

IBM Institute for Business Value

Combating risk with predictive intelligence

An analytical approach to enterprise risk management



IBM Institute for Business Value

IBM Global Business Services, through the IBM Institute for Business Value, develops fact-based strategic insights for senior executives around critical public and private sector issues. This executive report is based on an in-depth study by the Institute's research team. It is part of an ongoing commitment by IBM Global Business Services to provide analysis and viewpoints that help companies realize business value. You may contact the authors or send an e-mail to iibv@us.ibm.com for more information. Additional studies from the IBM Institute for Business Value can be found at ibm.com/iibv

By *Karen Butner*

Complexity and risk define our business environment, yet executives must often look in the rearview mirror with reactive hindsight to sudden geo-political risks, tragic natural events, market disturbances and global economic swings. Even daily operational disruptions and interruptions are typically handled in a reactive – instead of a proactive, predictive – manner, with resultant financial consequences. But companies with leading risk management practices are looking forward, applying “predictive intelligence” to proactively mitigate and manage complexity-fraught risks, while bringing significant value to their bottom line and their brand. These forward-thinking organizations see change as an opportunity, and they act on possibilities, not just react to problems. The question is how?

What risk factors keep executives awake at night, and what strategies do they employ to alleviate the effects of risk on the performance of their enterprises?

To learn the answers to these questions, the IBM Institute for Business Value polled 404 executives across a wide variety of industries and geographies (see sidebar, “Research overview,” page 3). As might have been expected, understanding risk is the first step to managing it. Companies can begin by profiling risk factors so that they can be assessed quantitatively. They can model risk events with scenario analysis and apply “predictive intelligence” techniques to proactively mitigate and manage risk.

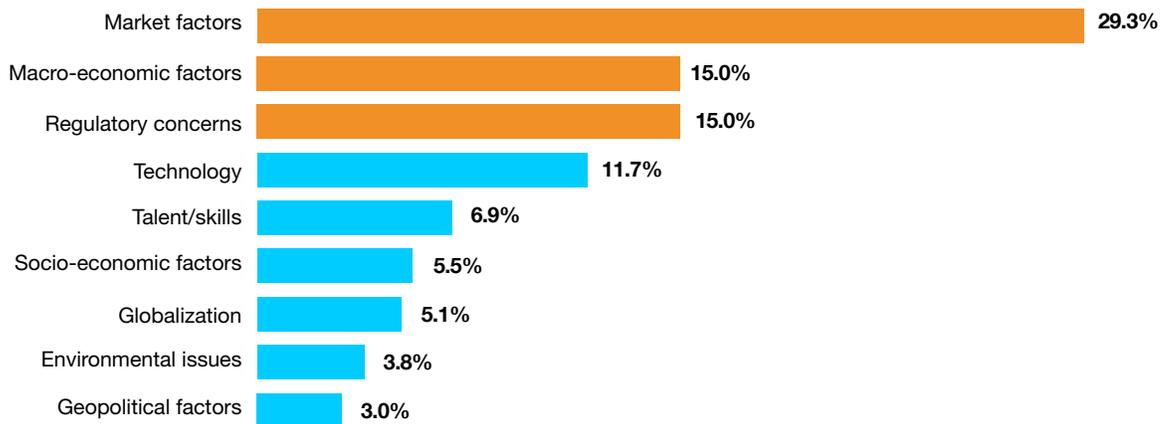
The ability to plan and implement innovative risk management strategies is becoming increasingly critical in today’s volatile world – one in which a single, unplanned event can cripple

even the strongest of enterprises. And as complexity in the business environment continues to mount, so, too, does the magnitude of risk factors companies must confront on a daily basis.

It is a riskier world

When asked to rank the three most important external forces impacting their organizations in the next three to five years, executives we interviewed cited market factors, macro-economic factors and regulatory concerns (see Figure 1, page 2). Other key external forces included technological advances, talent/skill shortages, socio-economic concerns, globalization, environmental issues and geopolitical factors. An overwhelming 77 percent feel as though their risk exposure has increased year-to-year. *Not a single respondent said risk is decreasing.*

What are the three most important external forces that will impact your organization over the next three to five years?



