

An Assessment of Risk Management Practices in the Alabama Building Construction Industry

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The construction industry is subjected to more risk and uncertainty than many other industries and does not have a good track record of coping with risks. Late completion of projects, surpassing their estimated budgets and in some worse instances without even achieving the desired quality and operational requirements, has given a bad name to the industry. Thus, effective management of construction associated risks remains a big challenge to the industry stakeholders. Due to increasing competition in the construction market, pressure is mounting on the contractors to cut down direct and indirect project costs. Many contractors have found that developing, implementing and maintaining a risk management plan can substantially help to improve their competitive position. This paper via a questionnaire survey evaluates the current practices of risk management used by the building contractors in the Alabama construction industry. The results reveal that the use of risk management techniques in Alabama is low to moderate depending on company size and their risk tolerance level. Most building contractors were found to apply individual intuition, judgment and experience to identify and assess risks. The main barriers preventing implementation of formal risk management practices were found to be lack of knowledge and doubts about the suitability of these techniques, sophisticated nature of techniques compared to project sizes and human/organizational resistance.

Key Words: Risk management, Risk tolerance, Project management, Decision-making, Building construction

Introduction

Different parties in a construction project face a variety of uncertain factors. These factors can be compiled under the category of risk. Making decisions on the basis of assumptions, expectations, estimates and forecasts of future events involves certain risks. Risk and uncertainty characterize situations where the actual outcome for a particular event or activity is likely to deviate from the estimated or forecast value (Raftery, 1994). Construction is one of the most dynamic, risky, and challenging businesses, and is associated with a high degree of risk due to the nature of its business activities, processes, and external environment. However, the construction industry has a poor reputation for managing risks, with many major projects failing to meet deadlines and cost targets. Clients, contractors, the public and others have suffered as a result (Edwards, 1995).

Construction risks are generally perceived as events that influence project objectives of cost, time and quality. Some of the risks associated with the construction processes are fairly predictable or readily identifiable; others may be totally unforeseen (Ahmed and Azhar, 2004). The level and scope of those risks vary from project to project and are tied directly to the context (the environment in which the project will be built such as geography, local regulations, etc.) and content (physical elements of the project such as scope, budget, materials, etc.) of the project

(Davis and Prichard, 2000). As construction projects become more technically and contractually complex, the risks associated with them are magnified and the negative impacts to their execution are enhanced. Thus, timely and adequate risk identification and analysis is paramount in order to enable risk to be adequately managed and administered (Cohen, 2002).

The purpose of this research was to study and critically evaluate the present practices of risk management used by the building contractors in Alabama. A questionnaire survey was conducted to collect the relevant data. The layout of the paper is as follows: firstly, the concept of risk management and its underlying process is discussed; secondly, research objectives, scope and methodology are defined; thirdly, a discussion is made on the questionnaire design and responses obtained; and finally, conclusions and recommendation are presented.

Risk Management in Construction

Risk management is a proactive approach to control the level of risk and to mitigate its effects. It also prepares project managers to take risks when a time, cost, and/or technical advantage is possible. Successful management of project risks gives the project manager better control over the future events and can significantly improve chances of reaching project objectives on time, within budget, and meeting required technical/functional performance (Gray and Larson, 2008). The major components of the risk management process are depicted in Figure 1.

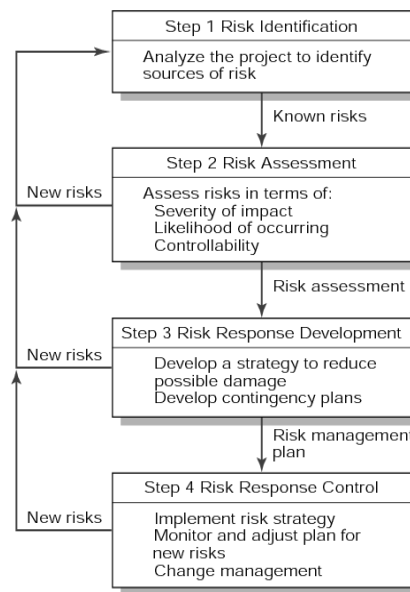


Figure 1: The Risk Management Process (Gray and Larson, 2008)

Steps in Risk Management Process

Step 1: Risk Identification

The risk management process begins by trying to generate a list of all the possible risks that could affect the project. Risks in construction can be classified into six categories as follows: (i)

