Enhancing Supply Chain Synchronisation in the Fast Moving Consumer Goods Industry

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Abstract. In 2021–2022, a decade's worth of disruptions battered material supply chains, establishing them as a permanent factor. COVID-19 caused labour shortages, rising fertiliser costs altered farming, Europe faced energy crises, USA-China tensions grew, and the Ukraine-Russia war escalated. Extreme weather and policy shifts worsened global supply chains, leading to bare shelves and crippled businesses. Just-in-time delivery failed, and traditional supply chains no longer ensure business continuity. This article aims to prove the inefficiencies of traditional supply chains and offer an approach to creating an end-to-end model with better visibility, service, and cost control for Fast-Moving Consumer Goods (FMCG) manufacturing plants. During the research phase, 12 European Pet food production plants were visited, analysing their supply chains via People/Systems/Process lenses. Risks, synchronisation needs, system requirements and training gaps were identified. Preliminary research findings are presented in this article.

Key words: supply chain disruption, manufacturing, fast-moving consumer goods, continuous improvement.

Introduction

Relevance of the article

The global supply chains have been shaken in recent years. COVID-19, wars, extreme weather events, economic and political instability unprecedentedly shook global trade, and it seems that such events will continue and become the new normal. Research is needed to help organisations become resilient and continue operations while facing these new challenges.

Problem investigation level

There are a lot of resources available that recommend a lean supply, just-in-time deliveries, inventory control. All those papers were correct for the time they were written. Unfortunately, business operations have changed, and there are very few papers that stress agility and resilience more than immediate cash benefits while stopping the factory due to the lack of materials, which is extremely expensive.

Scientific problem

How to strengthen and adapt the global supply chains to compensate for unpredictable force majeure that is more common than expected? How to increase supply chain risk visibility and transparency?

Object of the article – Fast-Moving Consumer Goods (FMCG) manufacturing sites and their global supply chains.

Aim of the article – to research and define the inefficiencies of traditional supply chains in the changing global environment and argue that this model can no longer ensure business continuity. End-to-end supply chain visibility and proper enterprise planning must be implemented in order to avoid losses due to missed deliveries.

Objectives of the article:

1. To overview traditional supply chains;
2. To reveal recent supply chain disruptions;
3. To clarify the findings of research done in 12 FMCG factories.

1. Traditional supply chain model and just-in-time concept

The APICS dictionary (Pittman & Atwater, 2016) defines the term "supply chain" as a set involving all processes that connect producing firms and consumers. These processes start with supplying the raw materials and finish with the final product delivery to the consumer. Additionally, the term "supply chain" is defined as a compilation of internal and external organisational activities, enabling the value chain to offer services and products to clients. (Cox et al., 1995). "Supply chain