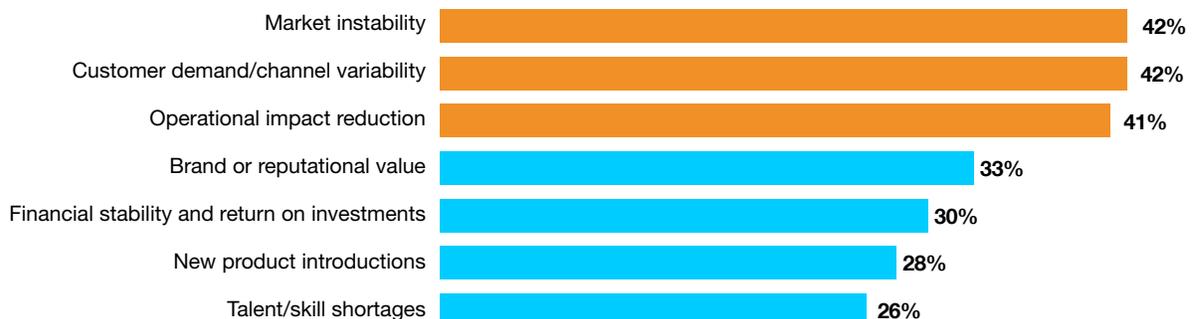
Source: IBM Institute for Business Value Risk Management Study

Figure 1: In the next three to five years, market factors, macro-economics and regulatory concerns will greatly impact enterprise performance.

The volatility of today’s global economic environment places intense pressure on enterprises, increasing risk exposure and impacting markets, customer demand, operations, brand and stability. Organizations often struggle to respond. Respondents to our survey cited market instability, customer demand/channel variability and impact on operations as their top areas of concern (see Figure 2).

Many organizations are responding by increasing their focus on refining those sales and operations planning processes that combine sales and marketing, finance, operations and executive vision to develop enterprise-wide consensus plans. Companies are also reevaluating their distribution channel strategies and, in many cases, reconfiguring their global networks of assets and relationships. Enterprises concerned with brand value and

Percent ranking significant risk factor



Source: IBM Institute for Business Value Risk Management Study

Figure 2: What key risk factors keep you awake at night?

growth strategies are responding with new product/service innovations, many of which are focused on growth markets. Those forward thinkers that are establishing best practices in risk management are applying insights from customer data and risk indicators across products and geographies to integrate operational and financial performance. They are using analytics at every opportunity to gather intelligence to fight risk exposures.

Assess risk for value

CEOs and C-suite executives have long been accountable to a varied group of stakeholders, including their customers, employees, communities and investors. These stakeholders are increasingly demanding executives articulate and demonstrate comprehensive risk management strategies that reduce exposure in today's changing and complex global marketplace. These strategies must assess and prioritize risk factors, as well as quantify business value.

Our study reveals that many companies are already developing their risk strategies. More than half of those executives we surveyed (53 percent) said they have a well-crafted and communicated risk management plan in place. But these plans are often reactive to operational disruptions, rather than proactive. Their plans are attentive to what needs to be fixed, as opposed to a proactive, preemptive risk strategy. Those exhibiting leading practices, however, consider risk management to be core to their overall business strategy and plan accordingly.

Research overview: Study methodology

The IBM Institute for Business Value surveyed and/or interviewed executives at 494 global companies representing 32 industries in 34 countries. Company sizes ranged from less than US \$1 billion (31 percent) to US \$1 to \$10 billion (34 percent) to over US \$20 billion (35 percent). Executive participation included Chief Risk Officers (12 percent), other C-Suite executives (29 percent), Senior Vice Presidents/Executive Vice Presidents or General Managers (27 percent) and Directors (32 percent).

An analytical approach to risk management combines risk efforts taking place enterprise-wide – integrating them into a cohesive whole and applying the results to all business decisions. Our research analysis identified a group of companies – 20 percent of the survey population – that incorporate “leading” practices to predict and manage risks holistically. Companies in this group share a common set of characteristics:

- They assess and prioritize risk factors, while quantifying business value
- They model scenarios with probability-adjusted analysis to develop a comprehensive risk mitigation plan
- They apply the same degree of responsiveness to unplanned events and disruptions as they do planned events.
- They predict and act proactively and collaboratively with their extended global network.

