RL RIVERLOGIC

OVERCOMING YOUR BIGGEST RISK CHALLENGES WITHIN 2020 AND BEYOND

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SUMMARY

As the events of the last few years have shown, businesses face many risks. While some are predictable, others aren't.

As we look back over 2019, the world, and in particular the U.S., was hit by *numerous catastrophic events*[1], such as wildfires, extreme weather events, flooding, cyber attacks, and incidents involving mass fatalities. In some cases, numerous companies were affected, resulting in bankruptcies or serious financial loss.

These events demonstrate the importance of risk management; particularly, the need for companies to actively anticipate risk events and take steps to mitigate risk. While risk mitigation is a well-established profession, it's mainly based on historical rules-based risk mitigation processes. These processes suffer from a degree of inflexibility and aren't well-suited for today's fast-paced, digitally interconnected business world where unconnected events on the other side of the globe often directly impact the local businesses. These shortcomings can be overcome by using *prescriptive analytics*[2] techniques for risk management, allowing companies to model the business environment with a greater degree of accuracy, readily evaluate different risk scenarios, and prepare better risk mitigation strategies.

INTRODUCTION TO RISK MANAGEMENT AND WHY IT'S IMPORTANT

Risk management is a formal process used by organizations to:

- Identify potential risks
- Assess their probability
- Establish the likely impact on the business or organization
- Determine appropriate risk mitigation strategies to eliminate or minimize their impact

Risk management was developed in the 1950s following World War II. Initially, *insurance companies and financial institutions used risk management*[3] to identify insurance risks so as to minimize losses arising from accidents. Later, companies started using risk management to identify potential business risks, allowing them to implement alternative strategies to minimize their impact.

In 2019, the *World Economic Forum*[4] identified the top ten risk trends primarily affecting banks and financial institutions. These included:

- Risk of economic confrontation between major powers
- Erosion of international trade agreements
- Serious international political confrontation
- Cyber-attacks and theft
- Weakening of security alliances
- Populist and nationalist policies
- Fake news

These predictions were largely correct, and their impact was felt by businesses across the world.

WHY MANUFACTURING COMPANIES ARE FACING CHALLENGES MANAGING AND MITIGATING RISK

*Long-established ideas about **globalization and international trade**[5] are changing. The US, UK and other countries are rejecting previously held concepts that globalization was good for industry. While the jury may be out on these concepts, changes precipitated by these views are directly affecting manufacturers and are bringing in a new period of unpredictability and, with it, increased risk.*

Complex supply chain structures are being disrupted by the increased incidence of political upheaval, adverse weather and natural disasters. Labor shortages mean it's difficult to find the right staff. Data shows that the *risk of internal disruption*[6] is at its highest since 1986 as the workforce becomes more vocal in demanding better wages and working conditions. Corporate practices, successes and failures are readily broadcast through social media, often resulting in widespread reactions affecting corporate reputation and impacting sales.

It's no surprise then that manufacturers are finding that long-established, historical risk mitigation approaches aren't working.

HISTORICAL APPROACH TO RISK MITIGATION

The historical approach to risk mitigation focuses on preparing a risk management plan using a rules-based process. The first step is risk identification, often performed as part of a SWOT analysis. Risks are then analyzed in terms of potential impact and perceived likelihood and dealt with in accordance with one of the following four strategies.

01

RISK AVOIDANCE

Some risks can be avoided by not proceeding with a project or decision. Alternatively, the project scope is changed to eliminate the risk.

02

RISK ACCEPTANCE

Sometimes, it's practically impossible to mitigate risks, in which case they are acknowledged and accepted. This strategy is valid for low probability risks or if the cost of risk mitigation is excessive.

03

RISK MITIGATION

Steps are taken to reduce the consequences of the risk through mitigation techniques such as hazard analysis, risk assessment and the implementation of manufacturing and quality control techniques like ISO 9001.

04

RISK TRANSFERENCE

The risk is mitigated by spreading or sharing the risk. The most obvious way is through insurance. Another method is to enlist partners in a project or facility, so the risk is shared.

WHY THESE HISTORICAL RISK MITIGATION TECHNIQUES ARE NO LONGER ENOUGH

While the above processes remain valid in terms of risk identification and some mitigation strategies, the primary weakness is that processes generally become compliance exercises, rather than a management tool. This is particularly evident with rule-based systems such as ISO 9001 and similar tools.

