to adjust detailed short-term forecasts to adapt to the current market situation. Utilize order trends, real-time market intelligence, social media sentiments to sense and respond to demand.

d. **Constraint Scenario Planning:** Use knowledge graphs and bill of materials (BOMs) to determine the impact of raw material constraints, bottlenecks, etc., and generate scenarios to plan around the constraints.

- John -

2. Source

a. **Smart Negotiation Platform:** Enable a data-driven, AI-backed negotiation process to drive target set up, pre-negotiation, negotiation, and closure. The platform can be connected to internal-external data sources and includes modeling/simulation capabilities to help planners make data-driven decisions.

b. **Supply Risk Assessment and Risk Prediction Using ML and Knowledge Graphs**

   i. Use machine learning to combine intel from various external sources (strategic, financial, reputational, operational, contractual/legal, geopolitical, etc.) to calculate the Stockout Possibility Score (SPS) and predict supply risk (read more about SPS here).

   ii. Use knowledge graphs to map the entire supplier network to locate and monitor alternative, secondary, and tertiary suppliers.

- John -

3. Make

d. **Downtime Reduction:** Combine IoT and AI to estimate optimal starting parameters for machines that reduce unscheduled downtime. Monitor output quality and predict machines' maintenance needs.

e. **Predictive Asset Maintenance:** Cross-examine asset performance and condition signals to proactively intervene and service critical capital equipment, such as enhancing key asset metrics like Remaining Useful Life (RUL), asset lifespan, and FG defect ratios.

f. **Quality Stabilization:** Build sophisticated feed-forward loops to predict the impact of various process and asset parameters on output quality, balancing high quality with production costs and energy utilization.

- John -

4. Deliver

e. **Intelligent Allocation:** Use ML models to determine the best way to allocate supply-constrained products to customers. The models should adjust allocations based on the planner's preference, like Netflix recommending shows based on the viewer's preferences.

f. **Dynamic Sourcing:** Use ML models to decide which DC fulfills specific customer orders. The model should balance customer service levels, penalties, inventory availability, and total cost to complete the order and adjust according to planners' preference.

- Jane -

This is great, John. There are many opportunities in our supply chain to utilize these use cases. Your methodology of transformation looks sound to me. I hope we can schedule a follow-up soon with other members of my leadership team and discuss the value case and what the future would look like post-transformation.

I will schedule something tomorrow, Jane. Thanks for your time today.

- Tom -

Supply Chain of the Future

Jane has been in conversations with Tom and John about the value case of digital supply chains and is interested to learn more.

John

Jane

Welcome back, Jane and John. Let's talk about the value case and future of digital supply chains.

- Tom -

- John -

Thank you. I'll begin with the future. Assume Liz, your supply chain planner, arrives at work and is welcomed by "Smarty," her digital assistant.

Hey Smarty, good morning! What do you have for me today?

- Liz -

- Smarty -

Good morning, Liz! I have been keeping an eye on news and social media, and I sense that the demand for the Coca brand of chocolates is increasing, especially in the Nordic countries. I have taken a few actions:

1. I have notified the procurement, operations, and transportation departments about the surge in demand.
2. I have identified and moved customer orders to alternate warehouses because of capacity issues at DC2010.

I was hoping you could weigh in on a couple of additional issues as well.

Demand is on the rise, which is a positive thing. This indicates more income for the company. Thank you for taking all the required actions. What else is needed?

- Liz -

- Smarty -

In four weeks, I expect you will run out of manpower in the Panama warehouse. I've prepared a couple of scenarios to help you mitigate this labor shortage along with potential costs and benefits, and it's up to you to decide which one you want to implement.

Smarty then provides Liz with various scenarios and the trade-offs that each entails. Liz chooses a scenario, and Smarty puts that plan into action.

- Jane -

This sounds exciting. It is an excellent example of a connected supply chain.

- John -

Yes, this is one instance of an agile supply chain that allows us to respond to rapidly changing external environments. Wherever the decisions are on clearly defined rules, the system can potentially make them automatically. However, the system will ask for human intervention wherever the decisions require a complex understanding of the business landscape. When you combine this scenario with the system making real-time decisions on re-routing delayed shipments to meet customer orders, automatically adjusting for any unplanned downtimes in manufacturing by re-routing orders, and even intelligently allocating inventory for important customers, you've got a more agile and flexible supply chain to support your customers.

- Jane -

Great! I'm already seeing huge productivity gains from these autonomous supply chains. What additional advantages are there?

- John -

Aside from increased productivity, there are several additional benefits that we have seen in supply chain transformations. These data show the benchmarks for success and can be used as a guide when implementing similar transformations at your company:

a. Sales loss can be reduced by up to 75%.

b. Transportation and warehousing costs can be cut by 30 to 50%.

c. Supply chain admin costs can be lowered by 75 to 90%.

d. Inventories can be decreased by 50 to 80%.

These service improvements, coupled with reduced costs and lower working capital, can significantly improve the agility of the supply chain.

- Jane -

Understood. What you're saying is that both customer and employee experience will improve, and the company will benefit from higher revenues, lower costs, and reduced working capital. I am convinced to explore this further. Let's start this. Would you please work with Tom to shortlist relevant use cases for us and kickstart a few pilots?

- John -

Absolutely. Thanks, Jane.

About Mondelēz International, Inc.

Mondelēz International, Inc. (Nasdaq: MDLZ) empowers people to snack right in over 150 countries around the world. With 2020 net revenues of approximately $27 billion, MDLZ is leading the future of snacking with iconic global and local brands such as Oreo, belVita and LU biscuits; Cadbury Dairy Milk, Milka and Toblerone chocolate; Sour Patch Kids candy and Trident gum. Mondelēz International is a proud member of the Standard and Poor's 500, Nasdaq 100 Wand Dow Jones Sustainability Index.

About Tredence Inc.

Tredence Inc. is a data science and AI engineering company focused on solving the last mile problem in analytics. The 'last mile' is defined as the gap between insight creation and value realization. We are 1500 employees strong and have offices in five countries at ten different locations, with clients including the world's leading brands in retail, CPG, Hi-Tech, telecom, travel, and industrials.

About the authors

Pratik Yadav

Supply Chain and Technology Leader,
Mondelez International, Inc.

Pratik is a senior supply chain and technology executive with over 15 years of experience in managing and digitally transforming B2C and B2B operations globally for multiple industries including industrial manufacturing, consumer goods, logistics, pharma, and technology. He brings with him a unique experience of understanding both – supply chain operations as well as in-depth knowledge of new techniques such as AI, ML, IoT, big data analytics, and blockchain.

Majaz Mohammed

Senior Director, Supply Chain Manufacturing,
Tredence Inc.

Majaz is an experienced supply chain expert with a solid background in operations. He's recognised for assessing clients' operations and recommending/implementing business process changes. He has led change management teams across many regions and departments. His specializations include Integrated Business Planning, Inventory Optimization, and Order Fulfillment. In addition, he is also a prolific writer and actively contributes to Tredence's thought leadership.