

SUPPLY CHAIN RESILIENCE

THREE PRACTICAL SOLUTIONS

Contributors

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Foreword

The need for supply chain resilience has come to the fore during Covid-19, particularly with the difficulties of securing PPE, food, medicines and ventilators at the outset of the pandemic and have therefore become more of a focus for both government industrial policy and business resilience, with the efforts to secure vaccine supply in particular becoming a matter of national and international debate.

Managing supply chains has never been easy due to their complex nature, and however good your existing systems, supply chain disruptions, such as those we've seen around Brexit and Covid-19, present unavoidable risks which need to be prepared for, mitigated, and acted on rapidly.

To help you do this, this report builds on best practice from the Covid-19 pandemic to offer three practical steps to prepare your business for volatile, uncertain, complex and ambiguous market situations.

► **Adopt a risk management mindset by identifying supply chain vulnerabilities and accelerating fixes.**

First, understand the vulnerabilities in your supply chain, from packaging supply to delivery speeds, then accelerate the decision-making process to deliver faster fixes, whether by preparing alternative sources in advance, or better monitoring to understand emerging pinch-points.

► **Use Demand profiling to prepare your supply chain for market variability.**

Designing your supply chain for late conversion ensures that decisions to make specific goods are made as close to demand signals as possible. This will require investment in sufficient spare fixed asset capacity to ensure your supply chain can cater for demand uncertainty. Properly understanding the demand profile of your product allows a segmentation approach to implement an appropriate replenishment process.

► **Adopt flexible contracting to enable greater collaboration.**

Demands will fluctuate and change across the life of any contract. A contract must be able to deal with and respond to that change. This can be achieved by adopting behavioural contracts, which focus on outcomes and constantly update the needed outcomes in line with the operational needs of the business. Should any disputes arise, the contract terms will help resolve the disputes promptly rather than delaying vital action.

Effective resilience across the supply chain enables each business within it to benefit from balanced demand and supply and swift, even flows (of cash, information and material).

We encourage firms to consider all the practical solutions in this report together in order to make your supply chain resilient, productive and sustainable for the long term.

I am grateful to my colleague Professor Jan Godsell, her research team and our partners, Argon & Co, Pinsent Masons and Tata Consumer Products, for all the support that has made this valuable work possible.



Margot James
Executive Chair WMG University of Warwick



Introduction

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Supply chain (SC) disruptions have become a fundamental business risk to companies in any sector, with three in four organisations likely to experience a disruption each year. Interestingly, some firms face smaller impacts on the business and recover quicker than others in the same sector. This is because firms with a high level of supply chain resilience (SCR) can prepare for, respond to and recover from disruptions more effectively.

There is no single, agreed definition of what we mean by SCR, but broad definitions tend to cover the following three perspectives:

- ▶ **Three phases** - SCR covers the moments of pre-disruption, during disruption and post-disruption with a focus on readiness, responsiveness and recovery/growth, respectively.
- ▶ **Two strategies** - Proactive and reactive strategies are adopted in the different phases to help organisations build up SCR.
- ▶ **Six practices** - SC planning, visibility, collaboration, buffer management, supply flexibility and adaptability are six SCR practices to support the SC resilience strategies.

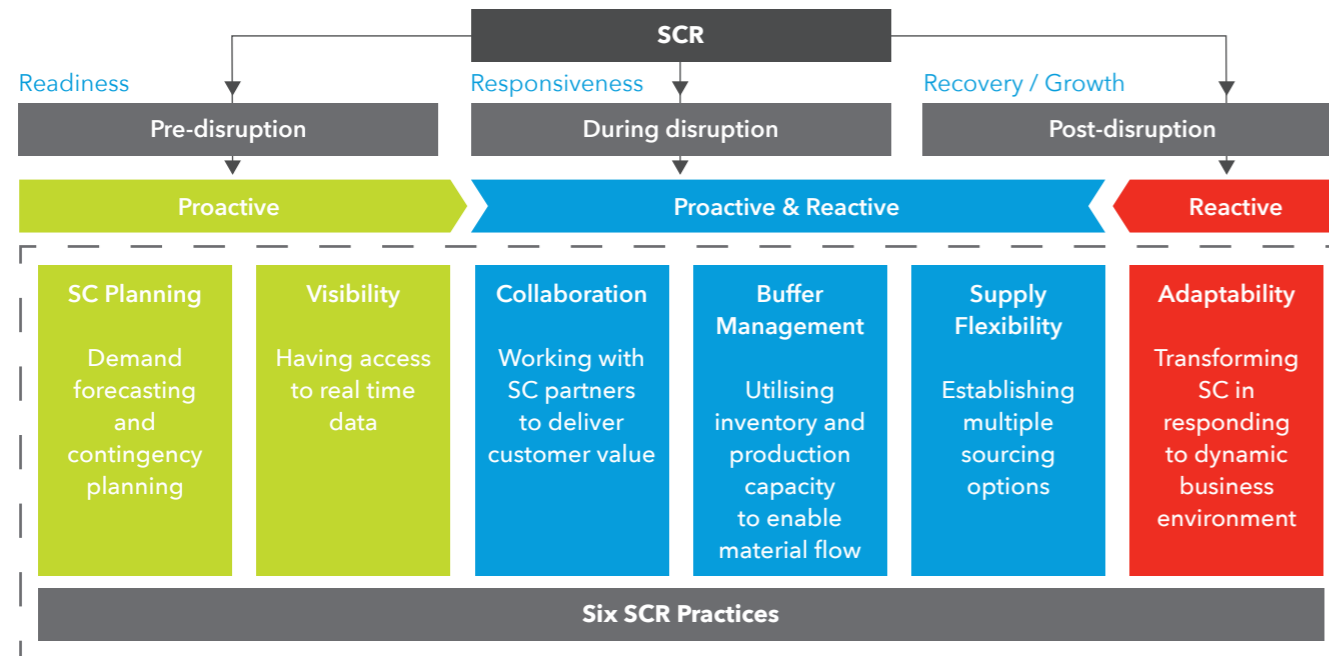


Figure 1

Over the past five years, UK manufacturing has experienced two major disruptions - pre-Brexit and Covid-19, during which the resilience of SCs has been significantly challenged. This is even riskier for those firms who run supply chain at a low cost, as many of the buffers (e.g. inventory and production capacity) have been removed to maximise profits. A joint study by WMG, the University of Warwick, in conjunction with industrial collaborators Argon & Co, Tata Consumer Products Limited and Pinsent Masons, was undertaken to assess the current

level of SCR in the UK and provide guidance to address the identified weaknesses. This report presents three practical considerations that firms can adopt to prepare for future disruptions:

- ▶ Risk management - Identifying risks throughout the supply chain to make wise decisions
- ▶ Buffer management - Utilising inventory and capacity in the supply chain to react in a timely manner
- ▶ Contract management - Increasing contracting agility to build a close tie with business partners

¹Ali, A., Mahfouz, A., & Arisha, A. (2017). Analysing supply chain resilience: integrating the constructs in a concept mapping framework via a systematic literature review. Supply Chain Management: An International Journal.