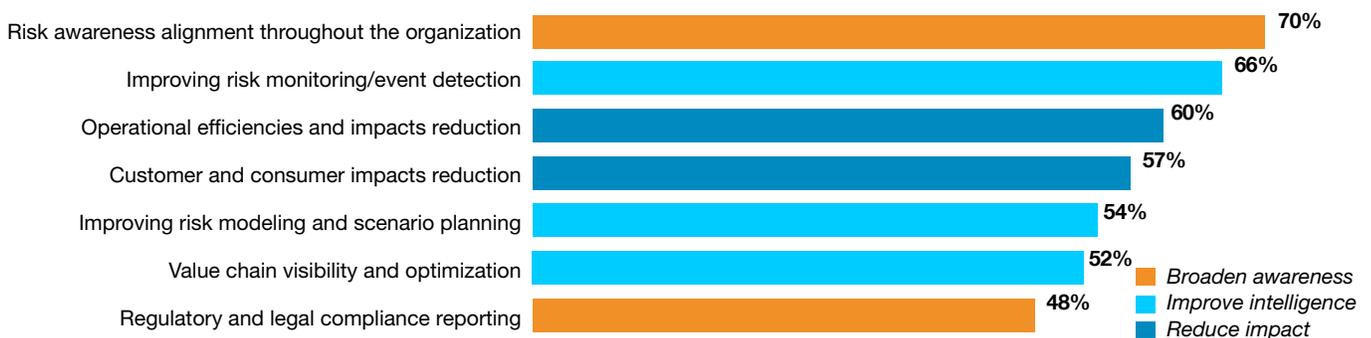
These leaders experienced greater cost efficiencies by eliminating operational interruptions. By removing the long-term effects of these disruptions, leaders, compared to others, were also likely to have improved their brand reputation, enhanced their competitive posture and generated greater growth opportunity.

A successful program must be aligned with the business strategy and have the attention and commitment of leadership. In our study, 30 percent of respondents indicated that their programs report to the CEO's office, while another 29 percent report to the CFO. Many (34 percent) have entitled a Chief Risk Officer or equivalent. Commitment by senior executives reflects the importance of the risk program to the overall health and wealth of the enterprise and its stakeholders. Sixty percent of our respondents said business resiliency and risk management is a joint responsibility of all C-level executives.

Creating risk plans and putting supporting processes and leadership in place starts with the creation of a business continuity plan in which companies use scenario planning and other analytic methods to evaluate probabilities and assign rankings to their risk factors and profiles. In addition to assigning overall responsibility to a single executive, they are also establishing company wide risk management teams, developing integrated alignment with their operational/supply chain partners and creating communications and training programs.

Executives are also concerned with the effects of various risk factors on their overall enterprise performance. Their strategic objectives highlight broadening risk awareness throughout the organization and across their global network of partners (see Figure 3). They are reducing operational and customer impact by increasing visibility and "intelligence" applied to risk scenarios. To accomplish this, they are modeling processes against the probability of various risk events. Using advanced analytics and other tools, they monitor their risk tolerance against the probability threshold of a risk event occurring. Many are investing in risk-related solutions to improve risk assessment, monitoring and event detection, while implementing a consistent governance model and enterprise-wide framework. Their objectives are to broaden awareness, reduce impact and improve intelligence to avoid, remediate or recover from risk-related events and disturbances.

What are the strategic objectives of your enterprise risk strategy?



Source: IBM Institute for Business Value Risk Management Study

Figure 3: Strategic objectives highlight awareness, impact and intelligence.

As shown in Figure 2 (see page 2), market instability and customer demand/channel variability were the top factors executives said cause them to lose sleep. Additionally, demand variability was cited as the most significant challenge by operational and supply chain executives in the IBM Institute for Business Value supply chain study, “*New Rules for a New Decade*.”¹ Many forward thinking, proactive executives are using analytics and optimization modeling to tame the effects of demand variability (see Case study: “Customer demand/channel variability risk avoidance”).

Even with the enhanced attention many companies are placing on risk management, numerous barriers in planning and execution remain. According to our respondents, these barriers range from a lack of adoption of best practices and emerging technologies, (21 percent), to a lack of C-suite vision, commitment and funding (14 percent). A concentration on functional needs (i.e., functional silos, cited by 28 percent of respondents) has inhibited many companies from executing an integrated, executive-led enterprise risk management program. But the biggest single barrier remains budget limitations and the inability to predict the return on investment of various risk programs and solutions (37 percent). To fund risk initiatives, executives are looking for the business case that demonstrates return on investment in terms of cost efficiencies, brand reputation, growth and competitive advantage.

