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Study and Analysis Risk Management in Real Estate Projects

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ABSTRACT: Risk is involved in every industry; construction industry is no exception. Most of the management problems in the project are the result of uncertainties associated with a project. India is the second fastest growing economy of the world which is governed by major projects across the country. Housing industry contributes greatly to the national growth, economic sector and gross domestic product of the country. Real-Estate projects have longer project lifecycle, multiple and complicated approval processes; cash flow uncertainties make it more prone to risks than other industries. This study presents the need for risk management in Real-Estate projects in India. This study provides the application of risk identification in early stages of the project life cycle in a Real-Estate project. Description of how the industry is operating in risk management is given. The objective of this study is to identify the current risk factors and uncertainties in the Real-Estate projects through literature study. All identified risk factors are prioritized by conducting a survey which was filled by housing project experts. Survey results provide relative weightages of the risk factors based on which the priority can be decided. Also identified risk factors were tested on the Real-Estate project using case studies and performance of project in terms of risk management was obtained. A risk index has been developed to assess the risk management level for Real-Estate projects. Relationship between risks categories have been developed based on the responses from the case study performance. Recommendations for better risk assessment have been provided based on risk score of the case studies.

KEYWORDS: Project Management, Risk Management, Risk Identification, Real-Estate Projects.

I.INTRODUCTION

The goal of good project management is to ensure that the project delivers results that meet or surpass the expectations of all stakeholders. Managing risks in a project entails a series of steps, such as tagging risks, conducting analyses, and developing mitigation strategies. It entails making the most of advantageous situations and limiting unfavourable ones. In most situations, people have control over their own level of exposure to risk, rather than it just being part of their environment. According to the BS 6079 standard set by the British Standard Institution in 1996, risk is "the uncertainty inherent in plans and the chance that something may happen that might alter the prospects of accomplishing, business or project objectives." Risk is "Unpredictability incorporations/businesses outcome factors," as defined by Purdue University professor Kent Miller. "Uncertainty of environmental and organisational elements that effect the corporation's/performance," business's he says of the topic of uncertainty. Risk refers to the possible negative outcomes that might occur as a result of exposure to uncertainty in a project. Risk, in the context of a project, is the possibility that an event will have an effect on the project's goals. Risk is the potential for negative or positive results, or for results to deviate from expectations, as a result of doing a certain action. Thus, there are two components to risk: the chance of an event occurring and the potential outcomes if it does. Effective risk management is a cornerstone of sound management, critical to producing desirable results in company and projects and facilitating the efficient acquisition of needed products and services. A systematic approach to evaluating and responding to future uncertainty is provided by risk management. The steps of a project's risk management plan involve looking for threats, assessing them, and dealing with them. As part of this process, you'll want to maximise the benefits of good occurrences and minimise the negative effects of any setbacks. The idea of risk management (RM) is applicable across all sectors, including the information technology (IT) sector, the automotive industry, the pharmaceutical industry, and the building industry. While there are RM standards specific to each industry, the core principles of the discipline are universal. Project risk management is one of the nine most important aspects of launching a project, as outlined by the Project Management Institute (PMI) (2004).

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The risk management process (RMP) is a common framework in RM that includes four steps: recognising the risks, evaluating them, responding to them, and keeping tabs on their progress. Risks may be managed at each of these stages using a variety of strategies. There has been an increase in the number of sectors that proactively include studies into their initiatives. Similarly, RM is now a topic of discussion in many other fields. But risk management is seldom implemented in the building sector. There has been an increase in the number of construction firms learning about the RMP, but this has not translated into a widespread adoption of risk management models and practises. This goes against the grain of the industry's efforts to streamline processes, cut down on waste, and gain more command over projects without increasing any of those three factors. Any project manager, regardless of their field, should take an interest in RM since risk is inherent to every project. Every construction project is different, hence every construction project has its own unique set of risks. However, not all professionals have come to understand the need of integrating risk management into project delivery. There is a lot of uncertainty and risk in the construction sector in India because of the complex and ever-changing nature of project settings. A number of technological, societal, and economic threats threaten the sector. The building sector does not have a great track record of successfully avoiding these hazards. Therefore, those who operate in the sector are responsible for a wide range of failures, including bound by quality and operational criteria failing, cost overruns, and unknown delays in project completion.

