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## **Supplier Financial and Operational Risk Management**

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CAPS Research

2010

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*2010*

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Rapid Ratings

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# Executive Summary

This research report examines risk management programs that recently have been implemented in leading companies. It focuses on what we judge to be supplier risk management best practices. By mutual consent, the companies that served as case studies in the research are not identified.

All of the companies that participated in the research had engaged third-party service providers (3PRs) to help them with their risk management programs. Because the 3PRs play such an important part in risk management programs, the research team interviewed several of the principals of these firms to understand how they viewed their roles and their value propositions. We carefully compared what we heard in these interviews with what their client companies told us in an effort to achieve a balanced view of the role and value of the 3PRs. By mutual consent the 3PRs we interviewed are identified in the report, but are not connected with the client firms that were interviewed.

Based on the study's research, some key findings and recommendations include:

## Key Recommendations

- Initiate a program to manage supplier financial and operational risk, which will be referred to in the study as “the program.”
- Obtain top management support for the program.
- Obtain funding for the program.
- Obtain support from the finance department for the program.
- Appoint a team leader from supply management and a cross-functional risk management team.
- Create a process for risk management.
- Train supply management associates in the principles of using financial ratios to judge financial risk.

- Decide if a third-party service provider will be engaged.
- If a 3PR is engaged, train power users about the service and integrate the service into the program
- Engage everyone in the company who has contact with critical suppliers to be the eyes and ears of the operational risk management program.
- Create a list of mediating strategies before they are needed. Modify and use as necessary.
- Commit to being proactive, not reactive, even in the face of resistance from internal users and suppliers.
- Set a goal of having no interruptions to company operations when suppliers go out of business.
- Continue the program as the economy improves. The number of companies on the watch list should decline in a better economy.
- Celebrate successes.

## Key Findings

1. Supplier risk management is not free — time and resources are needed to power the program.
2. Supplier risk management is a cross-functional activity that must have connections to upper management.
3. A good process is needed to guide risk management activities.
4. Even with the best monitoring and predictive indicators, a firm will not reach a zero level of risk. There will be occasional unanticipated events for which quick responses will be key to minimizing the damage to the sourcing plan.
5. No one metric will adequately measure risk. Each company will have to find the right combination of quantitative and qualitative metrics, indicators and reports.
6. It is not necessary to closely monitor all suppliers.
7. Critical suppliers, whose failure would have a large impact on the operations of the firm, must

be identified and put on a “critical supplier list” for continual monitoring.

8. Critical suppliers that show indications of financial or operational stress should be put on a “supplier watch list” for intense monitoring and possible mitigation actions.
9. There is a relationship between a supplier’s financial risk and its operation risk, but it is not one-for-one.
10. Good risk management will include both financial and operational measures.
11. Predictive measures that give advance notice of financial distress are available, reasonably reliable and should be used.
12. Measures or signals of operations distress are available, but tend to be concurrent with operational stress and thus have a shorter prediction horizon.
13. Third-party providers of supply risk management services can bring value to the risk management process. However, a careful review of capabilities and pricing should be conducted before engagement.
14. Mitigation strategies should be identified ahead of use, along with an estimate of the resources needed to execute them.
15. Mitigation actions prior to a “crisis” will face some user and supplier resistance. That is why it is important to have a credible business case for these actions that will generate top management support.
16. Supplier risk management and business continuity planning are different but complimentary.

# Introduction

This research was motivated by the great recession of 2008-2009. During that time many companies became acutely aware of the escalating risk of key suppliers going out of business with little or no warning. Such events threatened to have a devastating effect on the ability of the companies to operate at planned cost or at any cost.

Many large companies realized that they were at the mercy of one or a few suppliers, often much smaller companies, for key components and services. Some of these situations were industry specific. For example the aerospace and automotive industries have products in service for many years after the initial sale. To keep a supply of spare parts available at a reasonable cost, the spare parts business often was concentrated at first on a single, and then as the product aged, on a sole source. The sole sources were often relatively small businesses with a large part of their revenue coming from one of a few customers. Any financial upset put these businesses at a high risk of bankruptcy.

Also in recent years, most companies have been implementing strategies to “lean-out” their supply chains, resulting in fewer suppliers, outsourced manufacturing, offshoring, low levels of inventory and elimination of duplicate assets. While these efforts were spectacularly successful in lowering costs and increasing asset utilization, they also markedly increased the risk in the supply chain. Often these risks were not formally acknowledged or integrated into the strategic supply chain decision-making process.

The recession of 2008-2009, and the subsequent slow and uneven recovery, dramatically increased these risks and resulted in many worst-case scenarios coming true. Unexpected supplier bankruptcies created the need for a rapid re-evaluation of supplier financial and operation risks, and a determination to mitigate the effects of the

immediate crisis. Most importantly, it prompted companies to take steps to avoid, to the extent possible, future unexpected supply failures. This gave rise to a widespread movement to institute supplier risk management programs.

## What is Supplier Risk?

Supply managers encounter supplier risks daily in carrying out their duties, although the magnitude and frequency of these risks vary greatly. Missed supplier deliveries occur every day, but often have little effect on operations of the buyer. On the other hand, a supplier declaring bankruptcy, although unusual, can have significant impact, triggering reduced revenue, increased expenses, high search costs for a replacement supplier and reduced profits.

Supplier risk management focuses on events that have outcomes detrimental to the sourcing plans that have been put in place with the supply base. These events are generally in one of two categories:

1. Supplier financial distress
2. Supplier operational fall-down, mainly poor quality and poor delivery.

These two types of events are often linked — financial distress can lead to operational problems and operational challenges can lead to financial problems. However they are not always cause and effect. For example, financial problems may arise from an inability to obtain financing at a crucial point in the production season. And natural disasters such as earthquakes and hurricanes can greatly reduced production capacity or totally interrupt supply.

In the abstract, risk is the combination of uncertain events and the negative outcomes associated with those events. Probability and impact can be usefully combined into a 2x2 matrix that allows supply managers to categorize their supplier risks and, as a consequence, better manage them. (See Figure 1 below.)

Using a systematic approach to analyzing risk allows supply managers to improve their risk management by isolating and focusing on the higher risk suppliers. High-risk events, those with a high probability of occurring and with a high negative impact, can originate from supplier financial or operational difficulty.

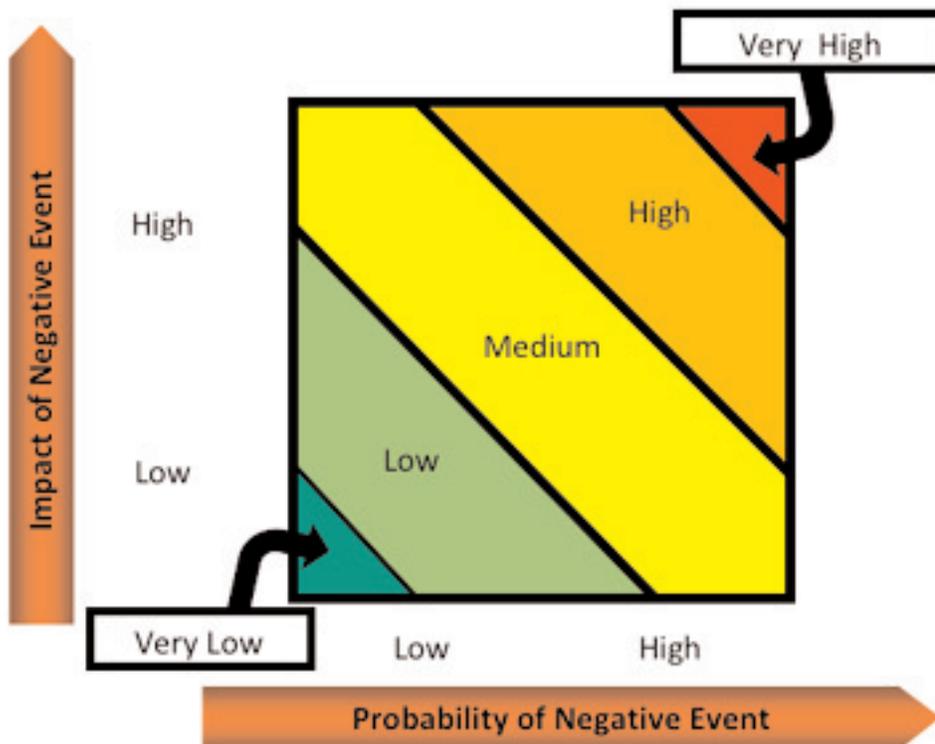
### What is Supplier Risk Management?

Risk management is the process of identifying potential negative events, assessing the likelihood of their occurrence, heading off these events before they occur or reducing the probability they will occur, and making contingency plans to mitigate the consequences if they do occur. This view of risk management is predicated on having acceptable sourcing plans in place that meet the needs of the company. Negative events are those

that disrupt the sourcing plans. While many risks should be monitored and measured in the supply chain, this study focuses on managing the financial and operational risk of suppliers.

Effectively managing supplier risk first requires a systematic process to monitor the supply base for potential problems. It then requires taking pre-emptive actions when potential problems are identified. Over the past several years, new data management and analysis tools have been developed for monitoring the supply base. However, continual monitoring of the entire supply base is neither practical nor necessary. The focus must be on those suppliers who, by the nature of their situation in the supply base (e.g., sole sources and providers of key items), could create major problems in the event they experience financial or operational problems that would curtail their ability to supply the buying firm. Using these tools, a few select suppliers can be continually monitored, and buyers can be provided with “advance notices” of supplier distress that allow them to take action prior to a disruption. This study defines the supplier critical list as those suppliers that the buying firm identifies as having the potential to have a significant impact on the buying firm’s ability to meet its goals. The supplier watch list is defined as

Figure 1  
Levels of Risk



those critical suppliers that have an elevated probability of experiencing significant financial or operational distress. Advanced notice of distress for suppliers on the watch list allows supply managers to have more alternatives for dealing with supplier problems. Actions that a buying company might take upon notice of impending financial or operational supplier distress include:

- Paying early to help with supplier cash flow
- Taking early delivery to move supplier payments forward
- Buying raw material for suppliers
- Visiting the supplier to see if more long-term help, rather than just a quick fix, can be provided
- Asking a larger supplier to lend a hand to a smaller supplier
- Helping with third-party buyouts
- Moving the business to another supplier
- Investing in or buying the supplier

After a supplier goes into bankruptcy, the options available to supply managers are greatly reduced and those that are available are more costly. Supply managers who are surprised by supplier failures are forced to react to and solve these problems in a crisis mode, leading to increased costs and perhaps reduced revenue due to unavailability of parts and materials.

## Sources of Supply Chain Risk

For the past several years, supply management has been pursuing strategies that emphasize cost reduction and efficiency in the supply chain. These strategies include:

- Reducing headcount
- Reducing the number of suppliers
- Reducing inventory levels
- Increasing outsourcing
- Using supply sources in low cost and developing countries

Each of these strategies by themselves increases supply chain risk. For example, while outsourcing is justified on the basis of lower costs, it results in a loss of control over the manufacturing or service process. This lost process control can lead to a loss of important production, inventory and service satisfaction information. It also can impede the ability of the firm to react quickly to problems or opportunities. Just-in-time programs have decreased inventory levels, resulting in large savings. But as a result, a single supplier's production disruption can lead to an immediate lack of parts downstream in the supply chain. With no surplus inventory to act as a buffer, the supplier must recover

rapidly or supply availability problems quickly result. In the same vein, supplier rationalization has led to more single sourcing. If a problem arises with a single source, there is no second supplier to turn to for additional supply. Finally, low-cost country sourcing can mean longer, and more uncertain, lead times. Risk grows because reaction times are longer. Taken together, these strategies have increased the supply chain risk many times over.

Despite the increased risk, there is a very low probability that these trends will be reversed to any great degree. Firms still need low costs and high efficiencies to compete. Thus, there is an acute need to manage the increased risk that has resulted from modern supply chain strategies.

Supplier risk greatly increased in the 2008-2009 recession, which placed a financial strain on many suppliers and impeded their ability to meet contractual agreements. This created a vicious circle of financial distress leading to operational problems that created even more financial problems. For example, a supplier that could not get financing for raw material inventories was unable to meet production schedules and missed deliveries. This, in turn, resulted in reduced payments from customers, which led to further cash flow problems and even greater hurdles in gaining financing for the required inventory.

# Supplier Risk Management Process

As is true of most activities in supply management, risk management requires the establishment of a robust process to guide the activity. The risk management process has several steps, which are presented in Figures 2, 3, 4, 5 and 6 and are examined below.

## Get Organized

### Engage Upper Management

A supplier risk management program will need support from upper management, which must be made aware that supplier risk management is an organizationwide issue, not just a supply management problem. This support is necessary because supplier risk management involves additional costs that will impact the budget. There will be additional expenses for training, access to data and perhaps third-party services. In addition, a risk management program will require that personnel be reassigned exclusively to this activity or that several individuals will take on additional duties. All of these expenses and reassignments must be accounted for. Upper management support is required before meaningful efforts can go forward.

Top management help may be needed in order to receive formal cooperation from other units, especially the finance department. Informally, many groups in the company should support the risk management effort. The risk management team should communicate with everyone in the company who has contact with the supplier, including buyers, accounts payable personnel, plant personnel, and internal users of suppliers' services. Each of these groups needs to be on the alert for any signs of supplier distress that may show up in their areas, and they need to report this information to the risk management team.

### Assign Responsibilities

There are many ways to organize the supplier risk management effort. A popular template is to select a leader who is supported by a cross-functional team. The leader can either be full time or part time, depending on the size of the undertaking. The team members are usually part time, with risk management assignments displacing other responsibilities they previously held. While supply base risk management efforts are usually led and managed by the supply function, an effective risk management program requires coordination with other functions and is best carried out by a cross-functional team. In particular, the finance department should be involved to help interpret supplier financial data and to accompany supply managers on visits to suppliers. The risk management team should organize the effort, analyze the data, generate reports and make recommendations for risk mitigation efforts.

### Provide Training

Supply management personnel in general are not skilled in evaluating supplier financial data, so those engaged in the supplier financial risk management will need additional training in this area. Additionally, they will need training in interpreting the reports provided by any third-party providers. Supply managers also will need training in the legal implications of bankruptcy and the rights of the buying company if a supplier declares bankruptcy.

### Monitoring Suppliers

A key step in supplier risk management is identifying those relatively few suppliers who pose a high risk to the company. Most companies do not have the resources or the capabilities to monitor 100 percent of their supplier base, and there is no need to do this.

Many commercial suppliers can be seamlessly replaced if they should go out of business. However every company has a number of suppliers that, if they should fail, would significantly impact the business. The challenge is to identify and monitor the high-risk suppliers.

Identifying high-risk suppliers is best accomplished by a series of screens that successively reduce the number of suppliers to be monitored. (See Figure 2 below.) The first screen identifies the critical suppliers, the second screen identifies critical suppliers with a high probability of financial or operational distress, and the last screen identifies the stressed suppliers that need intervention or mitigation.

The decision to use an outside resource to help screen and monitor the supplier base is one of the most important decisions the risk management team will make. (See Figure 3 below.) Engaging a third-party provider of risk management services (3PR) will significantly impact the risk management process and the overall cost of the program. A guide to help with this decision is presented later in this research study.

**Fig 4  
not  
called  
out**

## Developing Critical Supplier List

Of the thousands of suppliers a company has, only a relatively few fall into the critical category. A critical supplier is one whose failure will greatly impact the buying company. Deciding which suppliers fit this description is not as easy as it might first appear.

