

Understanding and Improving Your Risk Management Capability: Assessment Model for Construction Organizations

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Abstract: Implementing risk management in construction projects and organizations may bring a number of benefits and therefore it is necessary to have risk management as an integral part of a construction organization's management practice. The aim of this paper is to develop a risk management maturity assessment model for construction organizations. The paper describes the development process of a Web-based RM3 (risk management maturity model), including its contents, its validation and testing, as well as its applications. The RM3 developed has five attributes namely, *management, risk culture, ability to identify risk, ability to analyze risk, and application of standardized risk management process/system*. These attributes are measured against four levels: *initial, repeated, managed, and optimized*. It is found that the proposed RM3 was suitable and useful. Using the RM3, it is found that the Australian construction industry's overall risk management maturity level was relatively low (where 32% rated at Level 2 and 52% rated at Level 3). Furthermore, it is found that the weakest attribute was "analyzing risks" followed by "application of standardized risk management process." It is therefore necessary to provide more training on qualitative and quantitative risk analysis to construction personnel and to develop and apply standardized enterprise risk management. It is concluded that the proposed RM3 is suitable for construction organizations to assess their risk management maturity levels and find ways for improvement.

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Introduction and Research Aims

Risk is the chance of something happening that will have an impact on objectives and risk management is the culture, processes, and structures that are directed toward realizing potential opportunities while managing adverse effects (Australian Standard Risk management—Standards Australia 2004). Risk management processes typically include risk identification, risk analysis, risk response and risk communication, monitoring, review, and learning. Risk management is fundamental to accomplish business or project objectives, and it is not only trying to keep away bad results but also acting as a guide to maximize positive results (Monetti et al. 2006).

There are numerous reasons for construction organizations to develop and implement risk management systems. First, it is a legal requirement as outlined by legal policies for organizations to carry out their duty of care by assessing the risks associated with their business. Second, construction projects are all prototypes to some extent and imply change (Atkinson 2001) and each project is unique and inevitably involves complicated and numerous risks (Zhi 1995). Third, the nature of the risks alters over the duration of the construction project as do their impacts (Burcar and Radujkovic 2005). These risks are compounded by changes in legislation, effects of related authorities, adoption of nonstandard building contracts, and uncertain site conditions (Marsh Australia 2007). Fourth, construction projects involve different participants, construction methods, and various teams of different skills and background each time. Fifth, without proper risk management, it would result in inefficient use of efforts and resources. The negative impacts of lack of risk management processes can include increased uncertainty to project outcome, suffer financial loss, liabilities that may have been overlooked, and ineffective decision making (Loosemore et al. 2006).

Risk management maturity reflects the sophistication of an organization's understanding of its risk portfolio and how to manage those risks as well as the internal business continuity systems needed to cope with and recover from their eventuality. It is necessary for organizations to have a clear view on their current approach to risk in order to define goals, specify processes, and manage progress in raising their risk management capabilities [Risk Management Research and Development Program Collaboration (RMRDPC) 2002]. Furthermore, identifying the maturity

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of risk management and risk allocation preferences to the parties involved can contribute to minimizing costs and improving profitability (Anagnostopoulos et al. 2005). In addition, a risk management maturity model can help identify the strengths and weaknesses of an organization. As Loosemore et al. (2006) indicated, many organizations operate at different levels of maturity for different types of risks. For example, an organization's risk management culture may be as low as Level 1 but achieved Level 3 in risk management processes. This means that while organizations may have developed sophisticated risk management systems, they have not fully imbedded it within its organizational behavior and practices. Furthermore, assessing risk management maturity can identify areas needing improvement. In short, risk management maturity can provide a guideline for assessing the current risk capability of construction organizations. It can be used to identify the priority or weakest areas needed for improvement and actions can be taken to increase the performance (Hopkinson 2000).

Despite the increasing consensus on its value, effective implementation of risk management in organizations and projects are not common [Risk Management Research and Development Program Collaboration (RMRDPC) 2002]. Establishing risk management maturity in an organization should be the starting point when embarking on a review of current risk management practices, systems, and culture (Loosemore et al. 2006). This is especially important for construction organizations due to the high risk nature of their business. Furthermore, construction organizations wishing to implement a formal approach to risk management or to improve their existing approach need a framework against which to benchmark their current practice. To understand the risk management maturity of a construction organization, a useful starting point is to review current risk management, processes, and cultures (Monetti et al. 2006).

Research Aims

This research aims to develop an assessment tool namely, risk management maturity model (RM3) that can be used by construction organization for assessing and understanding their risk management maturity level, and develop strategies to improve their risk management practice.

