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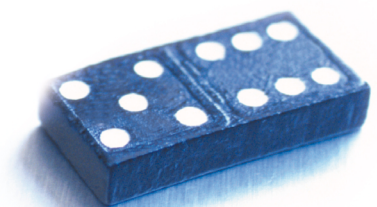
component manufacturer

Understanding Supply Chain Risk: A Self-Assessment Workbook

Understanding Supply Chain Risk:

A Self-Assessment Workbook

Prepared by LCP Consulting in conjunction with the Centre for Logistics and Supply Chain Management, Cranfield School of Management, supported by the Department for Transport



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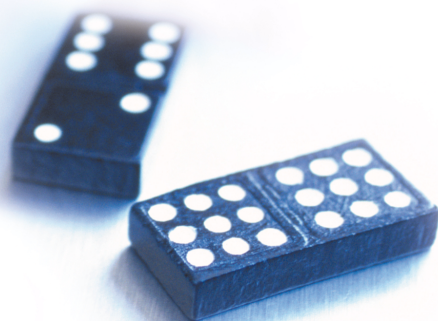
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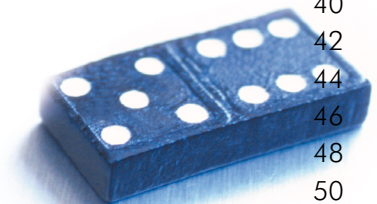
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Foreword

The events of the last few years from the fuel crisis to foot and mouth disease to port blockades and SARS have highlighted the vulnerability of many supply chains.

There are many forms of supply chain risk - internal to the company and external - that can impact a company's ability to maintain its operations and to serve its customers.

Recognising the implications for the economy and in particular small and medium enterprises (SMEs) the Department for Transport initiated a research programme into supply chain vulnerability. The research, undertaken by the Cranfield Centre for Logistics and Supply Chain Management revealed that there is still a lack of understanding, and assessment, of supply chain risks.

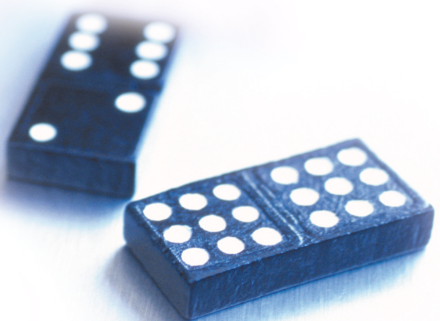
During the research it became evident that there was a need to provide a simple approach to enable managers to assess supply chain risk. This Workbook will, we hope, meet that need.

Accompanying the Workbook is the Executive Report, *Creating Resilient Supply Chains: A Practical Guide*.

Professor Martin Christopher

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School of Management
Cranfield University*





Introduction

Recent events have highlighted the exposure that companies have to risk in their supply chains. The impact of external and internal shocks on people, as consumers and employees, and on companies in terms of sustaining operations is now seen to be, perhaps, more profound than had previously been understood.

It is clearly a complex problem. There are many types of risk that can threaten business continuity and organisations will have intrinsic resilience to these at different levels. This means that executives planning for and managing vulnerability face a difficult task since problems can arrive from many different directions. A company that has an understanding of where potential supply chain risks may occur will be to some extent forearmed and in a position to make a more informed response should the necessity arise.

But while companies would be wise to identify and plan for vulnerability and resilience in their supply chains, research has shown that there are few support tools that provide analytical or methodological support for this task.

This workbook has been prepared to provide just such a methodology for companies, both large and small, to enable them to identify the vulnerabilities they have in their various supply chains and to support the planning of both mitigating and contingency actions.

It is a self-assessment process in which management teams will need to actively participate to identify and quantify the risks and vulnerabilities faced by their companies. While it is a truism that the world of business management is no stranger to risk,

we expect that following this process will assist companies of every size to uncover new areas for their attention. However, the very nature of risk and the dynamics of management mean that there are no guarantees that every possibility will be uncovered using this workbook.

The Workbook follows the simple sequence illustrated in Figure 1. First, the company is guided to identify and describe in broad terms the supply chains it is a part of. Second, the company is encouraged to test each of its chains using the six dimensions of possible vulnerability to pinpoint the big potential issues. Third, attention is directed to the exposure of the company in each of these in terms of the four key risk characteristics:

- Scale,
- Duration
- Recovery
- Cost.

Finally a framework is provided for the company to look at the potential to put in place mitigation and contingency actions. Mitigation actions are those where a change to operations are made to moderate or eliminate the implications of risk whereas contingency actions are designed to swing into place should the unlikely event occur.



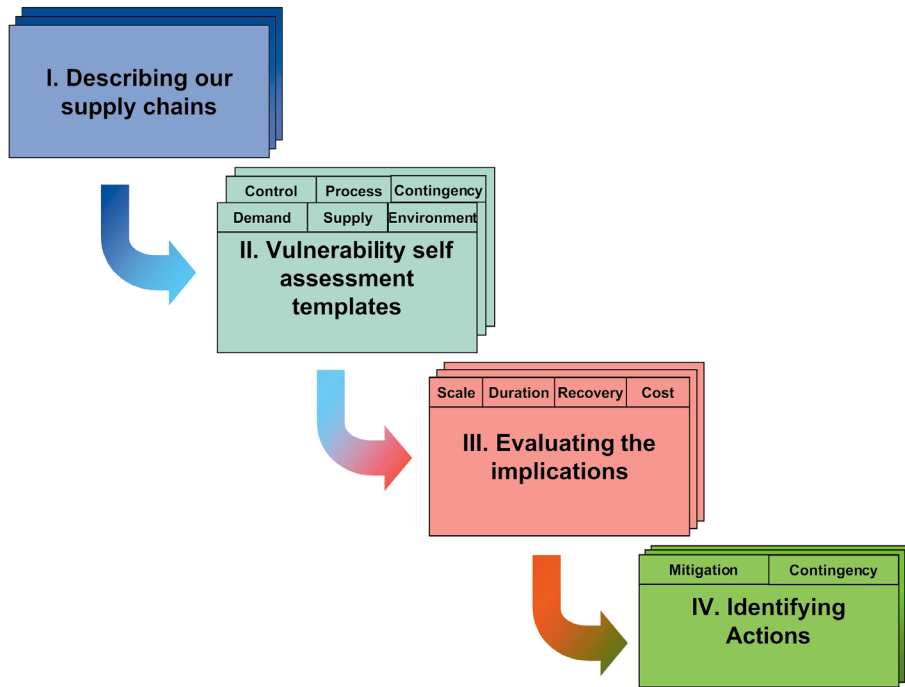


Figure 1: Supply Chain Vulnerability Workbook Flow

It is important for the reader to understand, as he or she prepares to read and apply this workbook, that issues of supply chain vulnerability are unlikely to have ever had formal organisational treatment before. Research shows that supply chain vulnerability is an area of concern that has not yet been addressed by many organisations.



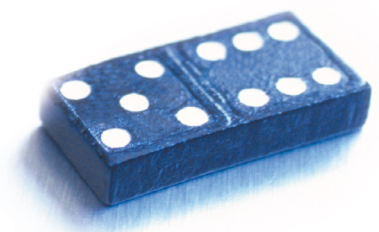
Section 1: The Importance of Supply Chain Vulnerability

Overview

The world is alerted to risk and disaster in a way that would have seemed pessimistic and morbid just ten years ago. The combination of 'global' shocks that have been experienced in the last few years and their consequential social, environmental and political implications have been a 'wake-up' call to the intrinsic vulnerability of our complex networked economies.

In the context of the supply chain, the experience of disruption of supply from the variety of shocks has been felt in terms of social welfare, employment, economic activity, and ultimately in corporate and global wealth. The risk points at the corporate level are better understood when external dependencies are considered, for example a supplier base can include a large number of companies of differing size located on different continents. If you add to this picture, the geo-political and economic dependencies that are represented by the rush to global sourcing and resource exploitation, the conceptual complexity is increased exponentially.

The complexities of the modern world and the single-minded pursuit of efficiency within supply chains have inadvertently increased the vulnerability of those same supply chains to unforeseen disruptions. There are many forms of risk, and many theories, too, but only one overriding principle. A risk that is visible may (not necessarily can) be managed, minimised and perhaps even eliminated; an unseen risk is far more dangerous. External risks are, by definition, potentially greater than internal ones - they are not within the focal company's direct control.



The scope of supply chain vulnerability

While it may seem surprising that there are few established tools and methodologies to support supply chain professionals in identifying vulnerability, a picture of the complexity of the task provides a quick reality check as to why this may be.

Every enterprise is a complex network of suppliers and suppliers' suppliers that the company connects to its customers and then its customers' customers. The company may be connected not only to this specific supply chain community but also to a number of other supply chain networks. Furthermore, the physical logistics operations that connect the nodes in these chains are an integral part of the network - be it by road, rail, air or ship.

The potential for failure is illustrated in Figure 2, which shows a typical scope of a manufacturer's supply chain. It makes the point that each node and connection is subject to a statistically low incidence of unexpected and undesired outcomes. The accumulated consequences of these various 'risks' of unexpected and undesired outcomes is still a low

incidence, albeit increased from the consideration of just a single node and its connections.

Depending on the position of the company in the 'industry to consumer' chain this diagram will take on a different perspective. However the core principles remain unchanged:

Risk, and hence vulnerability, can be induced by events on the demand or supply side, within the company itself from the perspectives of both process and control and, finally, in the environment at large where external events (e.g. from weather to strikes) can upset the workings of the chain.

The implications of these principles are significant:

- There are many types of risk in the end-to-end supply chain
- Their characteristics in terms of probability and severity will vary greatly
- Risk will be sensitive to the context of the company, its markets and its position in the chain
- The permutations and combinations of risk are such that few generalisations will apply
- Pinpointing all of the areas of risk that a company may face is likely to be a difficult task

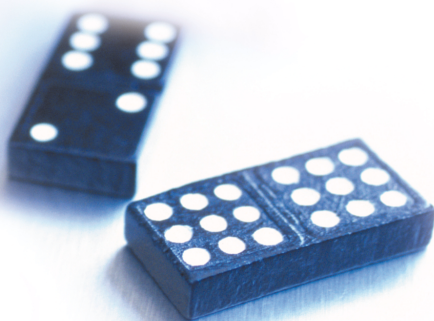
But the reality of this difficulty does not make it a useless endeavour.

The objectives of this self-assessment workbook

In the context of the key principles and the unique characteristics of the risk profile for any specific company, this workbook has been developed to enable a company to evaluate its potential supply chain vulnerability.