Supply Chain Resilience (SCR) during pre-Brexit and Covid-19

Normal operation (baseline)

In normal operations, manufacturing firms found their supply chain resilience (SCR) practices to be generally effective to support daily business. However, some areas need further improvement. The visibility and collaboration have been seen as enduring supply chain (SC) issues in the manufacturing SC, particularly those companies who have a global supply base. Improving the two practices enables more effective SC planning, as firms in the chain are able to gain access to real-time data and take joint commitments in managing activities.

The buffer management has been seen as an effective practice in normal operations. SC managers often flex up and down the inventory and production capacity to buffer against the dynamic demands in manufacturing. The adaptability and supply flexibility are exhibited at the normal level, as these practices are more effective when organisations react to an SC disruption, particularly unexpected changes such as panic buying during Covid-19.

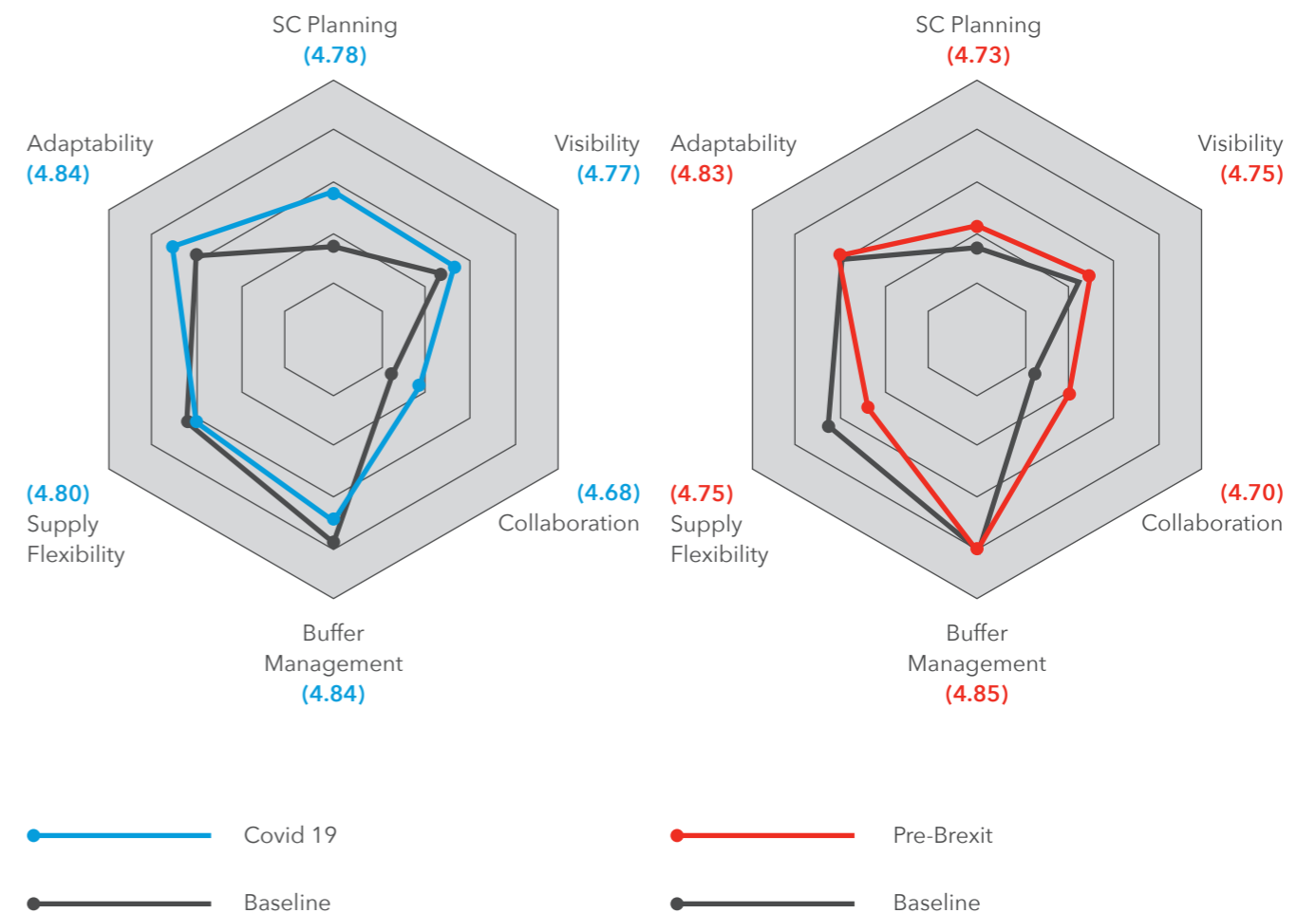


Figure 2 (scale 4.5-5.0)

Supply Chain Resilience (SCR) during pre- Brexit and Covid-19 (continued)

Assessment of SCR practices in Covid-19 and pre-Brexit

Covid-19

As the pandemic hit the world unexpectedly at the beginning of 2020, firms had little time to prepare for the disruption, the proactive practices, like adaptability, supply flexibility and buffer management, were proven more effective in responding to Covid-19.

Although firms reported that SC planning has been an effective practice during Covid-19, this required a high level of human intervention. Similar to normal operations, establishing greater visibility and collaboration into the end-to-end SC is a way to improve the overall SC planning. The buffer management and supply flexibility were found to be less effective than in normal situations. This is because industries had little time to rearrange the SC to meet the surging demand caused by the pandemic. The lockdown in different countries caused more significant disruptions to organisations with a global supply base.

