

# *Just-in-Time Inventory: Has Lean Gone Too Far?*



*Procurement and Supply Chain Management Made Simple.*

## **Foreword**

*Inventory has long been regarded as both an essential business asset and a significant financial burden. Holding sufficient stock protects organisations against disruption and uncertainty, yet excessive inventory ties up capital, increases storage costs and creates the risk of obsolescence. Finding the right balance has therefore remained one of the most important challenges facing procurement and supply chain professionals, particularly as markets become more competitive and customer expectations continue to increase.*

*Few inventory management strategies have influenced global manufacturing and logistics as profoundly as Just-in-Time (JIT). Originating within Toyota's production system, its principles transformed the way organisations approached purchasing, production and inventory control. By reducing unnecessary stock and focusing on continuous flow, JIT demonstrated that efficiency could improve profitability, productivity and customer service simultaneously, encouraging organisations around the world to rethink long-established inventory practices.*

*Recent years have tested these principles more severely than at any time since JIT was first introduced. The COVID-19 pandemic, geopolitical tensions, trade disputes, labour shortages, climate-related disruption and rising transportation costs exposed vulnerabilities within global supply chains. Many organisations discovered that while lean inventory delivers considerable financial benefits, resilience requires careful planning, supplier collaboration and a thorough understanding of operational risk.*

*Procurement professionals are increasingly recognising that successful inventory management is no longer simply about reducing inventory wherever possible. Modern supply chains require informed decisions based on product criticality, supplier capability, market conditions and the potential consequences of disruption. Digital technologies, improved visibility and stronger risk management now enable organisations to make more balanced decisions that support both operational efficiency and long-term business continuity.*

*The future of inventory management is likely to be shaped by organisations that successfully combine lean thinking with strategic resilience. Rather than viewing efficiency and resilience as competing objectives, leading organisations increasingly treat them as complementary elements of effective supply chain management. Those able to adapt their inventory strategies to an increasingly uncertain global environment will be better positioned to control costs, manage risk and maintain sustainable competitive advantage.*

*Just-in-Time (JIT) inventory receives goods, materials and components only as production or customer demand requires them. Rather than holding large buffer stocks, organisations run deliberately lean, converting warehouse space into working capital. Because inventory carrying costs typically consume between 20 and 30 per cent of average stock value annually, the financial logic is compelling. Developed within Toyota's production system, JIT now underpins manufacturing, retail and services throughout the United Kingdom.*

*The appeal is straightforward arithmetic. Every pound tied up in stock is a pound unavailable for wages, innovation or debt reduction. British warehouse floorspace exceeded 670 million square feet during 2025, and the logistics sector now contributes over £185 billion annually while employing 2.7 million people. Lean inventory reduces that footprint, accelerates cash conversion and enforces the supplier discipline that genuinely competitive manufacturing demands of every participant in the chain.*

*Recent events have severely tested that logic. The pandemic, the Suez Canal blockage, semiconductor scarcity and Red Sea disruption exposed how little slack lean supply chains actually retain when tested. British organisations faced shortages of food, construction materials, medicines and electronic components. Procurement professionals now ask a sharper question than before: not whether efficiency matters, but where resilience must be purchased deliberately rather than quietly assumed. That distinction now matters.*

### **The Origins of Just-in-Time**

*JIT emerged from post-war Japan, where Toyota faced acute capital scarcity, limited factory space and fierce domestic competition. Taiichi Ohno and his colleagues concluded that inventory concealed problems rather than solving them. By aligning production tightly with confirmed demand, materials arrived precisely when needed, exposing defects, bottlenecks and supplier weaknesses immediately rather than months later. Necessity, not management theory, produced the method that transformed global manufacturing. Constraint produced the innovation.*

*The approach became the foundation of lean manufacturing, a philosophy delivering greater customer value using considerably fewer resources. Lean encourages organisations to shorten process steps, reduce queuing, and remove activities that customers would never willingly fund. Shorter production cycles improve responsiveness to shifting markets and changing specifications. Crucially, lean treats efficiency as a discipline of continuous flow rather than simply an instruction to purchase less material. Flow matters more than volume.*

*Central to lean thinking is eliminating waste, known in Japanese as Muda. Toyota classified seven distinct categories: overproduction, waiting, unnecessary transport, over-processing, excess inventory, unnecessary motion and defects. Excess inventory occupies a particular position because it conceals every other form of waste. A generous stock buffer allows late deliveries, quality failures and unreliable equipment to persist unnoticed, which is why lean treats it sceptically. Buffers hide problems managers must see.*