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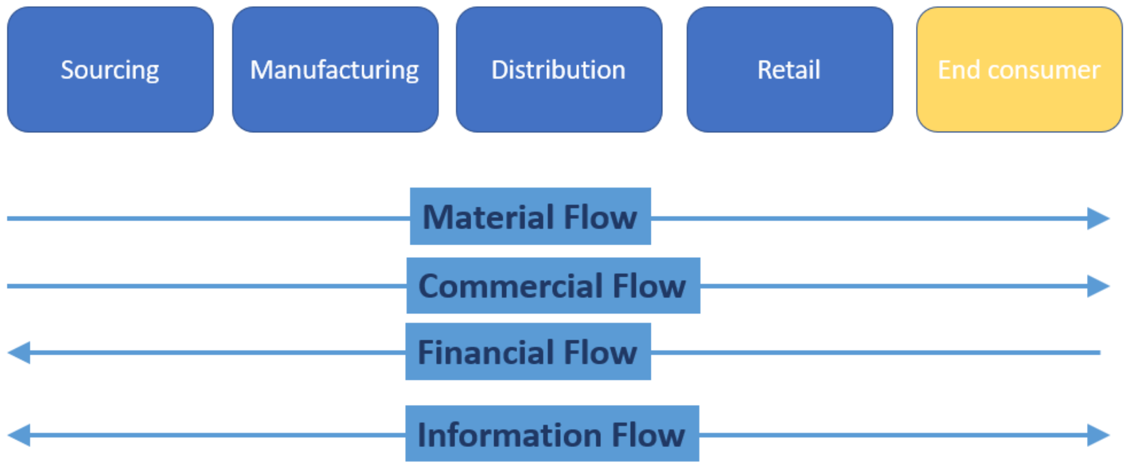
is defined as a group of inter-connected participating companies that add value to a stream of transformed inputs from their source of origin to the end products or services that are demanded by the designated end-consumers" (Lu, 2011). In other words, it is a flow of materials, information, finance and commerce from the extraction of raw materials to the final product sold to the end consumer. Active control strategies are often used to manage supply chain systems, where nonlinear control synthesis is recommended (Xu et al., 2022). These authors emphasise that using System Dynamics Theory can be a potentially effective strategy to deal with chaotic supply chains with unpredictable behaviour over time. Other authors (Wofuru-Nyenke et al., 2023) have explored recent trends in sustainable manufacturing supply chain modelling. These studies aimed to identify modelling approaches. Assessing the challenges posed by COVID-19 in adapting supply chains to function in suddenly changed conditions, significant research on strategy formation in crises was conducted (Durugbo & Al-Balushi, 2023). Such strategies fundamentally differ from conventional strategies that focus on developing competitiveness. The COVID-19 epidemic has drawn the attention of companies to blockchain technology, which can help them quickly gain competitiveness in the market. However, this technology also requires significant financial investments. To solve this problem, an effective supply chain contract can be started by adopting blockchain technology in the supply chain (Liu et al., 2023).



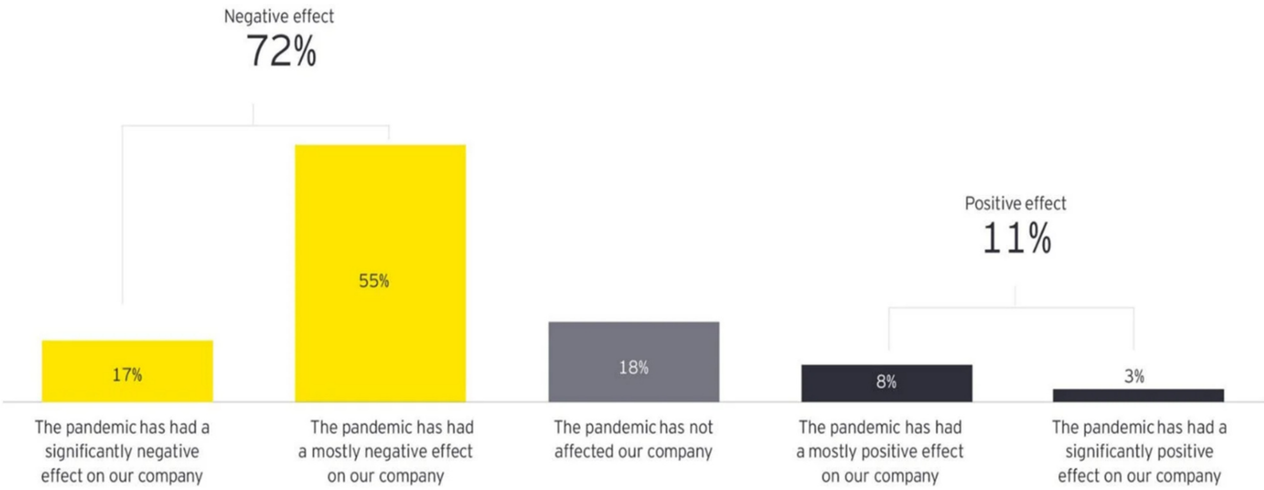
Source: created by the author.