In terms of adaptability, manufacturing firms exhibited a strong capability to transform the SC in reacting to the disruption.

Pre-Brexit

Unlike Covid-19, Brexit presents huge uncertainties ahead but gives industries plenty of time to prepare for possible scenarios. The proactive practices, including planning, visibility and collaboration, were more effective in preparing firms for pre-Brexit.

Firms found their SC planning to be more effective in preparation for Brexit than in normal operation. This was reinforced by improved visibility and collaboration, as firms took a coordinative approach in sharing data and managing SC activities.

Buffer management and adaptability were found to be equally effective as in normal operations. Considering the uncertainties of Brexit, firms were not able to rearrange the SC. This also explains the reason for decreased supply flexibility, as manufacturing firms are unable to reorganise the production scheduling, logistics and supply base for unforeseen circumstances.

Improving SCR

The SCR assessment results highlight that reactive, proactive or a combination of both practices are effective in dealing with different types of disruption, e.g. pre-Brexit (proactive) and Covid-19 (reactive). It presents three considerations for improving the resilience of UK manufacturing SC.

- 1. Identifying risks throughout supply chain to inform better decisions** - Assessing the current level of SCR to identify vulnerable areas and plan for possible disruptions.
- 2. Managing buffers effectively to respond faster** - Segmenting your SC to optimize inventory stocks and production capacity.
- 3. Adopting flexible contracting to enable greater collaboration** - Taking a coordinative approach to SC planning enables greater visibility and mitigates business risks.

Solution 1: Adopting a risk management mind set

Jonathan Gibson, Associate Director and Head of Logistics at Argon & Co

Covid-19 has disrupted global supply chains and altered demand patterns to an extent not seen in living memory. The UK's experience has been repeated across the world. On the supply side, the closure of Chinese borders along with the government's seizure of output, meant many companies had their only supply source cut off. Those who had stocks available struggled to ship it due to excess demand and reduced freight capacity and, once the product arrived at its destination, they experienced yet more difficulty getting it to the customer due to self-isolation and social distancing. On the demand side, specific sectors faced unforeseen spikes, such as medical PPE, along with panic buying of food, and there have been distinct, and possibly irreversible, channel shifts.

The issues faced in this most recent crisis reflect the fact that risk analysis and management has often become a 'tick-box' exercise.

Covid-19 showed that we have built complex international supply chains without considering the lack of visibility this caused. Businesses concentrated supply in a few key suppliers rather than diversifying it. At a global level, we have concentrated in certain geographies. We have broadly opted for lean and rigid over flexible and adaptable.

Why do companies take these risks, whether that be directly with supply, impacting immediate sales, or indirectly via reputation, that may have an even longer-term impact?

The prime reason is how individuals are targeted and the drive for short-term profits. Overcoming this culture, and taking a balanced longer-term focus is difficult but, even in this environment, there are a number of actions that can be taken to better prepare for future disruptive events without jeopardising short-term return.

Challenge

The scale may have been different, but global and local supply chain disruption has not been rare over the past 20 years, with diseases such as Sars, natural disasters (e.g. the Tōhoku earthquake), and political disruption. However, the Covid-19 pandemic exposed that, despite risk analysis of all supply chain investment decisions, including new suppliers, automation, and new factories and warehouses, many supply chains are ill equipped to cope with such disruption.

Struggling to cope: short term thinking versus managing risk

Issues in the crisis

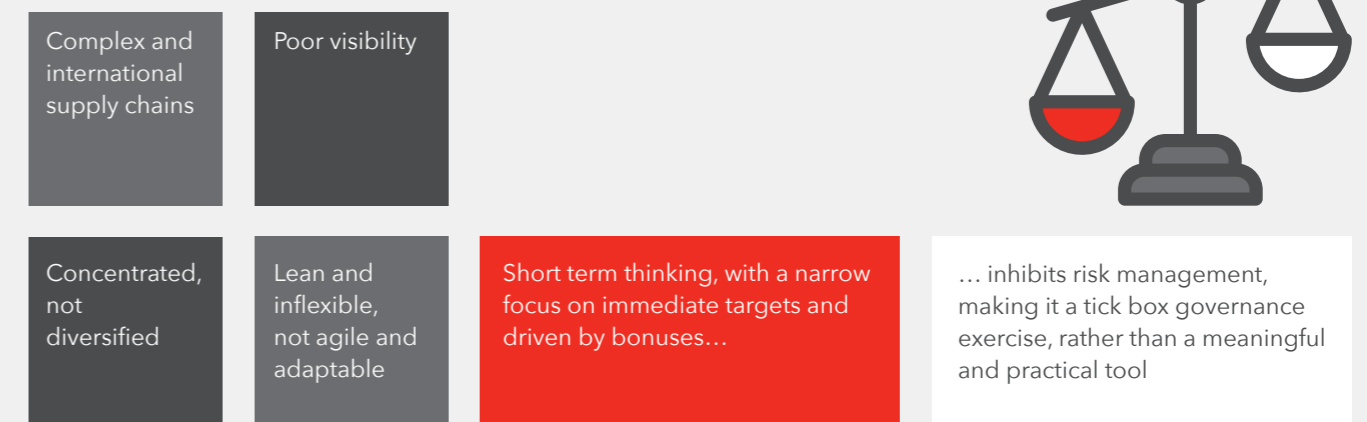


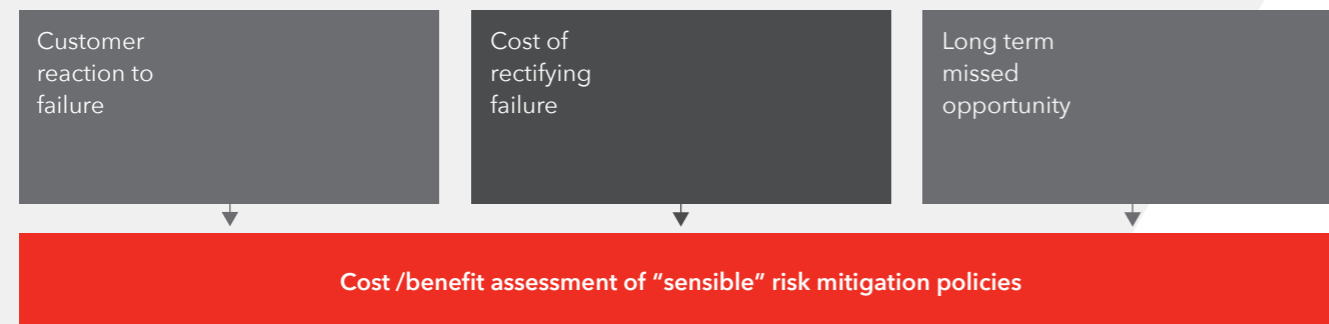
Figure. 3

Practical solution: Monetise the risk

The focus on short term is about optimising return to maximise bonuses; shareholders are looking for ongoing benefit, stretching beyond the life of the current management team.