II.LITERATURE SURVEY

According to the authors of this research (Azharsusanto and Meiryani[1]), risk management is a crucial aspect of the tactics used by any and all business owners. The procedure by which a company using a certain strategy might demonstrate the dangers inherent in that method's approach to achieving success in any given activity. The key to effective risk management is the ability to recognise threats and implement solutions to them. The purpose is to raise the company's optimum sustainable value. The primary goal is to examine all possible positive and negative effects on the business. Successful risk management raises the odds of achieving an organization's objectives while lowering the chances of failure and minimising uncertainty. Maintainability and the creation of procedures that fit in with the organization's overall plan and strategy in implementation are two essential components of effective risk management. The goal of risk management is to mitigate threats in a way that is consistent with how past, current, and future operations have been conducted in the company.

M. Berenger Y. Renault Additionally, N. Agumba According to [2] the aforementioned research, risks may be broken down into the following 10 classes: Design flaws include inconsistencies in the bill of quantities, drawings, and specifications, as well as a general lack of accuracy across the whole design. Accidents due to lax safety measures, subpar material supply, unsecured machinery and tools, a lack of public safety, and inconsistent output from workers and machinery are all examples of physical problems. Improper site inspection, an incorrect project schedule, a lack of available labour, supplies, and equipment, fierce competition among bidders, an ill-defined scope of work, and a lack of communication between headquarters and remote locations are all logistical nightmares. The parties to the contract may have legal issues throughout the building period, but there are no professional arbitrators to assist address the conflicts quickly. Bad weather, the site's remote location, and other environmental issues all count as environmental hazards. Misunderstanding of construction drawings and requirements, which leads to discrepancies between the real and contracted amounts, design revisions, decreased work quality owing to time restrictions, rushed bids, and unrecorded change orders. Problems with management might arise from a lack of clear communication between team members or from a lack of clarity in planning for a complicated project; from a lack of consistent access to information (which can include ambiguity); or from a failure to effectively manage available resources. Money-related: Contract payment delays, poor cash flow management, inflation, contractor bankruptcy, currency exchange rate fluctuations, closure-caused material monopolisation, and unforeseen political events. Changes in political climate include new laws and regulations, rising prices, and an uncertain security situation.

Based on a survey, Chaitali Pawar, Suman Jain, and Jalinder Patil [3] analysed the most significant threats to the infrastructure project. This article uses a qualitative risk analysis approach to provide a clear picture of the dangers associated with building Pune's infrastructure. Risk is managed via the use of contract papers, which are used to assign risks to certain parties. Risk management strategy must be implemented and evaluated periodically inside a construction project in order to reduce the likelihood of failure or underperformance. This research may be used as a reference for future infrastructure building endeavours in India.

Clients, designers, contractors, and governing authorities are all advised to work together beginning with the feasibility study to identify and mitigate threats as early as possible. This paper's study and conclusions provide important

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information for the government of India and local construction agencies in Pune, India to have a thorough comprehension of the risk environment in building in this city. Having this kind of insight is crucial for taking the necessary actions to guarantee that the construction industry is headed in the correct path for future growth.
The value of focusing on particular risks and directing actions to them is quantified through qualitative risk analysis. It's useful for gauging the possibility of the risks and how they could affect the project's goals. It's straightforward to grasp and gives you a rapid, clear image of potential dangers. This analysis is necessary because The used QRA Sheet consists of identified risks categorised into various types requiring a subjective response on the probability of its occurrence on a 5 point scale of very low, low, medium, high, and very high, and on the impact of these risks again on a 5 point scale of very low, low, medium, high, and very high. Quantitative Risk Assessment (QRA) sheets, like the one shown in the table, compile the probability and impact assessment replies from contractors and owners. Qualitative analysis was carried out by analysing the owner's and contractor's ratings of the risk's likelihood and effect in order to arrive at a single rating for each risk.