Acts of God, e.g. floods, hurricanes; (ii) *Physical risks*, e.g. labor injuries, fire, damage to equipment; (iii) *Financial and economic risks*, e.g. inflation, unavailability of funds; (iv) *Political and environmental risks*, e.g. changes in rules and regulations, political uncertainty; (v) *Design-related risks*, e.g. defective design, incomplete design; and (vi) *Construction-related risks*, e.g. change orders, labor productivity, etc (Al-Bahar,1990). Various techniques are available to assist in risk identification. Hillson (2002) lists “brainstorming and workshops, checklists, questionnaires and interviews, Delphi groups, and various diagramming approaches (e.g. cause-effect diagrams, systems dynamics, influence diagrams, etc.)” as suitable for risk identification. He mentioned that there is no single “best method” for risk identification, and an appropriate combination of techniques should be used.

Step 2: Risk Assessment

Risk assessment helps in estimating potential impacts of risk and in making decisions regarding which risks to retain and which risks to transfer to other parties. Both quantitative and qualitative techniques are available for risk assessment. The quantitative methods rely on probability distribution of risks and may give more accurate results than the qualitative methods, if the available data is strong and reliable. On the other hand, qualitative methods depend on personal judgment and past experiences of the analyst and the results may vary from person to person. Hence the quantitative methods should be given precedence if both choices are available (Ward and Chapman, 1997).

Step 3: Risk Response Development

There are four typical ways of responding to risks in a construction project, which are: (i) *Risk elimination*, e.g. by placing preconditions in the bid; (ii) *Risk transfer*, e.g. hiring subcontractors or buying insurance; (iii) *Risk retention*, e.g. reducing the impact of risk through preplanned strategies; and (iv) *Risk reduction*, e.g. training the staff about risk perception and its management (Panthi *et al.*, 2007; Thompson and Perry, 1992).

Step 4: Risk Response Control

The last step in the risk management process is risk response control which includes executing the risk response strategy, monitoring triggering events, initiating contingency plans, and watching for new risks. Establishing a change management system to deal with events that require formal changes in the scope, budget, and/or schedule of the project is an essential element of risk control (Gray and Larson, 2008).

Research Objectives and Scope

The main objective of this research is to assess the current construction risk management practices in use in the state of Alabama. The sub objectives include the evaluation of respondents’ perceptions towards risk management and the identification of barriers which hinder the implementation of risk management techniques. The scope of the research is limited to building contractors and subcontractors.

Methodology

The primary data for this research was collected via a questionnaire survey targeted at building contractors and subcontractors in the state of Alabama. The survey population was selected from two sources: (i) the general contractors list published by the Associated General Contractors (AGC) of America; and (ii) a customized list of contractors and subcontractors prepared from the yellow pages, trade magazines and other sources. The questionnaire contained twenty questions which were grouped into four sections. The description of these sections is as follows; *Section 1*: background information about the respondent and the organization; *Section 2*: respondent's and organization's perception towards risk management; *Section 3*: recognition and evaluation of risk management techniques in use; and *Section 4*: identification of barriers against implementation of risk management techniques. A few unstructured interviews with the selected respondents were also conducted to clarify their responses and to discuss the survey results. Based on all the gathered information, quantitative analysis was performed and the results are discussed in the following section. Due to paper length restrictions, only selected questions from the questionnaire are discussed. The complete survey results will be published in another paper.

Analysis of Results and Discussion

Questionnaire Response Rate

The questionnaires were completed by top management in the organizations (mainly vice presidents and senior managers) and almost all of them had over 15 years of construction experience. On the basis of their position, education, and work experience, it can be inferred that the respondents have adequate knowledge of the activities associated with construction. The response rate for completed questionnaires is shown in Table 1.

Table 1: Breakdown of Responses

Total questionnaires sent	Questionnaires returned uncompleted	Total number of potential questionnaires	Total valid responses received	Percentage of valid responses
160	8	152	31	19.38%

This response rate is typical of a construction industry questionnaire survey. In similar type of surveys, Panthi *et al.* (2007) received a response rate of 19.4%, Ahmed and Azhar (2004) received 30.4% and Wang *et al.* (2004) received a response rate of 7.75%. Baker (1998) reported that statistically reliable conclusion can be obtained from a sample size of 20 or more. However, the readers must be aware that the low or high response rates do not guarantee that the survey results would be representative of the population of interest.