Understanding the financial scale of the risk enables the short v long term trade off to be understood.

Key considerations in assessing the value of risk



Key steps:

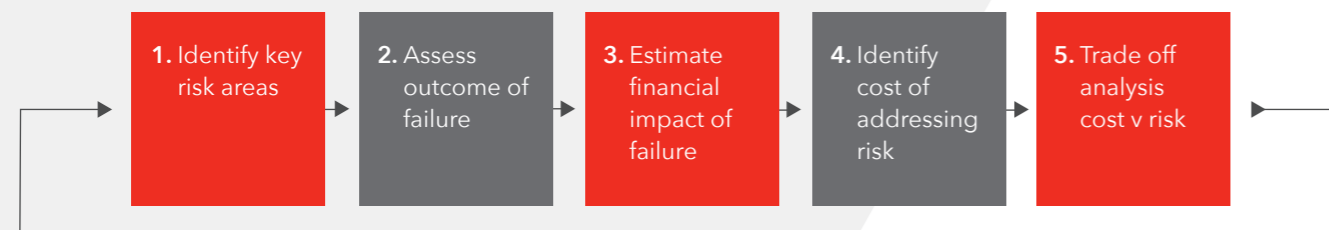


Figure. 4

Understand the scale and likelihood of potential issues by assessing the probability and financial impact of an event. Not every risk can be covered, so there needs to be cost/benefit analysis of potential mitigation actions. This involves considering how the risk can be sensibly mitigated or removed and an understanding of the financial trade-offs, over what timescale, will be necessary in taking this action.

Identify the supply chain's weakest links

Recent flour shortages were a result of a lack of packaging, not raw materials or processing capability. Other sectors, such as medical supplies, found their business was severely disrupted, as many of them sourced their glass bottles exclusively from China.

This situation occurred because the suppliers, despite selling a basic commodity that is likely to maintain or increase sales in time of crisis, did not understand where the supply chain pinch-points were.

The 'weakest link' can be:

- ▶ Raw material/packaging sources
- ▶ Transport links
- ▶ Single sourcing
- ▶ Labour shortages
- ▶ Customer ability to access product
- ▶ Lack of proper operational BCPs

Potential solutions

- ▶ Sourcing strategy
- ▶ Off shoring v On shoring
- ▶ Make v buy strategy
- ▶ Routes to market
- ▶ Use of robots and automation
- ▶ Adaptable facilities

Key steps:



Figure. 5

It is necessary to map the whole supply chain back to at least Tier 2 suppliers, understanding whether the supplier has effective plans in place to manage short-term problems and putting in place effective contingency measures. These should be followed up with regular supplier audits to ensure their plans remain relevant and up to date.

Covid-19 demonstrated the advantage to be gained by those companies who injected agility and pace into their decision-making.

Examples of quick adaptations, even if they added short-term cost, included IKEA using shops as dark stores to serve on-line demand and Nestle introducing track and

trace for its vehicles serving Italy to enable them to be redirected to border crossings with the shortest queues. For a number of sectors, fast decision-making is the norm - for example, D2C fashion, electronics - as product lifecycles can be very short and demand fluctuations extreme.

Accelerate decision making process

COVID 19 demonstrated how in a crisis companies were able to move with agility and streamline decision making processes without adversely impacting quality.

Key lessons in accelerating decision making process



Key steps:

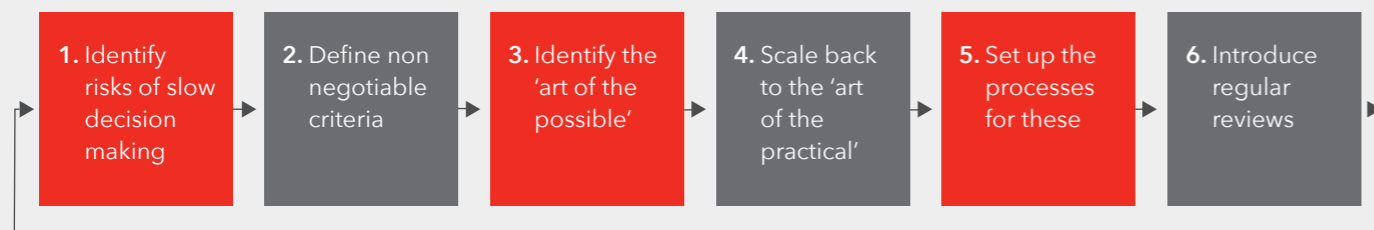


Figure. 6

Acceleration depends on understanding what cannot be put at risk in the pursuit of pace - usually quality - and exploring the art of the possible fully. For example, new packaging can typically take up to 26 weeks to introduce, but if likely SKU variants are identified, pre-work on potential designs and samples approved, this can be cut to three to four weeks, enabling rapid response to market opportunities. The trade-off is that some of the design and approval work will never be used.

This is a mental and process step-change for many companies. Success will take time, backed by evidence of how it will work and, above all, it will require a cross-functional culture change.

Next steps

A combination of all three approaches outlined above will provide far more effective risk management. The events of 2020 should be seen as a catalyst for change, as returning to old practices is not an option. History tells us that major disruption is a frequent event, even if the cause differs, therefore, we should be preparing now for future crises.

Solution 2: Manage your buffers

John Burdett, Global Operations Director, Tata Consumer Products Limited

The objective of a supply chain is to deliver the right products at the right time at the lowest possible cost, in a sustainable and responsible way. Businesses strive for optimal levels of performance to meet customer demands, while managing trade-offs between cost, quality and time.

Covid-19 has challenged supply chain configuration in ways unprecedented outside of wartime: from network design, the role of low-cost country sourcing, strategic stock holding locations, through to business continuity and risk management.

