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Critical success factors for risk management systems

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Despite the existence of extensive literature regarding risk management, there still seems to be lack of knowledge in the identification of critical success factors (CSFs) in this area. In this research, grounded theory is implemented to identify CSFs in risk management systems (RMS). Factor analysis and one-sample *t*-tests are then used to refine and rank the CSFs on the basis of the results of a survey which has been conducted among risk management practitioners in various types of Swedish corporations. CSFs are defined from three different perspectives: (1) the factors that have influence on the inclination and readiness of a corporation for implementing RMS; (2) The factors that are important during the design and implementation of RMS in a corporation and can significantly affect the success of RMS design and implementation; and (3) the factors that are crucially important to successfully run, maintain, and administrate RMS after the closure of the project of RMS design and implementation. A case study of a largely successful RMS is presented and discussed in terms of these key factors. This systematic approach toward understanding the taxonomy of the success dimension in RMS is important for re-enforcing effective risk management practices.

Keywords: risk management systems; success criteria; factor analysis; grounded theory; case study; critical success factors

1. Introduction

The expanded spectrum of new regulations and legal changes has created an increasing need to re-evaluate and better manage risk across the entire organization (Bedell 2007). Studies show that risk management is gaining international focus (Gjerdrum 2008), and corporations are considering it as one of their main objectives (Rawls and Smithson 1990). Not only governance authorities regard risk management as one of the most important responsibilities of managers (Atkinson 2005; Aquila 2006), but also clients' expectations about risk management are much more than before (Feinberg 1999; Unsworth 1997).

Despite the necessity, benefits (Rao et al. 1997; Stripling 2001) and effectiveness (Raz and Michael 2001; Schmit and Roth 1990) of implementing risk management systems (RMS), various researchers state that the organizations which have been successful in practical implementation of RMS are still in a small minority which does not exceed 25% according to the most optimistic reports (Akintoye and MacLeod

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1997; Ceniceros 2008; Gates 2006; Han and Lai 1995; Kutsch and Hall 2010; Lock 1992; Mitroff and Alpaslan 2003).

Although there is a well-developed body of knowledge about design and implementation of different processes of RMS, such as risk management planning (Lifang and Jun 2009), risk identification (Letens et al. 2008), risk assessment (Gogin and Johnson 2008), risk analysis (Campbell and Currie 2006; Vose 1996), and risk response planning (Lee and Chun 2009), or even manuals for creation of risk management standard operating procedures (Kallman 2006), there is not yet any approved and globally accepted standard or guideline available to help organizations with a successful design and implementation of RMS without limitation of business type. There have been some valuable efforts for providing risk management standards and guidelines, but they have neither the global acceptance, nor the required universality. Most of these standards either lack the required clarity of a general purpose guideline, or are limited to a small range of business types (IRM/ALARM/AIRMIC 2002; ISO/IEC 27005:2008 2008; ISO 17666:2003 2003; ISO/IEC 16085:2006 2006; ISO/TS 16732:2005 2005; Stoneburner, Goguen, and Feringa 2004).

There is an urge in the field of risk management to develop a body of knowledge related to critical success factors (CSFs). Moreover, it is also important to realize how these factors relate to each other, and how RMS strategies can be defined, monitored, and controlled to provide adequate treatment to these factors since a corporation decides to implement RMS, during the project of design and implementation of RMS and finally throughout the life of RMS.

The remainder of the paper is organized as follows: Section 2 reviews empirical studies that have investigated factors affecting risk management success. Section 3 describes the research method of our study. Section 4 discusses the qualitative and quantitative analysis results of interviews and a survey that we conducted with risk management practitioners involved in Swedish industry. We describe in Section 4 also the relationships among some of the major factors that emerged from the survey results. To better understand the CSFs and also to study the level of their importance in business, we have also presented a case study and reflected the results in Section 5. Finally, Section 6 presents conclusions and points out future work.

2. Literature review

Identifying CSFs can bridge the gap between literature and practice in the field of risk management; rationally organizations would focus their limited resource on those things which really make the difference between success and failure (Bullen and Rockart 1981). Rockart (Rockart 1982, 5) defines CSFs as: 'those few key areas of activity in which favorable results are absolutely necessary for a manager to reach his/her goals'. Leidecker and Bruno (1984) define CSFs as a few things that must go right for the business to flourish. Through CSF methodology key areas that are essential for management success are made explicit (Boynton and Zmud 1984). CSFs may also be used by managers as descriptions, predictors, and guidelines for achievement levels (Vedder 1992).

CSFs have been used as a management measure since the 1970s in so many different disciplines such as financial services (Boynton and Zmud 1984), information systems (Rockart 1982), manufacturing industry (Mohr and Spekman 1994), project management (Baker, Murphy, and Fisher 1988; Davies 2002; Pinto and Slevin 1988),

quality management (Seetharaman, Sreenivasan, and Boon 2006), supply chain management (Kim et al. 2008), etc.

Wood (2005) states the enhancement of the transparent practical linkage of the risk mitigation plan and risk register to the corporate plan objectives as a key measure of success. According to Hampton (2006) success in risk management is based upon knowledge, relationships, and sharing best practices. Lenckus (2005) mentions securing management support, committing ample time to the effort, planning wisely, proving the plan's worth early, and pacing risk manager among the CSFs for enterprise risk management (ERM). Coccia (2005) believes that communication and the promotion of behavioral changes throughout an organization are the key success factors for ERM. Based on a survey results by McDonald (2004), clearly defined risk appetite articulated through limits and monitoring procedures, involvement of managerial board, centralized ERM organizations, proper communication and instilling risk into the culture of business are among the most important success factors in ERM. Some other experts such as Lemos et al. (2001) and Roth and Espersen (2004) limit the success of risk management to the successful performance of its formal processes of risk management planning, risk identification, risk analysis, risk response planning, and risk monitoring and control.

In addition to the above-mentioned factors, solving a major organization's problems, application of diverse tools of risk management, creative and effective use of insurance markets, establishment of a workable information systems, performance of general managerial functions, cost and time efficiency, development of technical expertise, attitude to risk management practices, and career development are considered as the decision criteria for annual Business Insurance Risk Manager of the Year Award and Risk Management Honor Roll ('Criteria for risk manager of the year award' 2002).

According to our review, not only just a few numbers of CSFs have previously been identified in risk management literature, but also their importance relative to each other has not yet been uncovered. Moreover, the majority of these CSFs are introduced based on personal knowledge and experiences of the authors, and apparently there is not any survey result available to support them. On the other hand, the CSFs in different periods of the RMS lifecycle may be different from those in other stages. In previous studies success factors are ostensibly regarded as 'critical' but, as some must be more important than others, it is reasonable to attempt to rank them, particularly in terms of the attention that should be given to them in the different lifecycle stages of risk management.

3. Research method

In order to overcome the lack of adequate literature about CSFs in the field of RMS, we have applied two strategies; the first was to study the CSFs in the other related context. Due to the fact that risk management can be implemented in and combined with an extended variety of related managerial disciplines, such as safety management, project management, supply chain management, enterprise resource management, product development management, etc., we have decided to study the literature in these fields from the perspective of risk management and extract the CSFs that may also be important in RMS. As the second strategy, we interviewed 12 risk management experts and elicited their points of view and ideas regarding CSFs in RMS that they already have their hands on.