This is not to stigmatize those techniques; they are still essential for well-run companies. Rather, it's to highlight the need for *a new framework for managing risks*[7] and for dynamic risk mitigation processes that play an integral part of day-to-day management processes. This type of approach may have helped prevent the catastrophic Deepwater Horizon oil rig explosion in 2010 that was attributed, in part, to management failures to properly assess risk.

COMPLEX SUPPLY CHAIN STRUCTURES ARE BEING DISRUPTED BY THE INCREASED INCIDENCE OF POLITICAL UPHEAVAL, ADVERSE WEATHER AND NATURAL DISASTERS.

SWITCHING TO ADVANCED (PRESCRIPTIVE) ANALYTICS FOR RISK MITIGATION:

A fundamental weakness of rules-based risk assessment techniques is an inability to quantify risk in real terms. For example, manual techniques can't easily assess the increased probability of human error when asking employees to work extra time on a project. Likewise, it's difficult to assess supply chain risk without access to detailed supply chain data.

An effective approach is to implement a prescriptive analytics solution that accesses structured and unstructured data stored in company archives to determine historical performance and predict future performance. In the example of human error, it would be possible to link the rate of workplace errors with the number of hours worked and determine the best manning solution to meet demand. Similarly, historical supplier performance can quantify and help *manage supply chain risk, ensuring continuity*[8] and on-time delivery of critical orders.
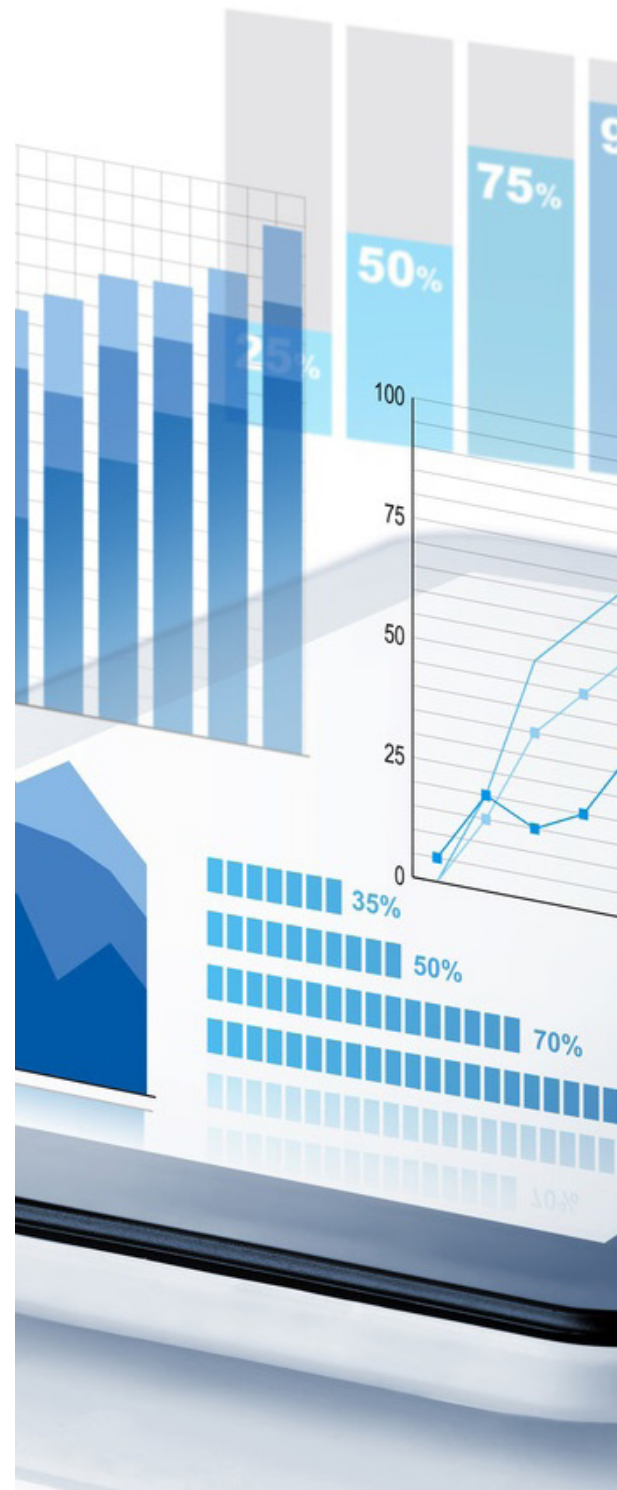
HOW PRESCRIPTIVE ANALYTICS TRANSFORMS RISK MANAGEMENT:

Unlike other forms of analytics, prescriptive analytics is a tool that provides actionable information. Working with the data provided by descriptive analytics as well as forward-looking information derived from predictive analytics, prescriptive analytics allows risk managers to determine the best ways to mitigate risk.