Section 1: Respondent Organizations Characteristics

Figure 2 depicts information about type and size of respondent organizations. The organization size is decided on the basis of number of employees as follows: 0-50→small; 51-250→medium; and >250→large. The results indicate that the majority of respondents are medium and large size

companies. The annual turnover of these companies varies from \$5 million to over \$20 million.



Figure 2: Type and Size of Respondent Organizations

Section 2: Individual's and Organization's Perception towards Risk Management

In this section, the respondents were asked about their personal and organization's risk tolerance as being *risk averse*, *risk neutral* or *risk taker*. The responses are shown in Table 2.

Table 2: Level of Risk Tolerance

Nature	Personal Risk Tolerance	Organization's Risk Tolerance
Risk Averse	12 (38.7%)	15 (48.4%)
Risk Neutral	16 (51.6%)	14 (45.2%)
Risk Taker	3 (9.7%)	2 (6.4%)

It is evident from Table 2 that the majority of respondents is either risk averse or risk neutral, with only 3 respondents as risk taker. Nearly similar results are obtained about the organization's risk tolerance. From authors' standpoint, these results are typical in the construction industry and Alabama is not an exception. An organization that is conservative towards risk taking is less likely to be able to respond effectively to the unexpected circumstances. This attitude is one of the main reasons behind less innovation in the construction industry as compared to other industries. An organization with a 'risk averse' culture is less likely to realize the improvements in delivery of projects with advances in technology and processes. Risk aversion, personal or organizational, is also a barrier to the effective implementation of the risk management practices. The researchers and the industry practitioners should play an active role to change this mind set in the construction industry.

Section 3: Recognition and Evaluation of Risk Management Techniques

Degree of Utilization of Risk Management Process Elements

The purpose of this question was to determine the degree of utilization (on a scale of 1 (low) to 5 (high)) of risk management process elements by respondent organizations. The results are illustrated in Figure 3.

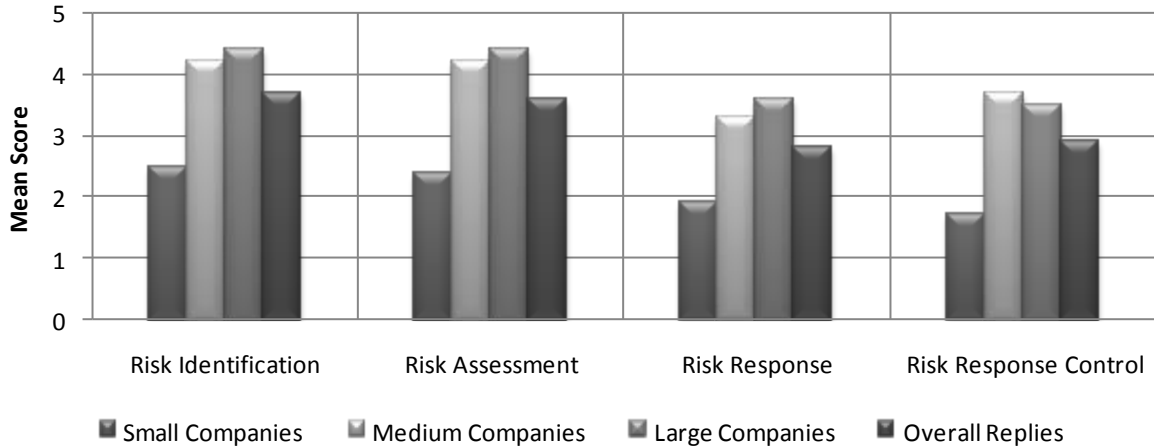


Figure 3: Degree of Utilization of Risk Management Process Elements

These results indicate that medium and large size companies mostly use all risk management process elements in their projects. Small size companies show a moderate and mixed response. It is also obvious that risk identification and assessment is frequently practiced ahead of risk response and risk control by all the three groups. Ulher and Toakley (1999) reported that for accurate risk analysis, the identification process is very important and in fact, the main benefits of risk management come from the identification rather than the assessment stage.

Evaluation of Risk Identification Techniques

Figure 4 depicts a summary of various risk identification techniques used by building contractors in the state of Alabama. A score of 1 indicates “very low” use and 5 means “very high” use.