3.1. Grounded theory

In both of the previous two approaches, grounded theory (GT) was used to build a theory about CSFs and their properties. As a subdivision of management science, risk management is socio-cultural in nature, and the research should present the basis for interpreting social, psychological, and cultural issues (Berstelsen 1997).

GT was chosen for data gathering and theory building in this research for the reason of its capabilities of studying human behavior and organizational culture as a qualitative technique, which enables theory to emerge on the basis of individual experiences and also its capacity for conducting inductive, theory-generating research (Goulding 2001; Strauss 1998). The steps of GT are executed as advised by Goulding (2001), illustrated in Figure 1 and described as follows.

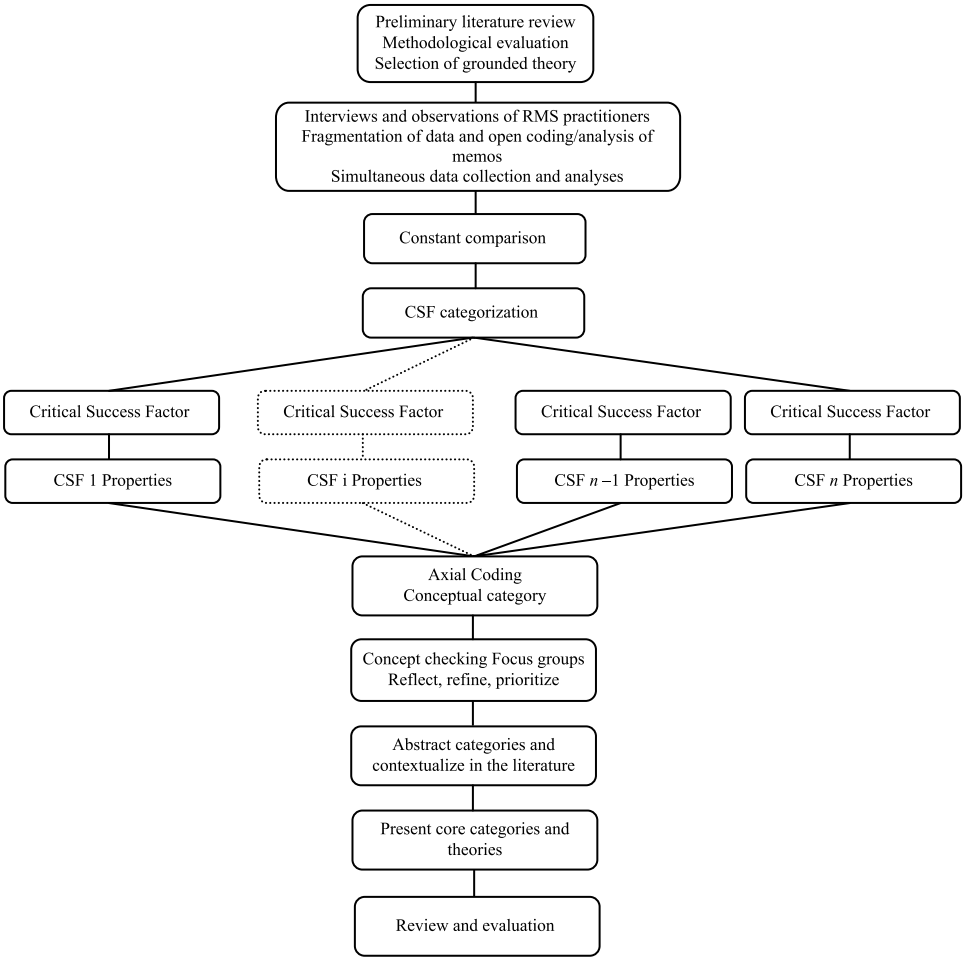

Figure 1. Theory building through the research process.
Note: Adapted from Goulding (2001).

3.1.1. Data collection

The goal at this step was to collect the data necessary for the research. A set of interviews about general success factors in RMS were conducted with experts and practitioners of risk management at different concepts of financial, operational, and enterprise risk management. In total, 12 interviews were done which contained the ideas of risk management experts about general descriptions of factors that had influenced the risk management initiatives. These descriptions are the basis from which the theory is grounded.

3.1.2. Open coding

At this step the collected data were analyzed and coded. In total 350 codes were generated and grouped into three categories of 'readiness', 'execution', and 'administration' according to the stage of risk management that they were indicated to have influence on. Since each code can be linked to quotations within the interviews, they provide support and rich explanation for the results.

3.1.3. Axial coding

Goulding (2001, 27) mentions:

> Axial coding involves moving to a higher level of abstraction and is achieved by specifying relationships and delineating a core category or construct around which the other concepts revolve. Axial coding is the appreciation of concepts in terms of their dynamic interrelationship.

At this step, the codes were grouped on the basis of their properties forming concepts that represent categories of CSF. These categories were analyzed, and subcategories were identified aiming to provide more clarification and specification. Finally, the categories and subcategories were related to each other.

3.1.4. Selective coding

At this step, a core category as a central category to the study and its correlation to other categories were identified so that the theory was integrated and refined. As the core category acts as the link for all other categories, they must relate to it, and it must appear frequently in the data (Strauss 1998).

The last steps were executed iteratively for the results of each interview. The objective was to try and emerge the theory since the beginning and constantly comparing it with new data until 'theoretical saturation' has been reached, that is, where additional data being collected is providing no new knowledge about the categories.

3.1.5. Memoing

As Montoni and Rocha (2007) have stated, the objective of this step was to make explanation of ideas, observations, and questions that occur during the last steps. The memos annotated in selective coding became increasingly theoretical and acted as the building blocks for the theory.

3.2. Survey administration

As illustrated in Table 1, 19 potential success criteria were identified in total. After being identified, the CSFs were grouped into three different categories: (1) the factors that have influence on the inclination and readiness of a corporation for implementing RMS; (2) the factors that are important during the design and implementation of RMS in a corporation and can significantly affect the success of RMS design and implementation; and (3) the factors that are crucially important to successfully run, maintain, and administrate RMS after the closure of the project of RMS design and implementation. A survey was then administered to elicit the ideas of risk management practitioners about the level of importance of each of these 19 factors at three different stages of RMS.

The target population for this study consists of 250 Swedish companies which are registered at Swedish Companies Registration Office: *Bolagsverket* (http://www.bolagsverket.se/index.html). The sample was randomly selected from the companies that met the following criteria: (1) the firm had to have an active RMS and (2) the firm had to be established for at least five years. The latter criterion was taken into account since according to Jeffcoate, Chappell, and Feindt (2002) small and new firms are notoriously fragile as they fail easily during the periods of startups, but we wanted to have a sample of successful companies.

Table 1. Definition of potential success criteria.