Fig. 1. Supply chain flows

Often, companies concentrate on financial and material flows, which allow operations in the short term, but do not allocate enough resources to information and commercial flows, which are crucial in the long term. In past studies, several strategies were provided for supply chain, which can generally be divided into two categories: responsive/agile supply chain strategies and efficient/lean supply chain strategies (Fisher, 1997). Toyota, a leader in innovative Lean manufacturing strategies, introduced its Just-in-Time (JIT) strategy. As M'Barek, Fujii and Ohtaki (1988) described in their paper, it is designed to produce and deliver materials, parts, and components just before they are needed. This strategy is well known for considerable cost reduction and total productivity improvement in many manufacturing companies. It is based on a close relationship with the supplier, allowing accurate planning of materials avoiding inventory storage. Implementing JIT can lead to significant savings for companies that can meticulously establish their planning systems. JIT became a go-to strategy for many manufacturing companies seeking to optimise resources and achieve cost and cash savings. However, in today's environment, not having any safety stock and relying on supply chains designed for a stable global market brings huge risks and potentially enormous costs if production must be stopped due to disrupted deliveries and lack of materials. This is exactly what happened to Toyota after the earthquake in Japan in 2011. Most of Toyota's Japanese plants were closed for nearly two months. In addition, Toyota's North American production was cut to 30% for the subsequent 6 months due to a shortage of 150 different parts which should have been produced by Toyota's Japanese plants (Canis, 2011). Toyota had a 77% fall in profits in the second quarter of 2011, equivalent to $1,36 BN (MacKenzie et al., 2012). Toyota learned this painful lesson early and revised its operating strategy, while the rest of the world did so only in 2020 after experiencing disruptions in the supply chain due to COVID-19. That is why Toyota did relatively well during 2020–2021, while most other companies struggled to get the needed materials and components for production.

2. Post-pandemic supply chain trends

Harapko (2023), working in Ernst & Young LLP (EY US), a global business consultancy company, conducted a survey of 200 senior-level supply chain executives in late 2020 and then in 2022 to determine how/if the COVID-19 pandemic impacted global supply chains. 72% of respondents reported a negative effect.



Source: Harapko, S. (2023).

Fig. 2. Survey results – pandemic effect on the business

According to the executive supply chain survey, it is evident that top priorities include enhancing visibility, efficiency, and reskilling supply chain personnel. These results align with expectations, considering that cost optimisation in the supply chain remains a consistent focus, even when bolstering resilience. Traditionally, cost reduction involved lean operations, extended lead times, and low-cost labour. Looking ahead, the emphasis shifts towards agility, visibility, automation, and upskilling the workforce. These factors contribute to cost reductions and foster improved decision-making, standardised processes, and excellence throughout the supply chain and collaborative partners within the ecosystem. The surveys highlight that supply chain visibility ranked among the top three priorities in late 2020 and claimed the top spot in 2022. Despite its prominence, achieving comprehensive supply chain visibility remains an ongoing effort. Although COVID-19 was the first factor that shook the global supply chains, it is now only one of many over the last three years. Executives acknowledge the heightened strategic significance of their supply chain due to the changing global trade environment. Consequently, businesses are forced to promptly establish a supply chain structure that aligns with the demands of the emerging digital and autonomous-focused era. To sum up, we can observe a trend where supply chains require adaptation to enhance agility and transparency, which is crucial for supporting business operations. Technological innovation is pivotal in facilitating data analytics, furnishing a foundation for strategic organisational decision-making. A case study was conducted to analyse this problem further and identify the specific challenges confronting businesses.

3. Optimising FMCG supply chains: a comprehensive analysis of 12 case studies

Research methodology

Aim of the research is to define "as is" material management process, identify supply chain weak points and gaps, propose solutions.