Using a validated business model that accurately reflects how a company, organization or business environment functions, prescriptive analytics uses optimization algorithms to determine the best risk mitigation strategy to deal with identified risk. With prescriptive analytics, risk managers can evaluate alternative scenarios and determine not only what may happen but also the best course of action to *perfect their risk mitigation strategies[9]*. Here are some examples:

Reducing risk in S&OP processes using what-if analysis

S&OP planning depends on a number of key assumptions, such as raw material cost, fuel prices, shipping tariffs, demand and inventory levels. These may all change, particularly in response to unexpected economic, political and natural events. Related to this, there may be supply chain interruptions, changes in demand and an inability to ship goods.

A prescriptive analytics S&OP solution allows managers to run multiple *what-if analyses[10]* to determine the business' sensitivity to unplanned changes and major events and determine the best possible outcomes.

Minimizing risk in capacity planning

Capacity planning allows organizations to determine required capacity to meet anticipated demand. However, there's a big difference between a workable capacity plan and the optimal one. Using prescriptive analytics for capacity *planning in the digital era[11]* allows planners to determine which capacity plan

PRESCRIPTIVE ANALYTICS OFFERS A SOLUTION BECAUSE IT ALLOWS SUPPLY CHAIN MANAGEMENT TO COMPREHENSIVELY MODEL THE NETWORK.

will achieve corporate objectives, such as highest profit or lowest manufacturing cost. A key aspect of capacity planning is evaluating alternative scenarios to anticipate potential disruptions and finding the most robust capacity plan able to ride through potential medium- and long-term upheavals.

Production planning and risk

As any production manager will tell you, production planning is never simple and is always subject to unforeseen disruption. Employing prescriptive analytics for production planning allows users to determine the best way to respond to unforeseen risks, such as critical equipment failure, flooding and plant outages due to devastating weather events. For example, in the _wood products manufacturing industry[12]_, a prescriptive analytics solution allowed one manufacturer to compare different scenarios to minimize risk and determine the best production plan related to demand, price, wood availability and mill capacity.

Supply chain network risk management

Manufacturing supply chains are notoriously complex and opaque. While many companies use out-of-the-box network design software tools, these often don't provide a holistic view of the supply chain and _lack effective risk management capabilities[13]_, particularly in large organizations. Prescriptive analytics offers a solution because it allows supply chain management to comprehensively model the network, taking into account interdependencies, constraints and limitations. This, in turn, allows them to interrogate the network to identify risks and develop contingency plans to minimize network disruption.

Financial planning

The success or failure of an enterprise is invariably determined by its financial performance. However, unforeseen events can cripple organizations unless financial measures are taken to mitigate disaster. It's not just a matter of profit and loss but also one of cash flow, as an enterprise that can't pay its bills will fold. Prescriptive analytics supported by financial planning can help identify financial risks, allowing organizations to mitigate these risks by taking out risk insurance or arranging appropriate lines of credit to ride through tight periods.

WHAT YOU CAN DO TO GET STARTED

Prescriptive analytics opens up a whole new perspective on risk management, allowing you not only to identify the best risk mitigation strategy, but also to identify unforeseen risks through scenario analysis.

The normal approach is to develop a digital model of the organization that reflects how it interacts with the environment, then using solver software to conduct multiple scenario analyses to identify optimal risk mitigation strategies.

Some vendors offer linear programming software solutions that use third- and fourth-generation programming languages to hard-code mathematical algorithmic models. Others, such as River Logic's Enterprise Optimizer, use fifth generation constraint-based programming languages. Both methods work well, but constraint-based modeling is faster, does not require specialist programming expertise and provides better model visualization compared to hard-coded modeling.

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