It adopts the following scope, guidelines and objectives:

- Scope - take an end-to-end perspective that enables an understanding of risk both inside the business and with its suppliers and suppliers' suppliers as well as with its customers and customers' customers
- Guideline 1 - provide a structured approach to enable a company to proactively develop an understanding of its specific vulnerabilities - this must be more than just a checklist, it should guide the user to the big issues
- Guideline 2 - place an obligation on the user to exercise care in developing the picture for his company - this must not be a superficial exercise
- Guideline 3 - provide signposts for the development of mitigation and contingency actions by the company in the context of the vulnerabilities identified



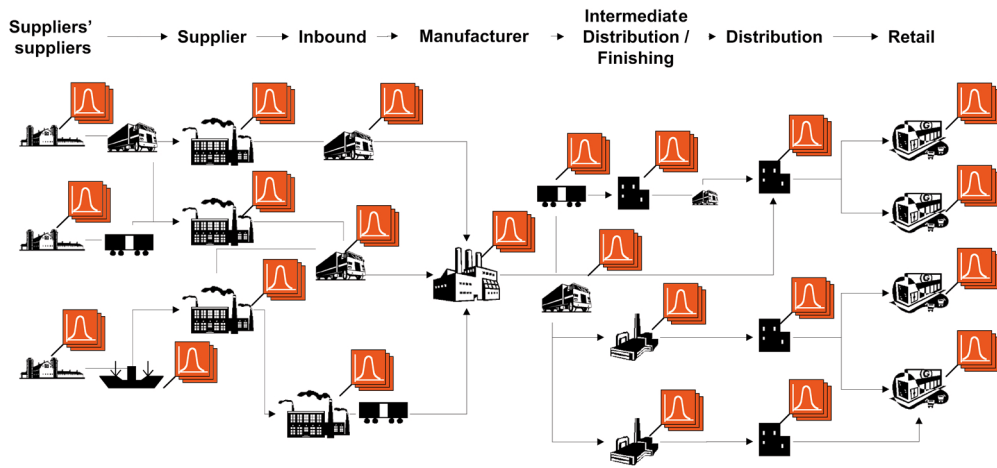


Figure 2: The Scope of Supply Chain Vulnerability

- Objective 1 - in the context of the scope and the guidelines above, to provide an easy to apply self-assessment methodology that enables a company to identify its main supply chain risk issues
- Objective 2 - provide the user with support to identify appropriate supply chain risk mitigation and contingency actions but not go into detailed cost-benefit analysis of such measures.

Achieving objectivity

Attitude to, and assessment of, risk is coloured by a number of factors that are personal to a manager's experience and the organisational pressures that they are facing.

This means that an objective assessment of risk is difficult to achieve since any assessment is likely to be influenced by a subjective dimension. Underlying thought processes are present such as:

- Will this reflect badly on me?
- Since I cannot cope with the implications of this risk, I shall ignore it.
- It is not acceptable for the organisation to discuss this risk area so I will not raise it.

As a result of this reality, any toolkit for examining risk and vulnerability cannot be more than a framework on which the user can base his/her attempt to make an objective assessment.

Since complete objectivity is not guaranteed, if a number of people in an organisation were to complete the process independently, it would be likely that some significantly different assessments would emerge. Indeed, it may be good to have a number of executives complete the workbook in parallel and compare the results.

Users of this workbook are advised to approach the task with the greatest degree of objectivity they can muster, but recognising that some of their biases may still slip through the cracks.





Section 2: The Approach of the Workbook

In this section, the overall approach of the workbook is described. It is built around the idea that the company faces risks of different types, some of which may be generated inside the company and some of which will arise from outside. The workbook workflow in Figure 1 is the foundation for stepping logically through the identification, categorisation and assessment of the many dimensions of risk that may exist for the company.

The big idea is that the elements of supply chain risk and the associated opportunities to mitigate or put in place contingency measures may be

connected. The work is designed to help the user to make the connections where they exist and as a result reach a more objective assessment.

This section develops that idea and is a primer for the final section, which introduces the workbook itself and guides the user in its application.

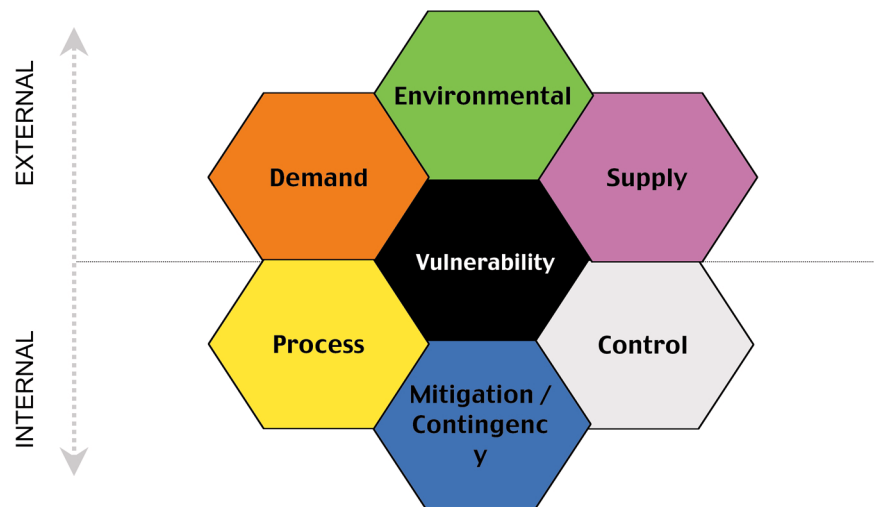
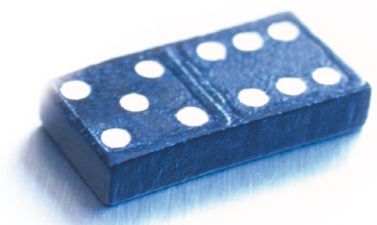


Figure 3: External and Internal Vulnerability Drivers



The Elements of Risk

Supply chain risk is about any threat of interruption to the workings of the supply chain. Risk may be generated as a result of risk 'drivers' that are either internal or external to the company. This idea is illustrated in Figure 3.

The external drivers are the risk areas that are most commonly thought of by managers. This is for exactly the reason that they are external and therefore may be perceived as 'unmanageable'.

The risks of unpredictable demand, unreliable supply and the effects of external shocks in the business, social and climatic environment are all the areas that we use as scapegoats for unexpected outcomes.

The internal drivers of process, control and mitigation/contingency are more tightly under the direction of the company itself and are therefore less obvious as being sources of vulnerability.

Making vertical and diagonal connections between the external and internal dimensions areas provides a conceptual breakthrough in understanding how risk is uniquely embedded in the individual company's supply chains.

Firstly, the external and internal drivers are described and then how they are connected to form the unique pattern for the company.



External Drivers

The following three sub-sections provide an introduction to the external risks for a company.

Demand risk

Demand risk relates to potential or actual disturbances to flow of product, information, and in this instance cash, emanating from within the network, between the focal company and the market. In particular, it relates to the processes, controls, asset and infrastructure dependencies of the organisations downstream and adjacent to the focal company.

Demand risk is the risk associated with a company experiencing demand that it has not anticipated and provisioned for through its chain to enable it to satisfy its customers' demands, or those of its customer's customers. This demand risk can be a failure on either the high or low side to accurately accommodate the level of demand. Demand risk is the most commonly articulated supply chain risk. It is often headlined as 'forecast accuracy' and the 'bull-whip' effect but this is not strictly correct since true demand risk is about unforecastable events that are outside the tolerance of the company's supply chain to accommodate.

Also the question of demand risk goes beyond the scope of demand volatility to include, for example, the whole area of new product introductions. This has been widely researched and evaluated, as it is a special area of significant demand risk.

It is important to note that the consequential liabilities and hence risk to the company of demand being either substantially greater or less than the capacity of the chain is context sensitive to the situation of the business. So for example:

- Demand greatly exceeding supply may not be a major strategic risk as the company could harden prices and reinforce the brand position in the market as being 'the hot product'
- Conversely an inability to meet exceptional demand could be interpreted by large customers as a failure of commitment to its market and cause them to look for replacement suppliers
- Demand that is well below expectation is almost always a major threat since the supply chain will have been provisioned and investments made against the forecast so substantial obsolescence may be incurred
- At the financial level, some level of demand risk can be accommodated but more may threaten the company's existence

Evaluating the resilience of the chain to demand side risk is therefore a key capability; we need to understand the scale/extent of the risk, its cost - should it occur - and the duration

for which the business is exposed. Clearly, this needs to include an ability to synthesise and assess the consequential impacts such as lost customer confidence and the effect on sales of other ranges.

Software solutions abound that address the need to improve forecast accuracy and developments in supply chain design are aimed at avoiding the worst effects of unforecastable demand through postponement strategies. In so far as these are effective in increasing the ability of the business to anticipate volatile demand, they mitigate against the worst experiences of demand risk. The effective operation of such solutions then becomes internal to the company and is essentially a control risk (to be discussed later in this section).

Supply risk

Supply risk is the upstream equivalent of demand risk, it relates to potential or actual disturbances to the flow of product or information emanating within the network, upstream of the focal company. Therefore, it



is risk associated with a company's suppliers, or supplier's suppliers being unable to deliver the materials the company needs to effectively meet its production requirements/demand forecasts.

The reality is that supply risk is almost invariably thought of as 'failure' of 'their' processes and controls. Most often this is about breakdown, shortage of materials through the supplier's chain, quality and rework issues or poor planning and hence committing to unreal delivery dates. It may be thought that an aspect of this risk arises when the supplier is unable to meet un-forecast demands placed on it by its customer. This is unreasonable since the key tests of supply side failure are about whether the demand was accepted by the supplier as being within the capacity of the company's supply chain and then whether it met them on time and to quality.

The consequences of supply side failure are usually financially debilitating, resulting from a series of issues including schedule adherence, technical concerns and quality questions. Typically, the company's consequences of supply failures will include:

- Loss of output, revenue and profit
- Customer dissatisfaction

Another common experience of supply side failure is supplier bankruptcy or withdrawal from the market. These events often happen without formal notice, causing considerable disruption; however they can usually be anticipated with the right intelligence systems in place. Contingency planning for such an event is an important control process inside the company and this will be described later in this section.

Supply risk extends as well to logistics service providers (LSPs), who fulfil the 'links' in the chain. If a supplier's product is available, but the LSP is late delivering (or loses) the product, the company will experience supply variability, albeit usually of a temporary nature.

Environmental

Environmental risk is the risk associated with external and, from the company's perspective, uncontrollable events. The risks can impact the company directly or through its suppliers and customers.

Examples would include port and depot blockades preventing shipment of products to stores; another could be the closure of an entire industrial area due to fire or chemical spillage.

Environmental risks with a wider impact would be events such as earthquake, cyclone, volcanic or terrorist activity. In these cases the business might be disrupted in terms of its ability to ship as well as causing an adjustment to levels of demand.

Economic slumps would come into the environmental category and many markets have some experience of dramatic reversals of fortune leading to business failures and bankruptcies. The economic shocks of events such as currency devaluations and stock market fluctuations are all environmental in nature.

Government actions around taxation and regulation can influence the market or the supply landscape significantly and, although there is usually notice of this, some areas of business (for example tobacco) have been impacted by changes of this type.

Finally some companies are exposed to targeted sabotage such as product tampering which can have dramatic effects on demand and the sustainability of the business.

Some of these risks are sufficiently remote to be insurable while others are not. Business interruption insurances can mitigate against some of the costs, but many of these factors are outside the insurance net and the return on a claim is unlikely to compensate the true loss of market.



Internal Drivers

This section provides an introduction to the internal drivers of risk including contingency measures (which if inadequate may be a risk in themselves).

Process risk

Processes are the sequences of value-adding and managerial activities undertaken by the company. The execution of these processes is likely to be immediately dependent on internally owned or managed assets and on a functioning infrastructure. Process risk relates to disruptions to these processes.

Process risk is risk associated with the variability of a company's operational processes. It pertains to execution whereas control risk relates to planning. The two dimensions are inextricably linked and inter-dependent, but nevertheless it is useful to consider separately events that may go wrong physically and operationally versus those from a planning and management perspective.

There is a wide range of potential for failure inside the company in the same way as with suppliers (supply risk) and customers (demand risk). Again these risks impact both on the ability to create and satisfy customer demand. The result is that sales and profitability will fall below expectations.

A breakdown in the company's processes can be experienced in some or all of the following ways:

- Variation in manufacturing yields, equipment and hence utilisation
- Quality and rework issues associated with internal manufacturing and technical processes
- Warehouse operations leading to fulfilment issues
- Business and supply chain systems failures
- Transport failures where the operation is under the control of the focal company

Failure to deploy and utilise the assets and resources of the business is largely unrecoverable as the time value of the asset perishes when it is not used.