Criteria that should be used includes:

- Strategic suppliers
- Single suppliers
- Sole suppliers
- Suppliers with parts/services in many product lines or programs
- Suppliers with a high-dollar value of company owned tooling
- Suppliers with long qualification times
- Suppliers with a high percentage of business with the company
- Key diversity suppliers

Ultimately each buying company determines which suppliers are to be included on the critical supplier list. For example, one organization's rule was simply "we

**Figure 2  
Screening Suppliers**

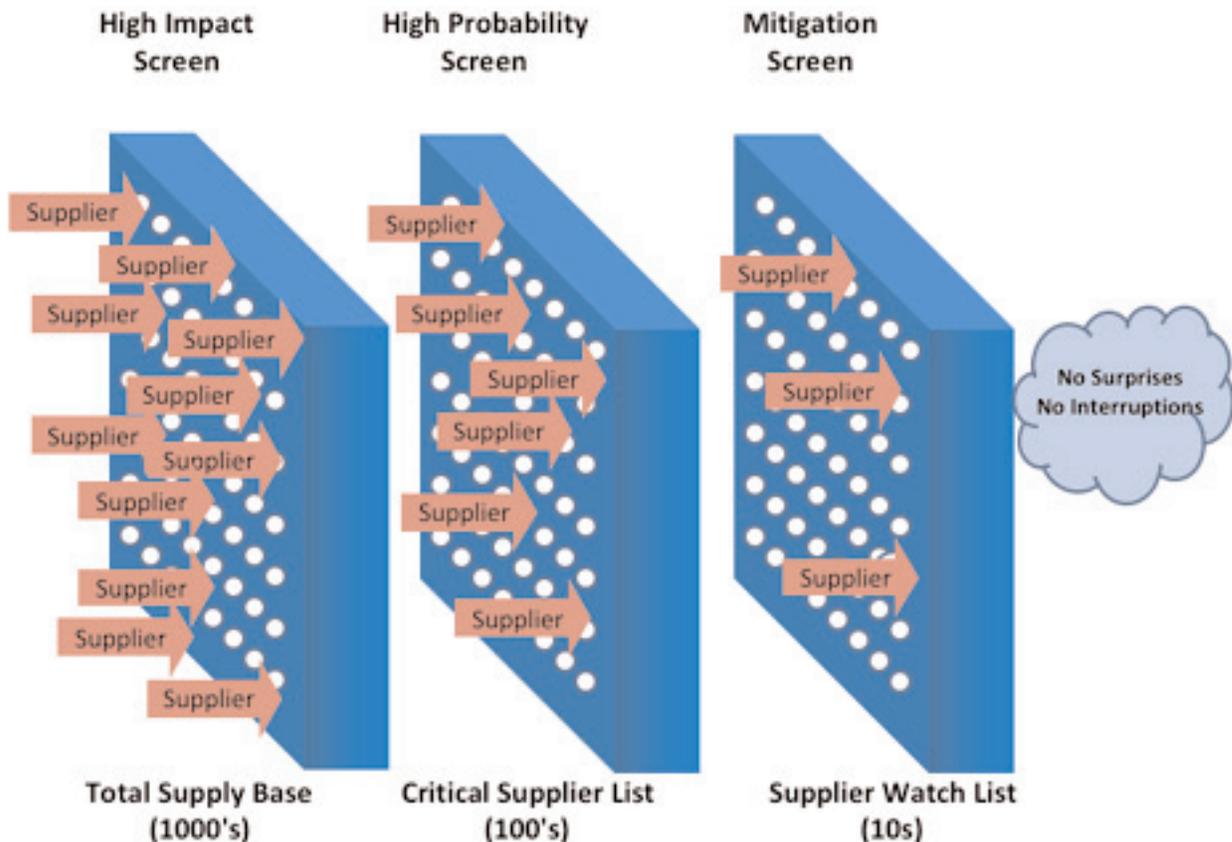


Figure 3  
Start of Supply Risk Management Process

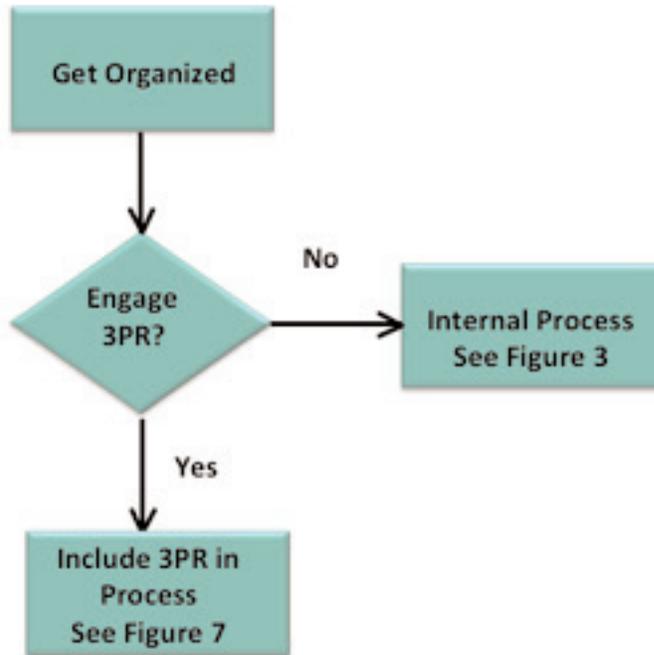


Figure 4  
Internal Risk Supply Management Process

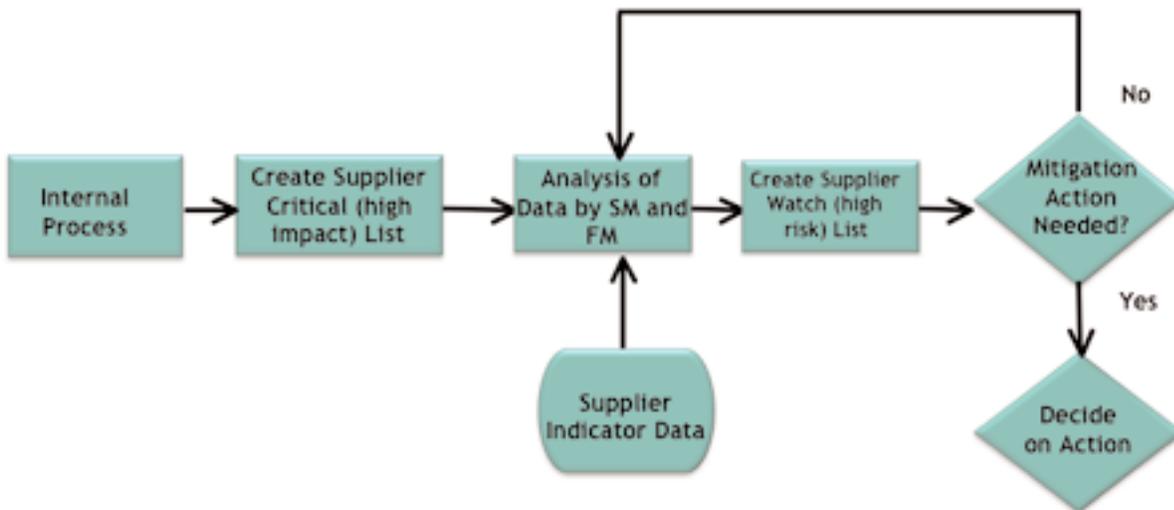
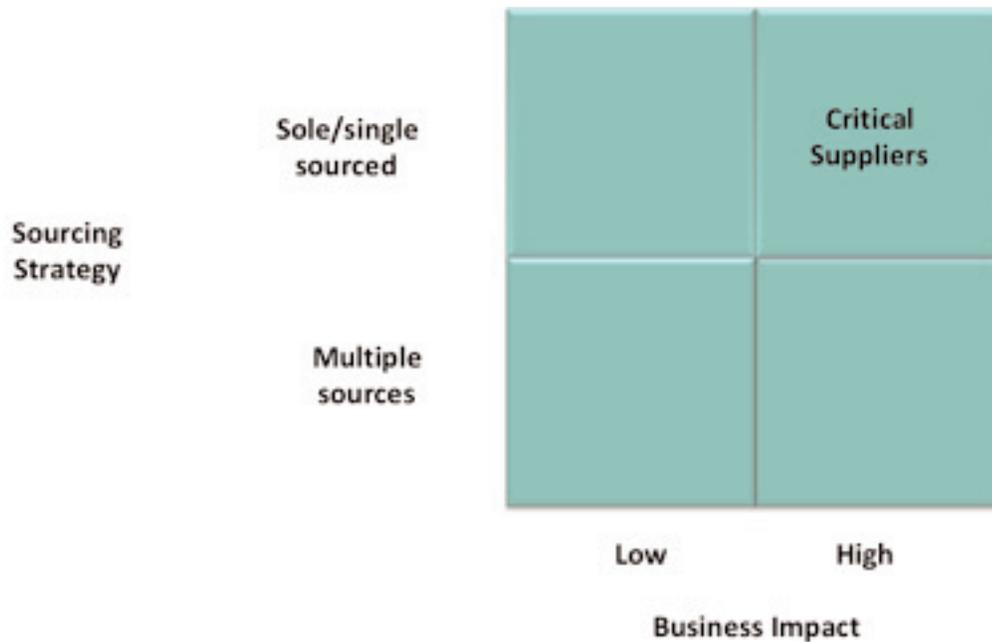


Figure 5  
Identifying Critical Suppliers



want all of our direct material suppliers with expenditures of over \$10 million on the list.” However, such a rule will usually result in too many suppliers on the critical list, so a second or third round of evaluation will be needed to get the list to a manageable number of truly critical suppliers. Another firm combined two criteria in a matrix showing the sourcing strategy (single/sole versus multiple suppliers) on one axis and the impact of the item on the customer base on the other axis. (See Figure 5 below.) The suppliers in the upper right cell of the matrix were placed on the critical supplier list. Whatever method is used to create the critical supply list, the list will have to be periodically updated as the supply base changes.

Once the critical supplier list has been compiled, another screen needs to be applied that identifies those critical suppliers on the list that have a high probability of experiencing serious financial or operational distress in the coming months. To do this requires information about the financial and operation condition of the supplier.

### Collecting Supplier Indicator Data

Once the critical supplier list is constructed, the next step is to collect the appropriate financial and operational data for each firm on the list. This can be a challenging exercise, particularly for private and foreign-based firms.

### Public Companies

Data for publicly held firms are available from the Securities and Exchange Commission in the form of 10K (annual), 10Q (quarterly) and 8K (special material events) reports that are filed by the companies. These reports can be accessed from the SEC for free. The SEC also has tools that allow users to download the financial data directly into spreadsheets for model building and analysis. However, this can be a time consuming task if undertaken for a large number of suppliers. The financial data also can be acquired from Bloomberg, Standard and Poor’s and other third-party providers.

Supply managers often deal with a strategic business unit (SBU) or division of a larger organization. That is why it is important to understand that while the overall corporation may have a healthy financial position, a particular SBU could be struggling financially, or it could be sold, closed or starved for new investment from corporate. Such situations with an SBU would not be detected by analyzing the financials of the parent corporation and could present a risk that is undetectable by reviewing financial data only. In such cases, local signals of operational distress take on more importance.

### Private Companies

Privately held companies in the United States have no public reporting requirements. As a result, obtaining financial data from these suppliers can be challenging.

Although companies can ask their privately held suppliers for financial data, they may not receive it. Private firms are often reluctant to share their financial data because they fear it could be used as a justification to ask for price concessions or it could find its way into the hands of competitors.

There are several ways that buyers can respond to this challenge. They include:

1. Ask for the financial data and hope that the supplier will comply. Some suppliers will comply with this request and some will not. However, a request for a balance sheet and income statement may not return all the details needed to perform a financial analysis. Therefore, it is useful to specify exactly what data is needed.
2. Require financial data as a condition of future business. Many companies are putting requirements for sharing financial data into their contracts and renewals with privately held suppliers. The success of this approach will depend on the relative power position of the purchaser and the negotiating skills of the two parties. Because buyers cannot unilaterally change contract terms, this approach may take one to two years (longer if the current contract runs longer) to get the desired data.
3. Use a third party. With this approach, a third party is identified to receive the financial data from the supplier. The third party can then calculate the required ratios and forward them to the buyer. In this way the buyer knows the supplier's ratios but does not have the underlying financial data, including most importantly, information about the supplier's margins. At the time this research was being conducted, some third-party providers were discussing setting up a business to receive financial data from privately owned suppliers. It is not known if these business models have indeed been implemented. However, other alternatives are available to serve as an ad-hoc third party, including the supplier's or buyer's accounting and/or legal firms.

Another variation on this theme is to have the buying company's finance department serve as the third party. Presumably the finance personnel would have less interest in investigating prices and margins from the supplier. The finance department could calculate the required ratios and only send those ratios to the purchasing department.

4. Use non-disclosure agreements. NDAs can be signed with suppliers to assure them that their financial data will be treated confidentially and will be used only to help assess their financial health.

### **Offshore Suppliers**

Suppliers operating in developing countries often have very different, if any, reporting requirements for financial statements. Many developing countries have very few, or no, accounting standards and the standards that are in place may be much different from U.S. standards.

The best solution to this problem is "feet on the ground." The feet may belong to the buying company if it has operations in the country or may belong to trusted third parties. In-country personnel can visit suppliers and ask about their financial condition. They can observe the operating condition of the suppliers and make educated guesses about their financial situation. They also can talk to other customers and competitors to gain useful information. Lastly, they can review whatever financial data is publicly or privately available and, taking into account the local conditions, make educated projects about the financial health of the supplier.

In the end, there is no easy solution to this problem. Risk mitigation actions, such as qualifying a second supplier or holding extra inventory, may be more useful than an expensive effort to get reliable financial data from one supplier in a developing economy.

### **Monitoring Suppliers Beyond the First Tier**

Ideally first-tier suppliers will monitor the financial risk of their suppliers and this will be the case up the supply chain. In practice this does not happen. Companies with well-organized risk management programs will need to selectively monitor critical suppliers several tiers up the supply chain to look for problems that may cascade down and create a disruption at their first-tier suppliers.

# Financial Data Analysis

Once supplier financial data is collected, the fundamental question to ask is, “What does this data tell the buying company about the financial condition of the supplier?” Several ratios are useful for judging the current financial condition of a company and these are generally well known. They include:

## Liquidity Ratios

- Current Ratio = Current Assets/Current Liabilities
- Quick Ratio = (Cash + Accounts Receivables)/Current Liabilities

## Profitability Ratios

- Net Profit Margin = Profits (after taxes)/Sales
- Return on Equity = Profits/Stockholders Equity
- Return on Assets = Profits/Total Assets

## Debt Level Ratios

- Debt to Equity = Total Liabilities/Stockholders Equity
- Short-term Debt to Equity = Current Liabilities/Stockholders Equity
- Long-term Debt to Equity = Long-term Debt/Stockholders Equity

## Efficiency Ratios

- Inventory Turnover = Sales/Inventory
- Fixed-asset Turnover = Sales/Fixed Assets
- Days Sales Outstanding = (Receivables/Annual Sales) x 365

If the analysis of the current condition shows that a supplier is in poor financial shape, immediate action will be needed to implement reactive strategies. It is probably too late to institute mitigating strategies because the supplier already is in serious trouble. The worst case scenario is that the supplier goes out of business on short notice and leaves the buying company without an adequate source of supply and perhaps with

critical tooling and inventory tied up in bankruptcy proceedings. It is this type of situation that supplier risk management is trying to avoid with proactive analysis of supplier data and the application of mitigating strategies.

## Making Projections from Ratio Analysis

For those suppliers that are not in immediate danger of financial collapse, the more useful question becomes, “What does the supplier’s current accounting and financial information tell us about its future financial condition?” Of course, investors and financial analysts have been asking this questions since companies began publishing financial reports. The difference for supply managers is that they are not as interested in comparing one company’s financial performance with another for the purposes of making investments, but rather in the fundamental question of whether a supplier will have the financial resources to remain viable into the future. The supplier does not have to be the most profitable in its category to continue to be a useful supplier.

The answer to the previous question can be found by examining the correlation of the current values of the financial ratios shown above (as well as others) to the future values of the same ratios. For example, if there were 20 years of historical financial data for 1,000 companies, analysts could use the first year of data to see what financial ratios correlated with financial performance in year two and beyond. This exercise could be repeated 19 times, using the “current year” to predict performance one year later. Different ratios and combinations of ratios could be tested to predict which companies prospered and which struggled at a later time. Statistical testing of the correlation of data at one point in time with data from a later time is essentially the underlying methodology in all predictive models.