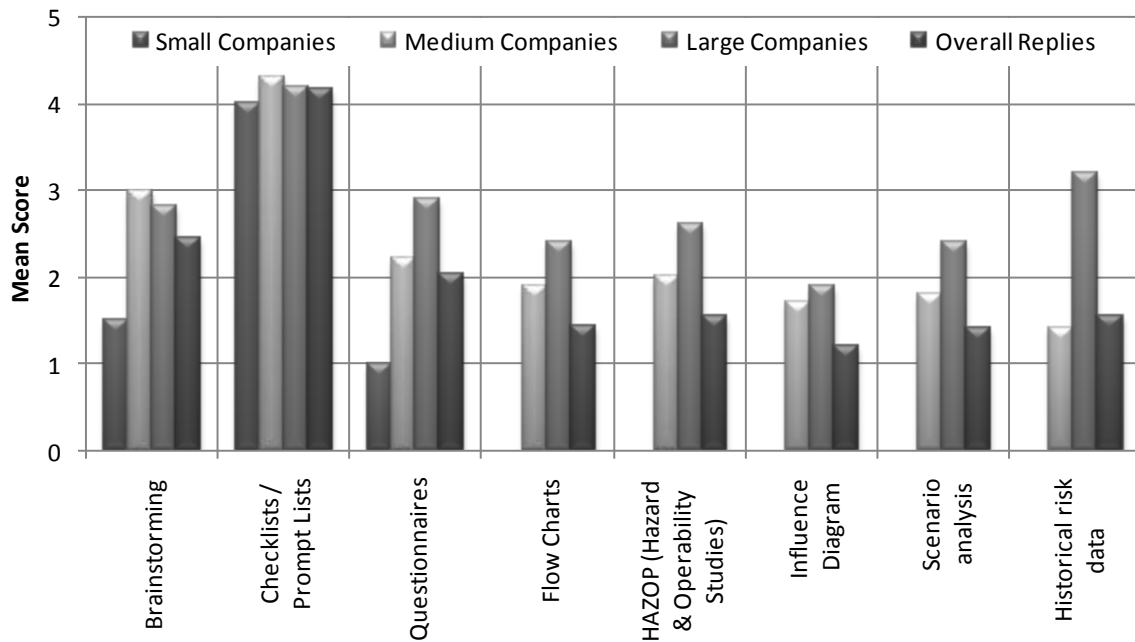


Figure 4: A Summary of Risk Identification Techniques used by Alabama Building Contractors

Evaluation of Risk Assessment Techniques

The companies were first asked to identify whether they use qualitative or quantitative methods for risk assessment. The responses are shown in Table 3 which clearly indicates that the qualitative methods are given preference over the quantitative methods in all companies. Ahmad and Azhar (2004) found a similar trend in the state of Florida where the majority of companies (over 70%) were found to depend on intuition/judgment/experience to assess risks involved in construction. A list of various qualitative and quantitative risk assessment methods was also provided to the respondents and they were asked to select the methods commonly used in their companies on a scale of 1 to 5 (1: Never used; 5: Always used). The responses are shown in Figure 5.

Table 3: A Summary of the Mean Score for Risk Assessment Techniques

Risk Analysis Methods	Small Companies	Medium Companies	Large Companies	Overall Replies
Qualitative	4.5	3.5	4.2	4.1
Quantitative	1.5	2.1	2.9	2.1

