Abstract. Statistics show that a crisis will hit large companies every 4-5 years and 73% of companies that suffer a disruption of 10 or more days will shut down or experience considerable, long term effects. Unprepared companies can be significantly impacted by these events. Disruptions in the flow of raw materials is one of the major supply chain risks facing companies. Raw material inventory is an expensive buffer against these risks and provides a false sense of security. Fortunately there is a SMART way to mitigate against raw material risks that is scaleable, flexible, and has proven to be successful in transforming an abstract problem statement into a measurable and actionable strategy.

Growing Risks. In the global economy, the impact of disasters—natural, geopolitical, economic, or financial—magnifies the impact of operational risks. At the same time, supply chain disruptions are being exacerbated by recent strategies aimed at reducing costs. The outsourcing and offshoring of manufacturing operations have greatly increased reliance on outside vendors, and extended supply chains have created more opportunities for outside events to disrupt the flow of materials. Although lean operations and just-in-time manufacturing have been successful at reducing inventory levels and costs, these practices have also taken away the traditional buffer against supply chain risks. And more companies are reducing their rosters of suppliers—sometimes even shedding second-source suppliers for critical materials.

A Smarter Model. Aware of the risks of disruption, some companies have started to increase inventories of raw materials and finished goods. While that response can mitigate the impact of supply-side disruptions, it does nothing to reduce supply-side risks. In fact, increased inventory exacerbates another kind of risk—the financial risk of obsolescence. Therefore, companies across many industries are looking for a more effective way of managing raw-material risks. The problem with most of the approaches being used to identify and manage supply chain risks is that they are either too simplistic or unrealistic. The simplistic approaches identify risks by assigning them subjective values—classifying them as “high,” “medium,” or “low,” for instance. The result of such work is not very discriminating, and it is certainly not conducive to making important investment decisions about risk mitigation. On the other end of the spectrum are approaches that sound good on paper but are unrealistic to achieve. Some of these approaches suggest that a company map all of its suppliers, understand all the processes that suppliers use, and even track the materials back through the supplier’s supplier to the ultimate source. What’s needed is an approach that allows for sound financial decisions but is pragmatic in nature.
Based on our experience helping clients reduce operational risks, PRTM has developed an approach that works well. It measures and prioritizes the risks of sourcing raw materials, components, and subassemblies—one of the major supply chain risks that companies face. We have dubbed this approach “SMART”—the acronym that describes its five sequential stages:

- **Specific**: Be specific about what contributes to raw-material risks in the company and identify the unique risk and impact attributes.
- **Measurable**: Quantify the risks and their potential impact on the business.
- **Actionable**: Move from studying risks to mitigating them. Pinpoint the risks that will have the most severe impact on the business and define initiatives to mitigate them.
- **Realistic**: Understand what resources are required to mitigate risk and prioritize the initiatives to address resource constraints.
- **Time-Phased**: Develop actionable implementation plans with clear roles and responsibilities.

**Specific: Define Risks.** The first step in any risk management process is to classify the company’s risks along two dimensions: the risk (or probability of an adverse event) on one dimension and its impact on the other. The impact tells us what will happen if this event takes place. We can therefore prioritize risks based on their probability as well as their impact.

To do this, we need to identify the “object” and the “attributes” of the risk we like to measure. The choice of objects makes this approach flexible and applicable to different types of risk. In the case of raw-material risk management, the objects will be the individual materials, identified by their part numbers. If we are measuring information systems risk, the objects could be the business applications that the organization is using. An attribute is defined as a measurable element that contributes to the magnitude of the risk and impact. The attributes therefore will allow us to rank objects in the risk-impact matrix. Figure 1 shows some examples of common risk attributes for raw materials and suppliers.

**Figure 1: example of risk attributes**

<table>
<thead>
<tr>
<th>Example of supplier risk attributes</th>
<th>Example of material risk attributes</th>
<th>Example of impact attributes</th>
</tr>
</thead>
<tbody>
<tr>
<td>* Quality rating</td>
<td>* Number of sources</td>
<td>* Where used</td>
</tr>
<tr>
<td>* Financial health</td>
<td>* Demand increase</td>
<td>* Lead time</td>
</tr>
<tr>
<td>* Physical location</td>
<td>* Shelf life</td>
<td>* Inventory</td>
</tr>
</tbody>
</table>

**Measurable: Quantify Risk and Impact.** The objective of this stage is to quantify the relative risk and impact attributes for each of the objects. We are not interested in absolute measures; we want to know which objects are riskier than others and which will have the largest impact on our business. This phase can be completed in four steps: define data sources, collect data, normalize data, and calculate risk and impact. Once the attributes are quantified, we can now translate the combined value of the attributes into a risk and impact score. The last step is to graphically plot each material on a grid to determine which materials should be prioritized for risk mitigation (see figure 2). Our experience is that between 10 and 20 percent of materials fall into the high risk-high impact quadrant.
**Actionable: Define Risk Mitigation Initiatives.** Having identified the high-priority materials, we can now outline specific risk-mitigation activities for them. If there are only a few materials in this category, an initiative can be defined for each. But if there are many—more than 100, say—it’s wise to combine them in groups based on the same risk profile. The risk profile identifies why a material or group of materials is considered risky. The risk profile will determine what mitigation activities should be considered. For example, if a material is currently sole-sourced, the following mitigation activities can be considered:

- Qualifying a second source
- “Insourcing” some of the material demand
- Identify alternative materials

Now that the mitigation options have been outlined for each material or group of materials, a team of cross-functional executives must come together to decide on the appropriate actions to take. Information not captured in the analytical modeling will determine the final recommendation. For example, for materials that are single-sourced, a recommended approach may be to qualify a second supplier. However, if the material in question is going to be phased out soon, the expense of finding and qualifying a second source may not be warranted.

**Realistic: Understand Resource Constraints.** This is where senior management makes trade-offs among the different risk management initiatives. Any change initiative requires a realistic execution plan along with assurances that the required resources are available and confirmed. In the case of risk mitigation, these resource requirements include man-hours, capital, and expense.
The senior management team, consisting of the leaders of all functions affected by the mitigation initiatives, should review the resource requirements, identify bottlenecks, and prioritize the initiatives accordingly.

**Time-Phased: Lay Out the Timeline.** Once the functions’ leaders have signed off on the agreed-upon initiatives and made the requisite resources available, it’s time to develop detailed plans for the initiatives selected for implementation. Those plans are more than a formal exercise in project planning. They serve as a “contract” between the functional departments and the organization. Because of the cross-functional nature of most of these initiatives, an independent party (internal or external consultant) is usually tasked with managing the project to completion.

**REFERENCES**


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