Model Development

According to Risk Management Research and Development Program Collaboration (RMRDPC) (2002), the concept of maturity model is well developed and accepted and the Software Engineering Institute at Carnegie-Mellon University was the first institute that developed a capability maturity model (CMM) for software organizations (www.sei.cmu.edu/cmmi). CMM is a well-known comprehensive software engineering improvement model (Ren and Yeo 2004). In specific to risk management maturity, several research has been conducted by organizations and researchers such as Risk Management Research and Development Program Collaboration (RMRDPC) (2002), International Association for Contract and Commercial Management (IACCM) (2003), Ren and Yeo (2004), HVR Consulting (2006), Risk and Insurance Management Inc. (2006), Loosemore et al. (2006), and Lacey (2007), all of whom have successfully developed risk management maturity models. Some developments of maturity models originated from a generic risk maturity model proposed by David Hillson in 1997 (Hopkinson and Lovelock 2004). Details of the

first risk management maturity model were first published in the International Journal of Project and Business Risk Management by Hillson (1997).

There are also several project management maturity models, including the P3M3 by Office of Government Commerce (OGC) (2006), which is Office of U.K.'s Her Majesty's Stationary Office (HMSO) Government Commence, Project Management Institute (PMI)'s PMM, and the Kwak and Ibbs (2002) (PM)² model. The RM3 proposed in this paper was derived from various literature and existing models as described above. Through studying the characteristics and functions of these existing models the most suitable attributes and maturity levels were determined as described in the following sections. It consists of five attributes and four levels of maturity.

Five Attributes

The attributes in the existing maturity models and literature were reviewed and assessed. Table 1 provides a comparison of the attributes used in different models. Although it appears that different names have been used as attributes, they are mainly related to the following aspects: system, process, people and culture, which collectively, include (1) application of risk identifications and analysis techniques and standardized process and (2) top management, people and leadership in implementing risk management that ultimately shapes an organizational culture toward risk management. Based on the comparison, five attributes were chosen for the RM3 which are designed to test different aspects of an organization's risk capabilities, including:

- Management (people and leadership) capability in relation to risk;
- Organizational risk culture;
- Ability to identify risks;
- Ability to analyze risks; and
- Development and application of standardized risk management process.

It should be pointed out that it is possible to have more attributes in order to take all aspects into consideration. For simplicity, the above five attributes may be sufficient for construction enterprises.

The attributes proposed in the RM3 reflect the fundamentals of risk management and were aimed to benefit construction organizations in assessing and improving their risk management capabilities. The construction industry is an industry that relies heavily on human interaction. This means that having a good cultural environment plays a significant role in the morale and productivity within the organization. Effective and efficient management is always necessary in order to manage people and make decisions. Therefore *culture* and *management* focuses mainly on the overall operations of an organization. *Risk identification*, *risk analysis*, and *standardized risk management process* are focused more specifically on risk events. It is the ability to properly and systematically address arising issues while taking into account possible risk factors, constraints and magnitudes of risks. This will demonstrate the capabilities of an organization to handle risks. By combining these five attributes, it will show the overall risk management maturity level of a construction organization.

Using the selected attributes as starting point, a series of questions were developed to evaluate an organization's risk management capability (Table 2). Their answers are used to calculate maturity levels. It should be pointed that more questions/

Table 1. Attributes Used in Different Risk Management Maturity Models

RIMS's RMM (2006)	RMRDPC's RMMM (2002)	IACCM's BRM3 (2003)	Hillson's RMM (1997)	Ferrando's ORMMM (2007)	Lacey's IRMMM (2007)	HVR's project RMM (2004) (Hopkinson and Lovelock 2004)	Ren and Yeo's RMCMM (2004)
Adoption of ERM-based approach	Application	Application	Application	Practical application	Top management commitment	Project management	Risk management knowledge and technology: (1) integration with other processes and (2) management of risk knowledge
ERM process management	Process	Process	Process	Processes	Enforcement of sound policies and standards	Risk identification Analysis and mitigation	Risk management process: (1) risk identification; (2) risk analysis; and (3) risk mitigation
Risk appetite management	Culture	Culture	Culture	Culture		Culture	Organizational culture: (1) attitude toward risks and uncertainty; (2) stakeholders relationships; and (3) leadership and commitment to risk management
Root cause discipline	Experience	Experience	Experience	Experience	Relationship management	Stakeholders	
Uncovering risks					Visibility of incidents events Understanding of information		
Performance management					Professional competence		
Business resiliency and sustainability					Use of modern security technology Benchmarking of costs		

Note: RIMS=Risk and Insurance Management Society; RMMS=Risk Management Maturity Model; ORMMS=Organizational Risk Management Maturity Model; IRMMM=Integrated Risk Management Maturity Model; RMM=Risk Management Maturity; and BRM3=Business Risk Management Maturity Model.

description could be used for each attribute. However in this case, five questions/statements were chosen to measure different aspects for each attribute.