Variable	Variable name	Definition and properties
CSF1	Business type	Type of the business that the organization is involved in, including its final product or service, and the relative level of technology that is implemented in the organization
CSF2	Communication	Communication system which is used in the organization and its hardware infrastructure and software capabilities design. It also includes data analysis systems and non-official and emotional communications within the organization
CSF3	Consultants	Utilization of management consultancy services in organization
CSF4	Documentation	Documentation system which is used in the organization and its hardware infrastructure and software capabilities design. It also includes the data accuracy level in the organization
CSF5	Education	Competence, awareness, training, and education of the organization's personnel, including risk management staff about RMS, its processes, tools, and applications
CSF6	Environment	External environment in which the organization is performing. It encompasses the effects of market, suppliers, competitors, socio-political systems and also the organization's partnership and joint venture strategies
CSF7	General management skills	General management skills including problem-solving, negotiating, communication, and influencing the organization
CSF8	Leadership	Leadership characteristics of risk and top managers. This factor is excluded from general management skills due to its importance and attention that it has gained from risk management researchers and practitioners
CSF9	Organizational culture	Staff morale and commitment. Adaption to change and respect to external management consultants

Table 1. (Continued).

Variable	Variable name	Definition and properties
CSF10	Organizational structure	Organization's design, allocation of authorities, and responsibilities
CSF11	Performance reporting	Short- and long-term performance measurement, monitoring, and feedback
CSF12	Process design	Detailed and clear process design and availability of documented process ownerships for the organization's internal processes
CSF13	Project management skills	Maturity of the organization's project management capabilities
CSF14	Resources	Availability of all kinds of resources and infrastructure including human resources, organizational validity, and technical validity. Cost and time are also included in this category
CSF15	Responsibility	Job design and descriptions and also level of employee involvement in RMS
CSF16	Reward and recognition system	Availability of reward and recognition system schemes in organizations
CSF17	Strategy	Well-defined and clearly understood vision, mission, and long-term strategy toward risk management in the organization
CSF18	Team-building	Existence of developed teams and teamwork spirit within the organization
CSF19	Top management	Level of top management support of RMS practices

Following a pilot survey and final refinements, the structured questionnaires were administered to the risk management practitioners in the selected companies to elicit the perceived importance of the 19 success criteria adopted for this research. Respondents were invited to indicate the degree of importance of each of the success criteria regarding three different risk management stages of 'readiness', 'implementation', and 'administration' based on a five-point Likert (1932) rating scale (very important = 5, important = 4, neutral = 3, unimportant = 2, and not very important = 1).

After one month, 28 responses were obtained in total, resulting in an 11.2% response rate.

3.3. Quantitative data analysis

In addition to simple descriptive statistics, the data gathered from this survey were subjected to a set of statistical data analysis methods, namely one-sample *t*-test and factor analysis. The one-sample *t*-test was used to identify the significance of the variables, while factor analysis was used in establishing which of the variables could be measuring the same underlying effect. Each of these two tests was carried out for the three different stages of risk management: 'readiness', 'implementation' and 'administration.'

3.3.1. One-sample t*-test*

To be more precise and verify if the survey results reflect a specific variable to be important or not, a one-sample *t*-test was performed based on the assumptions that the

respondents' answers were reasonably normally distributed and independent from one another. The details are as follows:

$$\left\{\begin{matrix} H_0: \mu = \mu_0 \\ H_1: \mu > \mu_0 \end{matrix}\right\}$$

where μ_0 represents the population mean and, according to Ling (2003), was set at 3.5. The confidence level was set at 95% in accordance with conventional risk levels (Field 2005). Thus, based on the five-point Likert (1932) rating scale, a success criterion was deemed critical or important if it had a mean of 3.5 or more.

3.3.2. Factor analysis

Factor analysis is used in order to identify the underlying 'factors' that might explain the dimensions associated with large data variability. That is to say factor analysis is helpful in identifying clusters of related variables and thus ideal for reducing a large number of variables into a more easily understood framework (Norusis 2000).

To ensure the appropriateness of the use of factor analysis, the Kaizer–Meyer–Olkin (KMO) measure of sampling adequacy, the Bartlett test of sphericity, and the test of Cronbach's alpha were performed. The results confirmed that the reliability of the research instrument used was good, the population matrix was not an identity matrix, and thus the sample size was suitable for the factor analysis to proceed (Hair 1998).

The data were subjected to principal component analysis (with varimax rotation). The eigenvalue and factor loading were set at conventional high values of 1.0 and 0.5, respectively (Lewis-Beck 1994).

4. Analysis of results and key findings

Analysis of survey results reveals the relevant ranking of each factor with respect to each of three different stages of risk management. In addition to these rankings, the variability among the 19 factors at each stage is described in terms of fewer clusters.

4.1. CSFs for a corporation's readiness

The summary of variable attributes at readiness phase is tabulated in Table 2. Based on the average of each variable, it can be inferred that the *reward and recognition system* is ranked as the least important factor, while *strategy* is graded as the most important one.

According to Field (2005), the standard error is the standard deviation of sample means, and it is a measure of how representative a sample is likely to be to the population. A large standard error (relative to the sample mean) suggests that there is a lot of variability between means of different samples. A small standard error suggests that most sample means are similar to the population mean, and so the sample is likely to be an accurate reflection of the population. As shown in Table 2, the standard error of all the means was fairly close to zero, signifying that the chosen sample is an accurate reflection of the population. Moreover, the fact that the standard deviations are all less

Table 2. Survey respondents' perceptions of the relative importance of factors in the readiness phase of RMS.

Variable name	Mean	Standard deviation	Standard error mean
Reward and recognition system	3.5536	0.28347	0.05357
Leadership	3.5893	0.33482	0.06327
Consultants	3.6071	0.31497	0.05952
Team-building	3.6607	0.40946	0.07738
Organizational culture	3.6964	0.43757	0.08269
Project management techniques	3.7143	0.47975	0.09066
Responsibility	3.7321	0.46112	0.08714
Documentation	3.75	0.44096	0.08333
Business type	3.7679	0.53545	0.10119
General management skills	3.7857	0.51691	0.09769
Performance reporting	3.8036	0.55007	0.10395
Process design	3.8036	0.55007	0.10395
Resources	3.8929	0.59872	0.11315
Top management	3.9286	0.60422	0.11419
Education	3.9643	0.60749	0.11481
Environment	4.0357	0.65162	0.12314
Communication	4.0893	0.6244	0.118
Organizational structure	4.1964	0.72443	0.1369
Strategy	4.2321	0.63073	0.1192

than 1.0 indicates that there is little variability in the data and consistency in agreement among the respondents (Field 2005).

According to the significance (i.e. *p*-value) of each variable which is displayed in Table 3, the variables of *consultants*, *leadership* and *reward and recognition system* have a *p*-value greater than and hence are not considered to be important at the readiness phase of RMS and are excluded from the CSFs at this phase.

Since the factor of *leadership* emerges during the implementation phase, before an organization starts its design and implementation of an RMS, *leadership* does not have as much importance. Although there is a large consensus in the literature that focus on *leadership* is the most *critical* aspect for success at the implementation phase of management systems (Chin, Chan, and Lam 2008; Lee and Shimpi 2005; Moura and Kanji 2003; O'Connor 2006; Thamhain 2004), there is not any evidence to support leadership effect at the readiness phase.

The results reflect the interesting point that the presence of *consultants* does not help the organization in being ready to have RMS, while having a clear *strategy* toward RMS has the most important influence. Both Ealy (1993) and Froot, Scharfstein, and Stein (1994) indicate that a company's risk-management strategy needs to be integrated with its overall corporate strategy. In other words, it largely concurs with the conventional wisdom that the need for the change should be perceived from inside of the organization. A third party, such as management consultants, may have a motivating effect toward an RMS, but based on the results of this study, it would not be a facilitating factor by itself.