Companies with extensive operations experience have generally reached equilibrium in their operations where the processes have been mastered and there is a degree of predictability. ISO controls are good evidence of this achievement, as are sound internal performance management procedures. (Failure of either of these would

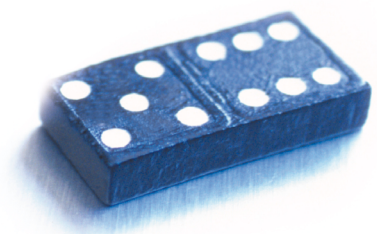
then be a control risk.)

The greatest process risks are commonly associated with introducing new products, technology and customers as well as changes to facilities and operating methods. A common maxim of risk management is not to undertake too many new initiatives at one time.

Control risk

Controls are the assumptions, rules, systems and procedures that govern how an organisation exerts control over the processes. In terms of the supply chain they may be order quantities, batch sizes, safety stock policies etc. plus the policies and procedures that govern asset and transport management. Control risk is therefore the risk arising from the application or misapplication of these rules.

It is associated with the company's planning and management activities including the quality, accuracy and reliability of its operating



procedures and its compliance with regulations and standards.

This is a broad category of risk, which as explained previously, is the planning and control perspective of the process risk (execution). Control risks are almost invariably self-induced by either omission or commission. They could include:

- Systematic forecast error as a result of flawed or non-existent sales and operations planning
- Inventory control accuracy
- Inadequate or unsound scheduling methods that are likely to give rise to inaccurate commitments to customers.
- Accounting and financial control failures ranging from credit control to not securing the capital necessary to continue to fund the company resulting in missing payments to suppliers or employees.
- Information technology control failures due to incorrect algorithms or parameters or processing capacity which impedes the ability of the company to operate (this is distinct from hardware failures which we would classify as a process failure in execution and for which operational

contingency will be appropriate). Information quality, workflow design and security, can significantly impact a company's operations.

- Failure to comply with the regulatory environment leading to external actions to impose fines or closure.

Mitigation and contingency

Mitigation is a hedge against risk built into the operations themselves and, therefore, the lack of mitigating tactics is a risk in itself.

Contingency is the existence of a prepared plan and the identification of resources that can be mobilised in the event of a risk being identified.

In Figure 3 (page 15), Mitigation/Contingency is an internal driver that can be put in place to compensate for some aspects of Supply, Demand, Environmental, Process and Control risks.

The classic mitigations in supply chain management are:

- Inventory
- Capacity
- Dual sourcing
- Distribution and logistics alternatives
- Back up arrangements

Inventory is a classic example. Safety stocks are put in place to compensate for unusual demand or supply within the lead-time to recover the situation. As an example, a pharmaceutical company with a single source of its active ingredient for a drug where the supplier was located on an earthquake fault held 18 months of inventory as

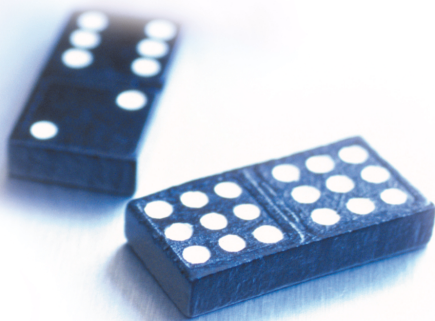
contingency.

By contrast a retailer might have worked out that the temporary loss of one of its four depots due to fire would not interrupt the business severely since product can be rerouted via the others and the likelihood of two burning down at the same time is remote. However, if that depot had single national coverage, it would be wise to have a rehearsed contingency plan if not actual back up.

Another example of contingency would be if a manufacturer operating on high levels of plant utilisation has identified alternative outsourced capacity against the event that the plant goes down or some other environmental shock occurs.

Computer systems are generally covered by back up arrangements and this is considered standard contingency practice. Where this back up takes the form of a complete disaster centre, then this is a mitigation measure since it incurs costs on an ongoing basis.

Failure to provide mitigation/contingency in any of these (and other dimensions) is a driver of risk.



The Idea of 'Connecting' between the risk elements

Risk is context sensitive for the company and the risk elements interact to neutralise or exacerbate the risks. This is a particularly challenging idea since it is very specific to the company and its environment and it is therefore difficult to make generalisations that will invariably apply.

The easiest way to demonstrate how the risk elements are connected is by examples and the following points are a platform for arriving at an initial understanding. Each risk area is taken in turn:

Demand risk

Many companies in manufacturing and distribution are dependent on a small number of customers for a large part of their revenue; the loss of these customers, highly volatile ordering patterns or delays in new product call offs represent serious risks for these companies.

However such risks can be at least partially offset and managed through the existence of good controls for account management, for collaborative forecasting with customers and for commercial terms that recognise the cost of volatility; these controls can extend to the way in which suppliers are managed to connect them to the potential for demand volatility.

Such risks can also be managed by process measures to reduce lead times and increase supply responsiveness.

Supply Risk

Many companies are equally dependent on just a few suppliers which may provide unique products via specialist tooling or technology, or which may be simply very large in their trading relationships. Typically companies buy in goods that represent a minimum of 40% and sometimes as high as 80% of revenues, so disruption to supply would threaten business continuity.

Such risks can be at least partially offset by control processes that monitor supplier viability and reliability, and that share forecasts and plans with suppliers and gain visibility of their schedules.

Mitigation of supply side risk could include strategic inventory holding, dual sourcing or arrangements to move tooling; contingency would include the identification of alternative sources of supply and planning for their introduction in the event of failures in the existing base.

Environmental Risk

Environmental risk is the melange of external risks to the company, its customers and suppliers. It is the most difficult to predict of all vulnerabilities as it spans weather, business environment, acts of war and so on.

Here the obligation on the company is to identify the impacts that could arise based on known hazards from the short term, e.g. exposure to power failure, through to severe business disruption due to strikes and natural disasters.

Environmental risks are likely to impact on both supply and demand and an attempt to identify such events should extend to these communities. Mitigation is less likely in this area than contingency. For example the big retailers have contingency plans to fly in fresh food from around Europe in the event of a port or tunnel blockade, while others have emergency fuel capacity to maintain depot operations in the event of temporary fuel shortages.



Process Risk

Most companies have a core process that is at the heart of their business. For a manufacturer this will be technical and for retailers and distributors this will be in the areas of buying and distribution. Typically manufacturers are more exposed to process risk than retailers and distributors with issues of yield, plant breakdown, quality issues, product safety and health questions.

For many companies, especially in the areas of food, pharmaceuticals and engineering, these risks are mitigated through standard procedures such as ISO 9000. They may also be mitigated through safety stock policies and controlled through supply chain visibility and lead-time reduction programmes.

Control Risk

The controls that a company applies to its supply chain will impact on its ability to deal with demand, suppliers and to manage the processes by which the company fulfils demand. Failures in inventory management, demand forecasting, manufacturing scheduling would all be examples of areas where control breakdowns could lead to risks being experienced.

The existence of programmes of supply chain performance measurement and key performance indicators (KPIs) and investments in computer systems to assist in the management of demand and scheduling are mitigating measures.

Training and people development programmes are equally valuable control mitigation measures as are the existence of standard operating procedures for perpetual inventory management.

Mitigation and contingency

The lack of mitigation and contingency measures for the major areas of risk that the company faces is a risk in its own right. The acid test of a company's preparedness is that it has a risk management programme in place that has tried to identify formally the risks that could occur in its supply chains and consider its options in relation to them.

The previous paragraphs in this section show the high level of connectivity between the risk areas and the connections with mitigation and contingency; it is for this reason that we have placed mitigation and contingency as a risk element.

In Section 3 the user will find mitigation and contingency as an integral part of the self-assessment worksheets, numbers 2 - 6.



Workbook Workflow - overview

The workbook provides a structured pathway through these six areas to help the user to identify and elicit the risks for the company in its supply chains. The Workbook flow was shown in Figure 1 and is reproduced again below:

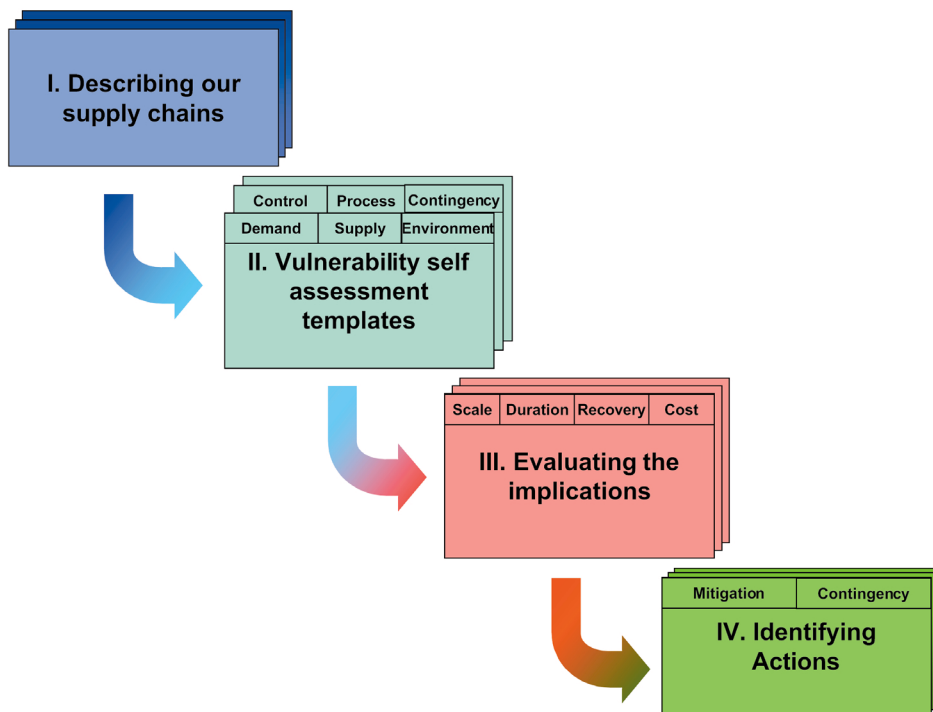


Figure 1: Workbook WorkFlow

In the following points we provide a short overview of the process:

1. Describing our supply chains

- Companies have many supply chains - the analysis of risk needs to be focused on the characteristics of each specific chain since they will be different.
- For example, Marks & Spencer has a food business and a clothing and home furnishings business; as a minimum in this case, the split of food and non-food would be made.
- As another example, Nokia makes mobile phones and the equipment to run the networks - these are quite different supply

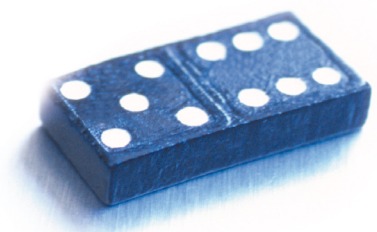
chains which would be analysed differently and have different risk characteristics.

- Birds Eye Walls makes both ice cream and frozen foods and these are quite different chains.
- Each supply chain that is identified has some basic characteristics that will be identified as a means of describing the chain in summary.

2. Vulnerability self assessment worksheets

- For each chain identified, this stage is a structured process of elicitation in each of the six areas of risk to identify where the company is most exposed.

- This process is designed to both identify and calibrate the severity potential for the specific types of risk - internal and external.
- Elicitation is designed to capture the 20% of events that will likely drive 80% of the risks.



- Calibration is based on the exposure of the business to the risk, where appropriate offset by the existence of operational measures or market place conditions (if any) that will mitigate the risk.
- Calibration is based on a simple 0,1,2 format corresponding to: 'none': 'some': 'significant'.
- The mitigation offset is based on the reverse format of 0,1,2 meaning: 'significant': 'some': 'none' and this is used as a multiplier to enable the user to classify the relative risk.
- This means that a highly significant risk with no mitigation offset gets a value of 2 times 2 = 4.
- At the end of this process the most significant risks from each area of the supply chain can be assembled and ranked.
- This form is carried through to the next phase with as many points as are considered significant.