Four Maturity Levels

Table 3 lists the different maturity levels used in several existing models. It is clear that these models used either five or four levels to measure risk management maturity. For those using five levels, it is found that Levels 1 and 2 are of similar meaning in that it is either nonexistence or ad hoc or initial. This means these two levels could be merged. Furthermore, past research showed that if an odd number of levels (scales) was used, there is a tendency for the respondents to choose the middle level. To avoid this from happening, the writers decided that four levels of maturity will be sufficed for the proposed RM3. The meaning of each maturity level is described in Table 4. The maturity of each attribute will be rated against the following four levels:

- Level 1: initial and ad hoc;
- Level 2: repeatable;
- Level 3: managed; and
- Level 4: optimized.

The maturity levels are spread on a scale between 0 and 1. This is a similar scale used by several models such as Risk Management Research and Development Program Collaboration (RMRDPC) (2002), HVR Consulting (2006), and TLP (2006).

The model analyzes the maturity levels of the organizations through the answers gathered in the model and the results may be presented graphically as shown in Fig. 1.

- Level 1: 0.00–0.25;
- Level 2: 0.25–0.50;
- Level 3: 0.50–0.75; and
- Level 4: 0.75–1.00.

Each of the five attributes has its own maturity level which presents the characteristics of an organization and the overall maturity of a construction organization's risk management capability is defined based upon the lowest value of the five attributes. The lowest value is considered the weakest link therefore the aspect of the risk management for which improvements are prioritized. For example in Fig. 1, "organizational culture" was the lowest value out of the five attributes. This idea was adopted from existing maturity models such as the models by HVR Consulting (2006) (i.e., Hopkinson and Lovelock 2004), TLP (2006), International Association for Contract and Commercial Management (IACCM) (2003), and Risk Management Research and Development Program Collaboration (RMRDPC) (2002).

As mentioned previously, the RM3 model for evaluating an organization's risk management maturity would include a series of questions covering specific areas. The answers received will assess the organization's capabilities through measuring its performance against these areas so that problems in process, atti-

Table 2. Descriptions and Questions for the Five Attributes in the RM3

Attributes	Descriptions or questions
Management perspective (people and leadership) in relation to risk	<ul style="list-style-type: none"> • Upper management actively takes part in risk activities, supports and encourages risk management • How often are the risk management capabilities assessments held within the organization • To what extent is risk management information distributed and communicated to all project participants within the organization • To what extent is risk management tools and techniques integrated and used in projects • To what extent are resources dedicated to projects in accordance to the severity of risk events identified
Organizational risk culture	<ul style="list-style-type: none"> • There is a build up of trust within the organization and project teams in relation to risk management • To what extent are team members taking risk ownerships during project implementation • Responsibilities for managing risks is distributed and carried out by all team members • To what extent was risk event openly communicated within the organization • Risk management is widely accepted and practiced in all levels within the organization
Identifying risks	<ul style="list-style-type: none"> • Potential risks are identified each time for new projects • A systematic identification method is used to ensure major risks are identified • Information on risks identified are processed, grouped and communicated to all project participants • Risks identified is consistently revised and reevaluated throughout the project process • Actual risks found are compared against to initially identified risks
Analyzing risks	<ul style="list-style-type: none"> • All project participants are capable of basic risk analysis skills such as qualitative or quantitative analysis • The likelihood of occurrence and magnitude of impacts of a risk is thoroughly assessed upon identification • Qualitative and/or quantitative risk analysis tools and applications are used to assess identified risks • After analyzing the analytical results of risks identified, it is used to aid in decision making for risk responses • The results of risk analysis is used as a basis for resource allocation and distribution to projects
Standardized risk management process	<ul style="list-style-type: none"> • Risks are consistently identified, analyzed, responded, and continuously monitored throughout the project life cycle • The flow of risk management information is passed on and communicated throughout the entire project life cycle • Risk management process is woven into daily business processes of the organization • A standardized risk management process is applied to all projects within the organization • How often is risk management process reviewed to ensure the process is effective

tudes, experience can be identified. The output of the RM3 assessments includes an indication of the current risk management maturity level (TLPM 2006). Once the answers are provided, the results can be displayed in the form as shown in Fig. 1. To collect data for this research, an on-line (Web-based) model was developed using a commercial IT platform, which will be discussed in later sections.

Development of the Prototype Web-Based RM3

Based on the above discussions, an internet (Web) accessible model was developed as a data collection method. The on-line

model was selected due to the cost saving, convenience, and time factors. It can also be administered to a wide spread of organizations located in different areas.