Reducing the likelihood of an occurrence and mitigating its impacts are the goals of risk mitigation strategies, such as the compilation of resource inventories or the offsetting of one risk by another, both of which contribute to a lower level of risk overall. At any time along the project's lifecycle, from initial planning to post-completion evaluation, the notion of risk reduction may be included into the proceedings. Reducing or eliminating exposure to danger during study is what we mean when we talk about "avoiding risk." Multiple investigations, both theoretical and empirical, have shown that risk is quantifiable and hence predicable. The use of schedules and computer analysis in the construction industry and among investors has led to a greater appreciation for these instruments for more strategic investment planning. It was understood that the project's eventual success may be predicated on the right execution of the project plan and the identification of risks early on. Given the long delays in implementing numerous crucial investments, drastic action is required.

This article by Engseng chia [4] provides a concise definition of risk and an overview of risk management. Following an introduction to the many types of risk drivers, the article suggests a three-model framework for evaluating these threats. These three models might be used alone on separate projects or together on the same one. The basic model, the standard model, and the systems model are proposed as a 3-model framework to evaluate such risks. It is dependent on the project's complexity, scope, and level of risk as to which model should be used. It is best to use the basic risk assessment methodology for low-impact, low-cost initiatives. Risk assessment using the systemic model may be of interest to the project manager of big, complicated, and high-risk projects. All three types may be used simultaneously on the same task. To evaluate risks associated with performance objectives where the impact factor is hard to quantify, the simple model may be used; the standard model may be used to evaluate risks associated with cost objectives; and the systems model may be used to address interdependencies between high-risk factors.

This paper's primary goal is to offer a risk model called the construction risk management system, written by Jamal F. Al-Bahar and Keith C. Crandall, Member F [5]. (CRMS). When applied to building projects, the suggested approach gives contractors a systematic way to recognise threats, assess their severity, and devise plans to mitigate them. This model offers a useful, methodical framework for quantifying the identification, evaluation, and response to construction risk. Risk management is defined as a multi-stage process in this paper's terms. It's possible the contractor may want to use these ideas to varied degrees. The categorization ideas may help small businesses get a more complete picture of their risks. Companies of a greater size may find it appealing to include the idea into their risks. The business world has now come to terms with this fact.

Professor Deepali D. Kadam, Mr. Shubhama.Simant, Mr. Swapnil M.Sinha, Mr. Swapnil S.Shinde, Mr. Rhushikesh, and Mr. D. Musale According to the study's findings, [6] the Indian construction sector might benefit from the use of cutting-edge technological methods and improved risk management techniques. The analysis conducted for this study was to determine the significance of the numerous elements found to be responsible for the occurrence of risk in a number of different types of building projects. This case Rather of relying on probability or effect scales, we will employ qualitative methodologies that are grounded on more nuanced descriptions of the phenomenon in question. The focus of the current study is to identify critical success criteria in the construction industry. They may have an impact on the project's technical, social, economic, environmental, or financial aspects. Thirty construction firms in the Nashik area of Maharashtra were surveyed using a questionnaire (India). Each of the thirty interviews lasted about an hour and took place over the course of five to seven weeks, from September to November of 2016. In-person interviews were used to collect data for the 30 closed-ended questions used to determine RII using the formula RII = W/A/N.

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Using the aforementioned equation, we ordered the indices for contractor risks, owner risks, designer risks, and project management team risks. The RII is used to assess the likelihood and severity of a risk based on survey responses. Even though the chance of occurrence of risk is low, the survey findings show that the risk factors emphasised have a substantial influence on the contractor, owner, designer, and management team. The study also taught me the significance of risk origins in a project's final outcome. The variables that may alter a project's timeline and budget. The survey findings are based on the RII value placed on the risks related to the project management group, the owner, the designer, and the contractor. The project owner is crucial in its success or failure. Hence Research shows that the levels of many components, including those related to the owner, contractor, designer, and project manager, might vary from what was originally anticipated.