3. Evaluating the implications

- For the list of significant vulnerabilities, the third stage in the process is to assess the implications of these relatively high-risk ratings.
- This is a four-stage process that places a value on the size of the risk, its likely duration before it is likely it can be corrected, the recovery actions that will be needed and the indicative cost of that recovery.
- There may be more than one recovery action and each should be detailed: e.g. airfreight and alternative supplier.
- Completing these implications pages is the most judgemental part of the whole process as it relies on knowledge of the company, its customers and suppliers.
- At the end of this process it is possible to see the importance of the risk from stage 2 in the workbook against the scale of the exposure and the cost to fix.
- A simple ranking of the most critical vulnerabilities in the chain for which there is no mitigation or contingency becomes available as a result of this analysis.

- By this time, the user can expect that the appropriate mitigation measures or contingency plans will be self evident; but there will be a need for informed debate on these measures and the extent to which the business can afford to invest in mitigation now or contingency planning and capabilities for the future.
- So the final step in the process is to prepare a list of actions and an estimate of the associated costs to mitigate or provide contingency.

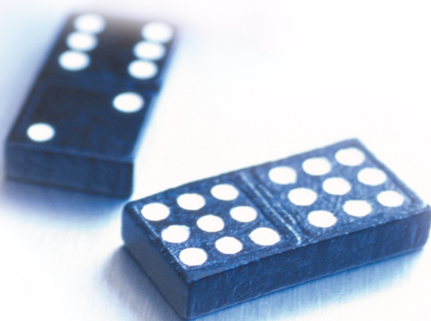
On completion of the workbook workflow, the company will have a list of supply chain vulnerabilities that has been narrowed to areas for priority focus and appropriate actions flagged and estimated.

This will allow directors and managers to make an initial judgement on where to focus their risk management efforts and resources in the supply chain. It may be that the analysis exposes some uncertainties that the company should address further with more detailed analysis.

The conclusion should be a valuable first step to taking an end-to-end view of the risk and vulnerability in its supply chains.

4. Identifying actions

- The ranked list of vulnerabilities becomes the input to the final stage, which is to identify potential actions in terms of either contingency planning of resources, or mitigation measures by design.



Section 3: Applying the Workbook

The workbook is designed against the objectives and guidelines described earlier and uses a simple worked example of a specialist food manufacturer to the retail and catering trades in the UK to assist the user in following the process and thinking through his/her company's risks.

Accompanying each section of the workbook is a blank pro-forma for the user to photocopy and complete based on the company's situation and the lessons gleaned from the example.

I. Describing our chains (worksheet 1)

Take worksheet 1 and use it to identify the number of discreet chains that the company operates. Each chain that is identified will need to have a separate analysis conducted on it through processes II, III, and IV. although there may be areas of the analysis that can be carried between the different chains.

Each discreet chain is characterised by the customers that are serviced, the products that are made, handled and sold, the primary sources of supply and the facilities and routings that support the chain in manufacturing and logistics.

The characteristics of the individual chain in terms of outcomes will be expressed in terms of inventory levels and customer service where the latter is broken down into order-to-delivery time and order completeness.

Using the form, think about the number of discreet chains that the business has. The example food manufacturer has two main lines of business; processed sauces, which are shipped in bottles and require no refrigeration and ready meals that are shipped chilled. The customers for the sauces are primarily the large retailers and the wholesalers; the customers for

the ready meals are both the retailers and food service companies serving offices, hospitals and factories.

The form shows that the biggest single supply chain in terms of revenue is the chilled ready meals to the food service sector. It also shows that the levels of inventory in the various supply chains and the customer service goals are quite different.

Using this example take your business and break it down into its big supply chain blocks.

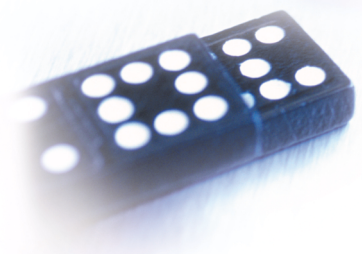
To help, here are some typical chains by industry type:

- Retail - Ambient food, chill food, frozen food, clothing, electricals, household, general merchandise, toys, furniture - superstores, convenience stores, specialist outlets
- Pharmaceutical - by drug type, by distribution type: wholesale, hospitals, pharmacies
- Chemicals - by chemical, by geography, by direct sell and distributor, by logistics mode
- Clothing - by sources of supply and technical characteristics and by outlet type
- Electrical goods - by source of supply, by delivery requirements (e.g. home delivered or carry home), by customer type

- Engineering components - by technology and customer type (e.g. original equipment manufacturer (OEM) and replacement)
- Hi tech equipment - by technology and sources of supply and by customer type

Using this breakdown of your supply chains as a starter, complete the sections on revenue, profitability, customer service and inventory performance.

If in doubt put more chains in than you finally find that you need. It is easier to compress the selection later than to expand it. Starting with the largest (or the most difficult) move on to the next stage in the workbook flow.



II. Vulnerability self-assessment pro-formas *(worksheet 2-6)*

The next five pro-formas are the foundation of the supply chain risk assessment and are based on the five risk dimensions: demand, supply, process, control and environment. This description will deal with each in turn. First read again the descriptions of the risk dimensions in Section 2, 'The Approach to the Workbook'

Demand Risk

The worksheet for demand risk is populated with a series of questions, which are generic to demand risk but may not be the full scope of risk for your company. Using the worked example for the food manufacturer as a guide, consider these questions and develop others that are relevant to demand risk for your company.

In the example the following questions are posed:

- Identify if the business is dependent on just a few very big customers who could switch away
- Identify if demand is subject to big swings as a result of promotional activities creating forecast difficulties

- Establish if the lead times required by customers are particularly exacting and therefore likely to lead to failures
- Establish if the order fill rates required by customers are especially demanding and could lead to failure
- Establish if the demand is subject to high seasonal swings that are difficult to predict and would cause difficulties in meeting demand
- Establish if any major customers or a large part of the customer base is likely to have financial difficulties
- Identify if new products are a critical and frequent part of the marketing cycle and can influence demand
- Establish if there is a track record of customer disloyalty and rapid switching which could leave the company vulnerable

Develop any further questions that are pertinent to demand risk; as an example, a company that is dealing in exports may have significant risk around the ability of customers to obtain foreign currency, also the tendering processes for exports may lead to major risks in how demand is experienced.

For each box completed describe the risk analysis. This can be quite simple as the example shows but may still require some analysis to come up with a simple one line statement of the current situation.

When you have described the demand risks, rank them in order of severity on a scale [0=none, 1=some, 2=significant]. This is not a ranking of the likelihood of

the risk occurring, simply an assessment of its importance should it occur.

As we can see from the example a number of the risk headings have zero risk attached to them, but both the customer base concentration and the financial stability of one of them does give some cause for concern, albeit not major.

Now we turn to the mitigation of demand risk by current operating practices. This is the section across the top right of the form. Complete this with all the things that you are doing that might mitigate the risks in demand. The list in the form again should be extended to reflect your own circumstances. The sample of mitigation measures on the form together with the situation of the example company is:

- Inventory cover - we have 1.5 weeks of cover which is probably enough to accommodate the sort of volatility experienced on the lead time of supply
- Collaboration with customers - we don't do that so it will be a risk if we don't understand our customer's intentions
- Forecasting processes - we only achieve 80% accuracy in our forecasts, not too bad for short lead time manufacture, but could do better
- Account management/customer relationship management (CRM) - we don't have a formal account management process so this is a risk, especially for accounts that are vulnerable
- Transport back up - we have a carrier contingency plan in place



The comments attached to each of the above are a qualitative assessment of the effectiveness/relevance of these (or other) mitigation measures that are in place. Fill in the boxes as shown. For risk factors that connect to the mitigation measures, look at the effects these may have and score 2 if there is no mitigation, 1 if there is some, and 0 if there is full mitigation. This is the reverse order to the risk factor on the left hand side of the worksheet.

The final step in determining significant demand risk factors is to multiply the risk ranking by the mitigation ranking. Using this method, the possible scores are:

- Zero - where either the risk is nil or the mitigation is complete
- One - where there is a risk and mitigation is only partial
- Two - where there is either large risk and only some mitigation or some risk and no mitigation
- Four - where there is a large risk and no mitigation

It may be useful to share this assessment across the company with colleagues and to ask a number of people to complete the forms independently for subsequent comparison. While the process is partly subjective it is quick to do and helps to focus the mind on the big risks.

In this example, the food manufacturer has no serious risks that are not partially mitigated; but it is clear that it is not close enough to its customers to really know what is going on with them.

Supply risk

The worksheet for supply risk follows the same format as for demand risk and with the same method of scoring. Again it is populated with a series of questions, which are generic to supply risk but may not be the full scope of risk for your company. Using the worked example for the food manufacturer as a guide, consider these questions and develop others that are relevant to supply risk for your company.

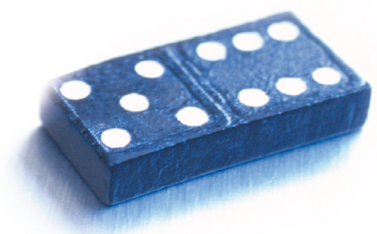
In the example the following questions are posed:

- Identify if the chain is dependent on either or both dominant or specialist suppliers where failure to supply could disrupt output
- Identify if any suppliers, particularly any that are critical, are in potential financial difficulties and could interrupt output
- Identify if any suppliers offer extended lead times that impact on inventory or customer service
- Establish if there is a record of poor quality from any suppliers and if there are risks that could arise as a result
- Identify if there are suppliers who have poor schedule compliance and if they are among the suppliers on whom there is a dependency
- Identify the state of the supply market. Is our company taking a large slice of the supply? And are there any tight spots in the supply market that might disrupt output

- Are there measures of performance in place with suppliers that provide a platform for an improvement programme
- Make an assessment of supplier capabilities to plan and fulfil demand. Are they using good methods or working hand to mouth

Develop any further questions that are pertinent to supply risk; as an example, a company that is buying in the UK on quite short lead times may be aware that this source of supply is likely to be acquired, its local capacity removed and that the prices offered may rise as a result. The company has options to find alternatives but these may be on longer lead times with lower reliability.

For each box completed describe the risk analysis. This can be quite simple as the example shows but may still require some analysis to come up with a simple one line statement of the current situation. When you have described the supply risks, rank them in order of severity on a scale [0=none, 1=some, 2=significant]. This is not a ranking of the likelihood of the risk occurring, simply an assessment of its importance should it occur.



As we can see from the example two of the risk headings have no risk score attached to them, but the analysis shows that there is significant supplier dependency on key materials and that lead times are extended for some ingredients.

Now, turn to mitigation of supply risk as we did for demand by looking at current operating practices. Complete the top right of the form with all the things that you are doing that might mitigate the risks in supply. The list in the form again should be extended to reflect your own circumstances. The sample of mitigation measures on the form and the situation of the company are:

- Materials inventory cover - we have three to four days supply but we do hold two weeks of key packaging items (tomatoes are obviously a seasonal commitment so they are available albeit not in physical stock)
- Supplier performance measurement - there is no supplier performance measurement in place

- Supplier contingency planning - there is limited contingency and none for packaging
- Lead time reduction / process integration - there is no such programme in place
- Transport back up - there are back up hauliers in place
- Quality programme - there is a product and material quality programme in place for production

The comments attached to each of the above are a qualitative assessment of the effectiveness/relevance of these (or other) mitigation measures that are in place. Fill in the boxes as shown. For risk factors that connect to the mitigation measures, look at the effects these may have and score 2 if there is no mitigation, 1 if there is some, and 0 if there is full mitigation. This is the reverse order to the risk factor on the left hand side of the worksheet.