Model Testing and Validation

Test 1—Invited Expert Evaluations

A selected group of experienced risk personnel (Table 5) were asked to provide comments regarding the RM3. This is for better understanding of the thoughts and opinions of the users so that to improve the RM3. Through their comments, the writers will be

Table 3. Comparison of Maturity Measurement Levels of Different Models

Model name	Level					
	0	1	2	3	4	5
Hillson (1997)		Naïve	Novice	Normalized	Natural	
Hopkinson and Lovelock (2004)		Naïve	Novice	Normalized	Natural	
RMRDPC (2002)		Ad hoc	Initial	Repeatable	Managed	
RIMS (2006)	Nonexistent	Ad hoc	Initial	Repeatable	Managed	Leadership
IACCM (2003)		Novice	Competent	Proficient	Expert	
Ren and Yeo (2004)		Initial	Repeatable	Defined	Managed	Optimized
Ferrando (2007)		Traditional	Awareness	Monitoring	quantifications	Integration
Lacey (2007)		Informal and ad hoc	Planned and tracked	Defined and institutionalized	Managed and measured	Optimized and agile
P3M3 (2006)		Initial	Repeatable	Defined	Managed	Optimized
Carnegie-Mellon University (2007) (capability maturity model)		Initial	Repeatable	Defined	Managed	Optimizing

Table 4. Descriptions of Maturity Levels [Source: Risk Management Research and Development Program Collaboration (RMRDPC) 2002]

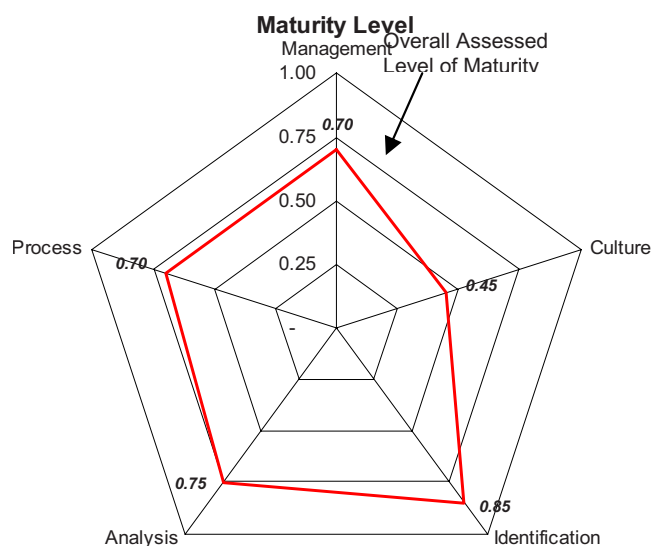
Maturity level	Descriptions
Level 4—optimized	The organization has a risk-aware culture with a proactive approach to risk management in all project activities. Risk information is actively used to improve risk management processes and gain competitive advantage. The consideration of risk is inherent to routine project and business processes. The risk management results from past historical and relevant data are analyzed to determine how accurate risk identification and analysis were versus actual impacts and causes. Identifying, assessing and managing uncertainty becomes second nature to the organization and risk management is built into all activities and business processes. Risks are not only identified and analyzed but also optimized where the opportunities are maximized. Risk review and learning is implemented. Risk management knowledge base is established and used for risk and opportunity optimization modeling.
Level 3—managed	Generic risk management systems and processes are formalized, implemented, and documented where the benefits are understood at all levels of the organization. This process is based on a common, organizationwide understanding of the activities, roles and responsibilities. Top management provides strong support while employees are empowered to implement risk management processes to take on risks. Level 3 maturity is considered enough for most organizations where risk has become an integral part of their daily practices.
Level 2—repeatable	Basic risk management processes are established on a project-by-project basis although they may not be consistently achieved in all cases. The organization makes realistic project commitments based on the results observed on previous projects and on the risks identified for individual projects. The risk management is disciplined because planning and tracking of individual project is stable and earlier successes can be repeated. Minimum risk management process has been applied including risk identification and analysis and responses. Yet there is a lack of organizationwide and standardized risk management processes.
Level 1—initial and/or ad hoc	The organization is unaware of the need and value for risk management and has no structured approach to dealing with risk. The organization is not experimenting the application of risk management. No attempt is made to identify risks in the project or to develop mitigation or contingency plans. The normal method for dealing with problems is to react after a problem occurs with no proactive thought. Occasionally, capable and forceful managers can identify and work to mitigate risks during the project. In some cases, although the organization is aware, at some level, of the potential benefits of managing their project risks, there is not effectively implemented organizationwide risk management process and is not gaining the full benefits. The organization has no formal or structured risk management process in place.

able to review and improve the model to better meet the needs of the construction organizations. This forms a key part of the RM3 development process and allows the model to evolve.

The model was commented by a group of six experts. These experts were from various construction organizations and have extensive experience in the construction industry (refer to Table 5). They all have worked in the construction industry for more than 10 years. The usefulness of the RM3 was validated based on

comments gathered from the group. All respondents felt that the contents of the model were easy to understand and interpret. Five respondents thought the model covered all relevant aspects of risk management.