## Altman's Z-Score

One of the early approaches to predictive models was developed by Edward Altman, who gave his analytic tool the name of Z-score<sup>1,2</sup>. Altman's first model was based on manufacturing companies and proved to be quite accurate in predicting which companies would go bankrupt one year prior to the event, or alternatively, one year after the ratios were calculated. Altman's original model included five ratios:

- $T_1$  = Working Capital/Total Assets
- $T_2$  = Retained Earnings/Total Assets
- $T_3$  = Earnings before Interest and Taxes/Total Assets
- $T_4$  = Market Value of Equity/Total Liabilities
- $T_5$  = Sales/Total Assets

The Altman Z-score is calculated as:

$$Z = 1.2T_1 + 1.4T_2 + 3.3T_3 + 0.6T_4 + 0.999T_5$$

The following ranges for Z-scores indicated various risk levels for the company:

- $Z > 2.99$  -"Safe" Zone — low risk of bankruptcy
- $1.8 < Z < 2.99$  -"Gray" Zone — medium risk of bankruptcy
- $Z < 1.80$  -"Distress" Zone — high risk of bankruptcy

The Z-score is a good indicator of risk, but not an absolute signal. For example, not all companies with a Z-score below -1.80 will go bankrupt, but most of them will. Therefore, a supplier with a Z-score below -1.80 should be carefully monitored and perhaps be subject to some mitigation action. Likewise, not all companies with a Z-score above 2.99 will avoid bankruptcy, but most of them will and do not require mitigating actions.

The Z-score, or comparable predictive analysis, should be calculated for all of the suppliers on the critical list. The suppliers can then be classified into one of three categories:

1. Red — High risk of financial failure in the next X months
2. Yellow — Medium risk of financial failure X months
3. Green — Low risk of financial failure X months

Using these assessments, supply managers can turn their attention to suppliers in the red zone and devise

strategies to mitigate their business risk with these suppliers.

## Developing the Supplier Watch List

The end result of the financial analysis will be to create a supplier watch list that identifies suppliers who are at high risk of causing serious disruptions to the business plans of the buying company. Some type of immediate remedial action should be considered for each of these suppliers. A generic list of remedial actions should be compiled prior to actual deployment. However, each supplier's situation is different and specific actions should be tailored to the situation. Each action will require a different level of resources, ranging from the relatively low cost of visiting a supplier to the higher cost involved with qualifying a new supplier.

## Risk Mediation Actions

For suppliers on the watch list, a broad view of their entire situation is needed. The first step should be a meeting with the internal cross-functional team to identify any known issues with the supplier. Then, ask the supplier to provide more information, and/or visit the supplier and discuss the situation with the supplier's management team.

Based on the results of these investigations, additional risk mitigating strategies can be formulated. It is difficult to make hard and fast rules because each case has its own unique circumstances. Following is a list of specific mitigating strategies that can be considered.

- Continue to closely monitor the supplier with no other action taken.
- Provide assistance to help correct short-term problems either through technical help or temporary financial support.
- Pay early to help with supplier cash flow.
- Take early delivery to move supplier payments forward.
- Buy raw material(s) for suppliers.
- Make a direct loan to the supplier at zero- or low-interest rate. In return for the loan, the buyer gets a discount on the supplier's pricing. This discounted amount is applied to paying off the loan.

<sup>1</sup>Altman, Edward I. (September, 1968). "Financial Ratios, Discriminate Analysis and the Prediction of Corporate Bankruptcy." *Journal of Finance*: 189-209.

<sup>2</sup>Altman, Edward I. Predicting Financial Distress Of Companies: Revisiting The Z-Score And Zeta® Models, viewed at <http://pages.stern.nyu.edu/~ealtman/Zscores.pdf>, March 26, 2010.

- Put money into an escrow account. Once the parts or services are supplied, the supplier can immediately access the money in the escrow account. This gives the supplier access to credit before shipment and immediate access to cash after shipment to meet its payroll and pay its bills.
- Take delivery of material on consignment before immediate need. The value of the consigned inventory is put into escrow accounts and when the inventory is used the supplier is paid. This is used primarily as a temporary strategy until the buyer switches sources. The supplier knows it will be paid for the inventory and the buyer has control over the material.
- Pay the supplier's invoices immediately at a discounted or factored rate.
- Provide assistance to a supplier to locate a bank or invoice factoring firm that will purchase the supplier's accounts receivables at a discounted rate. This provides the supplier with an immediate cash infusion.
- Develop a plan that enables the buying organization to react quickly to Chapter 11 or Chapter 7 by filing UCC Financing Statements.
- Increase business with the supplier in the short run. This may build inventory at the buying company but this can be consumed over time. If the supplier should fail, the buying company will have some safety stock to be used while a new source is being qualified.
- Provide operational long-term assistance, including Six Sigma quality tools or lean techniques in operations.
- Ask a larger supplier to lend assistance to a smaller supplier.
- Qualifying new supplier(s).
- Move the business to another supplier.
- Coordinate and assist a third-party buyout of the supplier.
- Invest in or fully acquire the supplier.

Supplier exit strategies must be carefully thought out. Anytime a new supplier is considered, the organization faces a switching cost. The change will create some short-term inconveniences for the buying organization, but if it is handled well problems can be prevented. Factors that must be considered in the exit strategy include:

- Be aware that if the supplier knows the buyer is leaving, the supplier may try to increase prices for the remaining time left on the contract.
- Determine how to remove the buying company's assets from the supplier's premises.
- Obtain control of required intellectual property

- Determine the time and resources required to move to a new source

## Securing Supplier Cooperation

For mitigating strategies to succeed, the supplier must acknowledge its poor financial condition and agree to make changes to improve. Suppliers may be reluctant to make changes because they may draw different conclusions from the same facts or may have information that is not available to the buying firm. Even if the buyer and the supplier agree on the need for change, there may not be agreement on the action to be taken. The threat to reduce or move the business may be the only way to coerce the supplier to cooperate. However, most suppliers want to survive and prosper, and they often are willing to accept help from an important customer.

# Third-Party Risk Management Companies — Beyond Altman's Z-Score

Many companies have developed their own programs for supplier financial risk management without outside help, but most have found this a challenging task. Realistically, supply managers have only limited time to conduct risk analysis and do not have all the tools and training required for a rigorous program. Just acquiring the necessary financial data can be a time-consuming effort. Analyzing and interpreting this data requires both time and training. Further, supply managers do not have the benefit of the extensive current/future state testing that has been performed by third-party providers. The end result is either a cursory look at a number of suppliers or an in-depth analysis of a very small number of critical suppliers. In a good economy, an internal program may be adequate — in a weak economy an internally developed program can easily be overwhelmed by the demands on supply management. These demands include the buying company's emphasis on keeping costs down and the increased probabilities of supplier failures.

Over the past decade or so several companies have revisited the relationship between current financial ratios and their ability to predict future financial performance. Using new data sources, new analyses and increased computing power, these companies have created tools that offer more comprehensive predictions about the future performance of a company's suppliers. (See Figure 6 below.)

These efforts have elevated the predictive metrics to a new level. The changes include:

1. Expansion of the number of financial ratios used to compute the predictor score
2. Extensive testing of the current/future relationship using longitudinal data from more companies and more ratios
3. Identification of the best combination of ratios for different industries and countries

4. Development of processes to routinely and efficiently collect data, financial and other, on large numbers of suppliers
5. Inclusion of qualitative data in the predicting process
6. Software that efficiently generates reports for multiple suppliers
7. Multiple indicators and reports that give different insights into the financial future of suppliers

Some of these companies, such as DNBI ([www.dnbi.com](http://www.dnbi.com)), have been around for several years and others, such as Rapid Ratings ([www.rapidratings.com](http://www.rapidratings.com)), are newcomers to the scene. All of the providers analyze the current financial (and other) data for a supplier and use this to predict the supplier's future financial condition. The analysis and forecasts are based on examining large numbers of historical data sets and selected financial ratios for their predictive ability. Based on this monitoring, the software's predictive models generate "alerts" that draw attention to suppliers whose risk of failure is increasing. The alerts give the buying firm time to take preventative or mediating actions prior to a supplier bankruptcy. Several third-party providers are discussed later in this report, along with an overview of their business models and capabilities.

## Role of Third-Party Providers in the Risk Management Process

Engaging a third-party provider (3PR) to help with risk management changes the process in several ways, as indicated in Figure 7 below. First, some, but not all, 3PRs can help companies clean up their supplier master records. By comparing client supplier records with their own extensive data bases created from public and private records for many clients, the 3PR can correct and rationalize supplier names and addresses and help

Figure 6  
Comprehensive Supplier Risk Analysis

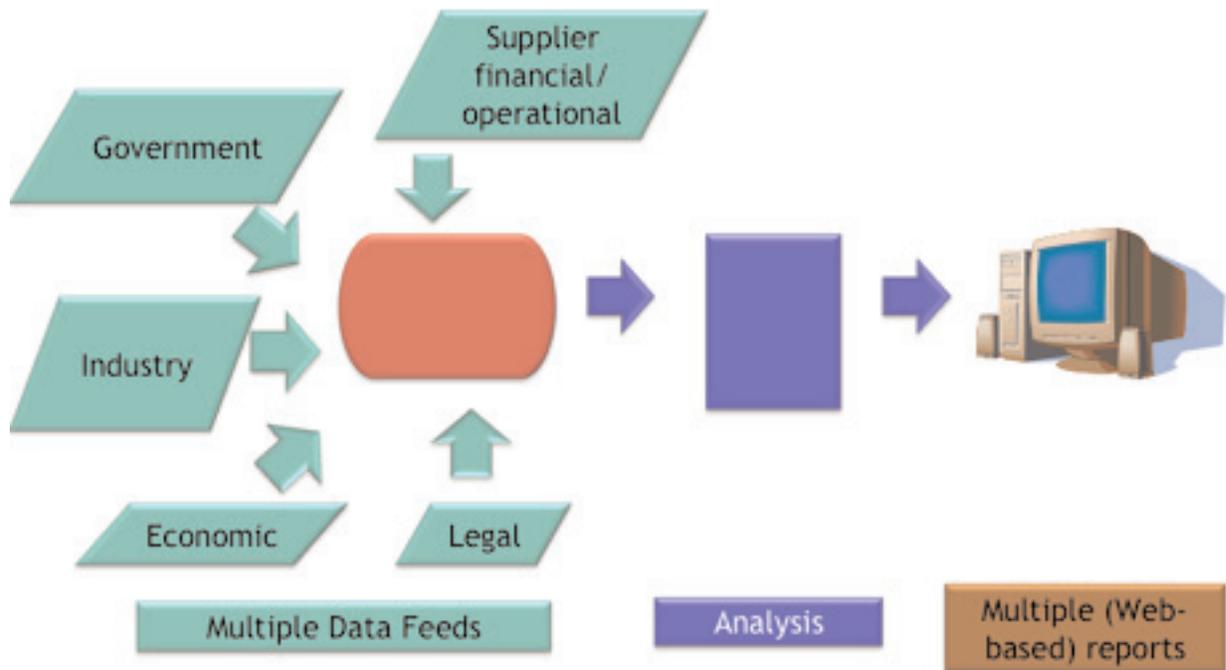
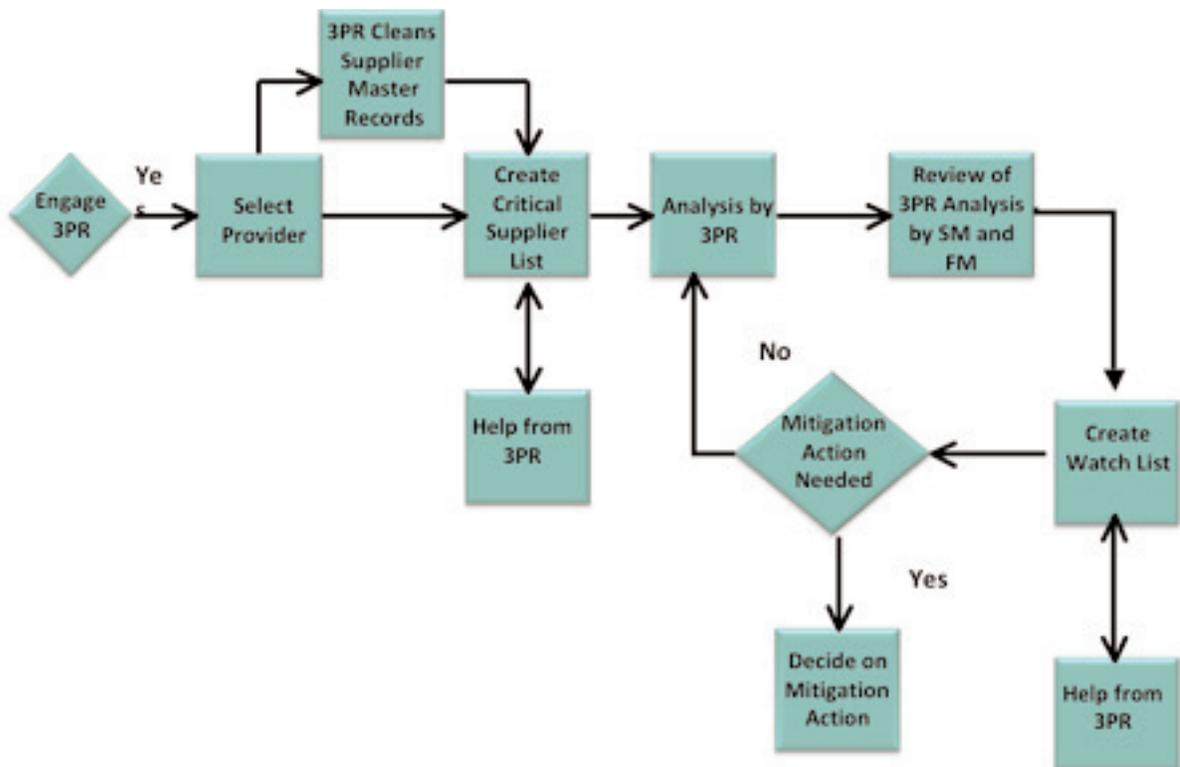


Figure 7  
Supplier Risk Management with 3PRs



identify links between parent companies and their subsidiaries.

Second, all 3PRs can conduct a preliminary financial analysis for all of the client's suppliers for which financial data is available. The results of this analysis can create a preliminary picture of the overall risk profile for the supply base. This can be used to help "tune" the alert levels so that supply managers are not overwhelmed by false negatives concerning supplier risk. The client also may eliminate suppliers from analysis because they are commercial suppliers that are easily replaced if they go out of business.

Once the critical supplier list is pruned down to an appropriate level, in-depth analyses of these suppliers can be conducted by the third-party provider. These results can be reviewed by the risk management team at the buying company and a supplier watch list (i.e., critical suppliers with high probability of failure) can be created. The 3PR can regularly monitor and provide reports for each supplier on the watch list. Supply management can review these reports, perhaps ask for additional information and analysis from the 3PR, and make decisions about mitigating actions.

### Third-Party Provider Reports

As discussed above, all of the 3PRs generate a risk rating score for suppliers that is the basis for risk assessment. The 3PRs have different names for their scores and use different scales, but all have certain elements in common. All third-party providers use a numerical scale to report risk that ranges from a low score (e.g., 10) to a high score (e.g., 100). The meaning of the number varies. At some 3PRs, a higher score means lower risk (e.g., 90) and a lower score means higher risk (e.g., 10) but in other 3PRs the reverse is true and a higher score means higher risk and lower score lower risk.

In addition to reviewing risk ratings, all of the 3PRs encourage their clients to look at other supporting data. For example, a client should analyze the risk trend for the specific company (e.g., a motor manufacturer supplier) and compare the supplier's trend to the risk trend in the business category (e.g., electrical equipment). This trend analysis, supplemented by visual graphs, can be more revealing than a risk rating at a point in time. For example, a risk rating that was 85 two years ago, 60 a year ago and 40 this year presents a strong signal of financial ills, even though the current rating of 40 is not yet in the red zone. The client must consider if the rating will continue to decline to the red zone or stabilize at 40 and perhaps

improve as the sector or overall economy improves. However if the risk rating is extremely low, the trend becomes irrelevant. For example, one 3PR states that if the risk rating is below 25 then the model indicates that the firm is essentially, if not formally, bankrupt.