Move again to the final step in determining the significant demand risk factors and multiply the risk ranking by the mitigation ranking.

As for demand risk, it may be useful to share this assessment across the company with colleagues and to ask a number of people to complete the forms independently for subsequent comparison. While the process is partly subjective it is quick to do and helps to focus the mind on the big risks.

In this example the food manufacturer has some mitigation around the major risk factors identified but the potential severity of the risks on supply are such

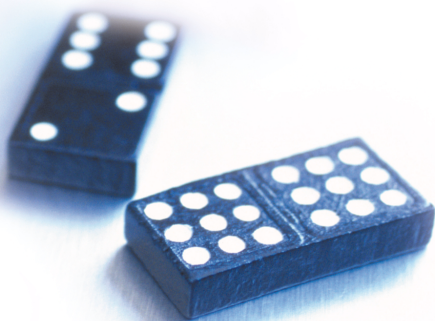
that a number of areas still score 2. It is clearly going to be important to take a more strategic view on materials supply.

Process risk

The worksheet for process risk follows the same format as for demand and supply risk and with the same method of scoring. Again it is populated with a series of questions, which are generic to process risk but may not be the full scope of risk for your company. Using the worked example for our food manufacturer as a guide, consider these questions and develop others that are relevant to process risk for your company.

In the example the following questions are posed:

- Is there any experience of the manufacturing plant having sudden and sustained loss of yield?
- Is there any experience of manufacturing quality being sustained at less than satisfactory levels?
- Are there adequate processes to deal with the requirements of quality and accuracy; is there any evidence that the company has been exposed to sabotage or failures through contamination (e.g. nuts) or incorrect ingredients?
- Are the systems robust and accurate and adequately backed up; is there any evidence that the company's systems have ever malfunctioned and are there adequate back up arrangements to prevent business interruption?



- Are the company's customer development and management processes under control; is there any evidence that the company does not respond in a timely and adequate way to customers' needs and is not well organised to generate demand?

Develop any further questions that are pertinent to process risk; as an example, a company that is highly dependent on labelling and batch controls for legal compliance could be at risk if it did not have back up and duplication in its capacity in that area.

For each box completed describe the risk analysis. This can be quite simple as the example shows but may still require some analysis to come up with a simple one line statement of the current situation. When you have described the process risks, rank them in order of severity on a scale [0=none, 1=some, 2=significant]. This is not a ranking of the likelihood of the risk occurring, simply an assessment of its importance should it occur.

As we can see from the example, one of the risk headings has significant risk attached to it and another three areas have some. The analysis shows that the company has some exposure to process quality based on experience.

Now, turn to mitigation of process risk as we did for demand and supply by looking at current operating practices. Complete the top right of the form with all the things that you are doing that might mitigate process risks. The list in the form again should be extended to reflect your own circumstances. The sample of mitigation measures on

the form and the situation of the company are:

- Full ISO 9000 procedures in place - none in place
- Adequate quality controls and anti-tampering measures - yes there are QC procedures but these will not catch all events
- Systems audit and back up contingency - there is only daily data back up with no systems contingency
- CRM process and effectiveness measures - there are no CRM processes as discussed earlier with demand risk
- Adequate training programmes for temporary staff - training programmes for new staff are very limited

The comments attached to each of the above are a qualitative assessment of the effectiveness/relevance of these (or other) mitigation measures that are in place. Fill in the boxes as shown. For risk factors that connect to the mitigation measures, look at the effects these may have and score 2 if there is no mitigation, 1 if there is some, and 0 if there is full mitigation. This is the reverse order to the risk factor on the left hand side of the worksheet.

Move again to the final step in determining the significant demand risk factors and multiply the risk ranking by the mitigation ranking.

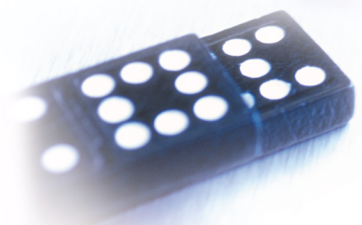
As for other risks, it may be useful to share this assessment across the company with colleagues and to ask a number of people to complete the forms independently for subsequent comparison. While the process is partly subjective it is quick to do and

helps to focus the mind on the big risks.

In this example the food manufacturer has a major and uncovered risk in the areas of product quality with no procedures and inadequate training leaving some major product and consumer liability issues. This is our first '4' score and measures here are likely be a priority. Three other areas score a 1 but the mitigation measures for quality will impact on them also.

Control risk

The worksheet for control risk follows the same format as for the previous analyses. Again it is populated with a series of questions, which are generic to control risk but may not be the full scope of this risk for your company. Using the worked example for the food manufacturer as a guide, consider these questions and develop others that are relevant to control risk for your company.



In the example the following questions are posed:

- Are the financial and inventory controls for the company robust and reliable; is there any evidence that the financial controls of the business uncover surprises in relation to inventory, cash, profitability and investments?
- Are the demand management, forecasting and buying processes reliable and not subject to systemic failure; is there any experience of un-forecast demand or wild swings in output plans leading to difficulties with either customers or suppliers?
- Is regulatory compliance adequate for fiscal and financial affairs; does the company complete its fiscal and corporate regulatory affairs effectively?
- Is regulatory compliance adequate for all environmental obligations; has the company carried out an environmental audit in the last two years and is there a specific responsibility for ensuring it complies?

- Is regulatory compliance adequate for all employment obligations; does the company comply with all employment obligations in relation to status of employees, formal procedures for warnings and dismissals and security checks as needed?
- Is regulatory compliance adequate for all operational, safety and Working Time Directive (WTD) obligations; does the company achieve auditable compliance with safety and working hours rules including tachograph and transport compliance?

Develop any further questions that are pertinent to control risk. For example, a company that is highly dependent on not incurring product obsolescence needs good location tracking and inventory planning systems. The company could be at risk if this was not the case.

For each box completed describe the risk analysis. This can be quite simple as the example shows but may still require some analysis to come up with a simple one line statement of the current situation. When you have described the control risks, rank them in order of severity on a scale [0=none, 1=some, 2=significant]. This is not a ranking of the likelihood of the risk occurring, simply an assessment of its importance should it occur.

As the worked example shows one of the risk headings has significant risk attached to it and another three areas have some. The analysis shows that the company has some exposure to control quality based on experience.

Now, turn to mitigation of control risk as we did for the others by looking at current operating practices. Complete the top right of the form with all the things that you are doing that might mitigate the risks in control. The list in the form again should be extended to reflect your own circumstances. The sample of mitigation measures on the form and the situation of the company are:

- CRM system and close account management - none in place
- Company wide sales and operations planning (S&OP) process - none in place
- Environmental audit and responsibility - no audit has been carried out
- Auditable personnel procedures - personnel management is limited
- Auditable WTD procedures - - there is no control here and none on suppliers such as hauliers

The comments attached to each of the above are a qualitative assessment of the effectiveness/relevance of these (or other) mitigation measures that are in place. Fill in the boxes as shown. For risk factors that connect to the mitigation measures, look at the effects these may have and score 2 if there is no mitigation, 1 if there is some, and 0 if there is full mitigation. This is the reverse order to the risk factor on the left hand side of the worksheet.

Move again to the final step in determining the significant control risk factors and multiply the risk ranking by the mitigation ranking.



As for other risks, it may be useful to share this assessment across the company with colleagues and to ask a number of people to complete the forms independently for subsequent comparison. While the process is partly subjective it is quick to do and helps to focus the mind on the big risks.

In this example the food manufacturer has a major and uncovered risk in the area of employment law compliance and uses high numbers of casuals. This is our second '4' score and measures here are likely to be a priority. Two other areas score a '2' because the risk is only 'some' although there is no contingency. Putting in place mitigation for the big risk will address one of the '2's.

Environmental risk

The worksheet for environmental risk follows the same format as for the previous analyses. Again it is populated with a series of questions, which are generic to environmental risk but may not be the full scope of this risk for your company. Using the worked example for the food manufacturer as a guide, consider these questions and develop others that are relevant to environmental risk in your company.

In the example the following questions are posed:

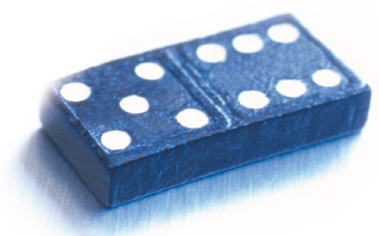
- Possibility of water contamination on the site - is the business susceptible to water contamination due to mains supply?
- Possibility of power supply interruptions for chill store; is the business adequately provided with reserve electricity?
- Risks of storm or flood damage; is the business susceptible to flood or storm damage that could create business interruption?
- Risks of foot and mouth or similar interruptions to meat supply; is the business exposed to supply side failures of a structural nature and has it thought these through?
- Risk of crop failures in tomatoes in Greece; is the business exposed to supply side failures of a structural nature and has it thought these through?
- Risk of work interruptions due to own staff; is the business exposed to the potential for labour disruptions and has the company adequate contingency plans?
- Risk of getting caught up in the industrial actions of others; is there any experience of the company being caught by secondary actions especially in transport and distribution?
- Risks of fire damage to plant; has the business adequate fire protection and back up contingency?
- Risks to transport routes and delivery due to congestion and unviable driving hours; is the business exposed to structural risks in its current logistics schedules as a result of

congestion and drivers hours regulations?

Develop any further questions that are pertinent to environmental risk; as an example, a company that is connected to a political cause such as animal testing or human rights would have a whole series of contingent risks and compliance measures to consider. A company dealing with timber might have conservation issues to be concerned about.

For each box completed describe the risk analysis. This can be quite simple as the example shows but may still require some analysis to come up with a simple one line statement of the current situation. When you have described the environmental risks, rank them in order of severity on a scale [0=none, 1=some, 2=significant]. This is not a ranking of the likelihood of the risk occurring, simply an assessment of its importance should it occur.

As we can see from the example, two of the risk headings have significant risk attached to them and another six areas have some. The analysis shows that the company has exposure to interruptions due to labour, fire, power, contamination, transport and crop/animal husbandry failures.



Now, turn to mitigation of environmental risk as we did for the others by looking at current operating practices. Complete the top right of the form with all the things that you are doing that might mitigate the risks from the environment. The list in the form again should be extended to reflect your own circumstances. The sample of mitigation measures on the form and the situation of the company are:

- Full site risk assessment and contingency plan - none in place
- Employment guidelines for temporary staff and agreement with authorities - none in place
- Supply side contingency planning for market shocks - limited contingency measures

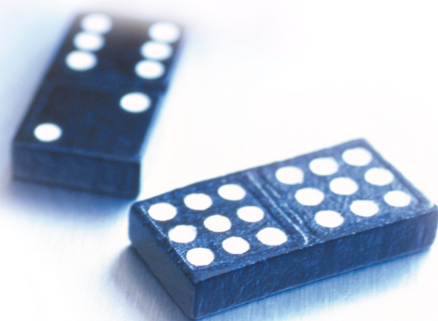
- Regular route evaluation and transport contingency - none in place

The comments attached to each of the above are a qualitative assessment of the effectiveness/relevance of these (or other) mitigation measures that are in place. Fill in the boxes as shown. For risk factors that connect to the mitigation measures, look at the effects these may have and score 2 if there is no mitigation, 1 if there is some, and 0 if there is full mitigation. This is the reverse order to the risk factor on the left hand side of the worksheet.

Move again to the final step in determining the significant environmental risk factors and multiply the risk ranking by the mitigation ranking.

As for other risks, it may be useful to share this assessment across the company with colleagues and to ask a number of people to complete the forms independently for subsequent comparison. While the process is partly subjective it is quick to do and helps to focus the mind on the big risks.