However some suggestions were made for further improvement. For example, one expert said "...should explore the concept of imminence understanding of risk management tools such as ROMS and Risk software ..." while another said "... explore some 'what would you do' scenarios..." Overall, the experts felt the model was practical—"I believe in the construction industry we come across a lot of hazards which need identifying and assessed as to which steps should be taken to avoid and minimize risk as much as possible." The experts were satisfied with the layout, content, and attributes of the model.

**Fig. 1.** Example of an organization's risk management maturity level**Table 5.** Profiles of the Experts

Expert's position	Years of experience in construction management
Director	11–20 years
Project director	More than 30 years
Project manager	11–20 years
Project manager	21–30 years
Risk management officer	11–20 years
Systems manager	11–20 years

Table 6. Participants' Profiles

Number	Respondent's profiles	Years of experience in construction management
1	Construction manager	11–20 years
2	Cost planner	11–20 years
3	Cost planner	More than 30 years
4	Development manager	11–20 years
5	Project manager	21–30 years
6	Risk management officer	11–20 years
7	Risk management officer	More than 30 years
8	Senior project engineer	5–10 years

Test 2—Testing the Model with a Construction Organization

Furthermore a specific organization was chosen to test the RM3. The following section discusses the company's background including reasons for such choice and the test results.

Organization's Background

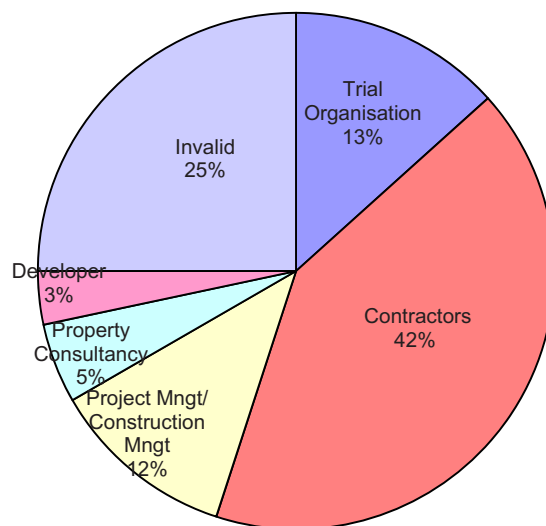
The chosen organization has offices on a multinational level and operates in over 40 countries such as United Kingdom, United States, and Australia. It is also involved in various key sectors of the construction industry including commercial, retail, residential, communications, industrial, and pharmaceutical. Their key skills include construction management, project and program management, design management, design engineering, procurement, and facilities management. Furthermore, this organization implements risk management as part of their general business practices. They have good experiences in risk management procedures, policies, and response guidelines to risks and incidents. Therefore, this organization is ideal to be used to test the RM3.

Trial

Eight employees within this organization were invited to provide answers to the questions in the on-line RM3. The employees chosen have good experience working in the construction industry and they are from various sections and different job scopes within the organization. This allows a diverse sample of respondents to be included. Table 6 shows the respondent's profiles.

Risk Management Maturity Level. Six of the respondents (75%) rated the maturity at Level 3 and two respondents (25%) rated it at Level 4 maturity. These showed that the chosen organization's risk management practices having achieved Level 3 and Level 4 maturities. This may be due to the nature and scale of their organization. It is a multinational organization that is involved in many different sectors in the construction industry. Established more than 50 years ago, it is a leading organization adapt in various aspects of its daily business as well as its risk management practices. They have risk management guidelines set out for every project as well as risk management officers to handle risk events. The results are conclusive to the current risk management capabilities of the chosen sample organization.

Weakest Attribute. As mentioned previously, an organization's overall assessed maturity is measured based upon the lowest value of the five attributes. This attribute is considered the weakest link in the organization's risk management practices and where improvements are needed the most. Organizations may operate at different maturity levels for different types of risks, therefore, it is normal for the respondent's organization to achieve

**Fig. 2.** Business types of the respondents

different maturity levels in different attributes. Since the respondents came from different departments within the organization, they may assess their organization's level of maturities from different perspectives.

One of the respondents (12.5%) highlighted their weakest attribute as "*standardized process*," two respondents (25%) indicated "*management perspective*," and the rest (62.5%) felt "*analyzing risks*" was their weakest attribute. The results can be interpreted that risk analysis requires specialized knowledge and skills as well as historical data in the case of quantitative risk analysis. None of the respondents perceived the attributes "*organizational culture*" or "*identifying risks*" as the weakest attribute. This shows that the organization does not have issues in implementing risk management in their daily business and project management practices.

Model Application

Based on the tests and validation conducted with selected experts and a specific organization, the RM3 was applied to different construction organizations in the industry to gain a broad understanding of the current risk management maturity level of the industry.