The risk rating can also trigger a change in the reporting frequency for a supplier. For example, one 3PR recommends the following update frequency:

- For risk rating of 50 or greater, update semiannually
- For a risk rating below 50, update quarterly
- For a risk rating in the low 20s, reporting should be as often as possible

When a company is undergoing restructuring under Chapter 11, monthly reports to the receivers or administrators are required. The purchaser should closely follow the impact of these reports through the 3PR risk rating scores to analyze improvement or deterioration in the supplier's financial condition.

Third-party providers offer "alerts" that are triggered by changes in risk ratings or other events that have been noted. This makes it easier for the risk management team to focus on potential problems without having to perform a detailed analysis of all of the reports. For example a downward shift in a risk rating (i.e., an increase in the risk) could trigger an alert, even though the supplier has not dropped to the red zone. Similarly a major restructuring, loss of a major customer, a legal action and so forth may trigger an alert for a supplier.

### Using Qualitative Data

The best approach to managing supply base risk is to use a combination of qualitative and quantitative signals. Many of the 3PR models provide some qualitative data in addition to the reports based on an analysis of financial data. These are at a macro level and include such things as legal proceedings, environmental judgments and adverse regulatory actions.

However, some of the best qualitative indicators are picked up by the organization directly when it interfaces with the supplier. The qualitative data is usually indicative of operational risks, which are often related to or precede financial risks. Some of the signals are at the business-to-business level, including late deliveries, fall in quality, lay-offs, and failure to respond to inquiries.

The qualitative signals can be just as prescient as financial data but are often harder to monitor. As

discussed later in this report, one organization uses an “Eyes and Ears” program to collect data on suppliers. Associates who interact with the supplier in any capacity are asked to submit a report if they notice anything problematic or out of the ordinary. The report is filed through the company’s intranet and becomes part of the risk file for the supplier. Several notices for the same supplier may trigger a comprehensive review of the supplier.

## Selecting a Risk Management Third-Party Provider

Once the decision to investigate the use of a third-party provider of Risk Management Services is made, a process to select the provider must be developed and implemented. While company approaches vary, the process outlined below represents a compilation of ideas from organizations that have selected and successfully used 3PR providers.

The specific steps include:

1. Developing a list of key 3PR selection criteria
2. Identifying 3PR providers
3. Narrowing the list of candidate through interviews and system tests
4. Final selection(s) and negotiations
5. Integrating the 3PR into the buying organization. (See Figure 8 below.)

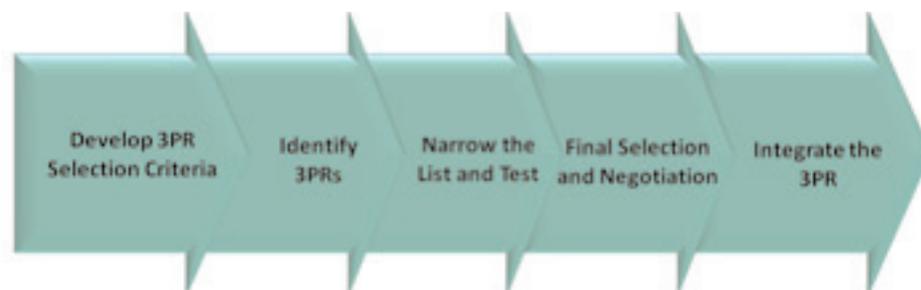
### Third-Party Provider Selection Criteria

Each 3PR will bring a different set of strengths to the table, so it is best to compile a list of criteria that will be used in selecting the 3PR ahead of the interviews. Comparisons of specific third-party provider capabilities can then be compared to this list. The creation and use of a cross-functional team consisting of supply management, finance, information systems, and internal users is recommended for this task. Some of key selection criteria are:

- Experience in supply management versus credit management
- Willingness to provide a list of companies, with contacts, that are using their services in supply management
- Availability of the service across the buying company’s other business units
- Provision of reports based on both quantitative and qualitative data
- Frequency of reports
- Availability of reports on demand and additional fees
- Sources of the data underlying the reports
- Frequency of data refresh
- Availability of data from private firms and foreign firms
- Format of reports
- Capability of downloading data to Excel for further analysis or historical tracking
- Capability of customizing reports for the customer’s needs
- Recommendations for critical signals, red flags, and alert levels
- Capability to help cleanse the buyer’s supplier-masters records
- Capability to provide training on the service
- Hours of training required for users to become proficient with the service
- Cost of training
- Availability (and cost) of pilot runs to test the system
- System backups and uptime service levels
- Pricing model — flat fee, based on number of seats, or combination — and any additional fees for additional services
- Discount pricing if service is currently used by the finance department

Other issues may arise as other clients of the 3PRs are interviewed. Also each company may have it own specific issues that need to be investigated.

**Figure 8**  
Process for Selecting a 3PR



## Identification of 3PR Providers

Once the key criteria are established, the next step is to identify specific third-party providers. The first step in this process is to identify any 3PRs that are currently engaged by the finance or marketing departments to help perform financial due diligence on the customer base. This can provide an internal assessment of the 3PR's current level of performance and internal satisfaction with the service. Also, there may be an opportunity for discount pricing if the company is already using the service in another department.

After the internal investigation of 3PRs is complete, the next step is to investigate other 3PRs in the marketplace. There are many 3PRs in the market and, as risk management becomes more common in supply management, it is expected these providers will grow in number. There may also be some consolidation in the marketplace as stand-alone providers are acquired by organizations that seek to add this product to their e-procurement suites. While the objective of this report is not to rate 3PRs, several are identified later in this report, with both overview and detailed descriptions provided.

The number of 3PRs to interview is up to the individual organization. Some firms extended their relationship with the 3PR from finance to supply management and did not investigate other options. Others have undertaken an extensive search and interviewed a large number of 3PRs — up to 10. Investigating multiple 3PRs is recommended to ascertain which best fits the company's requirements.

## Narrowing the List, Testing the Software

Based on the interviews with the 3PRs and their scores on the criteria listed above, the next step is to narrow the list to those which have the capabilities to meet the organization's objectives. Since 3PRs have different capabilities, it is not uncommon for companies to engage multiple third-party providers.

The next step is to test the service by providing a selected list of suppliers to the 3PR. This allows those who will be using the software to get an idea of the software's capabilities, the reporting formats and accuracy of alert levels. At this stage it is best to evaluate and test more than one provider's capabilities.

## Final Selection(s) and Negotiations

Once the test period is completed, the cross-functional team should meet to discuss the strengths, weaknesses and performance of each of the 3PRs during the trial test period. Then, negotiations can be conducted with the strongest providers with the objective of securing the best overall value. These negotiations should not

focus just on price but should also consider issues such as coverage of the company's supply base, cost for additional services, report customization, seat licenses, training, service level, public vs. private company coverage, and backup protection.

## Integrating the 3PR into the Buying Organization

Once a third-party provider is selected, the provider's services will need to be integrated into the buying company's operations. This can take many paths, but following are some common steps:

1. Provide the entire supplier database to the 3PR for preliminary analysis. This will help identify suppliers for which better or different identification data is needed or those for which the 3PR does not have data. This analysis also will identify suppliers that currently may be in financial difficulty.
2. Use the output from this preliminary analysis as part of the training exercise. Also decisions concerning reporting formats and frequency of reports can be made, if these are issues the client is able to influence.
3. Decide the starting levels for alerts, knowing that those levels can be changed later if necessary. The 3PR can make recommendations about alert levels, but the client will need to work with the levels for some time to get a feel for what works best. For example, one organization found it was receiving 10 alerts per week after giving the 3PR a preliminary list of 200 suppliers out of a total supply base of 16,000. This would extrapolate to 800 alerts per week for all 16,000 suppliers, too many to be usefully evaluated. Thus, the alert levels will have to be adjusted to generate a number that can be meaningfully evaluated.
4. Decide how to obtain data from private companies, foreign companies, and any other companies not included in the third-party provider's database.
5. Establish a training schedule. Supply personnel who will be "power users" should be trained first, followed by other supply management personnel and members of the cross-functional team.
6. Decide how to incorporate the reports into the day-to-day workload of buyers and supply managers.
7. Decide how the reports will be shared across business units and geographical regions.

## Examples of 3PR Selection and Implementation Process

The following are brief examples of how various companies approached the 3PR selection and implementation process. See Chapter 4 for the detailed case studies, which provide a more comprehensive look at the companies examined for this research.

### Firm W

Firm W is a high-tech Fortune 500 company with a spend of more than \$9 billion. Because it has many government contracts, Firm W does business with many small and disadvantaged suppliers, many of which are susceptible to financial distress. Because of this, Firm W's executive leadership directed supply management to develop a program to manage the risk in their overall supply base.

While many organizations have selected one or more third-party providers to help with their supplier risk management program, Firm W decided to combine the services of a 3PR with a robust internal program. Supply management at Firm W took a companywide approach to the challenge and included representatives from engineering, information systems, the program offices and finance on the supplier risk management team.

Firm W's program has both a formal and informal component. The formal program, "Corporate Supplier Risk Program" (CRISP), is used corporatewide across all business units. Major features of program include:

- Reports from Firm W's 3PR are based on the buying company's internal model and data collection.
- A supplier business questionnaire is sent to the supplier electronically. The questionnaire asks for financial and operating information, including five key financial ratios. The returned questionnaires are reviewed in detail by the cross-functional risk management team.
- If the questionnaire raises significant concerns regarding future viability, a Supplier Financial Health Review is conducted by the supply management team

Firm W has 40,000 engineers who interact with suppliers and are a critical part of the informal supplier monitoring program. The informal program asks all employees who interact with suppliers to be active observers and look for signs of supplier trouble. For example, if an employee visits a supplier and notices the parking lot is only half full or if a company engineer

notices that the supplier has laid off several design engineers, then these observations are to be reported. The associates fill out a "Supplier Risk Observation Form" on the company intranet. These multiple reporting points provide an effective way to spot qualitative issues. No fact or observation is considered too small to be reported.

The informal "eyes and ears" program is run at minimal cost. Firm W gives out gift cards and other minor awards for those who fill out the form regularly or spot an important trend that triggers further investigation.

### Firm Y

The following is an example of the specific steps that one organization, Firm Y, took to select and implement a 3PR into its risk management program.

1. The process of selection of a software provider began with push from top management amid concern about continuity and risk in the supply base.
2. The selection process was communicated to the Supply Chain Leadership Council and input was solicited from the council.
3. A broad range of 3PRs were solicited and analyzed for each of their specific offerings. In the final analysis, third-party provider A was selected for small firms and third-party provider B for large publicly held firms.
4. Testing of the software was conducted with the two selected 3PRs and an evaluation made of their reporting capability and their fit with the company's current needs and supply base.
5. Price negotiations for the number of user seats and price per seat were conducted with 3PR A. Third-party provider B's rates were published, so there was no price negotiation with 3PR B.

### Firm Z

Firm Z used a combination of three 3PRs. Third-party provider C, whose parent company was used by Firm Z's treasury department, was signed to a two-year agreement. Third-party provider D was signed to a six-month pilot contract. Firm Z had access to 3PR E through its European corporate headquarters' supply management group. This example highlights that supply management should check for 3PRs that might already be under contract with other departments. Even with services available from two third-party providers, the risk management team wanted the capability to customize certain supplier reports and signed a six-month pilot contract with 3PR D.

## Implementation Insights

Once the decision has been made to engage a 3PR and a budget has been established, several important decisions remain. First, an employee needs to be assigned the role of risk manager. This person should have responsibility for overseeing the implementation of the 3PR services, including the training program, the assignment of other roles, and the leadership of the risk management cross-functional team.

Next, a decision must be made about who will be responsible for reviewing the reports, analyzing the suppliers that generate alerts, and providing this information to the responsible buyers or sourcing teams. There are three common ways to approach this:

1. Centralized staff
2. Power users
3. Supply manager/buying teams

**Centralized staff** — With this approach, a headquarters group receives the alerts and determines if action is needed based on in-depth research of the available data about the supplier that generated the alert. This approach is based on the concept that a dedicated team will develop the capability and expertise to perform the required analysis and to make informed judgments about which alerts require action.

**Power users** — This option designates a few supply associates as power users. Power users should have good research skills and supplier knowledge. However, the amount of time they have to devote to the task is often limited and they may not have direct experience with all critical suppliers.

**Supply manager/buying teams** — Sending alerts directly to supply managers/buying teams gets the information quickly to those who know the suppliers best. However, any one buyer or buying team will not see all of the alerts, so they will not build up the same experience level as specialists on a central staff. Also the team will have many other important responsibilities and likely will have less time to devote to risk management.

The variation among the three choices stretches from a combination of high-specialization and low-direct contact with suppliers (central staff) to low-specialization and high-direct contact with suppliers. Not surprisingly, most companies opt for the middle strategy, power users, because it strikes a compromise among the choices.

A contract should address the extent of training to be provided by the 3PR. In addition to supply managers, finance personnel working on risk management and others on the cross-functional team also should be trained on the system. A training/consulting company may have to be engaged if more extensive training is needed, for example training on the basics of financial risk analysis.

Once the 3PR is selected, the firm must decide which suppliers to place on the critical list for analysis by the third-party provider. Some 3PRs indicate they can monitor the entire supply base, but this is neither necessary nor practical. Only a relatively small percentage of the entire supply base is truly critical to the client firm's operations. Monitoring and reacting to alerts from all suppliers is not a good use of scarce resources.

Once the critical supplier list is constructed, the risk management team must decide on rules for generating alerts. If the alerts are set to be reported on small changes in the supplier risk scores, there will be many alerts — many of them false positives — and sorting through them will consume a great deal of time. Conversely, if alerts are issued only for major changes, the supplier may be in serious difficulty before the team starts to take action. The correct alert levels will depend on the mix of critical suppliers, such as small and large suppliers, and suppliers that are global, U.S.-based, public and private. Over time, the buying firm will become more adept at setting appropriate alert levels.

Comparing 3PR reports with internally developed risk indicators is always a good idea, particularly when an internal system has been developed to gather operational risk signals at the local level. It is more unlikely that a third-party provider's data collection process will pick up signals at a local level. When both data sources indicate trouble, action is usually warranted.

## Summary of Third-Party Providers

Following is a brief description of the third-party providers that are either being used by companies in our research or who were being considered for use. Additional information about the providers can be found on their Web sites, which are listed below. (All third party providers except for Capital IQ provided more detailed summaries through interviews. Summaries of this information are provided later in this report.)

### **Beroe ([www.beroe.com](http://www.beroe.com))**

Beroe looks at risk analysis in a holistic manner and gauges the risk of the entire supply chain. Its research has shown that about 7 percent of supply disruptions are caused by financial problems at first-tier suppliers. The company believes there is a need to focus on risk assessments throughout the entire value chain. Beroe does this by engaging a wide network of reporters, some paid and some unpaid, to report on local events that can disrupt a supply chain, for example a labor action or a port closure. Beroe also engages in more traditional analysis of company financials and can overlay this analysis on a supply chain to obtain a holistic view of the risk in the supply chain.

### **Capital IQ ([www.capitaliq.com](http://www.capitaliq.com))**

Capital IQ's information platform is used by clients to gather competitive intelligence, manage merger and acquisitions, evaluate financing projects, and generate new business leads. Information is provided on companies, people, and markets worldwide. Credit analysts use the tool to evaluate credit quality and monitor ongoing credit positions in their portfolios. Internal company uses include:

1. Generating fundamental credit opinions
2. Creating internal credit ratings
3. Developing relative value opinions

Analytical tools allow users to address issues of financial strength, strategic planning, business development and sales capabilities. Global coverage also is provided through access to public and private firms worldwide. This global information includes corporate structure, capital structure, ownership, business relationships, related entities, comparables, competitors, securities, events, Standard & Poor's and Moody's credit ratings and research, estimates, filings, mergers and acquisitions and financing transactions, news and so forth. The platform is Web-based and can download data to Excel.