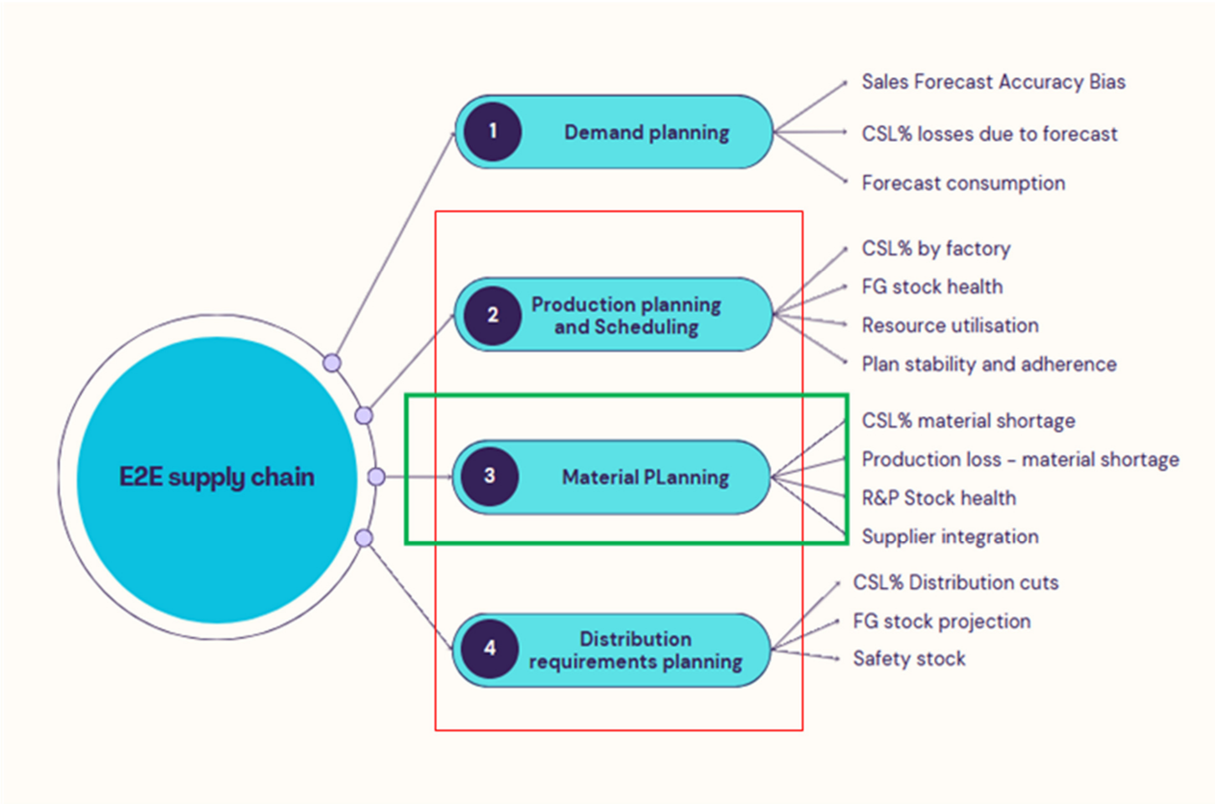
Objectives of the research:

1. To define "as is" material management process;
2. To identify supply chain weak points and gaps;
3. To propose solutions and methodology for continuous improvement.

Selective Sample. 12 EU and UK Pet Food manufacturing plants.

Research methods

The research was conducted in July-November 2023. Each production plant was physically visited and audited. The qualitative research methodology was used, and only matter experts were considered. Interviews were conducted with factory raw/pack material planners, who dived deep into their daily routines of ordering materials for production. The planners were asked to describe their daily tasks step by step, making sure to cover all areas relevant to the research: master data maintenance, MRP runs, requirements, ordering procedure, risk assessments and risk management, inventory assessment and management, new product development and other activity management, supplier relations and performance management. The planners answered open questions to get a complete overview, avoiding bias and predisposition.



Source: Company inner resources.

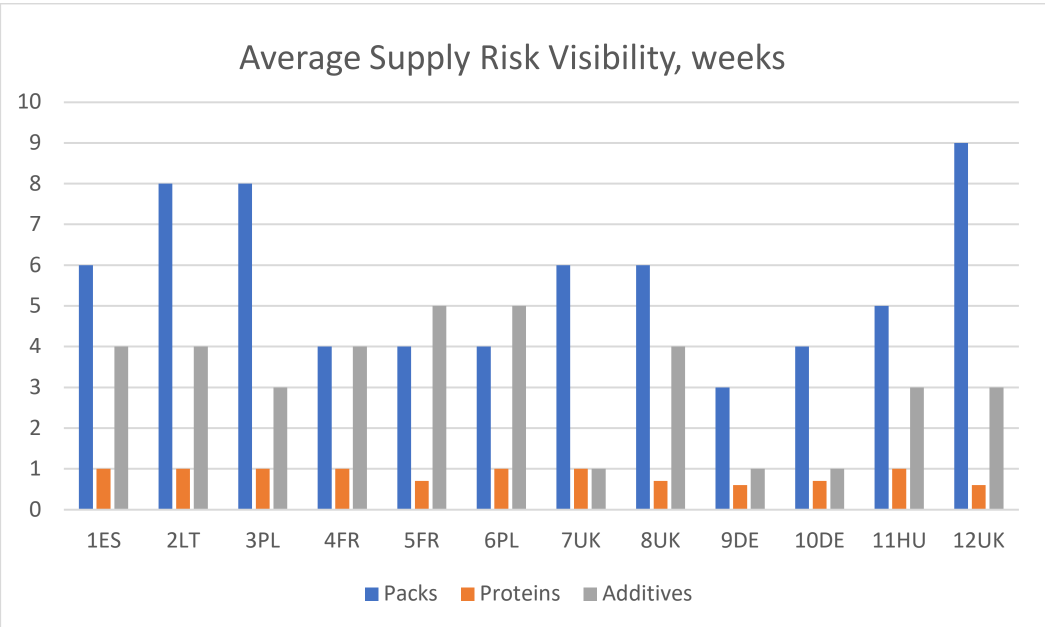
Fig. 3. End-to-end supply chain components and their KPIs