Our research uncovered that leading companies are applying analytics to assess risk and quantify avoidance value. These leading companies have analytical tools in place to compare and report actual assessed risk versus risk tolerance across their portfolio of risk factors and positions. Executive management prioritizes resource allocation based on the gap between risk tolerance and assessed risk or opportunity. The established risk tolerance parameters are examined periodically as part of the normal planning processes.

Case study: Customer demand/channel variability risk avoidance

What if inventory levels were optimized with marketing activities to reduce the risk of today's customer demand variations?

A large India-based retailer transforms inventory management and increases sales with an analytics-driven solution that systematically tracks product movement and launches promotional campaigns based on product stock level, availability and current demand forecasts.

The inability to optimize inventory and react quickly to customer preferences and demand variations was eroding sales and driving up costs for this large retailer. The problem stemmed from lack of information – a highly complex, decentralized and disparate IT infrastructure limited management's visibility into operations, inventory, purchasing and marketing. Demand data was faulty and delayed. Store and distribution channel stock levels were miscalculated. Customer profile data was practically nonexistent. And marketing campaigns were not aligned with actual demand fluctuations because of recessed market conditions.

After implementing an advanced analytical “engine,” this 80-plus store company radically improved its risk posture, including the ability to optimize inventory, react to demand trends and increase revenue. In addition to delivering hourly, organization-wide and store-level sales data, the system tracks products as they move throughout distribution channels, facilitating real-time decision making. Using analytics to profile and target customers based on buying trends, coupled with a logic-based promotion module, the company is able to launch product-specific promotions and replenish inventory according to actual demand streams.

“Now when our customers shop our stores, the products they want are there. Our promotional campaigns are better targeted. And our distribution channels are aligned with right-sized inventory levels. We monitor and react to customer demand variability now.”

- Vice President, Merchandising and Supply Chain,
Retail company, India

The results are astounding. These leaders have comprehensive programs to predict, monitor, detect, communicate, manage and mitigate risk exposure. They have reduced environmental risk effects and have reduced the impact on operations and their complex global supply chains. At the same time, they are averaging 20 percent more value from their predictive, intelligent risk strategies and initiatives. They are seeing:

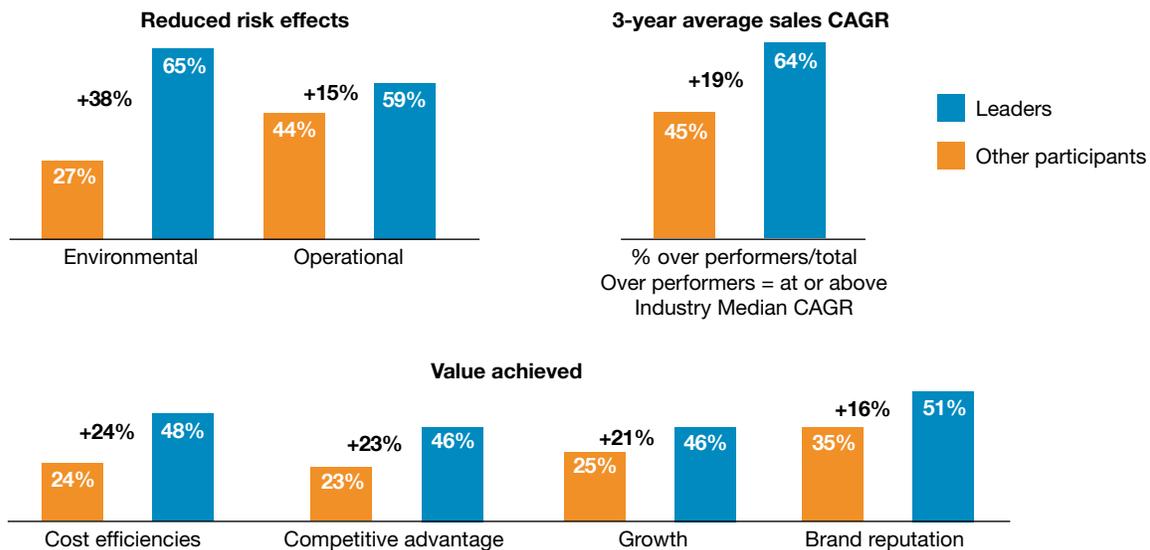
- Greater cost efficiencies through modeling risk scenarios and optimizing processes (+24 percent)
- Improved competitive advantage (+23 percent)
- Greater growth from reduced interruptions to product/service delivery and customer satisfaction (+21 percent)
- Improved brand reputation from reduced disturbances that may cause negative impacts on brand influencers.