*Kaizen, meaning continuous improvement, supplies the cultural engine behind sustained lean performance. Rather than relying on occasional transformational programmes, Kaizen asks every employee to identify incremental gains repeatedly. Combined with JIT, it produces organisations that surface problems quickly and correct them permanently. The pairing explains why committed lean adopters report sustained productivity gains, whereas businesses copying JIT mechanics alone struggle when disruption arrives. Culture matters considerably more than technique alone.*

### **How Just-in-Time Works**

*JIT synchronises purchasing and production with actual consumption rather than forecast optimism. Each stage of the chain is planned so that materials move continuously from supplier to factory to customer, pausing as briefly as possible. The primary measure of success is inventory turnover: how often stock cycles through the business annually. Higher*

*turnover indicates capital working harder and shorter exposure to obsolescence and damage. Inventory turnover is the honest scoreboard.*

*Pull production drives the model. Manufacturing begins when an order is confirmed rather than when a forecast predicts demand, thereby removing overproduction at the source. Toyota's kanban card signalling made this visible and repeatable across thousands of individual components. Because unsold finished goods represent the most expensive inventory any manufacturer can hold, pull systems protect margin as effectively as they protect scarce warehouse space. Overproduction, once created, cannot easily be undone.*

*Demand-driven replenishment applies identical logic to purchasing decisions. Instead of quarterly bulk orders, organisations buy smaller volumes far more frequently, triggered automatically whenever stock reaches predetermined reorder points. Electronic point-of-sale data, barcode scanning and integrated planning systems make this practical at considerable scale. British grocery chains now reorder thousands of lines daily, adjusting quantities against weather forecasts, promotional calendars and regional buying behaviour. Accuracy of demand data determines everything downstream.*

*Frequent small deliveries follow naturally from that approach. Suppliers deliver quantities matched to immediate consumption, which compresses storage requirements and reduces double handling throughout the network. This demands dependable transport, accurate scheduling, and disciplined communication among all parties. With roughly 81 per cent of British freight moved by road, JIT performance here depends heavily on highway reliability, driver availability and corridor resilience. Road reliability therefore underpins the entire British model.*

*Underpinning everything is visibility. Real-time data allows buyers and suppliers to see inventory positions, production schedules and demand signals simultaneously, so emerging shortages surface before they halt a production line. Enterprise resource planning systems, RFID tracking and cloud-based supply chain platforms have transformed what is knowable and when. Without that transparency, lean inventory is merely thin inventory, and the difference becomes expensive. Visibility, not stock, is what makes lean safe.*

### **The Benefits of JIT**

*The clearest benefit is cost. Carrying inventory incurs warehousing, insurance, security, handling, finance, and obsolescence provisions, typically totalling 20 to 30 per cent of average stock value each year. On £10 million of average inventory, that represents between £2 million and £3 million annually, repeated indefinitely. Halving stock levels, therefore, releases recurring savings, not merely a single balance sheet improvement in a single accounting period. The saving repeats every year thereafter.*

*Cash flow improves alongside cost. Purchasing against demand rather than forecast keeps working capital liquid, which matters enormously when borrowing remains expensive, and credit conditions are tight. A business converting stock into cash twice as quickly effectively finances its own growth from internal resources. During periods of elevated interest rates, capital immobilised in slow-moving inventory becomes among the most visible drains on profitability. Liquidity has become a competitive weapon itself.*

*Storage requirements fall correspondingly. Warehousing entails substantial fixed costs, including rent, business rates, heating, lighting, racking, and maintenance, and British industrial rents have risen sharply as available space has tightened. Occupancy across large distribution facilities exceeded 93 per cent in 2025, the highest since 2022. Organisations reducing stored volume can consolidate sites, redesign layouts and avoid competing for increasingly expensive logistics property. Space itself has become a genuinely scarce commodity.*

*Obsolescence risk declines too. Technology cycles shorten continually, regulations change, and consumer preferences shift quickly, so stored goods steadily lose value while sitting still.*

*Sectors such as electronics and fashion routinely see carrying costs towards the upper end of that range precisely because write-down risk is so severe. Replenishing only against confirmed demand limits exposure and reduces the waste associated with disposal. Stock held too long destroys its value.*

*Quality control improves in ways that frequently surprise finance teams. Small batches mean defects appear in tens of units rather than thousands, so root causes can be investigated while physical evidence remains fresh and traceable. Corrective action is cheaper, and the resulting disruption is smaller. Close collaboration among buyers, suppliers and production also standardises expectations, increasing consistency and reducing the inspection burden across the entire supply chain. Problems surface while they remain cheap.*