### **Company Watch ([www.companywatch.net](http://www.companywatch.net))**

Company Watch is a U.K.-based company. It has a self-developed "H-Score" as a measure of the financial health of a company. In the U.K. all privately held firms must also report financial data, so H-Scores are available for private U.K. firms. The H-Score models are country specific and are modified for different types of companies. The H-Score ranks companies on a scale of 0 (worst) to 100 (best). Companies in the warning area (H-Score of 25 or less) share the characteristics of companies that subsequently failed. It is rare for companies to fail or experience major distress as long as their H-Score remains outside the warning area. Historically, when the economy was weak, one in four companies in the warning area failed or had a major

restructuring within three years. This improved to one in five as the economy recovered.

### **Credit Risk Monitor ([www.creditriskmonitor.com](http://www.creditriskmonitor.com))**

CRM was created for corporate credit professionals. The company provides real-time financial information analysis and news about more than 40,000 public companies worldwide. CRM provides clients with commercial credit reports. These reports are supported by financial statements and a FRISK score. The FRISK score is a forward-looking score that predicts the probability of failure in 12 months. It is based on three indicators — Merton's model of stock price volatility, S&P and Moody's ratings, and the Altman Z-score. The FRISK score has a range of 1 to 10 with 1 being the riskiest.

### **DNBi (<https://sso.dnbi.com>)**

DNBi, a unit of DnB, provides predictive analytics on a firm's supply base. Its model is based on both quantitative and qualitative data when projecting a supplier's risk rating. DNB's customers are provided with several indicators about suppliers' risk conditions. These include:

- Financial Stress Score (FSS) — The likelihood of a firm experiencing financial problems.
- Supplier Stability Index (SSI) — The likelihood of a firm going out of business without paying creditors in full.
- Supplier Evaluation Risk (SER) — The rating of supplier performance instability and predictions of the likelihood of a firm ceasing business over the next 12 months.

Other indicators include:

- Business deterioration indicator
- Commercial credit score class
- Disaster indicator
- Paydex — indicator of payment performance
- Other indicators such as judgments, liens and lawsuits

The first three indicators, FSS, SSI and SER, are predictive indicators.

### **Equifax ([www.equifax.com](http://www.equifax.com))**

Equifax's distinctive competence is providing data on small businesses. Small businesses comprise 99.7 percent of all U.S. firms. Equifax has data from more than 50 million in their database. Forty-eight of the 50 largest banks provide data to Equifax. Forty-four data elements go into calculation of the risk score for small suppliers. There are four key indicators reported by Equifax —

Business Failure Risk Score; Business Failure Risk Class; Small Business Credit Risk Score; and Business Failure National Percentage. The Business Failure Risk Score ranges from 1,000 to 1,880 with 1,000 indicating the highest risk of failure. This score predicts the likelihood of business failure through either formal or informal bankruptcy within the next 12 month period.

### **Rapid Ratings (www.rapidratings.com)**

Rapid Ratings produces an index called the Financial Health Ratings (FHR). FHRs range from 0 to 100. There are 24 industry models using 62 ratios in six categories from income statement to balance sheet. These six categories are: Leverage, Working Capital, Revenue, Cost Structure, Debt Service, and Profitability Efficiencies. The FHR model is built on analyzing data from 300,000 firms over a 30-year history (9 million company-years of observations.) The company is expanding into supply management applications and sees this area as a major market in the future. Rapid Ratings will customize reports based on client request and also will analyze supplier data provided by the client, such as data for privately held suppliers.

### **Risk Management Return on Investment**

The return on investment for a risk management program is somewhat difficult to quantify. There are measureable costs to get the programs up and running, including out-of-pocket costs for training, data acquisition and 3PRs. There also are out-of-pocket costs for mediating activities, such as visiting suppliers, sending in lean or Six Sigma teams, paying early, and qualifying new suppliers. There also are opportunity costs for assigning personnel to the risk program instead of some other activity in supply management.

On the return side, the programs, if working effectively, produce cost avoidances that are not readily measured. The value of avoiding an unexpected supply bankruptcy is hard to accurately estimate. At least one company estimated this cost at more than \$5 million based on an actual experience. Even without this experience, companies readily agree that the cost could be substantial, perhaps even more than \$5 million in some cases.

The prospects of incurring such high costs from supplier failure have made the investment in a risk management program seem prudent. However, the justification rests more in a narrative than on hard and fast figures. Executives at buying companies will have to build business cases that estimate the costs associated with supply interruptions and justify the program on the basis of supply continuity and cost avoidance.

## **Steps to a Successful Risk Management Program**

Research for this study provided several insights into the necessary ingredients for a successful risk management program. Some aspects of a successful program include:

- Top-down driven and supported by top management
- Commitment to fund the program
- A cross-functional approach, not just a supply management issue
- A proactive approach to prevent interruptions
- Continuous monitoring of suppliers
- Executive review of mitigation actions
- An established team that makes the decision on developing a second source. This is the point at which risk becomes so high that the only mitigation is to second source. While developing a second source may be costly, the action is necessary to assure continuity.
- Recognition that this is a new activity in supply management and there are no precise roadmaps
- Trust the data
- Establish a method for estimating the cost of various mitigation actions and for deciding to which budget these costs will be assigned
- Understand the root causes of why a supplier is failing.
- Identify resources outside of the supply chain that will be needed in risk mitigation actions
- In-depth knowledge concerning the services provided by the 3PR

# Case Studies

The following case studies illustrate the development and use of supplier risk management programs at three companies. While each company followed the general approach discussed above, each approached the issue somewhat differently and used different third-party providers.

## Firm X

Firm X is a diversified firm in the energy business and has operations worldwide. It is headquartered in the Southwest United States. Information for this report was taken from discussions with the vice president of Supply Chain Management and her management team.

### Risk Management Program

Firm X has approximately 5,000 Tier 1 suppliers of which about 70 percent are non-product suppliers. Approximately 10 percent of those suppliers were placed on the supplier critical list and monitored. Critical suppliers fell into one of the following categories: sole source, preferred source, suppliers supporting a transition process, and suppliers that have a large spend with Firm X. Most of the firm's casting and forging suppliers, located in 38 countries, fit into one or more of these categories.

Suppliers on the critical list were monitored using the services of a 3PR (Firm C). Suppliers that triggered an alert were placed on the watch list. Buyers made phone calls to and on-site visits with these suppliers to discuss their financial condition. Audit teams reviewed critical aspects of the supplier's operations and finances. The results of the visits and audits were compiled in a supplier risk database

Firm X used several intervention strategies. It conducted a lean event with one supplier to help it

eliminate waste and improve efficiency. For firms needing more hands-on guidance, Firm X provided an on-site team to help improve operations. For other suppliers, payments were restructured so they received their cash faster, enabling them to pay their suppliers and employees. If these actions failed, the business was moved to another supplier.

### Risk Management Program Results

The goal of Firm X was to avoid business interruptions due to supplier failure. During the course of a year, 45 suppliers received critical alerts from the third-party provider, indicating there was a high probability the supplier would go out of business within the next nine months. Over the same time period, approximately 90 percent of the suppliers on the critical list were in the green zone and were not on the watch list.

One of the suppliers in the red zone was a small casting supplier with sales of less than \$1 million. A Firm X team visited the supplier and made a decision to remove the firm's casting patterns. Subsequently the supplier temporarily ceased operations. However there was no interruption to Firm X's operations.

In another case, a key machining supplier with \$8 million in annual sales fell into the red zone. Visits by the buying team determined the causes of the alert to be machine tool purchases made by the supplier as part of a facility expansion that resulted in additional debt and debt payments. Since the equipment required a start-up period, the supplier experienced capacity and delivery performance issues. Firm X reduced its workload with the supplier and kept in touch with weekly calls and continuing financial reviews. The supplier's financials stabilized and started to show improvement once the firm's additional capacity was up and running as planned.

In a third case, Firm X received an alert on a motor supplier. In this case, orders from a different industry had stopped coming in and the bank was at the doorstep of the supplier. A Firm X commodity manager visited the supplier and modified the terms and conditions of its agreement to give the supplier relief and increase cash flow. Firm X also increased its monitoring of the supplier's operations until the situation stabilized. The company was subsequently purchased by a larger organization. Firm X recently visited the facility and found that the lean implementation recommended by its commodity manager was proceeding well. Again, there were no supply interruptions for Firm X.

As its risk management program developed, Firm X realized the need to provide a better understanding of the capability and use of the 3PR's services and incorporate it as part of the overall skill set for the supply management team. Accordingly, Firm X implemented supplier risk management training with more of its supply management team.

## Firm Y

Firm Y, a leading Fortune 500 global security company with thousands of employees, provides innovative systems, products, services and solutions to government and commercial customers worldwide. Its annual purchases are more than \$10 billion. The company has five major business sectors, 1,700 supply chain personnel and 16,000 suppliers.

When selecting a 3PR for its risk management program, Firm Y followed the five-step process outlined in Figure 7 on page 21. After investigating several options, Firm Y selected two providers, third-party provider A for small firms and third-party provider B for large publicly held firms.

### Risk Management Program

1. A "champion" or power user was identified for each business unit.
2. Critical suppliers were identified using inputs from the business units (ground-up) and by the headquarters staff (top-down). Supply managers at the company's business units were asked to identify suppliers that, if they failed, would create major problems for the firm. Independently, the purchasing staff at headquarters started with the organization's entire supply base of 16,000 suppliers. This list was pared down by selecting those suppliers that fell into one of the following four categories:

- Program critical suppliers or those that impact the ability to meet program goals.
  - Unique/proprietary process suppliers
  - Single or sole-source suppliers
  - Program mission critical suppliers or those that have intellectual property that could impact program objectives.
3. The critical suppliers, identified by either the ground-up or top-down methods, were the next group submitted to the 3PRs for analysis.
  4. Firm Y then asked the 3PRs to provide alerts when one of those suppliers experienced a change in their risk rating. A supplier that experienced a change was then placed on the watch list. Deciding what magnitude of change triggered an alert was judgmental at best and could result in increased work if false alarms (false negatives) were triggered.
  5. For example, Firm Y at first thought that a small supplier would be at more risk of going out of business than a large supplier. It initially set rules with the third-party providers that small negative changes were viewed more closely for small suppliers than their larger counterparts. The first 200 suppliers analyzed generated an average of 10 alerts per week. Projecting that number of alerts, the total list of critical suppliers suggested that an extraordinary number of hours would be required each week to analyze the suppliers generating the alerts. Consequently, Firm Y decided to adjust the magnitude of negative changes required to generate an alert to keep the workload manageable.
  6. The business unit buying from a supplier with an alert is responsible for taking action with the supplier. For suppliers that have contracts with multiple business units, the SBU with the highest spend level takes the responsibility for action with the supplier.
  7. Buyers were trained on how to use the 3PR reports. This enabled buyers to understand what they would see on the reports and how to interpret this information.

Third-party provider A provides data based on payment history, which highlights cash flow issues for private suppliers. Third-party provider B is geared to larger public firms and uses the Z-score and other predictive measures. Both 3PRs report on qualitative data such as legal actions and liens on a daily basis for suppliers on the watch list. Comparisons are done for some companies using results from both 3PRs.

When a problem supplier is identified, the appropriate business unit dispatches a group to assess the situation. The team conducts a cost/price analysis, checks quality,

provides technical support and arranges for advance payments as needed. After the team visit the supplier is expected to develop an improvement plan and to make progress in improving its financial condition. If the team believes the situation is beyond help then more drastic actions are considered, such as finding a new supplier or insourcing the item.

## Firm Z

Firm Z is the U.S. subsidiary of a global industrial company headquartered in Europe. The North American headquarters provides management direction and corporate support for all Firm Z operations in the region, including more than 5,000 employees at more than 60 locations across the United States and Canada.

Firm Z uses a combination of three third-party providers:

- Third-party provider C, whose parent company is used by Firm Z's Treasury Department
- Third-party provider D
- Third-party provider E, which is used by Firm Z's corporate supply management unit in Europe

### Role of Third-Party Provider D

Third-party provider D provides Firm Z with three different, but related primary reports and several other reports. The three main reports are described below.

- The first report shows the risk rating for 42 publicly held suppliers on the critical supplier list. These 42 suppliers represent 67 percent of Firm Z's total spend. This report also shows how each supplier is doing in its sector. There is also historical data on how suppliers have fared over the past several years.
- The second report is a comparison of the 37 business sectors monitored by 3PR D. Firm Z uses this report to compare its industry with other sectors.
- The third report allows Firm Z to obtain more specific information for its sector. The report provides information on the financial health of all those companies (51 U.S.-based firms) that fall into Firm Z's sector. This is followed by an executive summary discussing how Firm Z's sector is doing.

Other reports/data provided by 3PR D include:

- Top five rating upgrades by supplier name
- Top five rating downgrades by supplier name
- Number of the 42 suppliers on the critical list that are above/below the sector average risk rating.

- Risk exposure for the 42 suppliers (changes up or down in risk rating scores)
- New exposure for risk, reports significant events that can affect the risk rating (e.g., large increase in debt, significant increase in inventory or receivables, etc.)
- High and very high risk suppliers
- Significant downgrades in risk rating by supplier name
- Bottom five suppliers by risk rating
- Largest five downgrades in risk rating
- Upgrades in risk rating for the 42 suppliers
- Distribution of suppliers by risk rating
- Distribution of risk rating over time (by quarter for three years)

### Using 3PR D's Report Data

Firm Z examines how many of the suppliers are rated high, medium, or low risk and which have been upgraded or downgraded in risk rating. This information is reviewed monthly for the previous quarter and for the prior 12 months. If the monthly average change in a supplier's rating is six points or more and it is below or above the third-party provider's threshold, it receives special attention. A rating change of six points or more in the threshold area either indicates that a supplier's financial situation is improving (moved above the threshold) or deteriorating (moved below the threshold). The six-point movement is set by Firm Z to focus attention on major risk rating shifts and not minor movements. Troubled suppliers are put on the Internal Risk Register (i.e., the watch list) and are scheduled for a meeting to talk about their financials. During the meeting, Firm Z will perform a deeper analysis into what is causing the poor financial performance.

### Privately Held Suppliers

For existing privately held suppliers, Firm Z requests financial data and submits it to third-party provider D for analysis. For new privately held suppliers, Firm Z requests balance sheets and income statements for the past three years and a cash flow statement for the past year. These statements must be certified with a letter from an internal accountant or the auditor. Suppliers are told if they do not submit the financials they will not be considered for business. Going forward, Firm Z will request that suppliers provide annual updates on their finances. To date, no privately held supplier has refused to provide the firm its financial data. Firm Z assures its suppliers that the data is used only for risk management. The supplier can send the data either directly to Firm Z or to 3PR D.

## Customized Reports

One of the reasons that Firm Z decided to use third-party provider D was the provider's willingness to offer customized reports. At the second or third layer beyond the monthly reports, for example, there was a great deal of data but very little of it was summarized graphically. The reports required reviewers to spend a large amount of time reading through the data. Third-party provider D was asked to customize these reports into graphics.

The provider is now in the process of working with Firm Z to develop a modified rating of financial health for private suppliers that would require less data. Third-party provider D spent several months working out a modified rating of financial health, based on critical financial data, and tested the model to provide specific weightings for the suppliers within the sector.

## Role of Third-Party Provider C

Firm Z also is using 3PR C's supply management module. Previously, supply management used the 3PR's credit risk management module that its finance group used. Firm Z uses 3PR C for its private suppliers and likes the provider's qualitative data capabilities. Firm Z also uses the supplier alerts that come from 3PR C. For example, one financially troubled supplier had a significant OSHA violation and the plaintiffs were expected to be awarded a large settlement. Third-party provider C analyzed when this supplier would pay the fine and how the funds would be generated.

## Role of Third-Party Provider E

Firm Z can go to the third-party provider E's Web site, enter a supplier's data and receive a risk report. Firm Z has found the risk ratings from 3PR D and 3PR E to be fairly close. Overall, 3PR E's ratings are more comprehensive than those from 3PR D. However, third-party provider E will not customize its reports. The firm, however, can receive an instant risk rating from third-party provider E, while 3PR D takes 24 hours to generate a report.