A sample size of 300 construction organizations in New South Wales state, Australia was approached. E-mails were sent to these organizations informing them the purpose of this research and inviting them to participate in the research by answering the questionnaire in the RM3 model via access on the Web site. A link to the on-line model was provided in the e-mails.

Sixty participants responded to the invitation. Fig. 2 shows the business types of the organizations that responded to the invitation. For the purpose of this study, two business types will be used to compare organization maturity levels in the construction industry: contractors and construction/project management organizations.

Construction Contractor Organizations

Risk Management Maturity Levels

Fig. 3 shows the distribution of maturity levels of the responding contractors. Four percent of the respondents had a Level 1 matu-

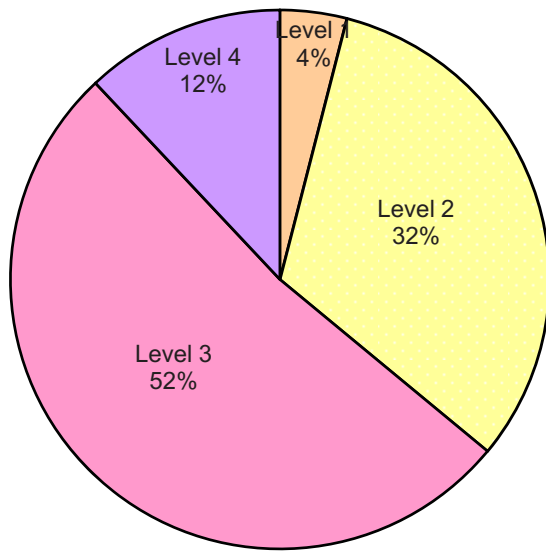


Fig. 3. Overall risk management maturity for construction contractors

ity. Thirty-two percent of the respondents achieved a Level 2 maturity, 52% achieved a Level 3 maturity, and 12% of the respondents achieved an overall Level 4 maturity. This shows that over one-half of the contractor respondents surveyed perceived themselves mature in their risk management practices. Nevertheless, 36% perceived their risk management capability immature.

Weakest Attribute

Fig. 4 displays the distribution of weakest attribute among the surveyed respondents. Six percent of the respondent's weakest attribute were organizational cultures, 9% were identifying risks, 16% were management perspective, 22% were standardized process, and the largest group is analyzing risks at 47%. This shows that analyzing risks needs improvement the most.

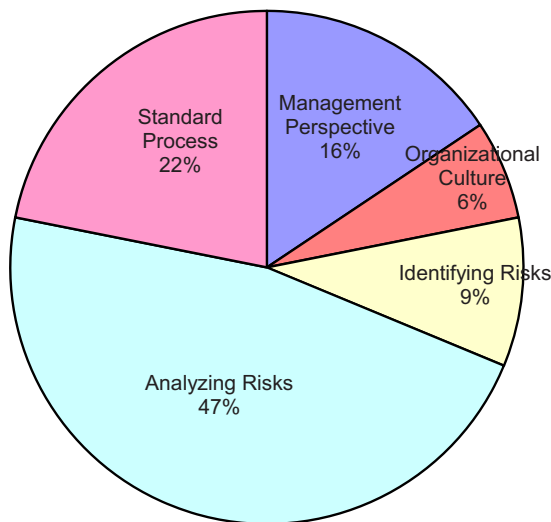


Fig. 4. Distribution of the weakest attribute for construction contractors

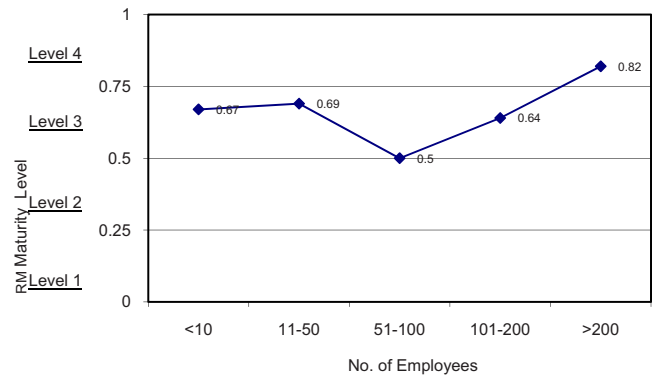


Fig. 5. Organizational size versus maturity level construction contractors

Risk Management Maturities versus Organization's Characteristics

It was anticipated that the characteristics of the respondents' organizations will have a direct impact to their risk management maturity levels. For example, the contractor organizations that deal with large-scale projects are likely to be more adapting in using risk management processes, due to the increased level of project complexities and increased number of project participants. The following will attempt to determine whether such relationship between the organization's profiles and their relative maturity levels exist.