*Short production runs expose operational weakness early. Equipment faults, tooling drift, supplier variability and process inefficiency all become visible before they compound into significant financial losses. Because no inventory cushion absorbs the consequences, problems demand immediate resolution rather than quiet accommodation. This uncomfortable transparency is entirely intentional: Ohno regarded stock as a blanket that kept management comfortable while performance quietly deteriorated beneath it. Discomfort here is deliberate, not accidental design.*

*Collectively these gains explain JIT's remarkable durability. Resources work harder, production responds faster and non-value activity shrinks measurably across the operation. Supported by capable suppliers, accurate forecasting and reliable systems, lean inventory delivers demonstrable improvements in cost, cash and competitiveness. The strategy has survived five decades of professional scrutiny because the underlying arithmetic remains sound, even where the operating environment has grown harsher. The economics remain difficult to argue against.*

### **The Risks of Inventory Reduction**

*Lean inventory converts efficiency into exposure. With minimal buffer, a modest delay becomes a full production stoppage rather than a manageable inconvenience, because nothing absorbs the shock. Lost output, missed delivery commitments, contractual penalties, and reputational damage follow quickly afterwards. The mathematics that makes JIT attractive under stable conditions works equally forcefully in reverse, so disruption costs frequently exceed years of accumulated savings. Efficiency and fragility are sides of one coin.*

*Supplier reliability becomes a single point of failure. If a critical supplier suffers financial distress, quality problems, equipment failure or outright insolvency, replacement capacity rarely exists at short notice. Dependence intensifies where components are specialist, tooling is bespoke or lead times extend across many months. Concentration in a single manufacturer, production site, or country considerably magnifies the consequences of any individual failure. Single sourcing is invisible until it fails.*

*Transport delays translate directly into stoppages. Congestion, rail disruptions, adverse weather, customs inspections, and shipping delays can each prevent the timely arrival of critical materials. Following the United Kingdom's departure from the European Union, additional documentation and border processing lengthened some journey times, converting previously predictable European routes into variable ones. For organisations holding hours rather than weeks of stock, variability itself becomes the problem. Predictability matters more than raw speed.*

*Ports remain critical chokepoints within global trade. Congestion caused by cargo volume, industrial action, weather or equipment failure can strand containers for weeks. The Ever Given grounding in March 2021 illustrated that fragility precisely: six days of blockage halted roughly \$9.6 billion in daily marine traffic (approximately £7 billion), left 369 vessels queuing, and produced a backlog of nearly 400 ships that required a week to clear. One vessel disrupted global trade.*

*Labour shortages have proved equally disruptive to lean operations. Warehouse operatives, HGV drivers, port workers and skilled manufacturing staff all became scarce simultaneously across the economy. British HGV driver numbers fell to around 268,000 in the year to June 2021, roughly 53,000 below the 2017 peak, while the Road Haulage Association estimated a shortfall exceeding 100,000. Empty shelves and fuel queues followed. Inventory cannot compensate for the absence of people.*

*Natural disasters strike without useful warning. Earthquakes, flooding, hurricanes, wildfires and severe storms damage factories, transport infrastructure and distribution networks, halting goods movement entirely. Climate change has increased the frequency and severity of several categories of extreme weather events. Organisations are consequently reassessing supplier geography, mapping concentration risk beyond first-tier relationships and rebuilding continuity plans that had gone untested for a decade. Concentration risk extends well beyond the first tier.*

*Cyber attack is now a mainstream supply chain risk rather than a technical footnote. Ransomware targeting a manufacturer, haulier, or software provider can halt order processing, inventory management, and delivery coordination within hours. Lean operations offer no manual fallback, since the stock that once covered system outages no longer exists. Robust security, tested recovery procedures and supplier cyber assurance have become standard procurement requirements. Digital resilience has become physical resilience.*

*Geopolitical instability compounds everything else. Armed conflict, economic sanctions, export controls and abrupt policy change restrict access to critical materials and reroute established trade at very short notice. Red Sea disruption has pushed vessels around the Cape of Good Hope, adding weeks to Asia-Europe voyages. Organisations are responding by diversifying supply, holding strategic buffers and treating political risk as a procurement discipline. Political risk now sits within the procurement remit.*

### **COVID-19: The Greatest Test of JIT**

*The pandemic remains JIT's most demanding examination to date. As lockdowns spread rapidly during 2020, supply chains that had performed reliably for decades failed simultaneously across several continents. Minimal inventory left almost no room to absorb factory closures, transport collapse and demand patterns that inverted within days. The event did not disprove lean thinking, but it exposed how thinly provisioned resilience had been. Lean was not the problem; provisioning was.*