The other factor which is put aside from the critical factors at this stage is *reward and recognition system*. These systems generally act upon assessing the personnel's

Table 3. Results of one sample *t*-est of factors at readiness stage.

	Test value = 3.5					
	t	df	Sig. (two-tailed)	Mean difference	95% confidence interval of the difference	
					Lower	Upper
Business type	2.647	27	0.013	0.26786	0.0602	0.4755
Communication	4.994	27	0	0.58929	0.3472	0.8314
Consultants	1.8	27	0.083	0.10714	–0.015	0.2293
Documentation	3	27	0.006	0.25	0.079	0.421
Education	4.044	27	0	0.46429	0.2287	0.6998
Environment	4.35	27	0	0.53571	0.283	0.7884
General management skills	2.925	27	0.007	0.28571	0.0853	0.4862
Leadership	1.411	27	0.17	0.08929	–0.0405	0.2191
Organizational culture	2.375	27	0.025	0.19643	0.0268	0.3661
Organizational structure	5.087	27	0	0.69643	0.4155	0.9773
Performance reporting	2.92	27	0.007	0.30357	0.0903	0.5169
Process design	2.92	27	0.007	0.30357	0.0903	0.5169
Project management skills	2.364	27	0.026	0.21429	0.0283	0.4003
Resources	3.472	27	0.002	0.39286	0.1607	0.625
Responsibility	2.664	27	0.013	0.23214	0.0533	0.4109
Reward and recognition system	1	27	0.326	0.05357	–0.0563	0.1635
Strategy	6.142	27	0	0.73214	0.4876	0.9767
Team-building	2.077	27	0.047	0.16071	0.0019	0.3195
Top management	3.753	27	0.001	0.42857	0.1943	0.6629

performance and involve empowering managers, giving meaningful recognition to employees and aligning recognition to corporate goals and values (Van and Garlick 2008). These systems may have a positive effect on perceiving the organizations' weaknesses and making a decision to have an RMS. On the other hand, Kohn (1996) argues that 'reward and recognition systems are effective in producing temporary compliance rather than lasting attitude changes'. Due to the adaption of an organization's staff to these systems and their reluctance to change their relatively fixed framework of performance, the existence of these systems at this stage may not be as helpful as they are in other stages.

Following *strategy*, the second important success factor is *organizational structure,* which encompasses the organization's design and allocation of authorities and responsibilities. Meijaard, Brand, and Mosselman (2005) have shown the direct relationship between organizational structure and firm performance in terms of sales growth, profitability, and innovativeness. Since a series of different criteria should be considered in order to compare and choose an organizational structure (Biggiero and Laise 2003), solely focusing on this factor cannot demonstrate any preferable organizational structure. But when studied together with *communication* as the third CSF in the readiness phase of RMS, it would be sensible to state that decentralized and heterarchical organizational structure is perceived as more effective than hierarchical structures. The results of a study by Bhargava and Sinha (1992, 228) show that 'an organization with

a heterarchical structure is perceived as having a higher degree of production, commitment, effective leadership, and less interpersonal conflict when compared'.

As shown in Table 4, six components with eigenvalues greater than 1.0 were extracted using the factor loading of 0.50 as the cut-off point. The factors of *performance reporting* and *process design* were also listed as a factor in component 3 with loadings of 0.575 and 0.532, respectively. Since their loading in component 1 was significantly higher, they were omitted from component 3. For the same reason, factor of *organizational structure* was also omitted from component 4 and considered to be of more significance in component 1.

The total variance explained by each component extracted is as follows: component 1 (23.546%), component 2 (17.378), component 3 (16.931), component 4 (11.699), component 5 (7.650), and component 6 (7.034). Thus, the final statistics of the principal component analysis and the components extracted accounted for approximately 85% of the total cumulative variance.

Based on an examination of the inherent relationships among the variables under each component, the six components were meaningfully renamed as: (1) strategy, (2) team spirit, (3) responsibility, (4) business type, (5) organizational culture, and (6) general management skills. Since the last two components have too few items for explanatory factor analysis and the data variance that they cover is relatively low in comparison with the other four, we focus only on components 1–4 as the major components at the 'readiness' phase of RMS.

Table 4. Total rotated variance explained for factors at the readiness stage.

	Initial eigenvalues			Rotation sums of squared loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.770	35.634	35.634	4.474	23.546	23.546
2	2.765	14.555	50.189	3.302	17.378	40.924
3	2.310	12.157	62.345	3.217	16.931	57.855
4	1.700	8.947	71.293	2.223	11.699	69.554
5	1.320	6.945	78.238	1.453	7.650	77.204
6	1.140	6.000	84.238	1.336	7.034	84.238
7	0.896	4.717	88.954			
8	0.567	2.984	91.939			
9	0.422	2.220	94.159			
10	0.277	1.459	95.617			
11	0.234	1.230	96.848			
12	0.185	0.974	97.822			
13	0.142	0.749	98.571			
14	0.107	0.563	99.133			
15	0.078	0.410	99.544			
16	0.036	0.190	99.734			
17	0.034	0.180	99.914			
18	0.009	0.049	99.963			
19	0.007	0.037	100.000			

Note: Extraction method: principal component analysis.

4.1.1. Component 1: strategy

This component includes the factors of top management (0.883), resources (0.868), strategy (0.836), education (0.789), process design (0.709), performance reporting (0.644), and organizational structure (0.521).

The number in parentheses indicates the respective factor loadings. This component accounted for approximately 24% of the variance. All of the seven factors of this cluster have a common link toward strategy. Top managers who are highly aware of the uses and benefits of RMS will decide about the organization's strategy and try to plan the organizational structure and processes. Having the organization's structure and process arranged, they can direct the organization's resources toward design and implementation of RMS. This interpretation is supported with the findings of Speculand (2007), which indicates people, processes, communication, culture, reinforcements, and reviews as the multiple dimensions that companies focused on to successfully implement their risk management strategy. Mu, Peng, and MacLachlan (2009, 170) have investigated the effect of strategy on new product development (NPD) and have concluded that 'risk management strategies targeted at specific risk factors, that is, technological, organizational, and marketing, contribute both individually and interactively in affecting the performance of NPD'. In another context, Courson (2008) states that strategy can provide a logical, disciplined framework for addressing risk. Geisel (2008) states that attaining a successful ERM program is dependent on the full support from a company's senior management and board of directors and adds that the effectiveness of ERM comes from integrating it into the business plan and strategy.

4.1.2. Component 2: team spirit

This component accounted for approximately 17.4% of the variance. The respective loading factors are leadership (0.893), communication (0.808), team-building (0.725), and consultants (0.647). Due to their relative common relations, the cluster is titled 'team spirit.' As described in Table 1, the factor of *communication* indicates the software and hardware infrastructure of communication systems in an organization. Leadership is a key issue in the development of groups, organizations, and nations (Yehuda Baruch 1998). The results of a study by Kolb, Prussia, and Francoeur (2009) show a positive correlation between the level of online communication and closeness perception between the team members; this study also indicates that online communications have a positive effect on the leadership. The results suggest that the existence of team spirit, team-building, and group development activities in an organization with a high level of communication among members is necessary before an organization starts the design and implementation phase of RMS (Table 5).