Risks were identified and analysed by Pawel Szymanski [7], who compiled a list of occurrences together with details on their potential causes, likelihood, and ultimate environmental effect. Frank Knight provided a clear distinction between risk and uncertainty in 1921: "Uncertainty is to be regarded in a distinctly different manner from the well-known idea of risk, from which it has never been really divorced. Measurable uncertainty, or the real risk (a phrase we'll use), seems to be so distinct from immeasurable uncertainty that it cannot be considered to be the same thing. Actions must be done to offer particular countermeasures for each identified risk after identifying all hazards that exist or may arise in the project. There are two possible outcomes from these steps. At first, they could try to eliminate any unfavourable effects on the project or at least lessen their negative impact. There are essentially four types of responses. Risk transfer is when one entity demonstrates its capacity to mitigate risk by passing it on to another. Direct transfer of losses effects to another entity is one kind of transfer. Insurance is the most common kind of this activity because it provides a legal mechanism for the transfer of risk. Risk transfer occurs, for instance, when a contractor is hired to do a "uncertain" work or when a shipping business is hired to provide transportation services.

Aven, Terje The purpose of this study is to provide a comprehensive overview of recent developments in the risk area, with a particular emphasis on the underlying concepts and theories that make up generic risk research (II). A study of this magnitude covers a lot of ground, so it was difficult to narrow down the focus to just a few of works from among the numerous essential contributions produced in the previous decade or so. Following are the broad themes that will be discussed: The concepts and tactics of risk management, with an emphasis on dealing with large/deep uncertainties, surprises, and the unexpected, as well as the prospects for further development in this area. Questions such, "What are the possible frameworks and viewpoints to be adopted in intergenerational decision-making situations?" are crucial to this discussion. What other choices do we have?

C. Umarani, S. Kamal, and S. M. Renuka [9] This study is part of a larger research initiative whose ultimate goal is to close the gap between theory and practise in the field of building risk management in underdeveloped regions of the globe. Due to a lack of information and understanding, risk management is seldom used. Additionally, the track record for managing project risks is limited, which has a negative impact on the success of initiatives. This research presents a comprehensive literature search focusing on the three stages of the risk management process (analysis, identification, and response). Particular attention is paid to the improvement of risk management in the world's developing nations. Many people's efforts to learn more about different strategies are highlighted.

III.RESEARCH METHODOLOGY

Research process

The methodology adopted in this project is given belowa. Study of literature related to risk analysis and risk management capabilities.

- Preparation of questionnaire.
- Site visit to major construction project site.
- Questionnaire survey and personal interviews with in charges and managers and collection of data from site.
- Analyzing the questionnaire.
- Qualitative analysis of data obtained from site and to identify the root cause.
- Remedial measures to be suggested and the present data to be recorded for future reference.
- Conclusions, recommendations and suggestions for future study.

Methods of Surveying

In-person and written questionnaires will be used to collect data from local building contractors of varying sizes for this study. To begin, we combed through the available literature to unearth the potential dangers that could compromise the

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construction industry's overall productivity. Shen et al. (2001) presented a more comprehensive and all-encompassing definition of risk for China's construction joint ventures, and that is the one that has been used in this study.

Questionnaire Structure

After that, you can see the actual interview structure in the form of a questionnaire. A preliminary survey was conducted to gauge the usefulness, clarity, and usability of the questionnaire. There are three sections to the questionnaire. We divide the potential dangers encountered in this research into three groups:

a. Impact on cost
b. Impact on duration
c. Impact on quality

Questionnaire Design

The goal of this survey is to get a cross-sectional look at how people in the construction risks industry behave. The questions for the pilot study were developed after reviewing prior research on the topic of construction risk. The interviewer was allowed to ask as many follow-up questions as they thought were necessary. Successfully conducting the interviews allowed me to hone in on specific projects, risk management protocols, and areas of expertise by sticking with the interviewee and asking targeted questions.

- First, these qualitative approaches will use descriptive scales to characterise the probability and effect of events. The focus of the current study is to identify critical success criteria in the construction industry. Technical, social, economic, environmental, and financial aspects may all have an impact on the project as a whole.
- It was determined by surveying 30 Maharashtra-based construction firms using a questionnaire (India).
- Three-hundred interviews were conducted over a period of five to seven weeks, and each lasted around an hour and a half. The questionnaire consisted of 30 closed-ended questions and was administered through in-person interviews.
- Experts from 30 different companies were interviewed, and their insights are reflected in the interviews; together, these insights should provide a glimpse into the most pressing issues facing regional building projects today.
- A descriptive survey is used since it provides information and does not need much participation from respondents.
- The Relative Importance Index will be used to conduct the full study, and rankings will be determined based on the calculated scores.