Challenge

As an overriding principle, the supply chain strategy must be aligned to a business' commercial strategy. The commercial strategy will inform critical elements of the supply chain strategy such as product lifecycle, routes to market and promotional strategies. The supply chain must be able to support the demands placed upon it for the commercial goals to be fulfilled. For example, a high-low price promotional strategy will bring increased volatility and uncertainty, whereas an Every Day Low Pricing (EDLP) approach supports a more stable demand profile.

Under normal conditions, it is relatively simple for a supply chain to respond. However, in a VUCA (volatile, uncertain, complex and ambiguous) environment, where the pace of change is increasing, the commercial strategy is likely to change more frequently, at a pace that may not be matched by the supply chain where frequency of change may be structurally slower. For example, fixed assets and machinery, that provide the backbone of supply chain capability may have a lifespan of around ten years, whereas the business may have moved from EDLP to high-low and back to EDLP again within that timeframe. It is important then that the supply chain is flexible enough to accommodate this degree of change while, at the same time, optimising performance.

The supply chain strategy will determine what you make and where. The structural framework within which the supply chain operates, will be set by the 'make-buy decisions', that is, what you choose to manufacture in-house versus outsource. An overlay of in-country versus near-country versus low-cost country sourcing provides cost, stock and service optimisation. Covid-19 has made the risk management considerations of this network design more important. However, it does present a challenge for supply chain leaders to articulate risk mitigation in new ways, rather than the relatively simplistic trade-off of low-cost sourcing/long lead time versus higher cost local sourcing, but with the ability to react more quickly.

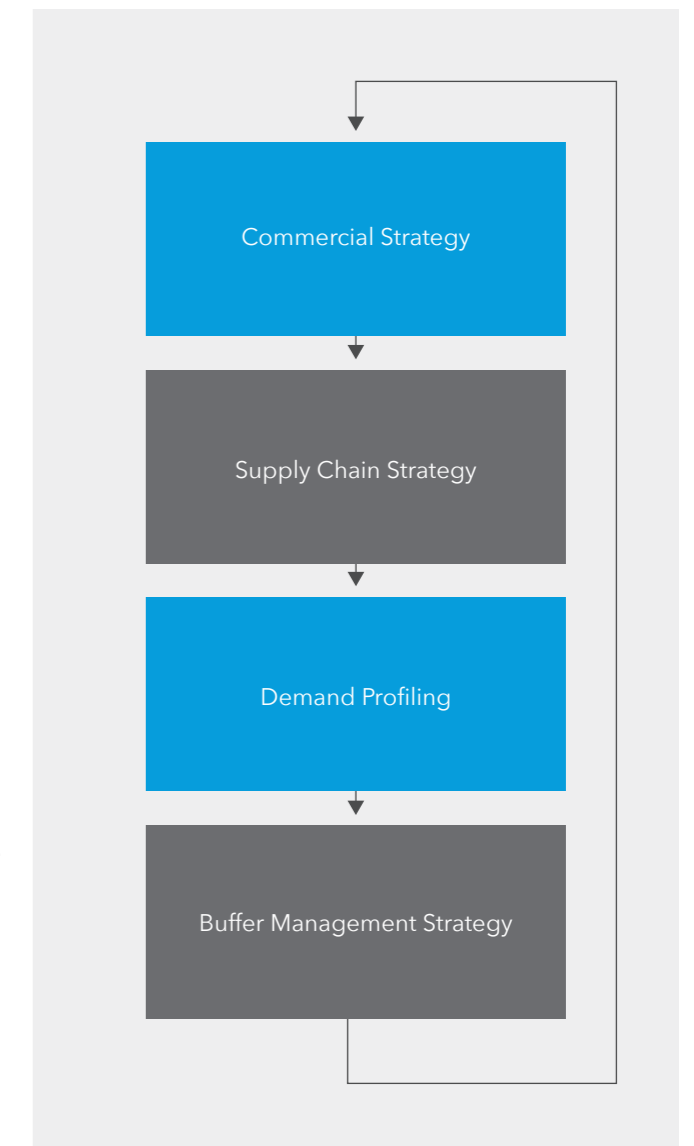


Figure. 7

Practical solution: Demand profiling

With demand profiling, the supply chain can be segmented and then supply chains aligned accordingly. Assessment of the demand characteristics of your product allows a segmentation approach where an appropriate replenishment process can be implemented. The critical questions are how predictable is demand and how best to fulfil that demand.

Buffer management

Essentially, there are two types of buffer - inventory and capacity. For inventory, there is constant pressure to reduce stocks in the supply chain and release cash through reducing working capital. Many supply chains have been "optimised" to run extremely efficiently with deliveries arriving just in time to keep factories running. At the same time, manufacturers strive for high levels of asset utilisation to maximise the return on their capital investment, so assets are run as hard as possible with limited capability to react to spikes in demand.

Covid-19 showed the impact that a sudden, unpredicted spike in demand had on UK supermarket shelves, with empty shelves and manufacturers desperately trying to replenish the stocks into retailers and having neither inventory to supply nor the capacity to react.

Next steps

There is often a disconnect between the asset investment decisions which may come every ten years versus the stock holding decisions that are principally short term - they should be considered together in light of the commercial strategy and historic demand variability. Supply chain resilience comes from optimising between desired service levels (linked to revenue), inventory (linked to working capital and service), capacity (linked to capital investment) and operating costs (linked to storage, shift patterns, and so on). This tests the trade-offs between the inventory buffer and capacity buffer and how they align with the commercial strategy.

Too often, the focus is on high levels of inventory being the means to ensure service and supply - this neglects the other tool that supply chain leaders have: the ability to produce more stock. Inventory is important, but it is temporary - once it is gone, it is gone!

The principle to design your supply chain for late conversion, ensuring that decisions to make specific finished goods are postponed as close to the demand signal as possible, holds ever true. Do not neglect your capacity buffer - invest in enough spare fixed asset capacity to ensure that your supply chain can cater for the demand uncertainty caused by your customers and your commercial strategy.

If there is one lesson that supply chain leaders should remember from Covid-19, it is that you need enough capacity and capability close enough to your markets to enable you to react quickly.