## Risk Mitigation Actions

Each month supply managers review the suppliers that fall in the high-risk category based on reports from third-party provider D. This data is compared with reports from 3PR C for confirmation. Once the high-risk suppliers are confirmed, an action plan is created for each.

Every two weeks a review is conducted of all suppliers in a treatment plan or on the company's watch list. First, Firm Z supply managers hold talks with their finance counterparts and with higher-level supply managers to discuss possible actions. Next, there are discussions with the supplier's management team.

Depending on the outcome of those discussions and the severity of the financial problems, the supplier is placed in a treatment plan. The treatment plan could include continued close monitoring or, for the highest risk suppliers, it could include clearly marking all of the tooling owned by Firm Z that is at the supplier's facilities.

All supplier exit plans are reviewed with the CPO before they are executed.

## Results and Challenges

Firm Z has been using this risk management process for a year, and it believes the process has helped identify high-risk suppliers and assisted the firm in developing mitigating strategies. Before the system was in place there were several unpleasant surprises in the supply base. The program now generates early warnings that lead to proactive meetings with suppliers. If conditions at the supplier are troublesome, a deeper financial review is conducted and additional actions may be taken.

One challenge for the firm is to make the risk rating reports useful to the buyers in their day-to-day work. The buyers find the volume of data in the reports overwhelming. Buyers and purchasing managers often do not know how to use the data. Firm Z conducted financial analysis classes for purchasers, but they were not very popular. The firm now is attempting to get buyers to use the reports from third-party provider C since those reports tend to be more qualitative in nature.

# Conclusions

Risk is a common, but not fully understood concept. Risk is indigenous to supply chain management and can never be completely eliminated. The challenge is to manage risk and to mitigate its effects.

Some supply chain risks can be better managed than others. Catastrophic natural disasters, such as hurricanes, earthquakes and tsunamis, are hard to predict. They can cut a wide swatch across many supply chains and can have devastating result on business operations in addition to the human toll they take. For these kinds of risks, contingency planning, scenario planning, and business continuity planning are more appropriate exercises than risk management. Companies cannot take proactive actions to avoid these events, but they can have reactive plans in place if and when the event occurs.

On the other hand, some risks can be managed proactively, and this is the case for much of the supplier financial and operational risk discussed in this report. Risk is defined as the combination of negative events and impact. To a large extent companies can successfully avoid the events and avoid, or at least mitigate, the impact of the events. The results of this research indicate that supplier financial and operational difficulties can be predicted in advance by using sophisticated statistical models that incorporate large amounts of historical and current financial data. The financial data also should be supplemented with more general data about overall economic conditions, sector specific economic data, and company specific data concerning legal actions, government actions, customer actions, product successes and failures, and other significant events. This data, properly analyzed and reported, can give supply managers the capability to see, in a probabilistic way, into the future and to make decisions to avoid the negative event all together, to mitigate the impact of the event or both.

This power to see into the future is not free and its application is not easy. Creating a vision into the future requires having access to computing power, current and historical data, smart modelers, and insightful analysts. This all costs money — and the results are seldom easy to interpret. Understanding the laws of probabilities is challenging. Integrating probabilistic forecasts of supplier performance into the daily lives of supply managers who are already busy sourcing new business, managing relationships with thousands of suppliers, negotiating new contracts, seeking cost savings and productivity improvements, fighting off cost increases and trying to create more value for their companies is even more challenging.

However this research clearly demonstrates that companies can manage supplier risk with the establishment of rational, affordable programs and processes as well as the appointment of capable people to manage those programs and processes. One challenge is the fact that the benefits are mostly cost avoidance — which is difficult to measure and put into a cost benefit or ROI analysis. Nonetheless, supply managers and their internal customers can readily appreciate the avoided costs. Management can understand how the lack of a key component or service impacts business if a supplier goes into Chapter 7 bankruptcy without notice. That is why supplier risk management should be a high priority, even without the benefit of a crystal clear return.

The engagement of third parties to help with this effort is also a question of cost and benefit. Each company will have to conduct its supplier evaluation of third-party providers and determine the benefits before making a decision. Many companies have engaged 3PRs and many have not.

This report has presented reasonable and appropriate approaches to creating a risk management program. By following the recommendations presented in this report, which are built upon good and best practices at several companies, the authors believe that any company can improve its approach to and outcomes of supplier risk management.

## Third-Party Providers of Risk Management Services

The research team interviewed several 3PRs directly and discussed the details of their services. In addition, the research team reviewed the third-party providers' Web sites for further information. The following pages give summaries for each 3PR, its background and services. These summaries are not intended to be a substitute for the due diligence a company should conduct when evaluating third-party providers for possible engagement, but can be a starting point for the evaluation process.

### **Beroe, Inc.**

#### **Background**

Beroe, Inc. is headquartered in the Research Triangle in North Carolina. The principal contact for the interview was Marcy Bucci, vice president of Business Development. Beroe was founded and is jointly marketed by Vel Dhinagaravel, Robert Handfield, Ph.D., North Carolina State University and Mitch Javidi of the Catevo Group.

With increasing globalization and market volatility, market intelligence has become a critical need for organizations. Beroe's founders identified market intelligence as an area of concern for CPOs. They also found that most market intelligence sources were generic, providing one standard report to all clients, regardless of their need.

Beroe views itself as a provider of customized market intelligence. Besides market intelligence and risk management, the company provides other services in the areas of sourcing and sustainability. The company began performing financial risk assessments in January 2009.

Research and analysis headquarters are in Chennai, India, with a support research and analysis center in

Rosario, Argentina. There are also satellite offices in Shenzhen, China; Hanoi, Vietnam; St Petersburg, Russia; Bucharest, Romania; Istanbul, Turkey; and Sao Paulo, Brazil.

#### **Risk Management Products**

Beroe's information network is based on a model similar to the popular professional network LinkedIn. Currently 220 analysts and 2,500 individuals participate in the Beroe network. These individuals post information about supply chain events to a Beroe Internet portal. They report on activity within and outside their firm. This network is especially valuable in countries where very little is published publicly, such as China, Vietnam and Eastern European countries. These individuals then have access to the information posted by others on the portal. Included in this group are about 700 individuals who are paid on a contingency basis. The remaining information providers get limited access to Beroe's market intelligence information in lieu of compensation. The informal network usually does not provide financial data. Those in the informal network are not paid but provide data in order to be part of a network that provides them with data they need. While members of the informal network are not paid, members of the Expert Network are paid on a contingency basis.

**Client use of the financial risk tool** — Currently, 80 percent of Beroe's revenue is for one-time projects from clients that want a snapshot of the soft spots in their supply base. For example, one firm indicated it wanted a view of its supplier portfolio every six months with the report highlighting the trouble spots.

**Supply chain risk assessment** — Beroe has a Supply/Value Chain program for clients that detail their entire value chain back to the raw material. Beroe believes that 90 percent of the risk occurs outside the first tier of

suppliers. Clients, particularly in the pharmaceutical industry, want the capability to map their entire value chain and create a global risk value chain assessment.

Events such as foreclosures and port closings are part of the value chain assessment that is reported in real time to clients. This report is provided to clients for their most critical supply areas. Clients can log in daily to the portal and view their global disruption matrix. This enables clients to spot where there are problems or potential problems. Points in the client's supply chain are color coded red, yellow or green to highlight the different levels of impact.

### **Predictive Indicators Provided to Buyers**

Beroe asks its client to stratify their supply base criticality in terms of the impact on their businesses. Usually this represents the top 5 percent to 10 percent of their suppliers. The financial risk report is comprised of three components: quantitative; quantitative and an overall risk rating.

The quantitative portion uses a blend of D&B data; data supplied by the client about the supplier; and interviews with the supplier directly. Analysts take the financials and perform a quantitative assessment. If the analysts need additional information they will interview the supplier directly. Both public and private firms are tracked. For private firms, Beroe creates a pro forma income and balance sheet based on data provided by the client or supplier. The data is updated monthly or quarterly.

Given the lack of universal accounting standards, Beroe analyzes import and export records and tries to validate the data provided by the international supplier. Analysts attempt to gain an understanding of the supplier's cost structure and then make educated projections about the supplier's finances. Beroe also conducts financial simulations to develop pro forma reports on the supplier's financial condition.

The second part of the risk model is a qualitative component. This is comprised of information from published sources as well as Beroe's informal and formal information network. Qualitative published data is taken from more than 14,000 news feeds, databases, social media and social networking sites by Web "crawlers" and is analyzed. The output contains information about major layoffs, labor force reductions, capital spending plans, lawsuits, regulatory compliance problems, payment delays, loss of key customers, etc.

The third component of Beroe's financial risk model is concerned with market dynamics. This component

analyzes the supplier's markets and revenue sources. For example, if 50 percent of the supplier's revenue is generated by sales to the auto industry, financial distress in the auto industry could create a large risk for the supplier. Other market dynamics indicators are general capacity levels, major technology investments and other market changes.

The data from all three components is triangulated, and the risk score is established by analysts. The output is an "Overall Risk Rating" score for each supplier which can be updated monthly or quarterly. Overall Risk Rating scores run from 0 to 100 with 0 to 33 representing low risk, 34 to 67 medium risk, and 68 to 100 high risk.

The current customer base is characterized as having a few critical products and a limited number of suppliers. Customers are provided a map of their supply chain with each area color coded with a red, yellow or green indicator of relative risk. Supply chain maps can be updated daily if requested by the client, however, periodic updates are more common.

### **Target Market and Pricing**

Market intelligence is Beroe's major strength with a focus on supply chain monitoring beyond the first-tier supplier. Currently, most of Beroe's clients are in the pharmaceutical and chemical areas. The corporate objective is to specialize in serving six to 10 industries. These targeted industries are oil and gas, pharmaceuticals, chemicals, materials, consumer products, and food products.

## **Company Watch (CW)**

### **Background**

Company Watch is headquartered in London, England. The principal contact for the research was Denis Baker. Company Watch (CW) has been in business for 11 years. It is a privately held firm that is partially owned by Tradius. CW currently does approximately 80 percent of its business in the U.K. and the remaining 20 percent in the rest of world. Business growth is focused on the European continent by acquiring public data on privately held firms.

### **Risk Management Products**

The H-score is CW's measure of the financial health of a company, and is the primary output of their risk model. CW characterizes the H-score as a turbo charged Z-score that is more accurate in predicting company failure. It is based on an evaluation of a company's publicly available financial results.

The H-score models are country and industry specific. The H-score rates companies on a scale of 0 (worst) to 100 (best). CW's tests show that H-scores of 25 or less predict failure 12 to 18 months before bankruptcy. Firms at 25 or below won't necessarily go out of business, but ratings in this range indicate a high likelihood of failure. CW's post-bankruptcy evaluations indicate that more than 90 percent of the time H-scores were at 25 or lower when a bankruptcy occurred within the following 12 to 18 months. These tests have also shown that a supplier's H-score is the most accurate predictor of failure. A large downward change in the H-score (e.g., going from 60 to 40) has not been shown to be a good predictor of future failure. It is rare for companies to fail or experience major distress as long as their H-score remains above 25.

To develop the H-score, CW used discriminate analysis with financial data from hundreds of thousands of healthy firms and hundreds of thousands of firms that failed to get predictors for the likelihood of failure. Twenty-one ratios are weighted to compute the H-score for a company. The ratios broadly reflect profit, asset and funding management. The following are eight specific areas for each firm:

#### **Profit management**

- Profitability

#### **Asset management**

- Liquidity
- Inventory and receivables management
- Current asset cover
- Funding management
- Equity base
- Current funding
- Debt dependency

As a further refinement to the model, companies are segregated based on their financial structure. For example firms with high capital requirements, such as airlines, railroads and steel companies, are placed in the same category. CW believes that the key differences in organizational financial performance are not driven by sector but by the firm's financial structure.

CW also has models that are country specific. For small countries, regional models have been developed. Finally, there are separate models for private companies and public companies. The various models apply different weights to the 21 different ratios to calculate the H-score. Discriminate analysis was used to derive the ratio weights for the different models.

**Private company data** — In the U.K. and many other European countries, privately held firms are required to report financial data to the government. This information is publicly available. The D&B data on privately held firms in the United States is not comprehensive enough to run H-scores so supply managers must enter their own data on U.S. privately held firms into the CW system. CW's has a self-use tool that is helpful for this task. The client enters the supplier data and receives an H-score in return.

**Forecasting future H-scores** — The modeling feature is especially helpful when a supply manager wishes to project future H-scores. For example, suppose a supplier is in the distress range (H-score below 25) and the supply manager meets with the supplier to express concern. During the meeting the supply manager finds out that the supplier expects to reduce debt by \$30 million through an equity sale and increase sales by 15 percent. The supply manager can enter this new data into the model and see the projected impact is on the H-score.

**Foreign suppliers** — While the majority of the firm's work is in the U.K., CW is expanding its global capabilities. For firms outside the U.K., CW currently just tracks financials. This includes income statement, balance sheet and cash flow information plus stock prices. Private company data must be collected by the client and entered into the CW model. CW's system retains the data for these privately held firms for each client's confidential use. For public firms outside the U.K., Company Watch uses data from Standard & Poor's Compustat database. Companies in India and China also receive H-scores using the S&P Compustat data run with CW's country specific model.

**Data availability** — Company Watch is currently available as a Windows product, but clients are gradually being transferred to a Web platform. The installed product provides access to Company Watch, which enables the client to review and evaluate the financial health of any company. It also offers a search engine that allows the client to screen the database for companies matching specific criteria and to create portfolios of companies.

#### **Predictive Indicators Provided to Buyers**

As discussed above, the H-score is CW's primary predictive tool. However additional value is provided to CW clients and includes:

1. A five-year history of the firm and probability of distress (PoD score). The PoD score combines economic trends with the financial data and covers three years to provide a medium- to long-term view of financial stress.
2. The ability to follow multiple tiers in the supply chain by obtaining information on supplier's suppliers
3. Allowing buyers to analyze the financial strength of potential new suppliers
4. The opportunity to put forecasted data into the model to permit a look ahead or predicted future H-scores.

**CW client output reports** — These reports provide H-score data analysis in several variations. First, clients receive reports showing H-scores for each supplier over the last five years in the form of graphics. This includes an explanation of financial health and if the financial health weakened, why that occurred. Second, clients receive a score on the probability of a supplier experiencing stress in next three years. This probability of stress is arrived at through a combination of the firm's H-score and the country's economic outlook. In the past the economic data was derived from level of failures for the past three years. CW supplements this with other economic measures since the failure data may be more of a lagging than a leading indicator. Third, a relative risk score on a scale of 1 to 10 is provided. A score of 1 indicates low-relative risk, while a score of 10 indicates high-relative risk. Each subsequent increase in the number doubles the risk, so a 3 would be twice the risk of a 2.

**Implementation cycle** — Understanding Company Watch's services and their uses usually requires two hours of training, which CW provides. Given this short training time, it is recommended that all parties who will be using the service be trained. CW believes that to get maximum benefit and use from the service, the entire sourcing team, some senior executives and one or two power users should be trained. It is good to expose senior executives to the system's capabilities since they are going to receive the reports and need to be aware of the system's modeling capabilities. CW also offers meetings/workshops with clients who want to discuss the relative financial strength of their supply base and CW's view on this.

### Target Market and Pricing

Currently, 25 percent of CW's revenues are generated from government agencies. The agencies use the services to review suppliers' financial conditions. Clients outside the government use the service for supply management, and customer financial and credit reviews.

Software licenses are sold by the seat. Clients get unlimited access for their annual fee.

## Credit Risk Monitor (CRM)

### Background

Credit Risk Monitor (CRM) is a 10-year-old firm located in Valley Cottage, New York. The CEO is Jerome Flum and the president is William Danner. Sales are \$8 million and the company employs 50 people. The firm is publicly held and trades on OTC under the CRMZ symbol. CRM estimates that it tracks \$45 trillion of the world's \$69 trillion in GDP.

Historically, the firm's target market has been credit managers who use CRM's services to assess the ability of a customer to pay bills. The firm is now moving rapidly into providing supplier risk ratings. If a firm is using the CRM model in the area of credit management it can add use in supply management for a discounted fee.