Relative Important Index

1. This research follows a step by step methodology which started with identifying the risk area of study followed by data collection from various sources. Initially it is observed that risk of the project is more at execution stage but which is perception. Study & site survey come to a conclusion that risk involved in project can be separated by life cycle of project. For the risk calculation, life of the project divided in to following steps:

Step 1: Concept and Feasibility Study Phase
Step 2: Fund Raising & Financial Closure
Step 3: Tendering, Bidding & Award Of Project
Step 4: Project Planning & Main Procurement
Step 5: Contract Execution, Monitoring And Control.
Step 6: Project Closure, Sale / Operations and Maintenance.

The later part deals with using the facts or information that risk has to measure in its identification stage, severity, probability & impact on project. This study conducted questionnaire survey from industry experts & professional in matrix form which contents mainly 6 steps of project & measurements of risk.

Already available and analyzing these to make a critical evaluation of the risk with the help of certain cases. Collecting financial data from companies is difficult since it is confidential and not transparent; hence due to company policies we are not able to obtain complete details. With this questionnaire output, from different industrial experts this paper further continues with analysis based on phase & counts its criticality on number scale. Identification of risk at or detection of risk is possible or not is measures on 1 to 3 point scale which emphasize on forecasting of risk in different stages. Severity is also counted on 1 to 5 number scale which examine the severity of the risk in particular phase.

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Probability is counted on 1 to5 scale where impact is found on 1 to 3 scales. Impact of risk mentioned by professional is varying from LOW-MEDIUM-HIGH.

Then Risk Priority Number and Risk Probability number were calculated as follows
Risk Priority Number = Probability × Impact Risk **Probability Number** = Probability × Impact × Detection.
Risk rating
A Likert scale of 1-5 was used in the questionnaire. A Likert scale is a type of psychometric response scale questionnaire, and is the most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement. The scale is named after Rensis Likert, who published a report describing its use. The respondents were required to indicate the relative critically/effectiveness of each of the probability of risk factors and their impact to the management.

TABLE 1: Probability Impact Matrix

		RISK SCORE	Very High 5	High 4	Medium 3	Low 2	Very Low 1
Probability of occurrence		Very high 5					
		High 4	**Legal Risk**	**Market Risk**			
			Quality Risk	**Financial Risk**			
		Medium 3		Social Risk	Political Risk	Design Risk	
				HSE Risk	Management Risk	Geographic Risk	
				Execution Risk		Technological Risk	
		Low 2			Procurement Risk		
		Very Low 1					

Every other risk, according to the analysis above, has its own impact on probable occurrence of those risks. But, the risks that have medium impact can be controlled easily. Hence, risks that have to be paid more attention, so as to reduce the adverse effects of those risks on the project are discussed in detail here. Mitigating measures of the above found risks have been included at the end of this chapter.

IV.RESULTS AND DISCUSSION

The overall risk factors are calculated by using SPSS tools (Statistical Packages of Social Studies). This is one of the management tool helps to analyze the 5-scale likert factor analysis. The Mean value is to be find out for the various risk factors and to determine the ranking of the risk factors. This questionnaire survey will shown the ranking of risk factors involved in the construction industries. Environmental Risk, Design Risk, Financial Risk, Physical Risk, and Market Risk has the maximum risk rating.
After completeting overall survey we calculate the below parameters

1) Legal Risk = (Probability× Impact) ÷ (Total No of site visit)
Legal Risk =394÷20=19.7≈20
2) Financial Risk = (Probability× Impact) ÷ (Total No of site visit)
Financial Risk = 328 ÷20=16.4≈16