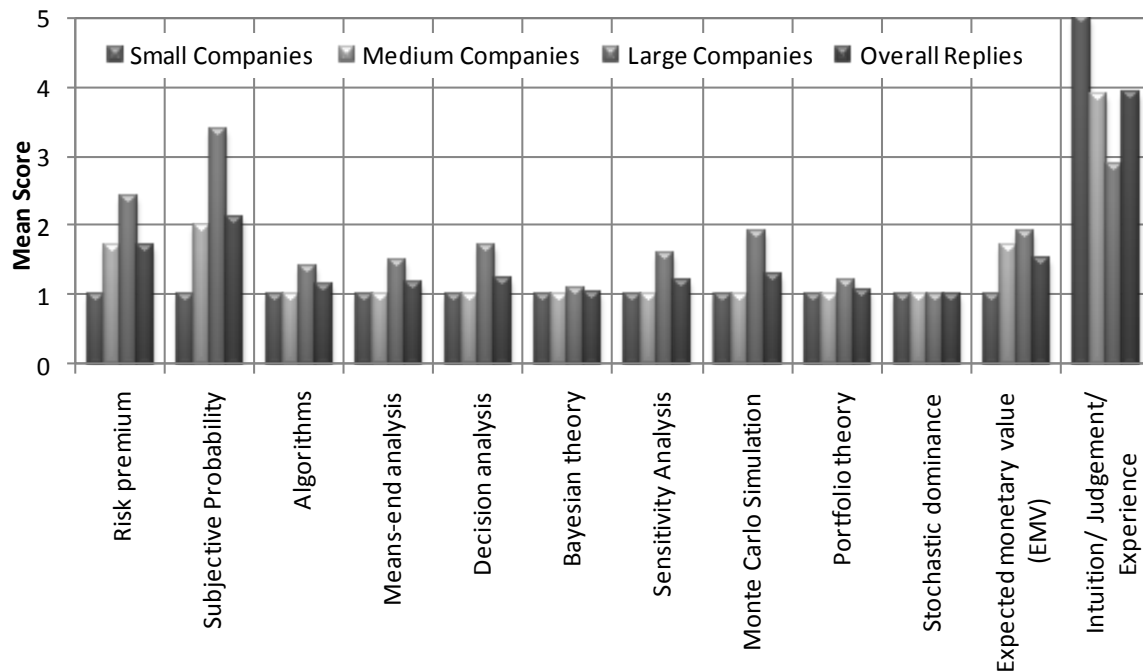


Figure 5: A Summary of Risk Assessment Techniques used by Alabama Building Contractors

While evaluating these results, it was inferred that the average value below 3.0 indicates that the frequency of practicing these techniques is from “occasional to never”. Out of 12 techniques, only one technique (i.e., intuition/judgment/experience) got an overall score above 3.0. It means that intuition/judgment/experience is the most commonly used risk assessment technique by all companies regardless of their sizes. Some large size companies are found to use subjective probability analysis for risk assessment in addition to direct judgment. Ahmad and Azhar (2004)

found a similar trend in Florida and Georgia. From these results, Byrne and Cadman's (1984) view is still valid, i.e. the measurement of probability is alien to most decision makers in construction, who are happy to take an intuitive approach, but reject procedures which require more formal analysis.

Evaluation of Risk Response Practices

From Figure 6, it is clear that *risk reduction* is the popular and most frequently practiced method with a mean score of 3.5 among building contractors in Alabama. After risk reduction the next favored method is *risk elimination* with a mean score of 3.3. *Risk retention* and *transfer* were ranked third with a mean score of 3.2.

While evaluating the individual groups, it is observed that risk transfer is mostly preferred by large companies; the next favored method by these companies is risk retention. A probable reason may be that since large contractors usually deal with large sized projects, they sublet most of the work packages to specialty subcontractors or transfer the risk through financial means such as insurance, after winning the bid for the project. On the other hand, in medium and small sized organizations, the most frequently used method is risk reduction, which is consistent with the overall industry trend. The activities to reduce risks may include brain storming to identify new risks, providing onsite training to workers, physical protection to reduce the likelihood of the risk, promptly updating the schedules, and maintaining safety protocols.