We evaluated the Compound Annual Growth Rate (CAGR) over a three-year period for publicly traded participants. Our leading practice community achieved 19 percent higher CAGR than the rest of the population. Although a lot of factors go

into a company’s growth successes, managing and mitigating risks clearly contribute to the overall enterprise performance achievement (see Figure 4).

Model to mitigate

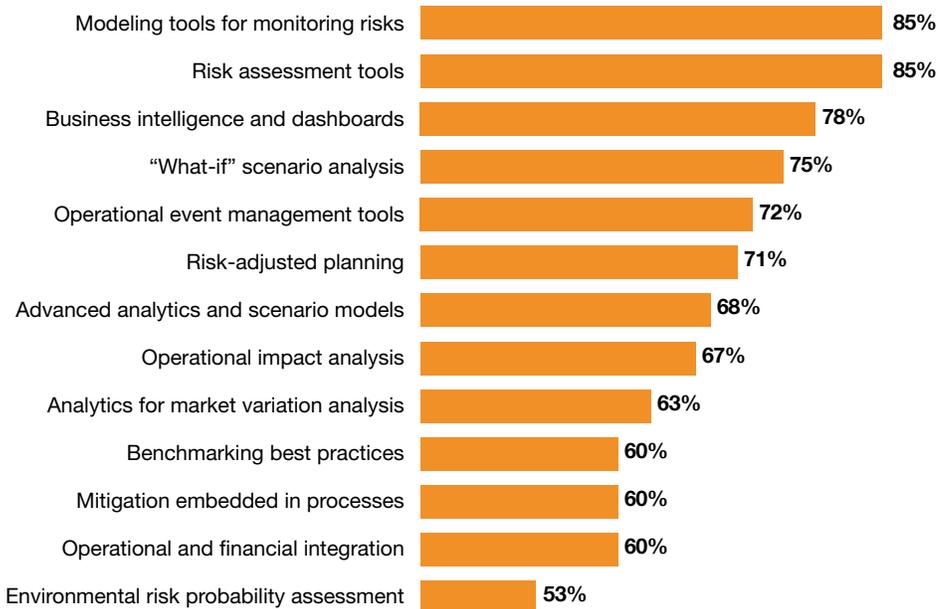
Executives are implementing business intelligence, modeling and scenario analysis to produce risk mitigation action plans (see Figure 5). With efforts to improve visibility, they are applying analytics and modeling to monitor risk probabilities. They are using dashboards on multiple devices – from “command centers” to smart phones to tablets – to review performance scorecards and receive instantaneous alerts to pending risk scenarios. Many are putting thresholds of tolerance on various risk factors and monitoring operational events to determine if thresholds are within tolerance. If not, an exception management notification, or alert, is sent to the appropriate parties for immediate action and response. Risk mitigation is embedded in their business processes across enterprise functions. But it is also extended to their value chain partners to enable collaboration and the communication of strategies and plans as quickly as possible when a risk event occurs.



Source: IBM Institute for Business Value

Figure 4: Leaders are applying predictive analytics to reduce risk effects and achieve cost efficiencies, competitive advantage and growth.

Where is your company focusing its key risk management implementation efforts?



Source: IBM Institute for Business Value Risk Management Study

Figure 5: Executives are implementing a multitude of modeling tools, scenario planning tools and analytics to assess, determine impact and mitigate effects.

Leaders are modeling risk holistically across the enterprise and their value chain networks to avoid unnecessary commercial or brand exposure. They are taking into account real-time market conditions and deep historical trending across massive and diverse data sets.

Government agencies, businesses, and consumers are making more information available in the public domain, including information about regional demographics, research study results, news events, market trends and the like. Billions of mobile devices, sensors, and meters are accelerating this growth. Data feeds from financial markets, weather and environmental sources, video surveillance and many other sensors provide a view of what is happening at any instant. This wealth of publicly accessible and privately owned data is

giving firms the ability to be more relevant and compelling to their partners and customers and enabling them to better predict, monitor and manage the myriad of risk factors. One company is taking advantage of this wealth of information to predict impacts on supplier performance and better position inventory against sales forecasts (see Case study: “Market instability and resultant supply chain network instability.”).