*Factory shutdowns propagated almost instantly. Plants across China, Europe and North America closed to protect workers, and because modern manufacturing is deeply interdependent, a single closure could stop production thousands of miles away. Organisations discovered that their supply chain maps extended only to first-tier suppliers, leaving second- and third-tier dependencies entirely invisible until those hidden relationships failed and output stopped completely. Few organisations truly knew their own chains.*

*Semiconductors became the defining shortage of the period. A modern vehicle contains up to 1,400 chips, and as consumer electronics demand surged, automotive orders lost priority at fabrication plants already running lengthy lead times. AlixPartners estimated the shortage cost the global automotive industry \$210 billion in lost 2021 revenue, roughly £155 billion, removing 7.7 million vehicles from planned production during that single year. Pennies of silicon halted billions in production.*

*Shipping disruption compounded the damage considerably. Container shortages, port capacity limits, quarantine rules and crew movement restrictions delayed cargo across every major trade lane worldwide. Drewry's World Container Index peaked at \$10,377 per forty-foot container in September 2021, approximately £7,700, against a 2019 average of \$1,420, near £1,050. Freight costing hundreds of pounds suddenly cost thousands, destroying long-standing margin assumptions. Contracts written for stable freight markets could not absorb it.*

Consumers encountered the consequences directly and immediately. British supermarkets rationed household staples, construction sites waited months for timber and cement, and furniture and appliance lead times extended dramatically. Vehicle manufacturers idled entire assembly lines because components worth pennies were simply unavailable. For the first time in a generation, availability rather than price became the dominant concern for many British households. Shortage, not expense, became the defining experience of that period.

The lasting lesson concerns provisioning rather than philosophy. Organisations recognised that efficiency and resilience are distinct objectives that require separate, explicit investment. Many have since built strategic buffers for critical items, qualified alternative suppliers and funded visibility technology. Few abandoned JIT entirely, because the underlying economics still hold firmly. What changed was willingness to pay openly for protection previously assumed to be free. Resilience, it emerged, had always cost something.

### **Modern Supply Chain Risks**

Supply chains now operate amid permanent uncertainty rather than occasional isolated shocks. Risks emerge quickly, cross borders freely and interact unpredictably with one another. JIT remains effective, but procurement teams must manage external threats actively rather than assume stability between disruptions. The professional challenge has shifted from optimising a known system towards maintaining performance within one that changes faster than planning cycles can accommodate. Stability can no longer be assumed.

Trade policy has become a primary variable rather than background context. Tariffs raise input costs directly, while export controls and sanctions can remove access to essential materials overnight. Conflict in Eastern Europe and the Middle East has disrupted grain, energy, metals and fertiliser flows while rerouting major shipping lanes. UNCTAD reports that over 80 per cent of world merchandise trade travels by sea. Maritime chokepoints remain a systemic global vulnerability.

Inflation and energy costs squeeze margins throughout the chain. Higher electricity, fuel, labour and raw material prices raise manufacturing, storage and transport costs simultaneously, and suppliers pass these forward wherever their contracts permit. Forecasting becomes harder and fixed-price commitments considerably riskier. Procurement teams must actively monitor indices, structure contracts to share volatility fairly, and identify genuine cost reductions rather than temporary deferrals. Volatility itself, not price level, is the challenge.

Climate disruption is increasingly material to inventory planning. Rising temperatures, altered rainfall patterns, and water scarcity reduce agricultural yields, disrupt manufacturing, and constrain transport networks, including inland waterways and canals. Simultaneously, regulatory expectations around emissions reporting and net-zero commitments continue to tighten steadily. Organisations therefore face resilience and sustainability pressures together, which frequently point towards identical answers: shorter chains and better data. Resilience and sustainability are increasingly the same conversation entirely.

Extreme weather causes sudden, localised and expensive damage. Flooding, storms, heatwaves, drought and wildfire close roads, damage infrastructure and halt production without meaningful warning. Flooding in Britain has repeatedly disrupted road and rail freight, while comparable events elsewhere have severely interrupted international trade. With approximately 670 million square feet of warehouse floorspace concentrated within particular corridors, geographic concentration itself has become an operational risk. Where inventory sits matters as much as quantity.

Supplier insolvency remains a persistent and underestimated threat. Higher borrowing costs, weaker demand and rising operating expenses place severe financial pressure on suppliers, particularly smaller specialists with limited reserves. When a critical supplier enters administration, JIT operations have no cushion bridging the gap while alternatives are qualified. Regular financial monitoring, diversification and pre-agreed contingency arrangements have become fundamental rather than advanced practice. Supplier financial

health is a core procurement metric.