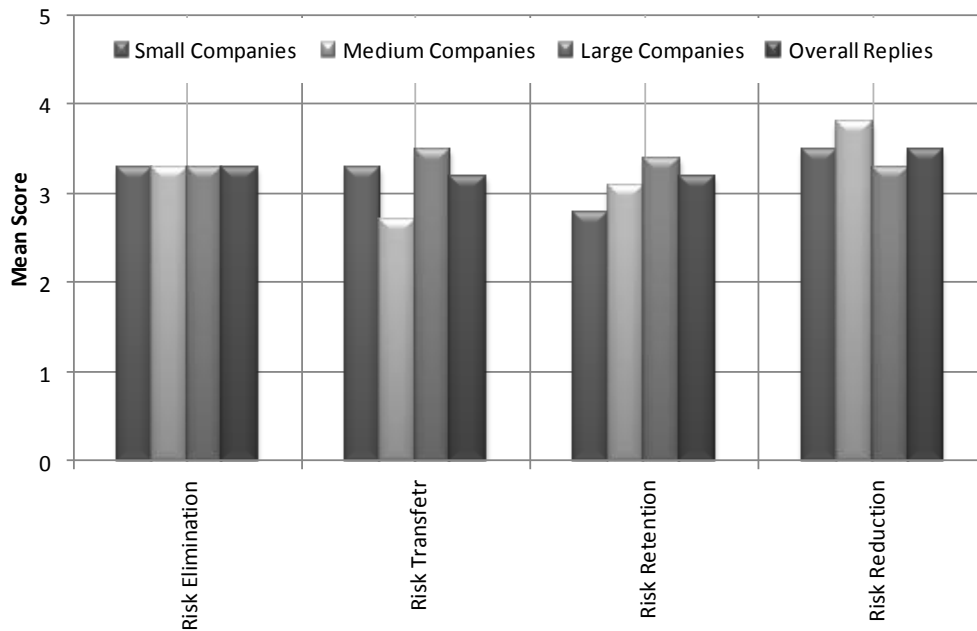


Figure 6: A Summary of Risk Response Techniques used by Alabama Building Contractors

The second favored method in all groups is risk elimination with a mean score of 3.3. The contractor's strategy may include:

- Not participating in the bid
- Bidding at a very high price
- Pre-contract negotiations as to which party takes certain risks

By choosing risk elimination, however the contractor loses the potential gains (opportunity) that may have been derived from taking the risk. If risk elimination is extensively used, the opportunity to receive profit or to achieve desired objectives may be decreased. Since, by definition, ‘risks’ could have a negative or positive effect on a project. So, by introducing the concept of opportunity, companies can identify events or conditions which could lead to positive consequences. If companies avoid/eliminate most risks, they may lose potential gains from the risks.

Section 4: Barriers against Implementation of Risk Management Techniques

The aim of this section was to ascertain information to identify barriers preventing the organizations from implementing risk management techniques. The data is shown in Table 4. The frequency of the barriers is rated on a scale of 1 to 5 (1 indicating “least significant” barrier and 5 indicating “most significant” barrier).

Table 4: List of Barriers preventing Implementation of Risk Management Techniques

Barriers to Risk Management	Small Companies	Medium Companies	Large Companies	Overall Replies
• Cost effectiveness	2.2	2.9	1.6	2.2
• Human/organizational resistance	2.6	3.2	2.6	2.8
• Sophisticated nature of techniques compared to project sizes	3.6	3.2	2.4	3.1
• Lack of time and adequate resources.	2.2	3.1	2.6	2.7
• Lack of expertise in risk management techniques	2.0	2.9	2.7	2.7
• Lack of knowledge and doubts about the suitability of risk management techniques	4.4	3.1	1.9	3.2
• Lack of sound data to ensure confidence	2.6	2.8	2.7	2.7
• Risk management is about predicting future & it is quite difficult	2.0	3.1	2.2	2.5

From the responses, the major three barriers can be identified as: (1) Lack of knowledge and doubts about the suitability of risk management techniques; (2) Sophisticated nature of techniques compared to project sizes; and (3) Human/organizational resistance. These comments are not unexpected considering the lack of formal training in risk management as indicated by most of the respondents. Ahmed and Azhar (2004) found a similar trend in Florida which indicates that the level of use of risk management techniques in both states is almost similar.

Conclusions

The formal risk management techniques are moderately used by medium and large size building contractors in Alabama. Small contractors rarely use these techniques due to lack of knowledge and expertise. It is found that qualitative methods of risk assessment are preferred by contractors

over quantitative methods. In most situations, contractors perceive risk based on their intuition, experience and judgment. Risk reduction is found to be the most popular risk response method. After risk reduction, the other favored methods are risk elimination, risk retention and risk transfer. Large companies prefer risk transfer because they are in a better position to hire specialty contractors or purchase insurance for risky work packages. The main barriers preventing implementation of risk management in Alabama are lack of knowledge and doubts about the suitability of risk management techniques; sophisticated nature of these techniques compared to project sizes; and human/organizational resistance. Formal or informal training of building contractors will be useful to educate them about risk management best practices. An increase in the use of risk management techniques may lead to improved profitability, reduced costs, better time management and improved customer/client relationships.

Disclaimer

The opinions and recommendations expressed in this paper are the authors' personal opinions and do not necessarily represent the official position of any participating organization.

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