Predict and act with intelligence

Some companies apply an *ad hoc* approach to risk management, reacting to events only after they occur. Our research indicated that most companies take a systematic, prioritized approach. They prioritize risk mitigation initiatives based upon the probability of occurrence or, worse, after a major disruption to their global operations. Those with leading practices in place,

Case study: Market instability and resultant supply chain network instability

What if you could account for seasonal, sales trend, supplier availability and other constraints when forecasting sales?

This OEM supplier of recreational and other vehicle systems implements an advanced optimization solution that uses “what-if” scenarios to account for multiple variables and constraints across locations for inventory forecasting and planning to reduce stock levels and improve customer requirements.

This company provides an advanced temperature-control heating system for coaches, trucks, boats and other vehicles that require heating. They determined the key to ongoing success in tight economic times is customer satisfaction and on-time delivery. The company implemented a predictive, advanced inventory-control system that helps improve stock levels, shorten supply and delivery times, and lower transportation and replenishment costs. The solution enables dynamic inventory planning using complex, individually configurable algorithms for planning optimization. A powerful “what-if” analyzer is designed to allow quick and easy determination of the impacts of changes in supplier commitments, logistics constraints and other potential risk scenarios. The solution forecasts inventory across distributor locations through the automatic identification and analysis of key variables such as trend, seasonality, promotional effect, price changes, sales volume, market frequencies and economic fluctuations.

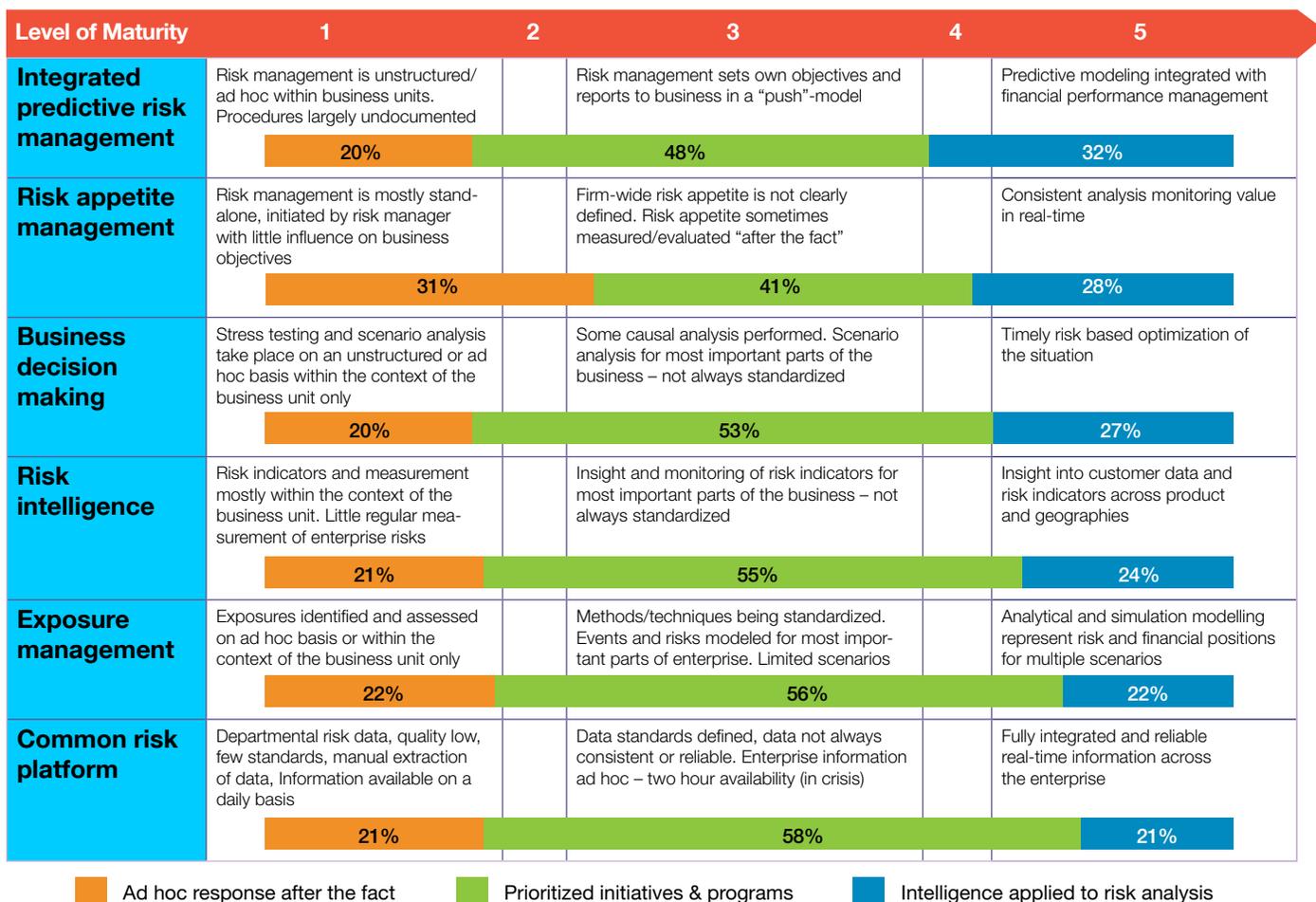
“We can now proactively avoid out-of-stock situations and ensure consistent shelf availability even in these unpredictable times.”