### **Just-in-Time versus Just-in-Case**

Compare the two approaches:

| Just-in-Time                 | Just-in-Case                     |
|------------------------------|----------------------------------|
| Low inventory, high turnover | Higher inventory, lower turnover |
| Lower carrying cost          | Greater disruption tolerance     |
| Efficient and capital-light  | Flexible and shock-absorbing     |
| Higher disruption risk       | Higher holding cost              |
| Lean operations              | Risk mitigation                  |

### **Three Inventory Strategies Compared**

| Traditional     | Just-in-Time | Hybrid            |
|-----------------|--------------|-------------------|
| Large stock     | Low stock    | Critical stock    |
| ↓               | ↓            | ↓                 |
| High cost       | Low cost     | Lean inventory    |
| ↓               | ↓            | ↓                 |
| High resilience | Higher risk  | Higher resilience |

### **The Rise of the Hybrid Inventory Model**

Most organisations have now concluded that the choice between lean and buffered inventory is a false one. Hybrid models retain JIT economics across the overwhelming majority of stock while deliberately protecting a small, carefully selected group of critical items. The objective is precision rather than compromise: identifying exactly where a buffer earns its carrying cost and holding nothing in surplus elsewhere across the business. Precision, not caution, defines the approach.

Strategic safety stock is the first mechanism. Rather than raising inventory across all lines, organisations calculate cover only for items where unavailability would halt production or breach service commitments. Cover is expressed in days of demand and reviewed against measured lead-time variability. Because the protected group is typically small, total carrying costs rise modestly, while continuity risk falls substantially across the operation. Protection is targeted rather than applied universally.

*Critical component buffering extends the principle to specialist parts. Semiconductors, electronic assemblies, active pharmaceutical ingredients and bespoke engineering castings all share long lead times and severely limited alternative sources. Holding modest quantities prevents complete production stoppage while replacement supply is arranged and qualified. Several automotive manufacturers now deliberately hold chip inventory, having painfully calculated the cost of the alternative during 2021 and 2022. Small buffers prevent disproportionately large production losses.*

*Multiple sourcing reduces dependence structurally rather than contractually. Establishing qualified relationships with several capable suppliers, ideally located in different countries, means that a single failure does not become an organisational crisis. Administrative effort increases, and volume leverage may reduce slightly, but the insurance value is considerable. Dual sourcing has moved from a procurement good practice to a board-level expectation in sectors with concentrated supply markets. The premium paid for optionality is usually modest indeed.*

*Nearshoring has attracted substantial attention in recent years. Relocating production or sourcing closer to end markets shortens lead times, reduces freight exposure and improves responsiveness, offsetting higher unit costs against lower risk and reduced inventory. Many British organisations have increased European sourcing or returned selected manufacturing to the UK, particularly where extended ocean freight has become both expensive and unpredictable in recent years. Distance carries a cost that unit price often conceals.*

*Regional sourcing complements that broader shift. Building supplier networks within a defined geography improves communication, simplifies logistics and enables closer collaboration on quality and product development. It supports local economies and reduces transport emissions, usefully aligning commercial and environmental objectives. For British buyers, regional strategies also reduce customs complexity, a meaningful cost and timing consideration since departure from the European Union. Proximity improves both commercial performance and environmental reporting simultaneously.*

*Supplier diversification now considers far more than price. Assessment covers financial stability, geographic exposure, capacity headroom, cybersecurity maturity, and environmental performance, alongside a straightforward cost comparison. Spreading suppliers across regions reduces the likelihood that a single political event, natural disaster, or industrial dispute would simultaneously disrupt everything. Effective diversification requires mapping beyond first-tier suppliers, since hidden concentration frequently exists several layers deep within supply bases. Apparent diversity often conceals genuine concentration further upstream.*

*Digital monitoring makes hybrid models genuinely workable. Advanced inventory systems, artificial intelligence, cloud platforms, and real-time analytics enable continuous tracking of stock, supplier performance, and customer demand. Better visibility permits smaller buffers because uncertainty, rather than volume, ultimately drives safety stock calculations. As data quality improves, organisations hold less while remaining better protected, which is the central promise of hybrid inventory. Better information is effectively a substitute for stock.*

### **Technology Supporting Modern JIT**

*Technology has fundamentally changed what lean inventory can safely achieve. Digital tools deliver visibility across inventory, production and supplier performance that was impossible when JIT was first conceived, allowing organisations to react within hours rather than weeks. Combining advanced software with real-time data reduces the uncertainty safety stock exists to cover, permitting genuinely lean operation without proportionate increases in operational risk. Technology has not replaced judgement, but sharpened it considerably.*

*Artificial intelligence has moved from novelty to established working tool. AI analyses operational data at volumes and speeds no human planning team could realistically match, identifying patterns, flagging likely disruption and recommending appropriate action. Applications now include inventory optimisation, automated purchasing and supplier*

performance analysis. Used well, AI supports leaner operation by improving the accuracy of assumptions on which inventory decisions depend. The value lies in better assumptions, not speed.