Systems experts, scheduling and commercial specialists, logistics managers and the factory leadership team were also interviewed to define their input to the factory supply chain. Visual inspection and observation methodology were also used. In addition to the physical interviews in the factory office, a factory tour was also arranged to learn about the technologies, capacity constraints, systems integrations, infrastructure and accessibility, storage capabilities, etc. The factory tour is the most valuable tool for witnessing each site's unique setup and understanding why specific working methods are applied. Focus groups were created with relevant site team members to discuss first findings and preliminary risk factors, urgent actions (if any), and continuous improvement action plan. The collected data is non-numerical, it is detailed information on processes, systems, and people integration. Based on the collected data, each site will be evaluated following the same template, clearly indicating the current "as is" maturity level, stating the gaps and defining the maturity level – primary, capable, advanced or enterprise. The template was prepared and created by the investigated company, following their enterprise planning guidelines.

Research data analysis and discussion of the results

The analysis and comparison of research data is ongoing, but the preliminary findings have prompted the company to implement new KPIs, training programs, communication strategies and process change procedures. An ingrained continuous improvement mindset in the company allows these changes to be implemented relatively smoothly – factory teams are engaged, understand the bigger picture, and welcome positive change. Several benchmarking opportunities were identified, where some factories have very effective processes that could be deployed to others.

Among the most worrying findings was the risk visibility, which usually is limited to the supplier lead time, while the target should be at least 12 weeks. If this lead time is less than 1-2 weeks, then the factory might not have enough time to implement any mitigation actions and end up stopping the production lines. While some safeguards are already in place, such as safety stock and diversification away from single-sourced materials, this cannot be implemented across all inbound portfolios. Fresh raw materials cannot have any safety stock due to limited expiry time, which is 24-48 hours. In this case – close relationships, service level agreements and systems integration with key suppliers are essential to business continuity. It is vital to inform suppliers of future demand and agree on risk management processes to allow more time to prepare for a material shortage.



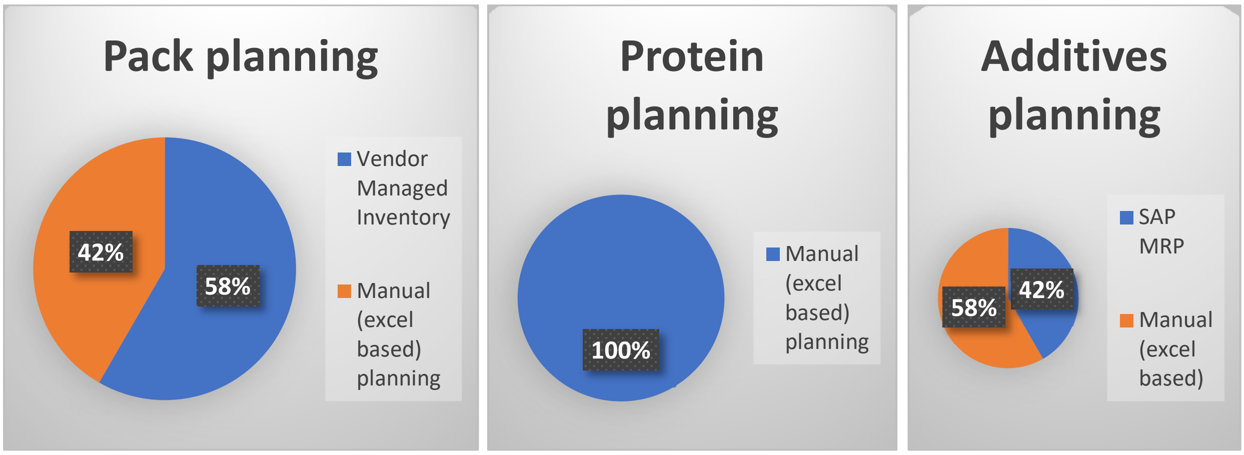
Source: Research data.