4.1.3. Component 3: responsibility

The third cluster which stands for around 17% of variance consists of three factors of responsibility (0.892), reward and recognition system (0.879), and documentation (0.623). It can be inferred that the more clear and detailed and the better documented job responsibilities, the easier it would be for the organization to start design and implementation of its RMS. Lawson and Price (2003) believe that the employees will be reluctant to change unless they see the point of the change and agree with it. They add that the reward and recognition systems should be adopted with the preferred

Table 5. Rotated factor matrix (loading) of CSFs at readiness stage.

	Component					
	1	2	3	4	5	6
Top management	0.88					
Resources	0.87					
Strategy	0.84					
Education	0.79					
Process design	0.70					
Performance reporting	0.64					
Organizational structure	0.52					
Leadership		0.89				
Communication		0.81				
Team-building		0.72				
Consultants		0.67				
Responsibility			0.89			
Reward and recognition system			0.88			
Documentation			0.62			
Business type				0.94		
Environment				0.93		
Organizational culture					0.85	
Project management techniques					0.70	
General management skills						0.92

changes. Altering the regular reward and recognition systems into a system which is tuned with the long-term strategy of a corporation for having RMS is vital before the initiation of RMS. Moreover, suitable team development methods should be chosen in order to convince the personnel that the changes would be beneficial for themselves and agree with it.

4.1.4. Component 4: business type

Business type covers 11.7% of the total variance. It consists of only two factors of business type (0.941) and environment (0.935). The results confirm the common belief that the organizations with a higher level of uncertainty in their products and production system will be more attracted to RMS. The results also prove that the high level of competition and roughness of the environment that the company is performing in play an important role in a company's decision upon starting an RMS.

4.2. CSFs for design and implementation of RMS

The factors which will be introduced are those which are critical during the project of design and implementation of RMS in the organization.

As shown in Table 6, strategy is again the most important factor at the design and implementation phase. It is good to notice that at this stage, leadership is standing just in the middle of the rankings. Following organizational structure, resources, top management, and communication together stand as the three most important factors

Table 6. Survey respondents' perceptions of the relative importance of factors at the design and implementation phase of RMS.

Variable name	Mean	Standard deviation	Standard error mean
Reward and recognition system	3.6429	0.35635	0.06734
Business type	3.6607	0.40946	0.07738
Documentation	3.7321	0.46112	0.08714
Consultants	3.75	0.5	0.09449
Responsibility	3.8036	0.55007	0.10395
Team-building	3.8571	0.5419	0.10241
Environment	3.875	0.61802	0.11679
Organizational culture	3.875	0.5713	0.10797
Leadership	3.8929	0.59872	0.11315
Performance reporting	3.9286	0.55635	0.10514
Project management skills	4	0.65263	0.12334
General management skills	4.0179	0.63073	0.1192
Education	4.0893	0.66741	0.12613
Process design	4.0893	0.66741	0.12613
Communication	4.1786	0.62678	0.11845
Top management	4.2143	0.65868	0.12448
Resources	4.2321	0.63073	0.1192
Organizational structure	4.25	0.68718	0.12987
Strategy	4.3571	0.5419	0.10241

of the implementation phase. This phase has a lot in common with project management, but the special characteristics of RMS make some of its CSFs unique in this specific area.

The results of one-sample *t*-test are tabulated in Table 7 and confirm that with the confidence level of 95% all of the 19 factors have an average over 3.5 and thus are considered to be critical.

Strategy, top management support, and resources are ubiquitous in researches about CSFs for project management (Bryde 2008; Clarke 1999; Westerveld 2003). Diallo and Thuillier (2005) consider communication and trust as the CSFs for international projects in Africa.

Organizational structure is ranked as the second most important success factor in RMS design and implementation projects.

In Table 7, on the other hand, consultants are considered to be the least important factor in these projects. Considering these two factors and their position in the ranking and also bringing the low rank of consultants at the readiness phase into account, we have concluded that the RMS projects which are designed and implemented primarily by the members of the organization are more likely to be successful. Although consultants can be very beneficial at both phases, it would not be very obliging to stand aside and outsource the system design and implementation to them. They are better to be in organization as mentors and advisors, but not the key people who design, implement, and run the RMS. Organizations with a matrix structure can assign human staff and allocate other resources to their critical projects (Turner 1993) and thus an RMS design and implementation project can be performed much more easily within a matrix organizational structure. The studies of Kuprenas (2003) and Bates,

Table 7. Results of one-sample *t*-test of factors at the design and implementation stage.

	Test value = 3.5					
					95% Confidence interval of the difference	
	t	df	Sig. (two-tailed)	Mean difference	Lower	Upper
Business type	2.077	27	0.047	0.16071	0.0019	0.3195
Communication	5.729	27	0.000	0.67857	0.4355	0.9216
Consultants	2.646	27	0.013	0.25000	0.0561	0.4439
Documentation	2.664	27	0.013	0.23214	0.0533	0.4109
Education	4.672	27	0.000	0.58929	0.3305	0.8481
Environment	3.211	27	0.003	0.37500	0.1354	0.6146
General management skills	4.345	27	0.000	0.51786	0.2733	0.7624
Leadership	3.472	27	0.002	0.39286	0.1607	0.6250
Organizational culture	3.473	27	0.002	0.37500	0.1535	0.5965
Organizational structure	5.775	27	0.000	0.75000	0.4835	1.0165
Performance reporting	4.076	27	0.000	0.42857	0.2128	0.6443
Process design	4.672	27	0.000	0.58929	0.3305	0.8481
Project management skills	4.054	27	0.000	0.50000	0.2469	0.7531
Resources	6.142	27	0.000	0.73214	0.4876	0.9767
Responsibility	2.920	27	0.007	0.30357	0.0903	0.5169
Reward and recognition system	2.121	27	0.043	0.14286	0.0047	0.2810
Strategy	8.370	27	0.000	0.85714	0.6470	1.0673
Team-building	3.487	27	0.002	0.35714	0.1470	0.5673
Top management	5.738	27	0.000	0.71429	0.4589	0.9697

Roenker, and Junker (1981) demonstrate that the performance of both private and public sector organizations while operating under a matrix structure has improved.

The data have been subjected to factor analysis following the same procedures described in Section 3.3.2; the results are tabulated in Tables 8 and 9.

Six components have been extracted which totally cover 77.124% of the data variance, but the last three components have too few variables to calculate a Cronbach alpha coefficient and do not have high rotated factor loadings of the exploratory factor analysis. Therefore, we consider the components 1–3 as the major CSF components. The first three components account for 56% of total data variance. Their elements are tabulated in Table 9.

4.2.1. Component 1: top management

This cluster covers 34% of data variance and consists of education (0.846), top management (0.810), resources (0.790), communication (0.733), leadership (0.710), environment (0.624), general management skills (0.621), project management techniques (0.614), consultants (0.566), process design (0.563), organizational structure (0.526), and organizational culture (0.523).

The first eight factors have loadings over 0.6 and are clearly addressing managerial issues which relate to senior managers. Focusing on these factors, we can

Table 8. Total rotated variance explained for factors at the design and implementation stage.