- Vice President, Supply Chain Planning,
Automotive OEM

however, are implementing innovative risk management practices and solutions based on real-time predictive analysis and insights (see Figure 6). They implement a common risk platform with their value chain partners with fully integrated and reliable data, sharing information across the enterprise and with partners as quickly as possible. They deal with their exposure by managing it – using analytical and simulation modeling to represent risk and financial positions for multiple scenarios before they occur.

These companies with leading practices apply insights into customer data across products and geographies. When situations occur that inhibit them from serving their entire customer base, they quickly prioritize their response, using market segmentation and insights already derived. Business decision making is timely as they have already predicted the possibility of the disruption and have detailed mitigation plans in place. Their first response is to apply a probability factor to the occurrence of an event, communicate the exposure and probability across the enterprise and throughout the value chain. Next, full deployment is engaged. Command centers, which are constantly measuring, monitoring, evaluating, and reporting on events, send the appropriate alerts and wealth of data for immediate executive and management reaction.

For example, supplier risk analysis plots suppliers based upon the likelihood of a disruption to their ability to meet supply commitments, against the impact that a particular component part has on overall production and, ultimately, customer service delivery requirements. Another analysis might plot trends in critical part availability in real-time.



Source: IBM Institute for Business Value Risk Management Study

Figure 6: Leading practice maturity includes applying intelligence to predict, monitor and mitigate risks in real-time.

Unlike traditional trending analyses, which are more backward looking in nature, predictive analytics is used to determine the probable future outcome of an event, or the likelihood of a situation occurring. By applying predictive analytics to operational data, companies can put themselves in a better position to solve problems before they occur. This forward-

looking view helps the organization drive decisions quickly. What if scenarios can be used to create business models that anticipate what might happen within an organization based on changes in defined variables or possible events. Using predictive analytics helps the organization to identify forward-looking trends based on identified data patterns.

Case study: Fast recovery from environmental disaster

Japanese earthquake, tsunami, nuclear reactor meltdown equals major supply chain disruption

Critical component parts from contract manufacturers in Asia were halted due to the devastation caused by the earthquake and tsunami in Japan. Prior to the event, IBM had been monitoring critical parts to ensure continuity of supply. IBM Integrated Supply Chain implemented a critical parts balancing analytics model. It is a multi-echelon platform that provides visibility to tiered supply and predicts potential imbalance situations. Through this platform, predictive and advanced analytics are applied to anticipate supply shortages and/or overages across multiple tiers of upstream supply partners. With advanced visibility into the ensuing disruption in supply, IBM was able to quickly confirm alternative sources through strategic analysis of supply chain effects after the major shock.

“The risk analysis tool avoided disruption and the potential revenue loss, while actually improving customer satisfaction through advanced notification of uninterrupted product availability.”