In this example the food manufacturer has a major and uncovered risk in the area of employment practice since it could be closed down due to the high numbers of casuals. This is our third '4' score and actions here are likely to be a priority. Two other areas score a '2'. Putting in place mitigation for the big risk will address both of the '2's and also the '4'.



III. Evaluating the implications (worksheet 7)

The next stage is to assemble a picture from the five worksheets, i.e. numbers 2 - 6, into a single ranked statement of the risks that may exist.

The worksheet No. 7 - Evaluating Implications is the means to complete this step.

Take from each sheet the areas of identified risk by rating after mitigation, starting with the '4's and then going on to the '2's and '1's. Record the risk area and the related risk theme based on the absence of mitigation. It will be immediately obvious that for the example the risk themes converge. For example, the lack of CRM and account management influences both the experience of demand risk and control risk. The lack of employment controls and processes and the absence of adequate training for casuals is also a risk theme.

Now take this ranked list through a three-stage process and answer the following questions:

1. What is the exposure of the company - how will this risk impact the company and what is the financial scale?

Look at the example and you will see that this is a commentary followed by an estimate of the financial scale. The estimate of scale is derived from the overall turnover and profit numbers in

the first of the forms that identified the chain. Taking the first line in the example, the estimate is that the realisation of the risk of production interruption due to the company's staff walking out would damage turnover with a sales loss of £1 – £2 million. This would translate into a cash cost of up to £1m since materials are around 50% of turnover.

2. How long would the exposure last before it could be fixed?

Estimate the duration/exposure of the risk event; in this case the first line example would be unlikely to last more than five to 10 days before either the labour could be replaced or normal work was resumed.

In this case the duration of ten days has been factored into the £2m sales loss and the forecast cash loss since this chain has revenues of roughly £1m per week.

3. What is the cost of recovery in terms of emergency actions?

Estimate the cost of recovery at a high level based on what you think will be needed to get the business back up and operating.

In the first line example the cost is premium temporary labour and idle staff, plus any legal costs that have been estimated at £350,000

From these three assessments it is possible to produce a simple high-level estimate of the total cost of the risk should it become a reality. This is done by multiplying the value of the risk for its duration before recovery, and adding the cost of recovery. In the first line example this comes to £1,350,000.

Looking down the example form for risk rankings of '4' and '2', it is immediately clear that the impacts vary quite a lot and also that the risk exposures are common across some of the risk 'themes'. Take the value of £1,350,000 and track the three entries that are based on that value back across the form. It is immediately apparent that all the risks are attributable to a lack of personnel policies and controls and are essentially the same business interruption from a different risk perspective. As a result only one fix is needed.

With the headline exposures estimated and the risk themes brought together and identified, we can move to the final stage of the workbook.



IV. Identifying mitigation and contingency actions *(worksheet 8)*

This final stage is to take the valued risks and estimate the cost of the actions that would reduce the exposure of the company to them.

The worksheet marked No. 8 - Identifying Actions is the means to complete this step.

Take from worksheet 7 (Evaluating Implications) the areas of identified risk and enter them ranked in descending order of their potential cost.

Look for the connected risk themes because the actions that address consistent themes across a number of risk dimensions will be common. From the example, it is clear that lines five to seven are covered by a single programme: recruiting personnel management and establishing standard operating procedures for HR.

For each action area, create a high level estimate of the cost to implement the change programme expressed in one-off, capital and running costs, as appropriate. This estimate can be derived quite simply as an annual cost based on people and resources required. Where an outside audit or ISO accreditation

and training is needed there are many providers of such services who would be able to give an indication of cost after a short meeting. (Note: The costs indicated in the worked example cannot be taken as an accurate guide in all situations.)

Once the management has a view of the top priorities and the likely cost and the risk mitigation value, it is time to take decisions as to which actions to take and which to defer. It is impossible to provide guidance on these choices in this workbook because there will be many factors that are specific to the business - not least profitability and cash. It is likely to be the case that some of these programmes will generate operational savings in their own right as well as narrowing risk; so look for these as they will help the business case for change and deliver double value.



In Conclusion

This workbook has been prepared as a starting point for SMEs (and perhaps larger companies) to identify risk and vulnerability in their supply chains.

It has been designed to provide a quick initial assessment and support the identification and prioritisation of risks.

It has not attempted to elicit the probability of a risk happening. The nature of risks is that they are infrequent and to some extent unexpected. Experience has shown that the challenge of quantifying the chance that a risk will happen is a difficult one. The workbook has avoided this challenge by devising a process that will identify risk themes and place a value on their occurrence and a value on their mitigation/contingency.

Through this the management of the company will then be informed on the range of risks that may exist, their likely cost should they occur, a measure (albeit subjective) of their relative significance, and some idea of the cost to fix.

This will allow the management team to take a view on the priorities for risk management based on the severity of the potential exposure, and so to prioritise the investments to make the necessary changes.

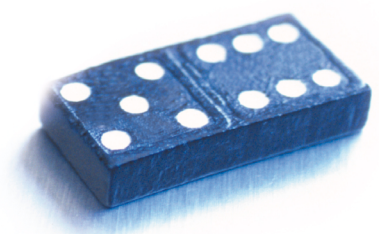
The process of prioritisation is a

major boardroom responsibility since some costs to mitigate risks will be charged against current revenue (and hence deplete profits in the short term). Some of these costs will be one-off while others will be recurring; yet others will be capital investments that will create recurring charges through depreciation on the P&L account. The management team may need to find the money to fund these changes from savings elsewhere inside the business. Alternatively, they may make a conscious and formal decision not to take the measures indicated.

While there is no absolute guarantee that the process in this workbook will elicit all the possible risks, commitment to a thorough execution of the process is likely to identify the main areas of supply chain vulnerability.

There are two maxims that summarise the approach in this workbook:

- 'Identify the big risks quickly' - avoid working to achieve illusory precision
- 'Forewarned is forearmed' - even if you decide not to invest in change



Supply Chain Elements										Financial and Service Summary		
REF	Summary description of chain	Main Materials Sources	Inbound materials routing	Plant(s) of supply	Primary Distribution	Distribution centres	Secondary Distribution	Revenue £millions	Net margin%	Inventory weeks and £'000s	Customer service turnaround and completeness	
Company total revenue												
1	Processed sauces to retail	Seasonal tomato imports Greece	TEU under own arrangements, other materials supplier delivered	Dunstable	Ambient truck full loads to NDC	Shared use outsourced NDC - Hams Hall	Shared use ambient truck	£ 85	9%	£ 2,300	5 days - 99%	
2	Ready meals to retail	As 1 plus local meat & cheese purchases	Materials supplier delivered to plant	Banbury	None - chill NDC onsite	Chill NDC at Banbury	Daily dedicated chill trucks to retail RDCs	£ 21	6%	£1250 / 7 weeks	1 day - 98%	
3	Ready meals to food service	As 1 plus local meat & cheese purchases	Materials supplier delivered to plant	Banbury	None - chill NDC onsite	Chill NDC at Banbury	Daily dedicated chill trucks to Food Service sites	£ 46	12%	£650 / 1.5 weeks	2 days - 95%	
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Enter a short description of the chain that can follow through each of the stages and that is easily understood by everyone in the business

Record the primary means of inbound transport, eg Sea, rail, road, air

Record the primary distribution method, if any and the destination(s)

Record the method of distribution to customer, if collected then record that too

Record any particular material or source origins, this is important as the sources of supply are a key characteristics

Record the plant or plants that are used for this chain. If you do not make products ignore this column

Record the locations and type of distribution centre, if there are subdepots, then record those too with the number in use

Record the basic financial and service characteristics for the individual chains and for the business as whole

Worksheet 1. Describing Our Chains

		Supply Chain Elements						Financial and Service Summary			
REF	Summary description of chain	Main Materials Sources	Inbound materials routing	Plant(s) of supply	Primary Distribution	Distribution centres	Secondary Distribution	Revenue £millions	Net margin%	Inventory weeks and £'000s	Customer service turnaround and completeness
Company total revenue											
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Supply Chain Reference and Short Name		3. Ready Meals to Food Service		Company Status		Mitigation Measures							B		Risk Rating
Vulnerability Element		DEMAND		Analysis		Ranking	Inventory cover	Collaboration with customers	Forecasting Processes	Account / management CRM	Transportation back up	Ranking	Overall risk score		
REF	TYPICAL DEMAND SIDE RISKS	Description	Analysis	Ranking	Inventory cover	Collaboration with customers	Forecasting Processes	Account / management CRM	Transportation back up	Ranking	Overall risk score				
1	Dependent on a small number of large customers	Identify if the business is dependent on just a few very big customers who could switch away	5 Customers account for 50% of the business and most purchasing is local under group terms = limited exposure	1	1.5 weeks	none	80% forecast accuracy	none	back up hauliers in place	1	1				
2	Big swings in demand due to promotions with difficult forecasting	Identify if demand is subject to big swings as a result of promotional activities creating forecast difficulties	Demand is not especially promotional and customers will generally accept substitutes	0	1.5 weeks	none	80% forecast accuracy	none	back up hauliers in place	1	0				
3	Very demanding fulfillment lead times	Establish if the lead times required by customers are particularly exacting and therefore likely to lead to failures	Fulfillment for this chain is typically 2 to 3 days which is not considered particularly onerous based on 1.5 weeks of stock	0	1.5 weeks	none	80% forecast accuracy	none	back up hauliers in place	0	0				
4	Very demanding fulfillment fill rates	Establish if the order fill rates required by customers are especially demanding and could lead to failure	Currently achieving 95% fill rate and customers are happy to accept a level of substitution	0	1.5 weeks	none	80% forecast accuracy	none	back up hauliers in place	0	0				
5	Major and unpredictable seasonal swings in demand	Establish if the demand is subject to high seasonal swings that are difficult to predict and would cause difficulties in meeting demand	Demand falls off in the summer but this is predictable as much of the demand is institutional and therefore very predictable	0	1.5 weeks	none	80% forecast accuracy	none	back up hauliers in place	0	0				
6	Customers in poor financial condition	Establish if any major customers or a large part of the customer base is likely to have financial difficulties	One of the top 5 has some balance sheet problems and credit is being monitored carefully - otherwise the picture is stable	1	1.5 weeks	none	80% forecast accuracy	none	back up hauliers in place	1	1				
7	Frequent and rapid new product introductions	Identify if new products are a critical and frequent part of the marketing cycle and can influence demand	There are two product introduction cycles per year to keep the range fresh - these are not normally technically difficult	1	1.5 weeks	none	80% forecast accuracy	none	back up hauliers in place	1	1				
8	Market experience of low customer loyalty and retention	Establish if there is a track record of customer disloyalty and rapid switching which could leave the company vulnerable	This is a highly loyal market with a low propensity to switch	0	1.5 weeks	none	80% forecast accuracy	none	back up hauliers in place	0	0				
		Place your written commentary here and enter the rating in the column alongside										Calculate the score by multiplying A times B and carry major areas of risk over to the stage III analysis			
		Test the firm against these simple criteria										For areas where risk has been identified record any mitigation actions that have been put in place; the headings are suggested and there is space for more; make a judgement on the extent to which the mitigation or contingency measures are likely to work. Here there are no CRM systems and this would be a key risk reduction measure. These are picked out in red for the risks it could reduce			
		Add other risks if you identify them													

Worksheet 2. Demand Risk

Supply Chain Reference and Short Name		DEMAND				Company Status		Mitigation Measures				B		Risk Rating	
Vulnerability Element		Description		Analysis		A						Ranking 0=significant, 1=so me, 2= none		Overall risk score = A*B	
REF	TYPICAL DEMAND SIDE RISKS					Ranking 0=none, 1=some, 2 = significant									
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Worksheet 3. Supply Risk