Fig. 4. Risk visibility based on material type and lead time

When looking at safety stock and material inventory targets, there is still a lack of standard methodology that could cater to differences in factory setup, such as infrastructure, production capacity, warehousing space, and material storage requirements. A standard safety stock calculation methodology could be applied region-wide but must be adjusted to individual factory setup requirements.

Demand accuracy and production plan adherence are other issues for factories. While in FMCG industry, manufacturing must be very reactive to fulfil ever changing customer needs, a balance is also necessary to have a steady fixed time horizon to prepare for production. Demand planning accuracy and bias must be assessed using new statistical, interpersonal and AI tools. If factories can achieve relatively accurate demand planning and factory output adherence to plan, a reasonable amount of cash could be saved by lowering the safety stocks on finished products and materials.

System limitations were another factor that added extra manual work. Because the main systems were not adapted to the local factory setup, requirements, and operations, workarounds had to be created to compensate for them. These manual Excel-based tools were used for material requirement planning and ordering while interfering with data accuracy and material inventory visibility in the central operating systems. Only individuals in specific roles possess the expertise required to handle the Excel-based macro tools, which causes a potential risk to the company's supply should they leave unexpectedly. Additional features must be added to the software so the factories can bring all planning back to the central operating systems, stop outside transactions, and have clean and reliable data to enable advanced technology adaptation and analytics.



Source: Research data.

Fig. 5. Factory planning methods based on material type

One more very important finding that should be mentioned is people: proper recruitment, retention, development, proper handover and onboarding. A clear trend emerged where the factory supply team exhibited experience, comprehensive training, and minimal staff turnover, resulting in fewer supply issues. In contrast, at other factories where knowledge was lost during handovers, more issues with data accuracy, lower system usage and trust, underutilisation of available tools were observed. A specific gap identified here was the lack of fully documented processes to support onboarding, along with the absence of training programs to develop essential knowledge of system functionality.

Conclusions

1. Having overviewed traditional supply chains, it was determined that traditional supply chain methods need reassessment to accommodate the new global trade reality. Businesses need to consider three key areas: processes, technology, and people. Advanced technology solutions can enhance supply chain efficiency by enabling predictive analytics that enables risk visibility and support decision-making.
2. Having revealed recent supply chain disruptions, earthquakes, COVID-19 and other severe natural disasters and uncertainties can immediately destroy prior developed and implemented manufacturing and distribution plans. Implementing JIT can lead to significant savings for companies that can meticulously establish their planning systems. However, all those benefits can be taken only in predictable conditions. COVID-19 has an extremely

painful impact on the disruption of such thoroughly balanced supply chains.

3. Having clarified the findings of research done in 12 FMCG factories, several benchmarking opportunities were identified that could be deployed to other factories for relevant process improvements. As one of the most worrying findings was the risk visibility, which is usually limited to the supplier lead time. It is important to inform suppliers of future demand, agree on risk management processes to allow more time to prepare for a material shortage. Another relevant finding is about safety stock and material inventory targets – there is still a lack of standard methodology that could cater for differences in factory setup – infrastructure, production capacity, warehousing space, and material storage requirements. Demand accuracy and production plan adherence are other issues for factories. System limitations were another factor that added extra manual work. Additional features must be added to the software so the factories could bring all planning back to the central operating systems, stop any transactions being done outside of it. One more very important finding that should be mentioned is people: proper recruitment, retention, development, proper handover and onboarding.

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