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3) Quality Risk= (Probability× Impact) ÷ (Total No of site visit)
Quality Risk= 392÷20=19.6≈20
4) Market Risk= (Probability× Impact) ÷ (Total No of site visit)
Market Risk = 316÷20=15.8≈16
5) Social Risk= (Probability× Impact) ÷ (Total No of site visit)
Social Risk= 239÷20=11.95≈12
6) Political Risk= (Probability× Impact) ÷ (Total No of site visit)
Political Risk= 187÷20=9.35≈9
7) Design Risk = (Probability× Impact) ÷ (Total No of site visit)
Design Risk= 123÷20=6.15≈6
8) Health Safety And Environmental(HSE) = (Probability× Impact) ÷ (Total No of site visit)
HSE= 234÷20=11.7≈12
9) Execution Risk= (Probability× Impact) ÷ (Total No of site visit)
Execution Risk= 244÷20=12.2≈12
10) Procurement Risk= (Probability× Impact) ÷ (Total No of site visit)
Procurement Risk= 316÷20=15.8≈16
11) Geographic Risk= (Probability× Impact) ÷ (Total No of site visit)
Geographic Risk= 126÷20=6.3≈6
12) Technological Risk= (Probability× Impact) ÷ (Total No of site visit)
Technological Risk= 120÷20=6
13) Management Risk= (Probability× Impact) ÷ (Total No of site visit)
Management Risk= 186÷20=9.3≈9

Based on the above analysis, it is clear that, there are four major risks that affect a commercial real estate projects on a large scale. They are:

1) Legal Risk
2) Quality Risk
3) Market Risk
4) Financial Risk

For the evaluation we have calculated a different risk factor given matrices (probability * impact). Around 13 type of different risk as calculated in whole work these are below

Table 2: Risk rating factor

S. No.	Type of Risk Factor	Probability * Impact	Result
1	Legal Risk	394÷20	19.7≈20
2	Financial Risk	328 ÷20	16.4≈16
3	Quality Risk	392÷20	19.6≈20
4	Market Risk	316÷20	15.8≈16
5	Social Risk	239÷20	11.95≈12
6	Political Risk	187÷20	9.35≈9
7	Design Risk	123÷20	6.15≈6
8	Health Safety And Environmental(HSE)	234÷20	11.7≈12
9	Execution Risk	244÷20	12.2≈12
10	Procurement Risk	316÷20	15.8≈16
11	Geographic Risk	126÷20	6.3≈6
12	Technological Risk	120÷20	6
13	Management Risk	186÷20	9.3≈9

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Risks related to lack of approvals facilitation that were identified are internal conflicts in public authorities and lack of previous experience for public authorities in a large scale project. Sometimes within the same authority, parties of different interest might be found, which risks delaying the approvals process. Such risk might be present as usually public authorities have its own internal political dynamics. In order to mitigate this risk, these dynamics need to be continuously analyzed in order to understand the zone of influence of each player and implement necessary lobbying accordingly. In case of lack of previous experience for public authorities in a large scale project, these authorities have to pass through an educational process before approving the master plan, which will increase the required time for final approval. For the purpose of overcoming such risk, the development manager needs to be proactive in proposing solutions for issues that are not covered by available regulations while emphasizing the public benefits of these solutions in addition to private ones. This way, the development manager can fasten this educational process, which helps in fastening the approval process.

Sometimes the business strategy of large scale development projects is dependent on governmental support like tax incentives or providing certain public facilities. Such support might be delayed, which will constitute a major risk for the project. In order to overcome this risk, the date of activation of such incentives needs to be clearly stated in the agreement with the government along with penalties in case of delays.

V.CONCLUSION

The Real Estate market has always been and continues to be risky. Yet owners and contractors spend little time and effort on assessing and strategically planning for known, probable, or even unknown risks. Without proactive risk management process, problems that occur on a project are likely to increase delays and costs. Basically, as all commercial Real Estate projects are unique; the risks associated with them are also unique. Hence, one particular risk mitigation strategy or a format cannot be advised to the victim. The strategies or mitigation process formats change from risk to risk and project to project; it should also depend on the probability of occurrence and severity of risk. The decision taken widely depends on the experience and knowledge of the Project Manager. Except for the existing methods of risk assessment, the need for a model is critical, and this research presents a method for filling the knowledge gap.In this work we have done the research on the construction process and the issues that arise on the job site, in the office, and elsewhere in the supply chain. As part of the survey development process, we go to several sites and collect data at the most relevant points. The dangers that need management's attention are highlighted throughout the risk analysis process, helping the business run more smoothly and efficiently. We must prioritise risk management initiatives based on their expected value to the business. Rarely do circumstances arise in which the time, effort, and quality required to mitigate a risk are not grossly out of proportion to the potential harm they may cause.

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