	Initial eigenvalues			Rotation sums of squared loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.499	34.207	34.207	6.499	34.207	34.207
2	2.482	13.064	47.271	2.482	13.064	47.271
3	1.675	8.817	56.088	1.675	8.817	56.088
4	1.536	8.082	64.170	1.536	8.082	64.170
5	1.348	7.096	71.266	1.348	7.096	71.266
6	1.113	5.858	77.124	1.113	5.858	77.124
7	0.876	4.612	81.737			
8	0.828	4.360	86.097			
9	0.621	3.268	89.365			
10	0.570	3.001	92.366			
11	0.387	2.035	94.401			
12	0.291	1.534	95.935			
13	0.277	1.460	97.395			
14	0.179	0.943	98.338			
15	0.122	0.641	98.979			
16	0.084	0.444	99.423			
17	0.066	0.345	99.769			
18	0.029	0.152	99.921			
19	0.015	0.079	100.000			

Note: Extraction method: principal component analysis.

conclude that the level of knowledge and awareness of top managers about risk management concepts and their benefits will be valuable during the design and implementation phase. The results of a study by Shehu and Akintoye (2010) show that lack of awareness, benefits and nature of program management ranked among the major challenges to the successful implementation of program management. In another study by White and Fortune (2002), it is confirmed that over 71% of unexpected side effects of projects were attributed either directly or indirectly to lack of awareness of the environment.

Moreover, the higher the level of general management skills, project management techniques, communication and leadership capabilities of managers, the better they can help their subordinates in successfully implementing RMS.

4.2.2. Component 2: human resources

This cluster covers 13% of the total data variance and includes the factors of performance reporting (0.695), documentation (0.546), reward and recognition system (0.517), and responsibility (0.500). Clearly all these factors share a link to human resource (HR) management practices. It can be inferred from the results that documented and in-depth job and responsibility descriptions, which are thoroughly conveyed through employees, as well as properly designed reward and recognition systems, are important during the implementation phase. Moreover, existence of a

Table 9. Rotated factor matrix (loading) of CSFs at the design and implementation stage.

	Component		
	1	2	3
Education	0.85		
Top management	0.81		
Resources	0.80		
Communication	0.73		
Leadership	0.71		
Environment	0.62		
General management skills	0.62		
Project management techniques	0.61		
Consultants	0.57		
Process design	0.56		
Organizational structure	0.53		
Organizational culture	0.52		
Performance reporting		0.70	
Documentation		0.55	
Reward and recognition system		0.52	
Responsibility		0.50	
Team-building			
Business type			0.81
Strategy			0.54

well-designed and fully functioning performance reporting system is vital for the successful implementation of RMS.

In view of the risks associated with project failure, Duffy and Thomas (1989) recognized that both project promoters and bankers require a detached independent review on the performance of their project. Raymond and Bergeron (2008) have studied the impact of project management information systems (PMIS) and performance reporting on project success and found a significant contribution of PMIS to successful project management. They observed improvements in terms of better project planning, scheduling, monitoring, control, and timelier decision-making. Stonich (1984) views reward systems and performance measurements as complements to strategy formulation and resource allocation for successful strategic implementation.

4.2.3. Component 3: business type

This component takes in the factors of business type (0.815) and strategy (0.543) and covers nearly 9% of total data variance. Considering the results from previous components, it makes sense to conclude that the organizations that are dealing with more uncertainties due to their special business type and thus have a fixed and thoroughly conveyed strategy toward the design and implementation of RMS will be more successful in their goal. The requirement and necessity of RMS for the business's success act as a motivation for organization to align all their efforts to implement the system as soon and as efficiently as possible.

4.3. CSFs for administration of RMS

The factors that are demonstrated in this section include those that are critical when the RMS has successfully been implemented and needs to be administrated. These factors address the most important issues that are necessary for successfully running, maintaining, and administrating the RMS in an organization. Like the previous phases, one-sample *t*-test and factor analysis are being used to analyze the data which are gathered through the interviews with risk management practitioners and the extensive literature study.

The factors are again ranked based on their mean as tabulated in Table 10. The results of the one-sample *t*-test are illustrated in Table 11 and confirm that all of the factors have an average over 3.5 and can be considered as critical for administrating RMS.

It is interesting to note that strategy is ranked first in CSFs at the administration stage as well as the two former stages. The importance of strategy in the success of RMS administration is not limited to its direction toward risk management; its other specifications may influence other parts of the organization and even its survival. Simons (1999) states a number of arising risk issues in an organization and among them he mentions strategy, decision processes, and reward systems of the organization. Strategy is being considered as one of the most important reasons for a company's long-range success by many researchers ('First thought' 2008; Helms 1994; Markides 2004). The role of mid-level managers, such as risk managers, is inevitable in combining the risk management strategy with the organization's overall strategy as well as its initiating and implementing (Altinay and Roper 2001). Based on the results

Table 10. Survey respondents' perceptions of the relative importance of factors at the administration phase of RMS.

Variable name	Mean	Standard deviation	Standard error mean
Reward and recognition system	3.6607	0.4095	0.0774
Business type	3.6964	0.4970	0.0939
Consultants	3.6964	0.4376	0.0827
Documentation	3.6964	0.4376	0.0827
Project management skills	3.7321	0.4611	0.0871
Leadership	3.7857	0.5169	0.0977
Team-building	3.8214	0.5808	0.1098
Responsibility	3.8571	0.5909	0.1117
Organizational culture	3.9107	0.5782	0.1093
Performance reporting	3.9107	0.5782	0.1093
General management skills	3.9643	0.5599	0.1058
Environment	3.9821	0.6733	0.1273
Process design	4.0714	0.6486	0.1226
Education	4.0893	0.6244	0.1180
Resources	4.1250	0.7022	0.1327
Communication	4.1429	0.6362	0.1202
Top management	4.2321	0.6307	0.1192
Organizational structure	4.2857	0.6726	0.1271
Strategy	4.4107	0.5782	0.1093

Table 11. Results of one-sample *t*-test of factors at the administration stage.

	Test value = 3.5					
					95% Confidence interval of the difference	
	t	df	Sig. (two-tailed)	Mean difference	Lower	Upper
Business type	2.091	27	0.046	0.19643	0.0037	0.3892
Communication	5.347	27	0.000	0.64286	0.3962	0.8896
Consultants	2.375	27	0.025	0.19643	0.0268	0.3661
Documentation	2.375	27	0.025	0.19643	0.0268	0.3661
Education	4.994	27	0.000	0.58929	0.3472	0.8314
Environment	3.789	27	0.001	0.48214	0.2211	0.7432
General management skills	4.388	27	0.000	0.46429	0.2472	0.6814
Leadership	2.925	27	0.007	0.28571	0.0853	0.4862
Organizational culture	3.759	27	0.001	0.41071	0.1865	0.6349
Organizational structure	6.181	27	0.000	0.78571	0.5249	1.0465
Performance reporting	3.759	27	0.001	0.41071	0.1865	0.6349
Process design	4.662	27	0.000	0.57143	0.3199	0.8229
Project management skills	2.664	27	0.013	0.23214	0.0533	0.4109
Resources	4.710	27	0.000	0.62500	0.3527	0.8973
Responsibility	3.198	27	0.004	0.35714	0.1280	0.5863
Reward and recognition system	2.077	27	0.047	0.16071	0.0019	0.3195
Strategy	8.334	27	0.000	0.91071	0.6865	1.1349
Team-building	2.929	27	0.007	0.32143	0.0962	0.5466
Top management	6.142	27	0.000	0.73214	0.4876	0.9767

of this study, it can be concluded that having a developed strategy toward risk management which is well conveyed through the organization and fully supported by senior managers is the golden key for success in RMS.