Predictive analytics shifts procurement from reaction towards anticipation. Analysing historical demand, market conditions, seasonality, weather patterns and supplier behaviour allows likely shortages to be identified well before they actually occur. Buyers can then adjust orders, accelerate deliveries or temporarily increase cover for specific items. Better forecasting simultaneously improves service levels and reduces inventory, which conventional planning methods have historically struggled to achieve. Anticipation is consistently cheaper than reaction.

The Internet of Things extends visibility into physical assets. Connected sensors continuously monitor stock levels, storage conditions, equipment status, and shipment location throughout the entire journey. Temperature monitoring protects the integrity of food and pharmaceutical products during transit, providing auditable evidence for regulators and customers alike. Immediate access to operational data allows intervention while a problem remains small, when lean operations can still absorb it. Early warning converts crisis into routine operational adjustment.

Digital twins model entire supply chains virtually. Using live operational data, organisations simulate disruption scenarios, test alternative sourcing arrangements and evaluate inventory policies without risking actual production or customer service. Weaknesses appear in simulation rather than in reality, where correction is expensive. As modelling capability improves, digital twins offer a practical means of quantifying resilience investment and what a buffer actually purchases. Testing resilience in simulation costs comparatively very little.

Enterprise resource planning systems remain foundational to lean operation. ERP integrates procurement, inventory, production, finance, and logistics into a single data structure, ensuring decisions are based on consistent, up-to-date information. Accurate stock records, automated purchasing and integrated supplier data make lean operation reliable rather than precarious. Poor master data, conversely, defeats every subsequent technology investment, which is why implementation quality outweighs software selection. Data quality determines whether this actually works.

End-to-end visibility platforms have become essential for international operations. These systems consolidate supplier, carrier, warehouse and production data into a single coherent view, exposing delays as they develop rather than when goods eventually fail to arrive. Combined with machine learning that continuously refines demand forecasts, they allow procurement teams to act on emerging problems while alternatives remain both available and affordable. Problems identified early remain problems that can be solved.

Machine learning improves through exposure rather than explicit instruction. As operational data accumulates over time, algorithms refine forecasts, detect emerging patterns and sharpen inventory recommendations without manual reprogramming by analysts. This matters because demand behaviour, supplier reliability and market conditions all shift continuously. Over time, learning systems narrow forecast error, and narrower error justifies smaller buffers, directly improving lean inventory economics. Forecast accuracy and required inventory levels are inversely linked.

### **Industry Perspectives**

JIT is widely applied across the economy but is heavily adapted. Manufacturers prioritise line continuity, retailers prioritise shelf availability, and healthcare prioritises clinical safety, so identical principles produce very different inventory policies. The examples below illustrate how various sectors have balanced efficiency against exposure, and how each recalibrated after recent disruption revealed where their tolerance for shortage genuinely lay in practice. The principle stays constant, but application is never identical anywhere.

*Automotive remains the definitive case study. Toyota's production system supplied assembly lines only as components were consumed, transforming manufacturing economics worldwide within a single generation. Yet the semiconductor shortage forced Toyota, Ford and Volkswagen to cut output substantially during 2021, resulting in a global loss of 7.7 million vehicles. Reportedly, Toyota fared comparatively well initially, having built chip reserves following earlier disruption analysis. Even JIT's originator required a deliberate chip contingency plan.*

*Aerospace demands extreme coordination throughout its supply base. Aircraft contain millions of components from specialist suppliers worldwide, and strict certification requirements mean substitution is rarely quick or straightforward. Airbus works with hundreds of suppliers delivering to precise assembly sequences, where a single delayed part can idle an entire production line. Supplier development, quality assurance and logistics precision matter more than inventory reduction here. Certification requirements make substitution slow and expensive.*

*Healthcare carefully balances efficiency against clinical consequences. NHS trusts use automated replenishment for high-volume consumables such as gloves, syringes and dressings, driven by actual measured usage rather than periodic ordering. Pandemic-era personal protective equipment shortages demonstrated the limits of that model, prompting the creation of national stockpiles for pandemic-critical items. The distinction between routine consumables and emergency reserves is now explicitly designed rather than assumed. Clinical risk justifies inventory commercial logic would reject.*