Fig. 5 displays the relationship between the number of employees in the respondent's organizations and their average maturity level obtained. The results showed the relationships were not very strong.

As shown in Fig. 6, the downward slope of the figure suggested that the older an organization is, the more capable it is in risk management.

Construction/Project Management Organizations

Risk Management Maturity Levels

Fig. 7 shows the distribution of respondents and their respective risk management maturity levels with mostly spread between Levels 2 and 3 maturities. Fourteen percent of the respondents had Level 1. Forty-three percent of respondents achieved Level 2 and 43% achieved Level 3. There was no respondent that

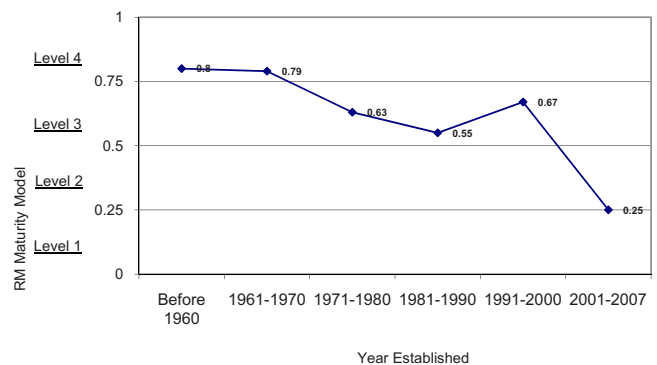


Fig. 6. Years since business establishment versus maturity level for construction contractors

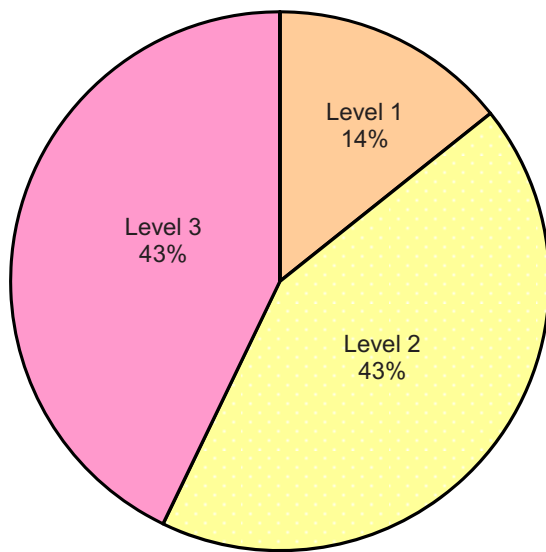


Fig. 7. Overall risk management maturity in construction/project management organizations

achieved Level 4. Furthermore, it shows that 57% (Levels 1 and 2 combined) of the organizations are not mature in their risk management practices.

Weakest Attribute

As shown in Fig. 8, 11% of the respondents' weakest attributes were identifying risks, 22% were management perspective, 22% were standardized process, and the largest group is analyzing risks at 45% while no respondent perceived organizational culture was the weakest link. This is similar to the results found in contractor organizations.

Comparison between Construction Contractors and Management Organizations

The results ranged from some organizations having low risk management maturity to those who are fully capable. From the study

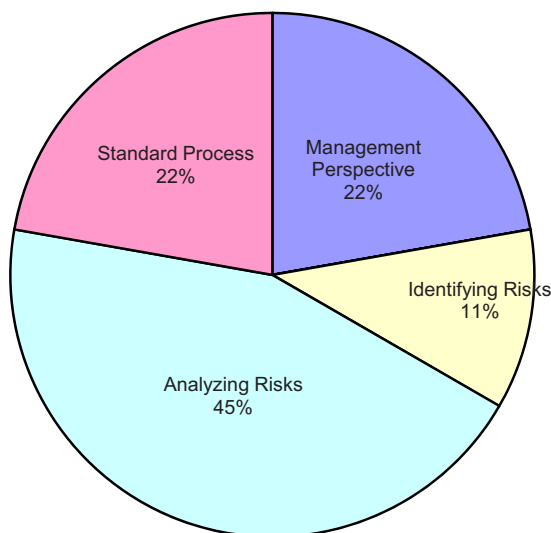


Fig. 8. Distribution of the weakest attribute for construction/project management organizations

conducted it shows that construction and project management organizations had a lower overall maturity level distribution compared to contractors. This may be due to the nature of their business. Furthermore, the risk management maturity levels of the two types of businesses appear to be influenced by their organization characteristics—the older and bigger organizations tend to have better risk management practices. This may be due to the level of experience, financial abilities, and resources available for these organizations to successfully implement risk management practices. In addition, it was found that “risk analysis” was the weakest link in most construction organizations.