As shown in Table 10, reward and recognition systems, business type, and consultants are ranked among the least important factors. This can be interpreted that a successful design and implementation of RMS will be easily accepted by personnel and motivation mechanisms, such as reward systems, would not be a crucial necessity. At this stage, RMS can be viewed as a product of the design and implementation project; the better the project is performed, the better its product would be, and the less rework and development efforts would be needed.

Table 12 shows five extracted components. They cover 72% of total data variance and are titled: (1) human resources, (2) organizational structure, (3) top management, (4) organizational culture, and (5) strategy.

4.3.1. Component 1: human resources

This component covers 23% of total data variance and consists of documentation (0.911), responsibility (0.867), reward and recognition system (0.820), performance reporting (0.798), process design (0.728), and education (0.511). Awareness of the

Table 12. Total rotated variance explained for factors at the administration stage.

	Initial eigenvalues			Rotation sums of squared loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6689	35,205	35,205	4286	22,557	22,557
2	2920	15,367	50,572	3416	17,981	40,537
3	1960	10,318	60,890	2695	14,183	54,720
4	1569	8259	69,150	2301	12,110	66,830
5	1150	6055	75,205	1591	8375	75,205
6	0.996	5244	80,449			
7	0.783	4123	84,572			
8	0.716	3768	88,339			
9	0.527	2774	91,114			
10	0.346	1821	92,935			
11	0.317	1671	94,606			
12	0.295	1550	96,156			
13	0.209	1103	97,259			
14	0.149	0.787	98,046			
15	0.112	0.588	98,633			
16	0.107	0.561	99,194			
17	0.082	0.432	99,627			
18	0.041	0.216	99,843			
19	0.030	0.157	100,000			

Note: Extraction method: principal component analysis.

people in an organization about RMS and its benefit are the important factors for its successful administration. The role of continuous training and education is significant in RMS successful administration.

Although during the previous stages, some employees have gained an understanding of what RMS is and the benefits that can be had from its adoption, it is still the key issue to enlighten all employees about the essence of risk management, its concepts, and the reasons for its implementation, how employees can contribute, and what they can expect from the risk management efforts.

Clear identification and documentation of the roles and responsibilities of personnel about the newly implemented RMS can help them to lessen the stress and better adapt to the changes that RMS has caused in the organization. Performance reporting and reward and recognition systems are crucial to be aligned with the new changes and serve the adaptation of personnel and clearly measure the performance of the system so that it can be developed to carry out the organization's expectations.

4.3.2. Component 2: organizational structure

This cluster associates with 18% of data variance and consists of the following factors: organizational structure (0.785), leadership (0.760), resources (0.748), consultants (0.643), and team-building (0.504). Organizational structure provides a snapshot of organizational life (Rapert and Wren 1998). Bennett and Gabriel (1999) explain that

flexible and informal structures facilitate internal communication within an organization and enhance people's willingness to change. Team-building activities and enhancing the informal communication between members can help the organization to enhance the performance of different processes of risk management.

4.3.3. Component 3: top management

This contains the factors of general management skills (0.871), top management (0.751), and project management skills (0.501) and covers 14% of data variance. Top management clearly has a key role in implementing and running enterprise systems in an organization (Dong 2001; Kakabadse et al. 1993). Various researchers have investigated and reported the influence of top management as a CSF in different management systems (Ahire and O'Shaughnessy 1998; Keller and Huwaishel 1993; Myers, Kakabadse, and Gordon 1995). The level of competence in general management skills and project management maturity in an organization has a positive correlation with the successful administration of RMS in the organization.

4.3.4. Component 4: organizational culture

This cluster is named after its most important factor, organizational culture, and explains approximately 12% of data variance. Having RMS implemented is just the first step. Achievement of the expected results and benefits from implementing RMS are dependent on the collaboration of all the personnel with this system and their level of confidence and acceptance about it. RMS cannot be run only by the people at the risk management office; organizational culture must be changed so that the staff believe in RMS and the benefits that their alliance with it will have for themselves.

4.3.5. Component 5: strategy

The last cluster covers nearly 9% of data variance and has two factors of business type (0.875) and strategy (0.562). Although business type has a factor loading much higher than strategy, it can be considered as a generalized CSF for all types of companies. It can be concluded that the organizations with a higher technology which may face more risks inside their internal operations are more dependent on their RMS and will pay more attention and allocate more resources for favorable administration of it. The point is that the organizations which are not necessarily high-tech companies and have relatively less risk to deal with may also be very successful with their RMS administration. On the other hand, strategy can be named as the ultimate key to success in RMS administration. As discussed before, a well-designed strategy aligns an organization's resources and efforts toward a favorable performance of RMS (Table 13).

5. Case study

As a widely accepted methodology for exploratory and theory-building research (Eisenhardt 1989; Yin 2009), the case study was used to crystallize the identified CSFs.

To conduct the case study, a global technology company providing Internet solutions to enable ISPs, media companies and advertisers to build close relationships with

Table 13. Rotated factor matrix (loading) of CSFs at the administration stage.

	Component				
	1	2	3	4	5
Documentation	0.91				
Responsibility	0.87				
Reward and recognition system	0.82				
Performance reporting	0.80				
Process design	0.73				
Education	0.51				
Organizational structure		0.79			
Leadership		0.76			
Resources		0.75			
Consultants		0.64			
Team-building		0.50			
General management skills			0.88		
Top management			0.75		
Project management techniques			0.50		
Organizational culture				0.82	
Communication				0.74	
Environment				0.63	
Business type					0.87
Strategy					0.56

consumers on the Internet was selected in western New York. The company was created in 2001 and has become a leader in progressive corporate culture and is a beacon for a burgeoning growth among the US technology and Internet companies. The company managers and interviewees requested to be anonymous.

The company's risk management system has been established since the very first days it came to existence and has performed well during almost 10 years of company life. We have evaluated the performance of the system to be very high to the risky nature of the company and high competition which has made many other rivals without a risk management system bankrupt during the last three years.

An interview conducted with the key personnel of the risk management department and the importance and relevance of each CSF were discussed. The interviewees were asked to consider different stages of the risk management system when expressing their points of view.

5.1. Business type

The type of business is considered very relevant in all the stages. Because of the company's business type, security is an important issue, and risk management appears to be of high importance to the business sustainability of the company. Due to the nature of the business, it is almost impossible to enter the market with a decent risk management system, so it is a very good trigger for initiating the system design; it would keep the company motivated during the implementation and administration phases as well.

5.2. Communication system

Email and phone are the main communication means in the company. Meetings with the people inside and outside of the department are conducted on a regular basis. The high technology level of the company makes it necessary for risk management people to be well informed about technical issues so that they can have a better understanding about the possible risks and ultimately enhance the risk management cycle. During the implementation and administration phases, the high level of communication was observed to be a key issue in the success of the risk management system.