Understanding Supply Chain Risk

Supply Chain Reference and Short Name		Company Status										Risk Rating	
Vulnerability Element		SUPPLY										Overall risk score = A x B	
		3. Ready Meals to Food Service											
		SUPPLY											
REF	TYPICAL SUPPLY SIDE RISKS	Description	Analysis	Ranking 0=none,1=som, 2=significant	Materials Inventory	Supplier performance measurement	Supplier contingency planning	Lead time reduction / process integration	Transportation back up	Quality programme	B	Ranking 0=significant,1=som, 2=none	
1	Dependent on a small number of key suppliers with few alternatives	Identify if the chain is dependent on either or both dominant or specialist suppliers where failure to supply could disrupt output	3 suppliers provide 30% of revenue covering the categories of meat, packaging and tomatoes - key dependency here	2	3 to 4 days with 2 weeks packaging	none	Limited plans - none for packaging	none	back up hauliers in place	In place	1	2	
2	Part of supply base is financially unsound	Identify if any suppliers, particularly any that are critical, are in potential financial difficulties and could interrupt output	One or two of the smaller suppliers are known to financially at risk but the big ones are OK; transport provider suspect	1	3 to 4 days with 2 weeks packaging	none	Limited plans - none for packaging	none	back up hauliers in place	In place	1	1	
3	Long supplier lead times	Identify if any suppliers offer extended lead times that impact on inventory or customer service	Packaging and tomatoes are both on long lead times. Of these packaging is critical with NPI taking 8 weeks and significant write offs taking place	2	3 to 4 days with 2 weeks packaging	none	Limited plans - none for packaging	none	back up hauliers in place	In place	1	2	
4	Experience of quality issues with suppliers	Establish if there is a record of poor quality from any suppliers and if there are risks that could arise	Full quality programme in place for tomatoes but meat is occasionally off specification - suppliers usually respond well but some interruptions have occurred	1	3 to 4 days with 2 weeks packaging	none	Limited plans - none for packaging	none	back up hauliers in place	In place	0	0	
5	Poor adherence to schedule and supply order completion	Identify if there are suppliers who have poor schedule compliance and if they are among the suppliers on whom there is a dependency	Deliveries are made to a schedule that allows 3 days slack for food materials, stocks of packaging held to mitigate	0	3 to 4 days with 2 weeks packaging	none	Limited plans - none for packaging	none	back up hauliers in place	In place	0	0	
6	Shortage of capacity in supply markets	Identify the state of the supply market. Is the firm taking a large slice of the supply? And are there any tight spots in the supply market that might disrupt output	The market is in general over supply but meat can tighten quickly. Tomatoes are contracted annually and are dependent on crop yields	0	3 to 4 days with 2 weeks packaging	none	Limited plans - none for packaging	none	back up hauliers in place	In place	0	0	
7	An absence of performance measures	Are there measures of performance in place with suppliers that provide a platform for an improvement programme	There is no formal supplier performance measurement system and no process for labelling strategic issues with suppliers	1	3 to 4 days with 2 weeks packaging	none	Limited plans - none for packaging	none	back up hauliers in place	In place	1	1	
8	Low supplier sophistication on planning and forecasting	Make an assessment of supplier capabilities to plan and fulfil demand. Are they using good methods or working hand to mouth	The packaging suppliers are quite sophisticated but offer long lead times, the rest are primitive	1	3 to 4 days with 2 weeks packaging	none	Limited plans - none for packaging	none	back up hauliers in place	In place	1	1	
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Calculate the score by multiplying A times B and carry areas of risk over to the stage III analysis

For areas where risk has been identified record any mitigation actions that have been put in place; the headings are suggested and there is space for more; make a judgement on the extent to which the mitigation or contingency measures are likely to work and highlight the areas where the business is at risk. Here there are no supplier measurement and monitoring processes, no supplier contingency plans and no lead time reduction plans.

Place your written commentary here and enter the rating in the column alongside

Test the firm against these simple criteria

Add other risks if you identify them

Worksheet 3. Supply Risk

Supply Chain Reference and Short Name		SUPPLY					Company Status		A		Mitigation Measures				B		Risk Rating
Vulnerability Element		Description		Analysis		Ranking 0=none,1=some,2= significant						Ranking 0=significant,1=some,2= none		Overall risk score = A*B			
REF	TYPICAL SUPPLY SIDE RISKS																
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Supply Chain Reference and Short Name		Company Status		Mitigation Measures						Risk Rating	
Vulnerability Element		Analysis		A		B		Overall risk score = A*B			
3. Ready Meals to Food Service		PROCESS		Ranking 0=none, 1=some, 2 = significant		Ranking 0=significant, 1=so me, 2= none					
REF	TYPICAL PROCESS RISKS	Description	Analysis	Full ISO 9000 procedures in place	Adequate QC controls and anti tampering measures	Systems audit and back up contingency	CRM process and effectiveness	Adequate training programmes for temporary staff			
1	Manufacturing yields falling below expectations	Is there any experience of the manufacturing plant having sudden and sustained loss of yield	Manufacturing typically produces to plan +/- 10% and there are few interruptions of more than a matter of hours	none	yes but will not catch all events	Only data back up	none	very limited	2	0	
2	Manufacturing quality standards falling below acceptable market levels	Is there any experience of manufacturing quality being sustained at less than satisfactory levels	There have been some occurrences where product has failed microbiological testing and plant cleaning has failed to clear this for 2 or three days	none	yes but will not catch all events	Only data back up	none	very limited	1	1	
3	Are there adequate processes to deal with the requirements of quality and accuracy	Is there any evidence that the firm has been exposed to sabotage or failures through contamination (e.g. nuts) or incorrect ingredients	There have been a couple of occasions where incorrect recipes have been produced and some isolated complaints that look like staff sabotage	none	yes but will not catch all events	Only data back up	none	very limited	2	4	
4	Are the systems robust and accurate and adequately backed up	Is there any evidence that the firm's systems have ever malfunctioned and are there adequate back up arrangements to prevent business interruption	The systems have been used for 3 years. Recent hardware upgrade caused difficulties; data is held off site but no full disaster recovery plan	none	yes but will not catch all events	Only data back up	none	very limited	1	1	
5	Are the firm's customer development and management processes under control	Is there any evidence that the company does not respond in a timely and adequate way to customers' needs and is not well organised to generate demand	There is no formal CRM programme and some isolated complaints of poor service and support	none	yes but will not catch all events	Only data back up	none	very limited	1	1	
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Calculate the score by multiplying A times B and carry areas of risk over to the stage III analysis

For areas where risk has been identified record any mitigation actions that have been put in place; the headings are suggested and there is space for more; make a judgement on the extent to which the mitigation or contingency measures are likely to work. Here there are some major risks around the lack of standard operating procedures, training and risks with the labour force of sabotage and these are highlighted in red.

Place your written commentary here and enter the rating in the column alongside

Test the firm against these simple criteria

Add other risks if you identify them

Worksheet 4. Process Risk

Supply Chain Reference and Short Name		PROCESS					Risk Rating	
Vulnerability Element		Company Status		Mitigation Measures				
REF	TYPICAL PROCESS RISKS	Description	Analysis	A Ranking 0=none,1=some,2 = significant	B Ranking 0=significant,1=so me, 2= none			Risk Rating
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Supply Chain Reference and Short Name		3. Ready Meals to Food Service										Risk Rating	
Vulnerability Element		CONTROL										Overall risk score = A*B	
REF	TYPICAL CONTROL RISKS	Company Status					Mitigation Measures					B Ranking 0=significant, 1=so me, 2= none	Risk Rating
		Ranking 0=none, 1=some, 2= significant	Analysis	Description	CRM system and close account management	Company wide S&OP process	Environmental audit and responsibility	Auditable personnel procedures	Auditable WTD procedures				
1	Are the financial and inventory controls for the firm robust and reliable	0	Business has strong financial controls, which discover few surprises - stock adjustments are low but some bad debt risk due to lack of CRM	Is there any evidence that the financial controls of the business uncover surprises in relation to inventory, cash, profitability and investments	none	none	none	limited	none and no supplier checks	2	0		
2	Are the demand management, forecasting and buying processes reliable and not subject to systemic failure	1	Short lead times and a narrow range means that the swings that are encountered are handled. However lack of a formal CRM process is a barrier to improved performance	Is there any experience of unforecast demand or wild swings in output plans leading to difficulties with either customers or suppliers	none	none	limited	none and no supplier checks	1	1			
3	Is regulatory compliance adequate for fiscal and financial affairs	0	Yes	Does the firm complete its fiscal and corporate regulatory affairs effectively	none	none	limited	none and no supplier checks	2	0			
4	Is regulatory compliance adequate for all environmental obligations	1	No audit and no formal responsibility - risks not thought to be high	Has the firm carried out an environmental audit in the last two years and is there a specific responsibility for ensuring it complies	none	none	limited	none and no supplier checks	2	2			
5	Is regulatory compliance adequate for all employment obligations	2	No formal personnel team on site at Banbury and high use of casual workers with immigrant workers implies risk here	Does the firm comply with all employment obligations in relation to status of employees, formal procedures for warnings and dismissals and security checks as needed	none	none	limited	none and no supplier checks	2	4			
6	Is regulatory compliance adequate for all operational, safety and WTD obligations	1	There is a safety officer in the plant but no auditable working hours records and some evidence that excessive hours are worked; transport is outsourced and not checked	Does the firm achieve auditable compliance with safety and working hours rules including tachograph and transportation compliance	none	none	limited	none and no supplier checks	2	2			
7													
8	Add other risks if you identify them		Place your written commentary here and enter the rating in the column alongside	Test the firm against these simple criteria								Calculate the score by multiplying A times B and carry areas of risk over to the stage III analysis	
9													

Worksheet 5. Control Risk

Supply Chain Reference and Short Name		CONTROL				Company Status		A		Mitigation Measures		B		Risk Rating	
Vulnerability Element		Description		Analysis		Ranking 0=none, 1=some, 2=significant		Ranking 0=significant, 1=so me, 2= none		Overall risk score = A B					
REF	TYPICAL CONTROL RISKS														
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Worksheet 6. Environmental Risk

Understanding Supply Chain Risk

Supply Chain Reference and Short Name		3. Ready Meals to Food Service		ENVIRONMENT		Company Status		Mitigation Measures						Risk Rating				
Vulnerability Element		Description		Analysis		Ranking		Ranking						Overall risk score = A*B				
TYPICAL ENVIRONMENT RISKS						Ranking		Full site risk assessment and contingency plan		Employment guidelines for temp and agreement with authorities		Supply side planning for market stocks		Regular route evaluation and transportation contingency		Ranking		
REF						0=none, 1=some, 2=significant	0=none, 1=some, 2=significant											
1	Possibility of water contamination on the site	Is the business susceptible to water contamination due to mains supply	There is no back up supply for the water to the site with substantial usage - major chemical industry presence in the area that could cause problems	1	none	none	limited	none	none	none	none	none	2	2				
2	Possibility of power supply inter-ruptions for chill store	Is the business adequately provided with reserve electricity	There is emergency power generation that can keep the chill stores operating but not adequate for the plant - no record of outages of more than 8 hours	1	none	none	limited	none	none	none	none	none	0	0				
3	Risks of storm or flood damage	Is the business susceptible to flood or storm damage that could create business interruption	No history flood or storm damage in the area	0	none	none	limited	none	none	none	none	none	0	0				
4	Risks of foot and mouth or similar interruptions to meat supply	Is the business exposed to supply side failures of a structural nature and has it though these through	The business was severely disrupted in the last foot and mouth epidemic and had to make arrangements to import at high cost	1	none	none	limited	none	none	none	none	none	1	1				
5	Risk of crop failures in Tomatoes in Greece	Is the business exposed to supply side failures of a structural nature and has it though these through	The tomatoes are quite specific to the recipes so this is key. There are good crop protection measures in place and adequate warnings if yields are low	1	none	none	limited	none	none	none	none	none	1	1				
6	Risk of work interruptions due to own staff	Is the business exposed to the potential for labour disruptions and has the company adequate contingency plans	No union organisation but there is an increasing incidence of casual workers with asylum and illegals - risk of regulatory intervention and no adequate contingency	2	none	none	limited	none	none	none	none	none	2	4				
7	Risk of getting caught up in the industrial actions of others	Is there any experience of the company being caught by secondary actions especially in transport and distribution	There has been some disruption as a result of material imports from Europe and some retail depot blockades have disrupted schedules	1	none	none	limited	none	none	none	none	none	1	1				
8	Risks of fire damage to plant	Has the business adequate fire protection and back up contingency	The chill stores are old and there are no sprinklers - the plant has passed all fire and insurance inspection tests	2	none	none	limited	none	none	none	none	none	1	2				
9	Risks to transport routes and delivery due to congestion and unviable driving hours	Is the business exposed to structural risks in its current logistics schedules as a result of congestion and drivers hours regulations	Some evidence that a few routes are becoming nearly illegal - this will require review in the near future. Risk to O Licence	1	none	none	limited	none	none	none	none	none	1	1				