Discussions

Advantages of the Model

There are several advantages for this model. The most obvious advantage of this model is its simplicity as it only contains 25 questions. Furthermore, it is a Web-based RM3 system so the respondents (users) can access the system any time 24/7 and from anywhere in the world. Another advantage is the graphical presentation of the results which shows the related levels of individual attributes. This in turn provides a straight-forward view of the weakest and strongest attributes.

How Construction Organizations May Use the RM3

Construction organizations may use this model to assess and get a basic understanding of their risk management maturity and capability. The assessment may be carried out by internal or external personnel. The model can be used the organization level (i.e., the organization as a whole). It can also be used internally to compare risk management maturity and capability between different departments and project teams. Once the strong and weak links (attributed) are identified and the current risk management maturity level is determined, strategies should be developed to increase its risk management maturity level. This strategy should include milestone targets, resource allocation, and action plans.

The action plans for moving toward the next level can be developed as described in Fig. 9 which was abstracted from the Risk Management Research and Development Program Collaboration (RMRDPC) (2002) model and refined to better suit construction organizations. Regular reviews may be carried out to capture lessons learned and test the effectiveness of risk management practice, such that the ultimate aim of Level 4 is achieved and maintained.

Limitations of This Research

Having stated the advantages, it is also necessary to point out several limitations in this research. The main one is the small number of respondents. Despite the fact that 300 were invited to participate in the on-line RM3 survey, only 60 actually participated. This small number of respondents might not truly reflect the entire construction industry in Australia hence the results should not be treated as conclusive (instead should be as indicative). Another limitation might be that the model could have five instead of four maturity levels to distinguish the organization that has no risk management process/practice/culture at all from those that are in an ad hoc starting stage.

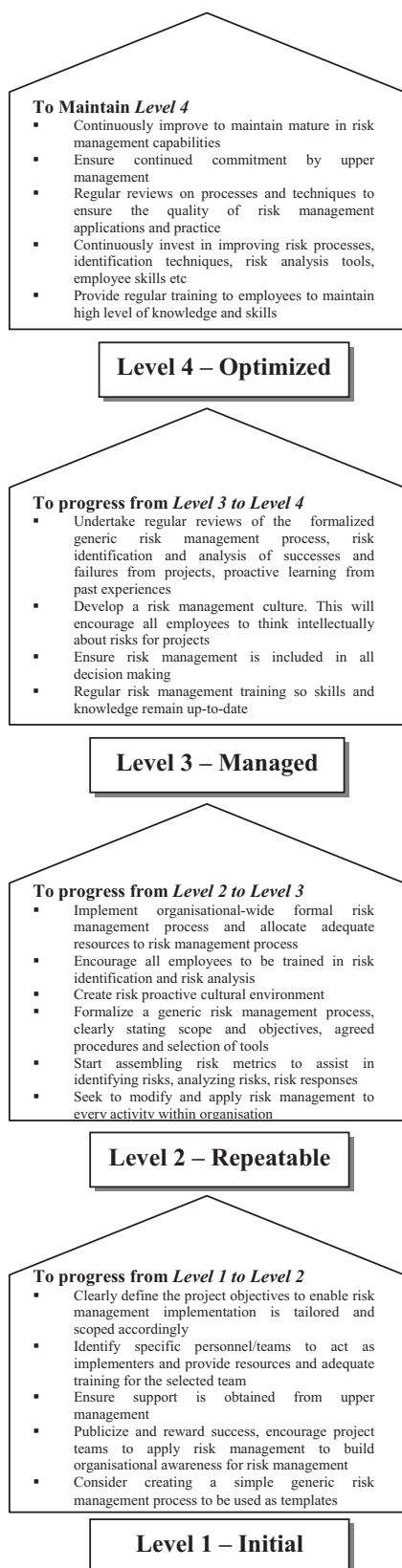


Fig. 9. Progressing between maturity models [modified based on Risk Management Research and Development Program Collaboration (RMRDPC) 2002]

Further Research

The further research in this topic will include testing and application of the model with specific small and medium size construction organizations. The further research will also try to develop methodologies to overcome the limitations identified in previous section.

Conclusions

The risk management maturity model (RM3) was successfully developed and validated using a group of risk management experts and specific construction organizations. The RM3 contains five attributes—*management, culture, risk identification, risk analysis, and systematic risk management* and these are measured against a four-level scale. Once tested, the RM3 was also successfully used in different construction organizations to gain a broad understanding of the current risk management maturity in the industry. Based on the research findings, it could be claimed that the RM3 developed in this research was user friendly, comprehensive, practical, and useful for construction organizations. It was found that the size and history of a construction organization may affect their risk management maturity—the bigger and longer history the organization, the more mature they are in risk management. The weakest attribute in construction organizations and the industry as a whole is risk analysis. As a starting point to enhance their risk management practice, construction organizations may use the RM3 to assess their current risk management maturity.

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