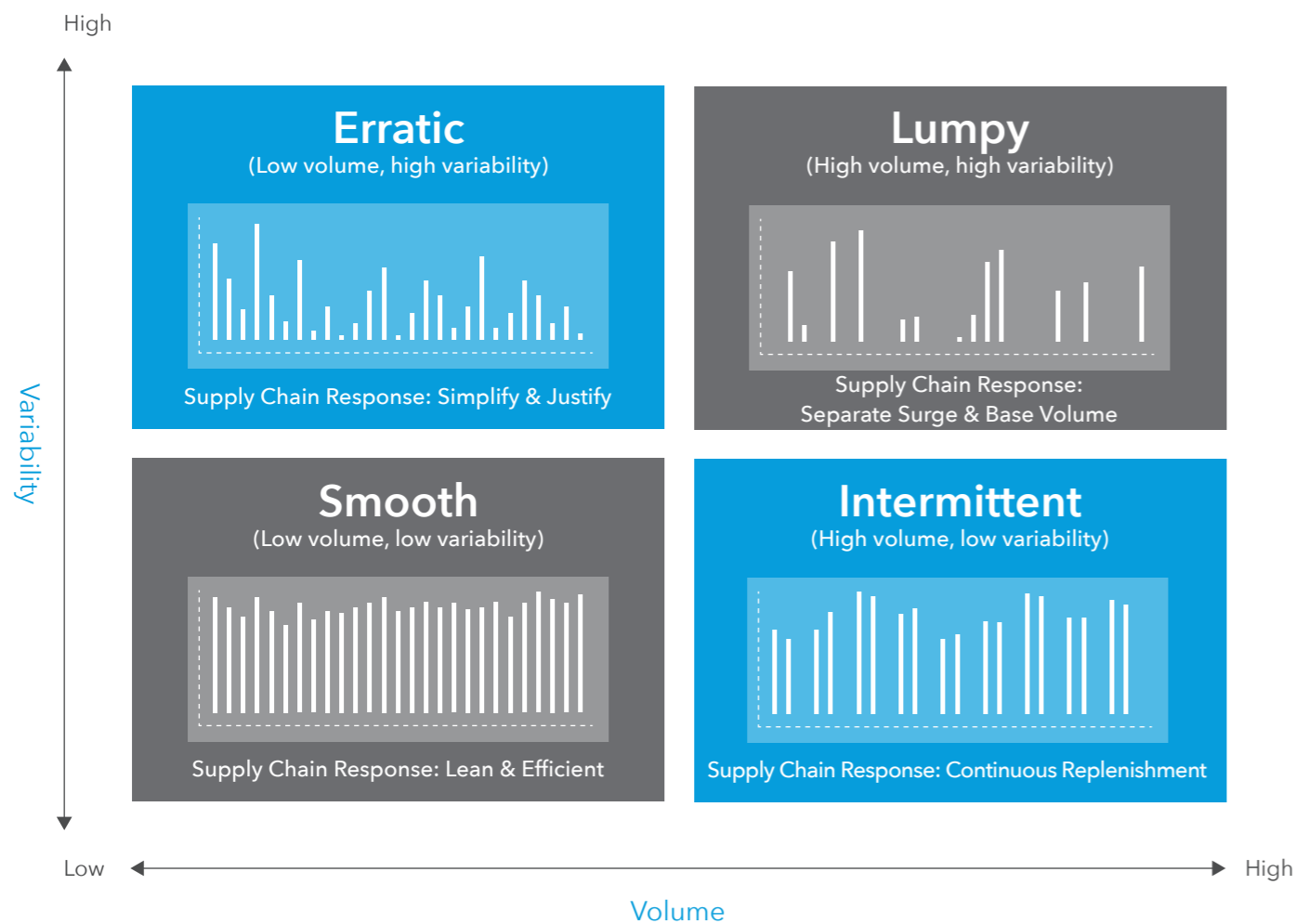


Figure. 8 Types of demand profiling in manufacturing



“you need enough capacity and capability close enough to your markets to enable you to react quickly”

Solution 3: Contract management

Clare Francis, Partner, Pinsent Masons
and Cerys Wyn Davies, Partner, Pinsent Masons

In 2020, a year that has changed the world, and on into 2021, contract management has never been more critical. Covid-19 laid bare the massive challenges that companies faced immediately and face going forward. There are other political, economic and social challenges already on the horizon and there will be further challenges that we have not yet foreseen. Contracting agility through the supply chain is key for businesses to succeed when confronted by such issues.

Challenge

Legal documents often seek to give the parties certainty, setting down prescriptive terms and mapping out the consequences of specific actions and inactions. The disruption experienced by business and supply chains due to Covid-19 has been unprecedented on a global scale and this has demonstrated the need for greater flexibility in contracting solutions so that they are able to deal with and adapt to any scenario, no matter how unthinkable it might be today.

Issue: Changes in volume demand

The fluctuation in demand for products before and after lockdown was vast. Many businesses saw a significant increase in demand occurring very quickly and giving little time to adapt or change processes. An equal number saw massive variances and a decrease in demand. This was, typically, less sudden, but the decrease in demand amplified as the pandemic continued.

For businesses, this volume volatility presents operational challenges requiring the implementation of new processes to manage stock and inventory. However, it is frequently also an issue in supply chain contracting, as the contract needs to support changes in practice.