Place your written commentary here and enter the rating in the column alongside

Test the firm against these simple criteria

Add other risks if you identify them

For areas where risk has been identified record any mitigation actions that have been put in place; the headings are suggested and there is space for more; make a judgement on the extent to which the mitigation or contingency measures are likely to work. Here there are some major risks that need a fuller compliance programme and risk assessment

Calculate the score by multiplying A times B and carry areas of risk over to the stage III analysis

Worksheet 6. Environmental Risk

Supply Chain Reference and Short Name		ENVIRONMENT				Risk Rating	
Vulnerability Element		Company Status		Mitigation Measures		Overall risk score = A*B	
REF	TYPICAL ENVIRONMENT RISKS	Description	Analysis	Ranking 0=none, 1=some, 2=significant	Ranking 0=significant, 1=so me, 2=none		
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Supply Chain Reference and Short Name		3. Ready Meals to Food Service		Estimate the Scale of the Risk			Estimate the Duration of the Risk		Estimate the Recovery Actions		Estimate the Total Risk costs
SCORE	Risk Area	Connected risk themes	Comment	Financial Scale	Comment	Time	Comment	Recovery costs		= 'financial scale' x 'duration to recover' + 'cost of recovery actions'	
4	Environment	No employment guidelines	Could get closure or close investigation by DSS with inevitable disruptions and fines	Worst case some sales loss = up to £2m with cash loss £1m	Days to a couple of weeks to sort it out	5 to 10 days	Premium temporary labour from Manpower or similar plus legal costs to fight any orders, plus wages for site staff	£350,000	£1,350,000		
4	Process	No ISO 9000 or adequate training	A case of contamination would lead to stock recovery and up to 6 weeks disruption with loss of market	Sales loss = up to £6m with cash loss of £3m	Full product recall, revalidate and assure processes to authorities	Up to 6 weeks worst case plus loss of market	The ultimate disaster with external support estimate at	£750,000	£3,750,000		
4	Control	Limited personnel procedures and no WTD policy	Could get closure or close investigation by DSS with inevitable disruptions and fines	Worst case some sales loss = up to £2m with cash loss £1m	Days to a couple of weeks to sort it out	5 to 10 days	Premium temporary labour from Manpower or similar plus legal costs to fight any orders, plus wages for site staff	£350,000	£1,350,000		
2	Supply	Limited supplier contingency planning and no lead time / process work	Supply side interruptions with possible loss of output or premium purchases	Worst case some sales loss = up to £2m with cash loss £1.25m	Days to a couple of weeks to sort it out	5 to 10 days	Premium purchases and expediting of materials estimated at	£1,000,000	£2,250,000		
2	Supply	No lead time and process alignment work	Supply side interruptions with possible loss of output or premium purchases	Worst case some sales loss = up to £2m with cash loss £1.25m	Days to a couple of weeks to sort it out	5 to 10 days	Premium purchases and expediting of materials estimated at	£1,000,000	£2,000,000		
2	Environment	No full site risk assessment and contingency planning	Disruptions to manufacturing with the need to import and store water by tanker	No loss of sales but cost to recover	Just a few days	1 to 3 days	Water tank facilities for the duration	£100,000	£100,000		
2	Environment	No full site risk audit and contingency planning	Disruptions to manufacturing with scale determined by damages to site	Worst case sales loss = up to £4m with cash loss of £2.5m but largely covered by insurance	Could have to outsource or create temporary arrangements	5 to 25 days	Rebuild and business interruption covered by insurance	£0	£1,500,000		
2	Control	No site risk audit or specific responsibility	Possible cessation or closure of site but usually with warnings to connect first	No loss of sales but cost to recover	Measured in weeks	20 to 30 days	Recovery costs measured in legal and other fees and penalties	£200,000	£200,000		
2	Control	Limited personnel procedures and not WTD policy	DSS with inevitable disruptions and fines	Worst case some sales loss = up to £2m with cash loss £1m	Days to a couple of weeks to sort it out	5 to 10 days	Premium temporary labour from Manpower or similar plus legal costs to fight any orders, plus wages for site staff	£350,000	£1,350,000		
1	Demand	No CRM or collaboration with customers and SKOP - only average forecast accuracy	Loss of one or two big customers would impact revenue by 20%	Loss of revenue for sustained period giving max risk of up to £8m							
1	Demand	No CRM or adequate monitoring	Loss of one or two big customers would impact revenue by 10%	Loss of revenue for sustained period giving max risk of up to £4m							
1	Demand	No CRM or collaboration with customers and SKOP - only average forecast accuracy	Loss of capacity during product introductions and loss of sales too	Worst case some sales loss = up to £1m with cash loss £0.5m							
1	Supply	Limited supplier contingency planning	Supply side interruptions with possible loss of output or premium purchases	Worst case some sales loss = up to £2m with cash loss £1.25m							
1	Supply	No supplier performance measurement	Supply side interruptions with possible loss of output or premium purchases	Worst case some sales loss = up to £2m with cash loss £1.25m							
1	Supply	No supplier performance measurement or lead time and process integration	Supply side interruptions with possible loss of output or premium purchases	Worst case some sales loss = up to £2m with cash loss £1.25m							
1	Environment	Limited supply side contingency planning for market shocks	Supply side interruptions with possible loss of output or premium purchases	Worst case some sales loss = up to £2m with cash loss £1.25m							
1	Environment	Limited supply side contingency planning for market shocks	Supply side interruptions with possible loss of output or premium purchases	Worst case some sales loss = up to £2m with cash loss £1.25m							
1	Environment	Limited supply side contingency planning for market shocks	Supply side interruptions with possible loss of output or premium purchases	Worst case some sales loss = up to £2m with cash loss £1.25m							
1	Environment	No regular route evaluation and transportation contingency	Disruption to both inbound and outbound with possible loss of sales	Limited sales loss at any one event of £0.5m with cash loss of £0.3							
1	Process	NO ISO 9000 and only limited QC with limited training	Disruptions to manufacturing with scale determined by failure levels	Worst case sales loss = up to £1m with cash loss of £0.5m							
1	Process	No systems contingency only data back up	Supply side interruptions with possible loss of output or premium purchases	Worst case some sales loss = up to £2m with cash loss £1.25m							
1	Process	No CRM or collaboration with customers and SKOP - only average forecast accuracy	Sales loss due to customer neglect	Limited sales loss at any one event of £0.5m with cash loss of £0.3							
1	Control	No CRM or collaboration with customers and SKOP - only average forecast accuracy	Sales loss due to not being aligned to customer needs	Limited sales loss at any one event of £0.5m with cash loss of £0.3							

Calculate the headline exposure

Estimate the basic recovery actions and the headline estimate of cost to recover

Estimate the duration of the risk before it can be fixed and provide a comment

Make a quick estimate of the sales loss potential and the net cash cost to the business from lost contribution

Extract the underlying issue themes from the assessment sheets - note that they converge

Extract the risk areas from each of the 5 assessment sheets and rank by score and show the risk area it came from

Worksheet 7. Evaluating Implications

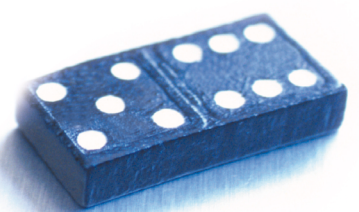
Supply Chain Reference and Short Name	CORE		Estimate the Scale of the Risk		Estimate the Duration of the Risk		Estimate the Recovery Actions		Estimate the Total Risk costs
Identified risks by rating after mitigation	Risk Area	Connected risk themes	Comment	Financial Scale	Comment	Time	Comment	Recovery costs	= financial scales x 'duration of recover' + 'cost of recovery actions'

Supply Chain Reference and Short Name		3. Ready Meals to Food Service			Estimate the Total Risk costs	Actions and Costs to reduce this risk	
Identified risks by rating after mitigation	SCORE	Risk Area	Connected risk themes		Brief description of actions	Estimated cost of actions	
Are there adequate processes to deal with the requirements of quality and accuracy	4	Process	No ISO 9000 or adequate training	£3,750,000	Implement full ISO 9000 programme with manufacturing standards and staff training programme	£350,000	
Dependent on a small number of key suppliers with few alternatives	2	Supply	Limited supplier contingency planning and no lead time / process work	£2,250,000	Hire additional procurement management and establish a full supplier assurance and development programme	£150,000 pa	
Long supplier lead times	2	Supply	No lead time and process alignment work	£2,000,000			
Risks of fire damage to plant	2	Environment	No full site risk audit and contingency planning	£1,500,000	Buy in risk audit for site and implement key findings in capital investment	£70,000 plus £1,000,000 capital	
Risk of work interruptions due to own staff	4	Environment	No employment guidelines	£1,350,000			
Is regulatory compliance adequate for all employment obligations	4	Control	Limited personnel procedures and no WTD policy	£1,350,000	Recruit personnel function and establish standard operating procedures	£60,000 pa plus £100,000 one off change costs	
Is regulatory compliance adequate for all operational, safety and WTD obligations	2	Control	Limited personnel procedures and not WTD policy	£1,350,000			
Is regulatory compliance adequate for all environmental obligations	2	Control	No site risk audit or specific responsibility	£200,000	See line 4 above	See 4 above	
Possibility of water contamination on the site	2	Environment	No full site risk assessment and contingency planning	£100,000	See line 4 above	See 4 above	
<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> <p>Take the risks from Worksheet 7 Evaluating Implications and sort in descending order of risk costs and carry over the risk themes</p> </div>							
<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> <p>Prepare a headline commentary on the actions that would mitigate the risk more completely and estimate the cost to put these actions in place</p> </div>							

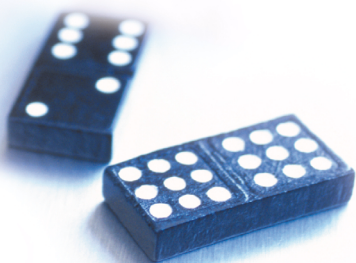
Worksheet 8. Identifying Actions

Supply Chain Reference and Short Name		Estimate the Total Risk costs			Actions and Costs to reduce this risk	
Identified risks by rating after mitigation	SCORE	Risk Area	Connected risk themes	Brief description of actions	Estimated cost of actions	Estimated cost of actions
1						
2						
3						
4						
5						
6						
7						
8						
9						









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