The firm's Web site touts the benefits of its Commercial Credit Reports as a time saver. Instead of spending hours assembling financial analysis CRM says its clients can:

- get ratings and scores in seconds
- see detailed 5-year financial analyses
- rapidly download data into spreadsheets
- quickly compare a company to its peer group

These comprehensive commercial credit reports for more than 40,000 public companies worldwide feature annual and quarterly financial analysis, financial statements, peer analysis, company background information, Moody's ratings and analysis, and Standard & Poor's ratings. Reports also include trade payment data and public filing information, for example lawsuits, liens, judgments and bankruptcy information, on more than 6 million public and private U.S. companies.

Similarly, *Real-Time Monitoring and Alerting Reports* save individuals hours checking news services. The service has the capability to:

- Filter out non-financial stories
- Deliver a single daily list of headlines or full-text articles in real time
- Combine information from multiple news services
- Provide timely and up-to-date information

The client company identifies the suppliers of interest, called their portfolio, and the service will deliver credit-related news, financial updates, SEC filings, and Moody's or S&P rating changes. CRM monitors the

supplier portfolio 24 hours a day, 7 days per week, 365 days a year, so the client always knows what's going on with the companies in the portfolio.

### Risk Management Products

CRM provides two major reports for its customers:

**My Current News** — One e-mail per day summarizing any events that occurred for a tracked firm. This includes bankruptcies, liens, etc.

**Credit Risk Monitor Lookup** — Provides the FRISK score and Z-score for the tracked firms.

Some features of this FRISK score and the CRM service are:

- The FRISK score is a forward-looking score that predicts the probability of failure in the next 12 months. It is based on three indicators: Merton's model of stock price volatility, S&P and Moody's ratings, and the Altman Z-score.
- The FRISK score has a range of 1-to-10 with 1 being the riskiest.
- The FRISK score has been tested on more than 10,000 firms.
- The FRISK numbers are updated quarterly.
- Several ratios from balance sheet and income statement are provided that measure liquidity, leverage, etc.
- CRM does not track privately held firms, but a client can enter data from a privately held firm into the CRM model and receive results of the analysis.
- The data on the firms followed can be sorted any number of ways, for example by FRISK score, Z-score, and by industry.
- Clients can select second-tier suppliers for analyses, and there is no additional charge for analyzing additional companies.

### Predictive Indicators Provided to Buyers

The FRISK score is the main predictive indicator and is reported on a scale of 1-to-10.

The FRISK score is based on a model created by Dr. Camilo Gomez. The composition of the three major tools includes stock market volatility, agency ratings and the Altman Z-score.

Merton's model of stock market volatility is based on the presumption that bond holders carry a "put" against the company since they are owed money. If there are too many of these "puts," namely too much debt, then the firm will experience share price volatility. Thus the model connects stock market dynamics to the implied

credit risk of the company. The model uses six months of volatility data. Some of the key characteristics of the FRISK scores are:

- Credit ratings provided by Standard & Poor's and Moody's provide categorical credit risk information. This information, combined with the historical default rates for each rating category, can be used to arrive at historically reliable estimates of the probability of default for the rated company.
- Altman's Z-score is a refinement of the model created by Edward Altman in the late 1960s and uses balance sheet information to create a relative measure of a company's credit risk. The absolute score is converted to a probability of default by calibrating the Z-score with historical company default data.
- The result of these three inputs is a proprietary score indicating the probability of default for a company over a 12-month horizon. The FRISK scores are a mathematically derived opinion, calculated daily with inputs including the most recently available information in the CRM database. The model has been validated using the histories of 10,000 companies. The FRISK scores are color-coded to reinforce the message. The table below lists the FRISK score and probability of default.

### Target Market and Pricing

The firm's target market is credit managers and supply managers. CRM is unique in that its pricing is published on its Web site and is shown below. The Fundamental Service, including *Commercial Credit Reports* and *Real-Time Monitoring and Alerting*, is a package offered at the following pricing schedule. (See Figure 10.)

### DNBi

#### Background

DNBi is a business unit of DNB and headquartered in Boston, Massachusetts. The principal contact is Jim Lawton, DNB senior vice president and general manager, Supply Management Solutions. DNB is the first of the "new model" firms to combine vast computing power with large databases of financial information to assess the financial risk of companies.

Open Ratings is the predecessor company to DNBi, which was started in 1999 and funded by two venture capital companies (Atlas and Ampersand) along with D&B, which took a minority stake in the firm in exchange for providing Open Rating's data to its

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Figure 9  
FRISK Score and Probability of Default

FRISK	Probability of default within 12 months	
	From	To
10	0%	0.3%
9	0.3%	0.4%
8	0.4%	0.9%
7	0.9%	1.9%
6	1.9%	3.7%
5	3.7%	7.4%
4	7.4%	10.1%
3	10.1%	14.1%
2	14.1%	21.0%
1	21.0%	50.0%

Figure 10  
CRM Pricing Mode

Unlimited-Use Subscriptions		
	<u>North American Service</u> U.S., Canadian, Mexican, and Caribbean companies	<u>Worldwide Service</u> All companies in the CMR data base
Annual Subscription	\$3,950 per year	\$7,950 per year
Each additional password	\$800 per year	\$1,500 per year

customers. Open Ratings evolved out of research at MIT on pattern recognition and machine learning. In conjunction with MIT researchers, Open Ratings developed algorithms for machine learning patterns in large data sets. Open Ratings started with the purpose of vetting companies that were participating in industry-sponsored consortia and other public exchanges. The sponsors of the exchanges did not use the exchanges to buy but wanted to monitor the suppliers who were participating. The idea was to develop a set of predictive analytics that would help the exchanges and their customers with an assessment tool. The major customers at the time were firms such as Commerce One, Ariba, Free Markets, and Lockheed Martin.

Eventually Open Ratings shifted its focus to selling ratings directly to companies. Lockheed Martin and United Technologies were early clients of Open Ratings.

The value proposition for DNBI is to give client companies the lead time to deal with problems and to be proactive in mitigating supplier risk instead of just reacting to problems as they arise. The DNBI system constantly monitors the suppliers in the client's vendor master list and makes predictions about the future. DNBI sends the client alerts of potential problem suppliers so supply managers can take action before the problems occur and not after the fact.

## Risk Management Products

DNBi Supply Management is the online risk management product. It can be installed and running in few days for a new client. DNBi services break down into three parts:

1. Content — This includes revenue and other financial data, legal actions against the company, government actions, etc.
2. Risk ratings — These are provided in several ways to assess supplier risk.
3. Reporting/delivery mechanisms — These give the buyer two choices:
  - Web-based access to the risk rating reports. This is the most popular choice.
  - Integration of the reports into the company's ERP system. DNBi sends daily change files, which the client company manipulates and displays using its own software. This option is not as popular since vendor data masters get corrupted quickly, making it difficult to keep reports and suppliers synchronized.

**Database** — Data collection is one of DNBi's competitive strengths. This is based in part on its access to the Dun & Bradstreet database of company information. D&B currently has data from 145 million companies in its database, with 1 million to 2 million updates per day. A growth area over the past five years has been in offshore suppliers. For foreign-owned subsidiaries, D&B collects data directly from the parent company and directly from the subsidiary in the foreign country.

The DUNSRight™ Process is the standard D&B data collection method. This process collects both operational and financial data about suppliers. DUNSRight™ obtains data from many sources including:

- All county courthouses in the United States where filings of lawsuits are recorded. This data is a very reliable predictor of future difficulty.
- Industry trade associations
- OSHA
- Office of Foreign Asset Control. This office tracks terrorist organizations. If a supplier appears on the OFAC list it is a red flag. One buyer's reaction to an OFAC alert was to turn the ship around in the middle of the ocean and return the shipment to the supplier.
- EPA
- Diversity and certifications, for example ISO, information

Once the data is collected it is matched to an existing D-U-N-S® Number. Next a corporate family tree is created that relates D-U-N-S® Numbers to each other. Once the data is associated with a D-U-N-S® number predictive scores are calculated based on DNBi algorithms.

The Data Universal Numbering System, abbreviated as DUNS or D-U-N-S®, is a system developed and regulated by D&B. The D-U-N-S® Number is a nine-digit number assigned to each business location in the D&B database having a unique, separate and distinct operation. The number is random and the digits apparently have no significance. This numeric identifier is then referred to as a D-U-N-S® Number. It was introduced in 1963 to support D&B's credit reporting practice. It has gained wide acceptance globally and is a common standard. The D-U-N-S® database has more than 57 million entries for businesses throughout the world.

**Vendor master lists** — DNBi is typically able to automatically match 75 percent to 80 percent of the companies in a client's vendor master file to companies in their database. For the remaining suppliers, DNBi must go back to the company to clarify or get more information on the supplier. The vendor master list becomes the buyer's Registered Supply Base. All information for a company in the DNBI data can be related to the D-U-N-S® Number. Upon receiving the vendor master, DNB follows the following process:

1. Entity matching — DNBi matches the supplier to a D-U-N-S® Number at a physical location.
2. Where no D-U-N-S® number can found, one is assigned. Typically 80 percent of suppliers already have a D-U-N-S® Number.
3. The D-U-N-S® Number is used to produce a family tree showing the ownership/corporate affiliations of the firm.
4. Predictive analytics are then run on the supplier data associated with the D-U-N-S® Number.

Once the vendor master list database is provided and cleaned, a client can have a watch list up and running in a matter of days. Each user at a client company can create his/her own watch list of suppliers for alerts. The alerts are distributed to users by e-mail. For each supplier that generates an alert, the buyer can go to the DNBi Web site to review the supplier's risk score and any qualitative data available.

Another feature buyers can use is the Research Model (tab) on the DNBI Web site. It allows companies to build a file of surveys taken and actions performed for a supplier that needs help. There are standard questions

developed by DNBI for the supplier survey or the client can create its own survey questions. For example, the Inventory Survey asks about inventory performance.

Another questionnaire available is the Supplier Assessment Survey. This is different from the other surveys available (e.g., inventory) since it drills down into specific areas of risk. The survey has more than 300 questions. Only a few customers use this survey because it takes too much time for suppliers to complete.

### Predictive Indicators Provided to Buyers

Users receive new alerts daily by e-mail. Based on the criticality of the alerts, users can log in to the DNBI system and review the most recent alerts as well as alerts over the past five months. Users also can select the companies with alerts and see a profile page for the company along with key data points that indicate risk.

Several indicators of potential risk are available to clients including:

1. Supplier Stability Indicator (SSI) — This is based on a risk scale of 0 (lowest) to 10 (highest). It represents the probability that a supplier will experience financial difficulty or go out of business in the next 90 days.
2. Financial Stress Score (FSS) — FSS indicates the probability that a supplier will experience financial difficulty or go out of business in the next 12 months. This score is calculated for each of 26 different countries.
3. Supplier Evaluation Risk (SER) — It is similar to the FSS but is globally leveraged. The SER score shows those suppliers that are in good financial condition for which no action is necessary; ones that are in bad shape and need immediate action, and the ones in the middle who may require action at a later date depending on their next report.
4. Paydex — This index indicates how well the firm is doing with its payables. It is not considered a predictive metric, but a current indicator of financial condition.
5. Overall Performance Indicator — For this index a score of 42 percent, for example, means that 42 percent of the firms are globally more risky than this firm.
6. Business Deterioration Indicator — This score is based on data from a qualitative survey. It indicates if the business is displaying signs of financial distress or operating difficulty. The survey can take 6 to 8 hours to complete.
7. Commercial Credit Score — This score predicts the likelihood of a company becoming severely delinquent in its payments (90+ days past terms) within the next 12 months.
8. Disaster Indicator — This indicator reports on special events and disasters such as fire, hurricanes, etc.
9. Excluded Parties List System -This list identifies supplier facilities that have been excluded by the U.S. government from receiving federal contracts or certain subcontracts.
10. Blended Risk Score -Since different metrics from the analysis are best used for different timeframes, clients have the ability to create a blended score by combining or weighting different indicators. For example the FSS score, which is best for a 12-month horizon and the SSI score, which is best for a 90-day horizon, could be put on two axis of a matrix to show a combined score. Suppliers that scored high on both scores would be considered to have the greatest overall risk.
11. Other reports of adverse judgments, liens, government actions, etc.

### Alerts

Clients can fine tune the alert mechanisms for their own use. For example, a move up in the risk rating (e.g., three to five) or an absolute risk score (e.g., seven) can be used to trigger an alert.

Although the client may want to monitor only a select set of suppliers, DNBI prefers to run the analysis on all suppliers for a company and then work with the company on establishing the alerts mechanism. For U.S.-based suppliers it doesn't matter how many suppliers are monitored, as the computers are fast and the algorithms are efficient. For international suppliers, DNBI may have to pay for data from their international partners and this can limit the number of suppliers it will analyze for a customer without additional fees.

There are three major ways to handle alerts.

1. The Customer Center of Excellence at DNBI receives the alerts. Employees at DNBI review the alerts and determine if action is needed based on in-depth research of the supplier. This provides good research and analysis but does not include the in-depth supplier knowledge that buyers have.
2. Buyers get the alerts. Information gets to the buyers quickly. The buyers have the in-depth knowledge of supplier, but are less capable of analyzing the data.
3. Alerts go to power users. They have good analytical skills and in-depth supplier knowledge. However, the amount of time they have to devote to this task may be limited.

The Center of Excellence is a way to quickly implement the DNBI services. For every alert, the center will issue a report. The customer can use this method initially and, after gaining experience, the customer can perform the analysis. There is an additional fee for this service

DNBI provides advice on alerts and suggests that users start with simple reports and put the alerts into one of three categories: no problems; middle ground and big problems. The middle ground alerts require the most judgment and experience.

Other ways clients can use the DNBI predictive system include:

- Creating a watch list of suppliers that are at risk
- Getting alerts history from start of system use
- Setting and modifying alert triggers (e.g., change in SSI score)
- Creating data triangulation. For example, if the customer is qualifying a new supplier, it can get data from the supplier. DNBI can also get data about the supplier. DNBI can flag any material differences, which allows the purchaser to further investigate the supplier.
- Building a project file that all buyers can work on. For example at one company, 16 buyers got an alert on a supplier. No one took action because each assumed that someone else would. Companies should create a project or file for a supplier that everyone can see and review. Supplier responses also can be included in the project file.

### Training

Training gives the buyer an understanding of why an alert was issued. After training, a buyer can properly analyze the reason for an alert and determine if it is critical enough to warrant contacting the supplier. It also discourages a one-size-fits-all analysis. For example, one client uses a binary approach. If a supplier scores seven or above on SSI, the company would not do business with that supplier. According to DNBI, this binary approach is too simplistic and other factors should be considered. During or after training DNBI will run tests on a subset of suppliers for a client to show buyers which suppliers are at risk and why. If a client chooses to have buyers or power user do the analysis, DNBI recommends two days of training for basic information on the system. More training is needed to learn how to use scorecards, assessments and other aspects of the system.

Training also helps increase familiarity with the system and increases the chances buyers will use the system. DNBI will perform basic training for client personnel to

get them thinking about the process, what companies should be on the watch list, and how alerts are to be set. The typical training period is two days. If the project is a major change management initiative for the client then a consulting firm is engaged to help with the training. This more detailed training also covers how to set up customized scores, perform surveys of suppliers, and use the spend analytics provide by DNBI. Another challenge is to get companies to do more in-depth risk analysis beyond the metrics provided by DNBI by using other available information from DNBI or from surveys. Most users require a lot of training on what to do with the information reported. Training needs to be comprehensive since risk management is a new role for buyers.

### Target Market and Pricing

The original target market for the DNBI software was very large firms. These customers included Lockheed Martin, Raytheon, Eaton, Honeywell, Dresser, United Technologies and others. Now any firm that is concerned with managing supply base risk is a potential customer.

DNBI's contracts are on a fixed-price basis. There is no per seat fee so any number of employees can see the data. One client, for example, has 30,000 users, but more typically a client will have 100 to 1,200 users. DNBI will monitor the entire supply base or parts of it. The only difference for DNBI is that a client with more suppliers on the watch list will receive more e-mail alerts. DNBI prefers to run the analysis on all suppliers for a company and then work with the company on the alert mechanism. The client may want to monitor only a select set of suppliers. For U.S.-based suppliers, it doesn't matter how many suppliers are monitored and DNBI does not charge by the supplier. For international suppliers, DNBI may have to pay for data from its international partners and this can limit the number of suppliers it will analyze for a customer without additional fees.