*Food retail runs among the leanest operations found anywhere. Supermarkets receive fresh produce, dairy, and bakery daily against electronic point-of-sale data, holding only a few hours of cover on many lines to protect freshness and limit waste. That precision delivers exceptional efficiency but minimal tolerance for disruption, as evidenced by driver shortages, harvest failures, and transport interruptions in very recent memory. Freshness demands leanness, but leanness leaves almost nothing in reserve.*

*Pharmaceutical manufacturing combines lean practice with regulatory rigidity. Active ingredients and packaging must satisfy strict traceability and qualification requirements, so alternative sources cannot simply be substituted when supply falters unexpectedly. Companies including AstraZeneca manage ingredient inventories carefully to maintain continuous production across multiple sites. Vaccine programmes demonstrated how quickly capacity, logistics and supplier networks must scale when public health genuinely demands it. Regulatory qualification, not preference, dictates the sourcing options.*

*Electronics operates a sophisticated global JIT system because product cycles are short and obsolescence is expensive. Apple coordinates suppliers and contract manufacturers across multiple countries to support device production at enormous volume and consistent quality. Lean inventory protects against technological redundancy, but concentrated component sourcing creates corresponding exposure, as the semiconductor shortage demonstrated across every consumer electronics category simultaneously during 2021 and 2022. Short product lives punish excess stock; concentrated sourcing invites shortage.*

*Construction increasingly applies JIT to reduce site congestion and material damage. Scheduling deliveries shortly before installation limits storage, theft and weather exposure on constrained urban sites where space commands genuine value. Major British infrastructure programmes have used carefully sequenced deliveries to improve productivity and reduce waste. Success depends on reliable suppliers and accurate programming, because material delay translates immediately into prolongation costs. Sequencing matters as much as price on site.*

### **Is JIT Still Relevant?**

*JIT remains highly relevant because its underlying economics have not changed. Lower carrying costs, improved cash conversion, and higher operational efficiency continue to deliver*

*measurable competitive advantage across many sectors. Digital tooling, stronger supplier collaboration and better forecasting have arguably made lean inventory more effective than at any previous point. For organisations in stable markets with capable suppliers, traditional JIT remains entirely appropriate. Stable conditions still fully reward the original approach.*

*However, uniform application has become increasingly indefensible. Businesses with complex international chains or critical single-source components require deliberate flexibility built directly into their inventory policy rather than added afterwards. Procurement professionals increasingly apply differentiated approaches: lean where supply is dependable and substitutable, buffered where it is neither. This segmentation preserves most efficiency while removing the concentrated exposures that proved disproportionately expensive. One policy can no longer serve an entire business.*

*Some organisations have moved considerably further still. Healthcare providers, defence, utilities, and critical infrastructure manufacturers accept higher inventory levels because the consequences of failure are measured in terms of public safety rather than commercial margins. In these environments, supply security and service continuity legitimately outrank inventory cost in every calculation. The relevant question is not whether stock is expensive, but whether its absence would prove costlier. Failure cost, not stock cost, ultimately drives that decision.*

*The future is therefore differentiated rather than binary. Organisations will apply inventory policy according to the risk profile of individual products, suppliers, and markets, supported by data that makes those distinctions defensible to sceptical finance colleagues. Combining JIT efficiency with targeted contingency, digital visibility and robust supplier relationships produces supply chains that remain genuinely competitive while absorbing shocks without operational collapse. Evidence-supported segmentation is where inventory policy heads next.*

### **Best Practice Recommendations**

*Begin by classifying inventory according to operational criticality rather than purchase value alone. Items whose absence would stop production, breach contracts, or compromise safety warrant protection that low-risk consumables plainly do not require. Combining ABC value analysis with criticality and lead-time assessment produces defensible policy, concentrating investment where disruption cost is highest and avoiding indiscriminate stock increases across the entire business. Not every item deserves the same level of protection.*

*Diversify suppliers deliberately, not incidentally or reactively. Sole sourcing concentrates risk within a single organisation's finances, workforce and geography, however capable and stable that organisation may appear today. Developing qualified alternatives in different regions provides genuine optionality when disruption occurs, though it requires investment in qualification, tooling and relationship management. The test is simple: could production continue if the supplier failed tomorrow? Optionality costs money; having none costs far more.*

*Develop contingency plans that identify risks, assign clear responsibilities, establish communication routes, and specify alternative sourcing arrangements well in advance. Plans must be reviewed regularly as suppliers, products and markets change, because outdated documents create dangerously false confidence. Preparation before disruption reduces decision time when it matters most, and decision speed frequently determines whether an incident becomes an inconvenience or a material loss. Untested plans provide comfort rather than genuine capability.*