Increase in volume demand

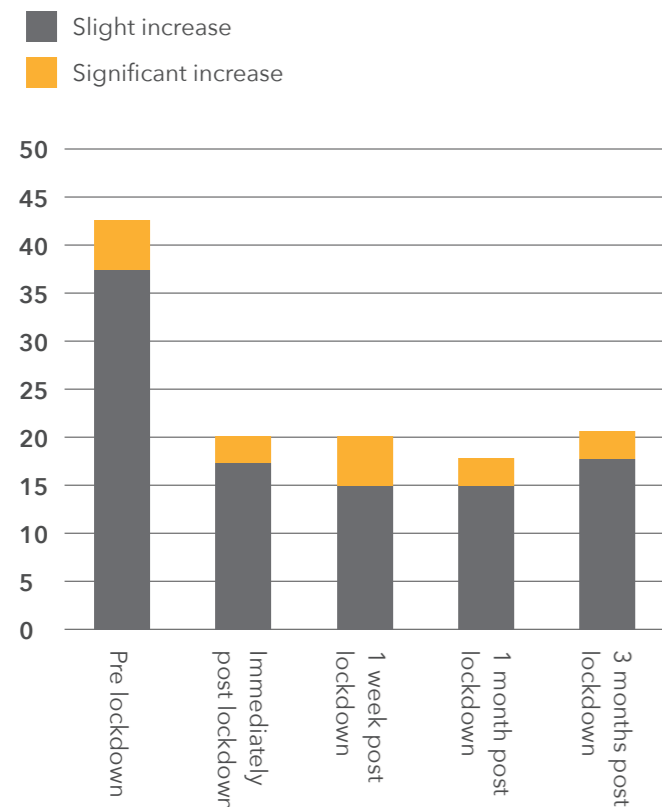


Figure. 9

Decrease in volume demand

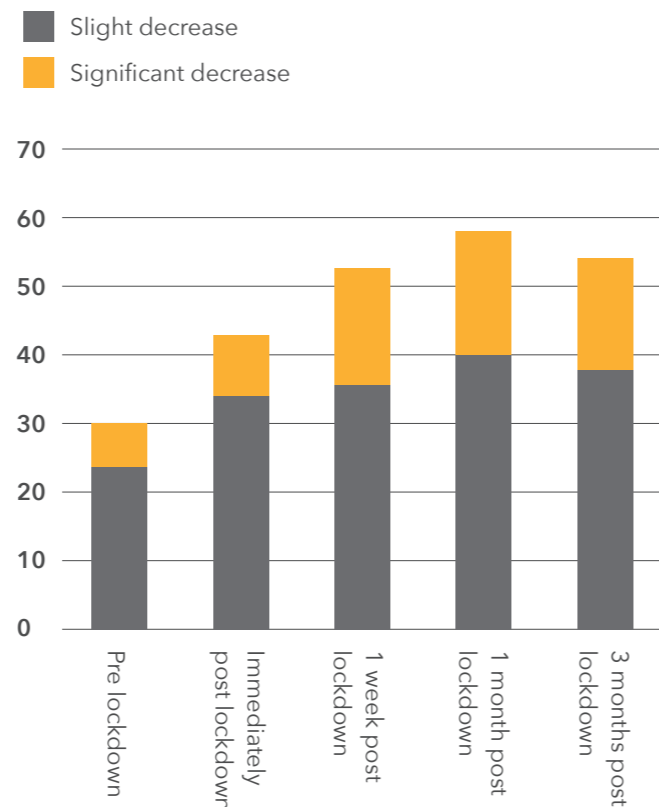


Figure. 10

Issue: Effectiveness of collaboration

Covid-19 has also resulted in a significant increase in collaboration between parties. Many businesses moved away from the traditional arms-length relationship of customer and supplier, to a more collaborative arrangement where parties seek to work together co-operatively for mutual benefit.

The data also shows us that businesses believe this will be a mechanism to help deal with some of the challenges and risks associated with Brexit. Overall, the need for collaboration to deal with uncharted eventualities is much greater than when businesses are operating in a steady state with little interruption and uncertainty. Therefore, as a general trend, increased collaboration and a contractual framework to support successful co-operation will be important.

Effectiveness of collaboration

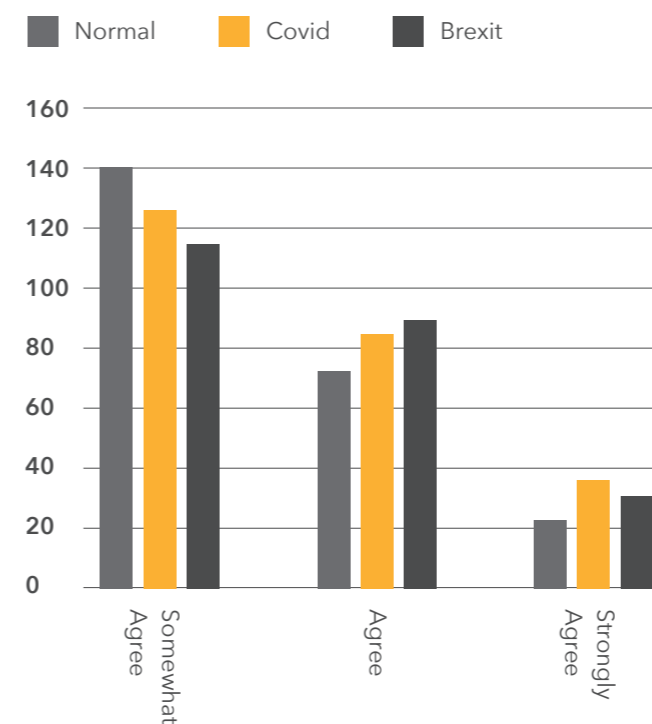


Figure. 10

Issue: Strategies for supply chain

Over the years, many manufacturers have developed supply chain strategies that focus on specific issues, such as stock, dual sourcing or obtaining the perceived panacea of supply chain transparency with access to more live data. However, it is clear is that there are a range of measures available and, to achieve true supply chain resilience, businesses need to consider several of these to provide the best ultimate protection and resilience.

Contracts can help support the implementation of these measures and mitigate the risks associated with the business strategy but, in order to do so, the contractual framework needs to map onto the strategies being deployed.

Effectiveness strategies for supply chain

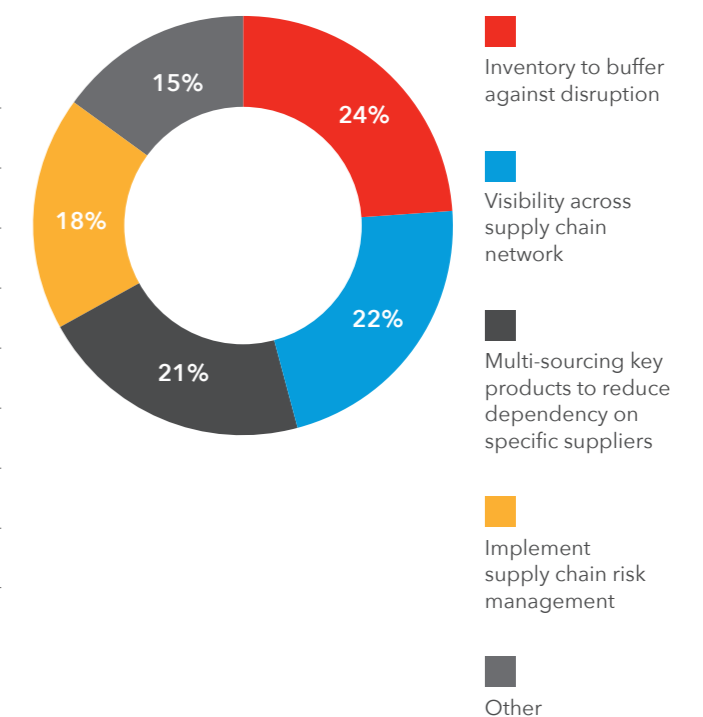


Figure. 12

Practical solution

Checklist for demand changes

During the life of any contract, demands will fluctuate and change. A contract needs to be able to deal with and respond to that change on an agile basis. From a customer's perspective, this provides supply chain resilience and, from a supplier's perspective, it ensures it is not left exposed when requirements change. Both parties are incentivised to include the right provisions in the contract.