- Fran O’Sullivan, General Manager,
IBM Integrated Supply Chain

The use of data analytics to analyze, measure, model and predict risk is a growing capability among leading enterprises. These new tools can add a sophisticated advantage in avoiding, detecting, and responding to risk in many categories. Leaders are employing analytics to move from passive trend analysis and reactionary states of “sense and respond” to “predict and act.” It’s all about analyzing the patterns in data to predict potential future outcomes and formulating trends into predictive analysis to determine reaction – before the fact. It requires predicting or anticipating the future so that appropriate action can be taken. Should a disaster occur, like the recent environmental catastrophe in Japan, this predictive, scenario-based analysis allows for immediate decision making and fast action (see Case study: “Fast recovery from environmental disaster”).

The journey to predictive intelligence for managing enterprise risks

Predictive risk management has been described by several industry experts as a journey, not a destination. An organization’s approach depends to some degree on the type of risks it faces and its appetite for risk. From this research, and our own risk management experiences, we have confirmed that predictive intelligence is an optimum path for protection against disruptive or catastrophic operational risk events.

1. Assess for value

Forward-thinking organizations see change as an opportunity. They act on possibilities, assessing risk factors while quantifying business value. They identify risk factors through consistent, objective and pervasive evaluation criteria of impact, likelihood and the effectiveness of controls to quantify the risk level. They evaluate their risk tolerance to determine acceptable risk and opportunity levels while quantifying the balance between benefits and potential consequences (e.g., uninterrupted customer service, product availability, continuity). These forward-thinking organizations:

- Use probability-based risk assessment of likelihood, severity, ease of detection for key risk factors
- Conduct risk-based financial impact analysis, decision tree, and sensitivity analysis

- Develop risk mitigation strategy and prioritize options
- Develop an implementation roadmap of initiatives to embed the risk mitigation action plan in current processes
- Develop the risk communication plan – internal to the enterprise and external to all stakeholders and partners.

2. Model to mitigate

Scenario modeling with analytics can be used to formulate mitigation plans. Sales and operations consensus plans can be adjusted for the probability of various risk factors occurring. Sourcing and distribution networks can then be modeled and redesigned for resiliency. Scenario modeling entails:

- Modeling risk mitigation scenarios for each major risk factor
- Market risks (customers and competition)
- Operational risks (supply chain network and environmental)
- Financial risks (economic and enterprise)
- Optimizing pipeline inventory with risk-based constraints
- Developing contingency plans based upon analytical probabilities
- Selecting partners for risk mitigation and communicate the mitigation plans
- Establishing value realization based on key risk indicators and assign responsibilities.

3. Predict and act

Many companies with leading risk management practices are moving to a “predict and act” risk management strategy; they predict with visibility into planned events and unexpected disruptions with a plan for proactive, network response. By analyzing patterns in data, companies can predict potential future outcomes and act with anticipation of either mitigating the risk exposure, or even capitalizing on opportunity. Steps to establish this strategy include

- Developing a common risk platform of integrated, reliable real-time information
- Reducing risk exposure through analytical and simulation modeling
- Improving customer insight and risk indicators across products and geographies

- Employing real-time decision making through risk-based optimization tools
- Integrating predictive analytics into operational and financial performance management.

Global supply chains are stressed. The global recession and crippling financial crisis vividly demonstrated how quickly businesses can be consumed, even destroyed – especially when the predominant enterprise risk strategy is reactive. As complexity mounts in today’s tumultuous business environment, those companies looking to better manage and mitigate risk – as well as add value to the business – will take lessons from those forward-thinkers who use today’s data to simulate and predict future events. Transitioning from a reactive posture to a preactive one can accelerate appropriate responses to risk events throughout the enterprise and across the supply chain. Rethinking risk management and strategic planning to deal more effectively with the new era of heightened global risk needs to become a top priority for C-level executives. By using advanced methodological and analytical frameworks – early warning systems, scenario planning and predictive intelligence – companies can learn to avoid, address or quickly recover from major risk events. For many executives in today’s climate, such a strategy may be the only way to ensure a good night’s sleep.

To learn more about this IBM Institute for Business Value study, please contact us at iibv@us.ibm.com. For a full catalog of our research, visit ibm.com/iibv.

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Reference

- 1 Butner, Karen. “*New rules for a new decade: A vision for smarter supply chain management.*” IBM Institute for Business Value. October 2010. <http://www-935.ibm.com/services/us/gbs/thoughtleadership/ibv-new-rules-new-decade.html>



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July 2012
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