5.3. Consultants

The company did not use consultancy services for either designing or the other two phases of the system. We found that the reason that the company has not used the consultancy services is simply because they did not feel they had to. In issues other than the risk management system, top management has always welcomed consultants if they faced a problem which they felt the consultants may be able to help with. However, after a comprehensive review of the risk management department, specifically risk analysis issues, we found several decisions that could have been made much more wisely if the company had used consultants. They have been looking at the issues from the same perspective for a long time and the fact that they had a very high expertise in the company profile and a relevantly low expertise in other business types prevented them from using a diversity of risk analysis methods or thinking about many other possible alternatives.

5.4. Documentation

All the documents regarding the risk management system were imaged and backed up to an offsite provider. We observed many samples of risk mitigations having mechanisms in place that promote secure and precise data protection.

5.5. Education

The importance of education was observed to be high, as the company staff should understand what is important to the business, understand asset values and the impact of risk management practices on benefitting the business. People in the risk management department had a fine knowledge about risk management and regularly participated in training events regarding this issue. The human resources department at the company measures the performance of the people and the impact of training on their level of performance. Based on the company's internal reports, higher education has a positive impact on employees' performance; also the more training courses the employees attend, the higher their performance tends to be.

5.6. Environment

As previously discussed in this section, the risky environment of the business makes it a very important factor when it comes to the design phase; we noticed that the level

of detail in system design is considerably higher than that in common RMS. This is found to be due to the risky environment and the high level of competition that the company has to keep up with. In the administration phase, a risky environment always keeps risk management issues at the focus spot.

5.7. General management skills

A general manager has insight into operational processes and the strength and repeatability on these processes; it was observed that strong general management skills will increase the probability of risk identification and description. Having strong general management skills makes it easier to design the system and perfectly match the links with the risk management system. During document investigation in the HR department, we found that there were a number of training courses designed only for risk management people. HR has perceived that these programs would enhance the performance of the risk management department in general.

5.8. Leadership

Leadership is apparent in both the risk manager and the CEO of the company. The CEO's leadership skills have been an asset in motivating and enhancing team spirit during the implementation phase. Leadership skills also help solve some personal issues between employees and specifically the risk management department, which we can infer would ultimately benefit RMS administration.

5.9. Organizational structure

The risk management department is officially recognized, and risk management employees are officially assigned by the CEO. Risk management is considered as a full-time responsibility rather than a side responsibility which should be taken care of in case of extra time.

5.10. Organizational culture

We observed a very high level of commitment in people at the company; this commitment includes risk management staff as well. As a measure of commitment, we tried to compare the average time that people left work early or came to work late in a month. We observed that it was slightly lower in the risk management department. During our one-month observation period, we noticed that people have no problem in cooperating with us even after working hours.

5.11. Performance reporting

The company already has a performance evaluation and reporting system which is also used for the risk management department. One of the cofounders of the company mentions that the lessons learnt from previous similar companies that he has worked in made them recognize the importance of a fine performance system. Many decisions regarding changes in risk management procedures and also the focus of risk analysis efforts are driven through performance reports.

5.12. Process design

The company has designed and implemented its quality management systems based on ISO 9001:20083 standards and as a requirement of this standard has clearly defined and documented its processes.

5.13. Project management skills

A basic knowledge of project management skills is shown in the risk management department. The company's CEO is a certified Project Management Professional (PMP).

5.14. Resources

To observe the availability of resources, we focused on human resources as the most important in the risk management department. We reviewed the job requirements designed for risk management people and then compared them with the actual level of competency, education, and experience of the risk management people. Interestingly, there was almost no gap in between, while there was a significant gap among the same criteria in other departments. We also took the average salary of the risk management department and compared it with the company's average salary, which again shows to be higher.

5.15. Responsibility

Since the company has well-established performance reporting, it has developed its job description, job design, and list of responsibility profiles as a requirement. We studied these descriptions for the risk management department and found that they are perfectly inclusive and exclusive. During our interviews with risk management employees, we understood that they have a very good perception about their job and responsibilities.

5.16. Reward and recognition system

The system works based on a performance reporting system and includes both financial rewards and promotions. The people whom we were in contact with at the company valued promotions more than financial rewards. This system has been working in the company since 2008 and has proven to affect performance in all departments, including risk management, in a positive way.

5.17. Strategy

During our observation, we tried to see how people are informed about the strategy of the organization. We found that they are all well informed about it and can fully understand the importance of risk management and the relevance of their job responsibilities in satisfying the strategic goals of the company.

5.18. Team-building

Teams played an important role in the company. In addition to routine individual responsibilities, most of the works in the risk management department were done in

the form of projects which not only required a high level of project management skills, but also strengthened the teams. People were chosen based on the project and their competency so that each team could reach the required goals perfectly.

5.19. Top management

Top management has proven its commitment to the risk management system by clearly declaring its high ambitions toward risk management in the company's guidelines and also in providing resources for this purpose. The risk manager of the company has regular monthly meetings with the CEO in addition to unplanned meetings when necessary. The CEO knows almost every employee in this department in person and is actively involved in the teams and puts the issues related to risk management at the top-priority level.

6. Conclusion

By identifying, ranking, and classifying the CSFs for RMS in three stages of readiness, implementation, and administration, we have bridged the gap between the studies regarding theory of risk management and its practical issues. The results of this study are of interest to both researchers and practitioners of risk management.

Based on the extensive literature study of the authors, despite the necessity of knowing about CSFs, there has not been any similar research or serious attempts for identification and classification of CSFs for RMS. We have concluded that in all of the three stages, strategy is the most important factor for success. Realizing the need and necessity of RMS by organization and deciding solemnly to have this system is the first step toward successful RMS. During the implementation phase, strategy plays an important role since the allocation of resources and contribution of efforts to the project of RMS implementation should be addressed as a vital component of an organization's overall strategy. After having the system implemented and during its lifecycle, strategy is again the most important factor. The organization must have a prolonged strategy toward risk management and keep developing the RMS as new requirements and challenges emerge. Moreover, strategy has a fundamental role in changing and shaping the organizational culture and structure through all the phases of RMS. Without a carefully designed and thoroughly conveyed strategy toward RMS, it would be much more difficult to manage the change in an organization and align the resources, operations, functions, staff, and their willingness with RMS requirements. In addition to strategy, organizational culture and structure, the support of top management is also a very influential factor. Top management is the first component of an organization which should be aware of RMS, its tools and techniques, applications, requirements, and benefits. Top management's competency, education, and awareness about RMS play an undeniable role in having a constructive strategy and combining it with a risk management strategy in future.

The main limitation of this study is its relatively small survey sample. Although the necessary primary tests associated with the adequacy of sample size proved favorable for analysis to proceed, generalization of the results should be done with caution. The other limitation of this study is its restricted geographical focus on Swedish companies. Although all the identified factors are ubiquitous everywhere and in almost every kind of organization, the ranking and their relative importance may be different regarding the special conditions and geographical characteristics of

the company location. For example, reward and recognition systems may be more or less important in different countries regarding the unique cultural issues of personnel.

This study can be the basis of a series of other studies regarding risk management. Future studies may include relatively larger sample sizes in more expanded geographical boarders. The CSFs for RMS can also be studied in special organizations and industries to compare the importance of each in different contexts. The authors are currently working on designing a risk management system maturity model based on the identified CSFs. The impact of each of the CSFs can also be studied in more detail to shed light on the best possible ways and approaches that can be undertaken for achieving them.

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