Use this checklist to confirm if you have the right model and levers for any relationship.

- ▶ Use of forecasting with binding orders
- ▶ Inventory management provisions
- ▶ Strong governance process
- ▶ Volume flex with cap/collar tolerances
- ▶ Multi-supply models
- ▶ Transparency and access to real-time data

Collaborative contracting

Collaborative contracts, often called behavioural contracts, focus on outcomes. They move away from the traditional linear supply chain models to provide something more balanced, co-operative and streamlined.

Focusing on outcomes ensures all parties are incentivised to achieve the best result and to work together to achieve this. This is a move away from typical penalty-driven contracts with liquidated damages and termination rights, to a more outcome-based partnership that drives better behaviours.



Figure. 14

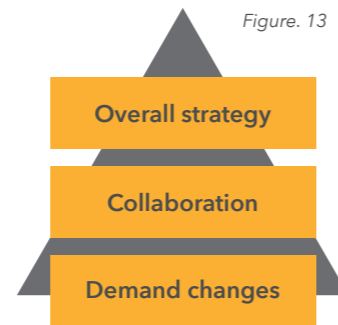


Figure. 13

On strategy contracts

Disputes often arise from contracts that have not kept pace with the operational requirements of the business. Contracts can become out of kilter with what the parties are doing in practice. Keeping the legal team fully informed of the business strategy can help ensure contracts are put in place to achieve the required operational requirements and flexibility.

By 'living the contract' and employing good contract management techniques there will be less value leakage throughout the supply chain. Should any disputes arise, the contract terms will be there to support the parties and help resolve the disputes promptly rather than hindering those discussions.

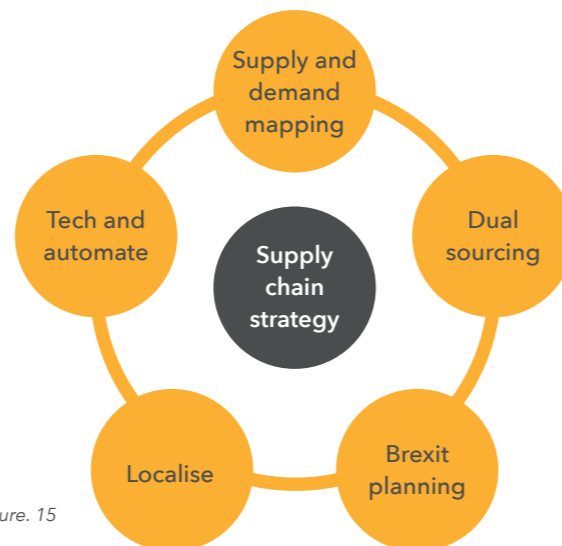


Figure. 15

Next steps

Taking on board the lessons learnt from Covid-19 as we go into 2021 and beyond will be critical for business resilience. As we live and work in a world where disruption is the new normal, robust contract management is required to help deal with those challenges on a day-to-day basis.

Businesses should review their contracting processes, build in checklists for appropriate provisions and challenge themselves to think about contracts as outcome-based tools rather than merely tools to mitigate risk and limit liabilities. If we change the way we think about contract negotiation and contract management, it will deliver not only a more resilient supply chain, but better working relationships with customers and suppliers.

Final thoughts

Managing supply chains has never been easy due to its complex nature. Brexit and Covid-19 have rung a bell that supply chain disruptions will always be unavoidable risks for businesses in the UK and elsewhere. Drawing on the survey results, this report confirms that UK manufacturing supply chains are vulnerable in some areas, particularly supply chain planning, buffer management and business collaboration. To unleash the future potential, manufacturing firms must improve how they manage their supply chains, which, if done effectively, will make them more resilient when confronting any future crisis. To help firms with this, this report presented three practical considerations:

- 1. Identifying risks throughout supply chain to inform better decisions -**
Assessing the current level of supply chain resilience to identify vulnerable areas and plan for all possible disruptions.
- 2. Managing buffers to respond faster -** Segmenting your supply chain through the adoption of demand profiling and managing inventory and capacity effectively to cater for uncertain demand.
- 3. Adopting flexible contracting enables greater collaboration -**
Taking a collaborative approach in managing supply chains with suppliers and customers provides greater visibility and lowers risk.

We encourage firms to consider the feasibility of all the solutions together, as adopting only one them may not be as impactful. Effective management of the entire supply chain enables each entity within it to benefit from balanced demand and supply and swift, even flows (of cash, information and material). This, ultimately, makes the supply chain more productive and sustainable in the long term.



“Brexit and Covid-19 have rung a bell that supply chain disruptions will always be unavoidable risks for businesses in the UK and elsewhere”

Working partners



Argon & Co is a global management consultancy that specialises in operations strategy and transformation. Its expertise spans the supply chain, procurement, finance and shared services, working together with clients to transform their businesses and generate real change. Its people are engaging to work with and trusted by clients to get the job done.

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An academic department of the University of Warwick, and one of the Government's High Value Manufacturing Catapult centres, WMG is a world leading research and education group. WMG has internationally recognised facilities and expertise in supply chain operations and organisational transformation. Our supply chains research group applies customer responsive supply chain theory into practical solutions that generate both economic and societal value. Collaborating with industrial partners, we seek to resolve complex business and organisational problems across agrochemicals, automotive, defence, consumer-packaged goods, retail and pharmaceuticals.

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Birmingham International
(approx 20 minutes by car)



Nearest train stations -
Coventry or Canley
(approx 10-15 minutes by car)



Getting in touch



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