Justification of costs can't be performed using the traditional ROI method since risk management will often add monitoring costs to avoid major costs of a supply interruption. One client study concluded that one supply chain disruption cost the firm an average of \$5 million.

### EQUIFAX

#### Background

Equifax is headquartered in Atlanta, Georgia, and employs approximately 7,000 people in 15 countries throughout North America, Latin America and Europe.

Equifax has been in business for more than 100 years. The principal contacts during this interview were Craig Schiro; Greg Crowe, vice president of Product Management; and Dr. Reza Beraszak Sr., vice president of Commercial Analytics. Dr. Beraszak developed the risk management systems, built the decision models and developed the scores. Sarah Urlich and Ginny Wright of the analytics department also participated in the interviews.

Equifax markets itself as a global leader in information solutions. Its database contains one of the largest sources of consumer and commercial data. The firm uses advanced analytics through its proprietary technology to create customized insights to enhance the performance of businesses. Businesses rely on Equifax for consumer and business credit intelligence, portfolio management, fraud detection, decision support technology, marketing tools, and risk management. Equifax services include: due diligence on customers; risk management for suppliers; database management; and employment verification background checks.

### Risk Management Products

The company's distinctive competence in supplier risk management is in small business information. Small businesses comprise 99.7 percent of all U.S. firms. Equifax has data on more than 50 million small businesses in their database.

**History of the Equifax small business database** — In 2000, Equifax was approached by credit card firms to help them manage risk data for small businesses. Forty-eight of the top 50 banks agreed to send data on their small business customers to Equifax through the Small Business Financial Exchange. This data reflects the payment history of the small businesses and is reflective of the cash flow for the business. The small business database also tracks bankruptcy ratios by region and business type. In 2006 Equifax developed a persistent identifier enabling tracking of two independent firms owned by the same person or organization.

### Predictive Indicators Provided to Buyers

There are 44 data elements that go into the calculation of the risk score for small suppliers. The predictive risk scores reported by Equifax include:

**Business failure risk score** — The range is from 1,000 to -1,880 with 1,000 indicating the highest risk of failure. It is designed to predict the likelihood of business failure through either formal or informal bankruptcy within a 12-month period.

**Business failure risk class** — This groups businesses into one of five classes based on the business failure risk score. Class one indicates the lowest risk of failure and class five the highest risk of failure.

**Small business credit risk score** — This score predicts the likelihood of a small business incurring greater than 90 days delinquency, charge-off or bankruptcy on supplier accounts over the next 12 months. The score range is 101 to 816 with a higher score indicating lower risk. The score uses unique bank loan, credit card and lease information, as well as supplier, telecommunications and utility company credit history, public records and data from the Equifax commercial database. In addition to the quantitative score, qualitative codes are provided. Two examples of these are the number of years a firm has been in business (the longer a firm has been in business, the lower its risk), and evidence of liens or judgments.

**Business failure national percentile** — This is a rank ordering of the business failure risk score. It indicates where a company ranks compared to other businesses in the Equifax commercial database. Percentiles range from 1 to 100 with the first percentile being the highest risk.

In addition to these scores, Equifax will work with the buying firm to develop a category rating for the supply base. Suppliers are placed into a one of nine categories representing relative risk. The sample report below shows 640 suppliers in the "1" category with a 0 percent chance of bankruptcy while 960 are in the "9" category with a 64 percent chance of bankruptcy. (See chart below.)

### Target Market and Pricing

The target market is companies that need risk assessments for small companies.

Pricing for Equifax is based on the number of suppliers in the supply base; the larger the supplier list the higher the fee.

Category	1	2	3	4	5	6	7	8	9
Number of Companies	640								960
Change of Bankruptcy	0%								64%

## Rapid Ratings

### Background

Rapid Ratings (RR) is headquartered in New York City. The principal contact is James Gellert, CEO/President.

Patrick Caragata, Ph.D., founded RR in the mid-1980s. He attended the University of Toronto where he was influenced by the book *Structure of Scientific Revolution* by Thomas Kuhn. The theme of the book was that for every paradox there is always structured ways to solve a problem. Those who look for and can find early warning signs will be at advantage in the business world, according to the book. This idea was a driving force behind the founding of RR.

In the 1980s, Caragata was employed in the Country Risk Department of Toronto's Dominion Bank. His job entailed doing risk analysis of different countries. His research revealed that reports published by the large financial houses didn't provide any additional information than the *Financial Times of London*. He was surprised companies were paying money for data that had no predictive capability.

When reassigned to a project on NAFTA, he began working with econometricians. From this experience Caragata learned the lesson that one must let the data speak. Bringing various constructs, conceptual models and other issues into the data covers the true meaning. At that point, he started to see the advantages of building models for predictive financial analysis.

His next position was as chief tax policy advisor in New Zealand, a country that had the first electronic tax filing system. At that time New Zealand had 100,000 companies. Caragata was able to access this data and started to build models looking at various financial variables and ratios that would predict business stress, or ultimately failure, which thus precluded businesses from paying taxes.

His models outperformed market share price and credit default swaps spreads as predictors. One reason for this is that models that use share price and credit default swap spreads are unreliable in the short term because there is subjectivity in markets resulting in overshooting or undershooting the targets. In general, it is much easier to forecast three-to-five ahead than three-to-six months ahead. After developing his model of the key ratios, Caragata built a second model to test the first. This second model confirmed the results of the first model.

Two other individuals worked with Caragata to develop the econometric models. They were Adolph Stroombergen, Ph.D., econometrics, and Paul Dunmore, Ph.D., physics with a masters in accounting. These two worked on validating the models and ratios.

Caragata eventually sold his 85 percent share of the company to an Australian Company, Collection House. Jim Gellert and his partner purchased the business in 2007 and moved it to New York City and are now operating the business in the United States.

### Risk Management Products

Rapid Ratings saw a market need for an unbiased, non-conflicting, uncorrelated and trusted source of insight into securities issuers and corporate counterparties' financial health. Rapid Ratings provides this with its unique and proprietary quantitative ratings system called Financial Health Rating (FHR). FHR measures a company's overall ability to remain competitive against its global industry peers. Rapid Ratings can rate both private and public companies in the same way and on a global basis. RR employs a user-pay instead of an issuer-pay model, avoiding any conflicts of interest.

The FHR is based on robust and adaptive models that combine extensive financial ratio analyses with nonlinear modeling techniques. FHRs are the product of the automated econometric analysis of 62 efficiency ratios that examine how effectively a firm uses its resources. The FHR system compares each company to a proprietary data set of more than 300,000 companies with more than 30 years of history. The proprietary model is based solely on company financials. The FHR is reported on a scale of 0 to 100. An Estimated Probability of Default (EPD) model is derived from the FHR, based on extensive analysis of historical defaults. For example, during the 1990-2007 period, 50 percent of all companies that defaulted had an FHR score of 20 or lower

**Database** — The FHR database contains data on the Russell 3000 without REITS and insurance companies. In addition there are 100 U.K. and 100 Canadian firms. At the end of 2009 the public database was to be expanded to include the Russell Global 10,000. Data is acquired from Bloomberg's public database, which includes more than 60,000 firms. There are 1,000 private firms in the RR database. The overall strategy is to maintain data for 3,500 U.S.-based firms, called the core group. Standard updating for large firms in the U.K. and Canada is twice per year, while U.S. firms are updated four times per year. The current data set has 9 million observations in it. This extensive data set

provides a robust model that builds on itself. Every five years the ratio weightings are reviewed and updated as necessary.

**Privately owned firms** — The buying organization supplies the financials on all privately owned firms and Rapid Ratings runs its model using this data. Updates are put into the system as provided. Rapid Ratings does not distinguish between audited and non-audited data. Rapid Ratings needs the income statement (with details) and balance sheet from companies to perform an analysis. Rapid Ratings likes to have three periods of data (quarters or years) to perform an analysis. Once financials are input and tied to an industry model, companies can be coded and their names do not have to be revealed. The client company can identify them from the code.

If a supplier does not want to give the customer its financial data, the supplier can provide the data directly to Rapid Ratings for analysis. Rapid Ratings is in the process of setting up a third party to receive the data, which would then be provided to RR for analysis. Currently, 15 percent to 20 percent of customers are disguising the names of their privately owned suppliers.

Completeness of data from companies is a concern, since Rapid Ratings needs 29 inputs from the financial statements to create the 62 ratios. Rapid Ratings is currently studying how missing data affects the FHR ratings. Current results indicate the FHR will be three to five points lower on average with missing data.

**Foreign companies** — Using the FHR with foreign suppliers requires tying the score it to an ethics index. In general, developing countries have different standards in their presentation of financial data. Therefore the data needs to be adjusted based on this ethical index.

**Accessing reports** — Rapid Ratings has a Web site from which all reports can be accessed. Clients can login and receive a flat file with data and a downloadable Excel file. On the screen the user sees the reported risk levels associated with the FHRs. Clients can see reports only for the public companies for which they subscribe and only for the private companies for which they have submitted financial data.

**The FHR model** — Each industry model contains different weightings for each of the 62 ratios. A strong group of companies in each industry is used to establish the weightings based on correlations of the ratios to financial performance in the industry. The same 62

ratios are used for each industry, only the weightings change.

**Publicly held companies** — Reports for publicly held companies are updated automatically by taking data from Bloomberg and feeding this into the Rapid Ratings model. A firm in India collects data from private firms and enters the data into templates from which the FHR analysis is run. RR's time to generate the FHR report on a company is decreasing. In 1997-1998 it took 15 minutes to process the report, one year later it was down to 3 minutes and is now down to 10 seconds.

Rapid Ratings is in the process of testing the impact of a reduced number of ratios (reduced model) on the FHRs. So far testing shows lower ratings result with a reduced data set. In the future the client company will have to decide which model it wants to use.

**Automated ratings** — Reports are generated automatically with no intervention by analysts. This eliminates any subjectivity, conflicts of interest, and issues concerning analysis by people, including a variation in skill level. There is a concern that people can have a bias for "management's story" in their analyses. Automation also makes report generation highly scalable, so an unlimited number of companies can be added to the database. Rapid Ratings is building out new reports that are interactive so clients can run their own analysis. RR is also developing a more compact report for clients on a custom basis. Companies also can look at their own FHR scores and use them to improve their own operations.

### **Predictive Indicators Provided to Buyers**

The Financial Health Rating is RR's major predictive indicator. RR believes that a change in the FHR is more important than the absolute number. However, RR does recommend that the frequency of updating the FHR should vary with the absolute rating. Rapid Ratings recommends:

- For FHR of 50 or greater, update the FHR semiannually
- For FHR of below 50, update the FHR quarterly
- For FHR in the low 20s update as often as possible.

RR reports to users the risk levels associated with the FHRs. The five categories are: low; moderate; medium; high; very high. For example an FHR below 40 is high risk; 40 to 59 is medium risk. When the FHR drops below 65, an alert is triggered and the client should start to look for drivers of the drop, such a major

restructuring or taking big write-offs from closed facilities. Large changes of nine points or more also generate alerts.

A client can request a report on any one company or can create custom sectors or groups of companies for a report. The reports are updated quarterly for public companies and periodically for private firms.

Rapid Ratings creates a weekly supplier risk report for the client. The client provides, for example, the 100 largest suppliers or counter partners (e.g., banks) with whom they have some risk (e.g., hold cash or investments) and need a rating. The ratings are shown by category and movement of the FHR.

**Implementation cycle** — Style of use styles depend on a company's organization structure. In addition to supply management, some credit departments use the reports to perform due diligence on customers. The majority of the clients pay for two seats although one new client is a 100-seat customer. Basic training on the system is provided by Rapid Ratings. Additional training is provided by consulting/training companies.

### **Target Market and Pricing**

The current target market for supply chain analysis is the Fortune 1000 firms, but RR management believes size is not a factor in its application in supply management. Currently the firm is strongest in the energy sector of supply management with six to eight clients. Other supply management clients are in technology and aerospace, and RR is starting to get some interest from retail firms. Within these organizations the functions targeted are Treasury, Credit and Supply Management. Direct sales methods are used and a technical representative accompanies the sales representative on calls.

Pricing depends on what services are subscribed to. Rapid Ratings prices some products by the numbers of users or seats. Usually one or two seats are enough and these users share the data with others in the organization. Organizations can share Rapid Ratings data internally although the company monitors this for overuse. Current annual subscription charges range from \$15,000 (two seats) to more than \$100,000.

# Research Methodology

## Introduction

The objective of this research is to provide supply managers with a framework for managing both financial and operational risks in supply management.

Three specific research questions guided the research effort:

1. How do supply managers proactively identify, assess and mitigate supplier financial and operational risks?
2. What value can third-party providers (3PRs) bring to the process of identifying and assessing supplier risk?
3. What are the mitigation strategies used by supply managers to proactively manage these risks to minimize potential disruptions?

The research is timely in that the recessionary period of 2009 and 2010 created increased probabilities of supplier financial failure. Additionally, the subsequent recovery could strain the capacities of the remaining suppliers and create cash flow, delivery and quality problems. The outcome of not managing risk is supplier disruptions. Given this environment many firms are asking how to implement risk management programs.

Since risk management programs are relatively new to supply management, answering the above research questions required interfacing with firms who had implemented risk management programs in supply. Given the challenges of managing such a program solely from inside the corporation, the next step required an understanding of the various third-party providers that provide data to supply management about the financial health of the buyer's supply base. The knowledge collected in this research should help later adopters to reduce the risk management learning curve and enable the implementation of such programs more quickly within their organizations.

## Research Design

Field research was the primary method used to collect data for this research. In-depth telephone conference calls were used to supplement on-site face-to-face visits. The research design included in-depth interviews with 3PRs and buying organizations that had implemented risk management solutions. While risk management is relatively new to supply management, previous writings were reviewed to extract information thought to be important in the interview process. Contacts were sought at the highest levels in all the organizations interviewed.

## Data Collection

The CAPS Executive Roundtable provided input on 3PRs that companies were using, had used or considered using. Eight in-depth 3PR interviews were conducted. Third-party providers were each asked for the names of clients who were using their product. The buying organizations were selected based on recommendations by 3PRs and through the researchers knowledge of their previous involvement in risk management through CAPS presentations and statements about their risk management programs. This resulted in four in-depth user analyses being developed. All of the in-depth analyses were from organizations that had made a substantial commitment of resources to risk management. Three of the four had established programs, and one was 12 months into its program. Further, data was collected through a CAPS Roundtable of risk management users that was convened in Indianapolis and attended by 14 organizations active in developing risk management programs. In some cases, attendees from the same organization who were in supply management and finance discussed their efforts in risk management. This provided a view of risk management from functional groups within the organization, but outside of supply management.

For the in-depth interviews and conference calls two structured questionnaires were developed. One for supply organizations that had implemented risk management and one for 3PRs. Questionnaires ensured consistency in the data collection across organizations. All respondents were assured that their comments were confidential and would not be attributed to them.

### **Analysis of Data Collection, Writing of the Report**

The interview notes, field interviews and conference calls were compiled and reviewed by each of the researchers independently. Next the researchers discussed any differences in their notes and worked to reach a consensus. Key points and takeaways from the interviews were used to develop the report.

The report is based on data collected from organizations using risk management in their supply base and the supplementary capabilities of 3PRs in providing assistance to supply management. An outline for the report was developed from the objectives of the research. The report was drafted by categorizing respondent comments into each of the major areas on the outline. This, in turn, was the basis for writing the narrative that became the basis of the final report.

# CAPS Research

**CAPS Research** was established in November 1986 as the result of an affiliation agreement between the W. P. Carey School of Business at Arizona State University and the Institute for Supply Management™. It is located at the Arizona State University Research Park, 2055 East Centennial Circle, P.O. Box 22160, Tempe, Arizona 85285-2160, telephone 480-752-2277.

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