*Invest in visibility technology in proportion to the genuine risk. Modern inventory systems, ERP platforms, artificial intelligence, and real-time tracking provide accurate, up-to-date information on stock levels, supplier performance, and logistics status. Earlier problem detection permits smaller buffers because uncertainty, rather than volume, drives safety stock calculations. Visibility investment therefore pays twice: reducing the frequency of disruption while simultaneously reducing the inventory needed to absorb it. Information reduces the uncertainty safety stock exists to cover.*

*Monitor supplier risk continuously, not only at the selection stage. Financial performance, capacity utilisation, cybersecurity posture, regulatory compliance and environmental exposure all change considerably between tender events. Credit monitoring, structured performance reviews and honest relationship management surface deterioration early, while alternatives can still be arranged calmly and affordably. Suppliers under pressure often signal difficulty long before formal insolvency proceedings begin. Selection is only a moment; risk is a continuous condition.*

*Balance cost against resilience explicitly, using numbers rather than instinct or historical precedent. Compare the carrying cost of additional stock against the quantified disruption exposure, including lost margin, contractual penalties, and recovery expenses. This converts an argument about caution into a commercial calculation that finance colleagues can properly evaluate. Where protection cannot be justified on financial grounds, document that conclusion and revisit it periodically. Resilience arguments succeed only when expressed in commercial terms.*

*Finally, stress-test supply chains against realistic disruption scenarios. Simulate supplier failure, transport disruption, cyber incident, natural disaster, and sudden demand surges, then honestly examine whether response plans actually function under pressure. Testing exposes weakness before real incidents do, and repeated exercises build organisational familiarity. Regular stress testing converts resilience from an aspiration stated in policy documents into demonstrated operational capability. Plans never tested are merely assumptions rather than genuine capabilities.*

### **Summary - The Future of JIT Inventory Management**

*JIT transformed inventory management by reducing cost, improving cash conversion and forcing genuine operational discipline. For five decades, it has underpinned lean manufacturing and strengthened competitiveness across the automotive, healthcare, retail, electronics, and construction sectors alike. Recent disruption exposed real vulnerabilities within highly lean chains, but the underlying principles retain considerable value when supported by sound planning and capable, well-informed procurement practice. The principles endured because the arithmetic never stopped working.*

*Experience suggests JIT is neither inherently correct nor fundamentally mistaken. Its success depends entirely on the quality of implementation and an honest assessment of the specific risks a particular organisation actually faces. Stable markets with dependable suppliers continue to reward traditional lean inventory handsomely. Volatile markets with concentrated sourcing require additional safeguards to protect production, customer service, and contractual performance from entirely predictable disruptions. Context, rather than doctrine, should determine the adopted inventory policy.*

*Modern procurement therefore balances efficiency against resilience deliberately rather than accidentally. Strategic safety stock, diversified suppliers, regional sourcing, and regularly tested contingency planning all strengthen an organisation's capacity to absorb disruption without surrendering the considerable advantages of lean inventory. This balanced approach reduces unnecessary costs while retaining the flexibility that an unpredictable global trading environment now demands of every serious procurement function. Efficiency and resilience are complementary objectives, provided that both are deliberately funded.*

*Technology continues reshaping what is realistically achievable. Artificial intelligence, machine learning, predictive analytics and real-time visibility give organisations far better insight into inventory, supplier performance and demand behaviour than was previously possible. These capabilities accelerate decision-making, improve forecast accuracy, and surface emerging risks earlier, allowing smaller buffers to deliver equivalent protection at a meaningfully lower cost than earlier inventory methods ever permitted. Better data is steadily replacing the need for buffers.*

*The organisations that succeed will combine efficient inventory management with proactive*

*risk management and genuine supplier partnership. Rather than abandoning JIT altogether, most are adapting it thoughtfully to reflect economic, environmental and geopolitical realities that show no sign of reversing. Future inventory management will not require choosing between lean efficiency and resilience, but rather integrating both into a single coherent strategy. Adaptation, not abandonment, has become the sensible response to modern volatility.*

*Organisations combining lean inventory with genuine resilience will be best prepared for whatever disrupts global trade next. Procurement and supply chain professionals should continually review inventory strategies, supplier performance, and emerging technologies to ensure operations remain competitive in an increasingly uncertain world. The greatest advantage available today is no longer holding less inventory, but managing it far more intelligently than competitors. Review inventory policy now, before disruption decides it for you.*

*Additional articles can be found at [Procurement and Supply Chain Management Made Simple](#). This site examines procurement and supply chain management issues to assist organisations and individuals in improving the quality, efficiency, and effectiveness of their product and service supply, to the customers' delight. © Procurement and Supply Chain Management Made Simple. All rights reserved.*