

## Corporate real estate risks

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# Corporate real estate risks

## A survey on risk perception amongst corporate real estate practitioners

Corporate real estate risks

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### Abstract

**Purpose** – The purpose of this paper is to identify the corporate real estate (CRE) risks that might influence the added value of CRE to the shareholder value of an organization and to analyze if there are differences in perception of these risks according to job and company specifics of the respondents.

**Design/methodology/approach** – A literature study was carried out to identify the CRE risks. In addition, a number of interviews were held with CRE specialists to complete the list of risks. An inventory of the risk perception was gathered by making use of a survey among 70 end-users, 16 CRE consultants and 2 CRE academics. Differences are analyzed making use of Kruskal–Wallis tests, Mann–Whitney U tests and *t*-tests.

**Findings** – In total, 43 risks in six different categories were identified. It turned out that the risk perception differentiates the most per geographical location or industry segment. The size of the organization (number of employees) does not appear to influence the way in which the risks are perceived.

**Practical implications** – This paper provides CRE managers and risk managers with a basis for a risk register that contributes to identification of possible CRE risks. Besides, it enables a comparison of their risk perception with industry peers.

**Originality/value** – Earlier research concerning CRE risk management approached the subject from a specific point of view, but did not provide a CRE risk list using an integral perspective and covering multiple topics. Also, this paper provides insights in how CRE risk management is perceived in practice.

**Keywords** Shareholder value, Survey, Corporate real estate management, Risk identification, Risk perception, Corporate risk management

**Paper type** Research paper

### 1. Introduction

After the terrorist attack on the World Trade Center on September 11th, 2001, companies became painfully aware how much they rely on their corporate real estate (CRE). Terrorism, as well as issues such as civil unrest and cyber threat have become potential risks to corporations (CBRE, 2012). Corporate management now realizes that business continuity plans need to include more than ensuring a resilient information technology infrastructure. They also need to ensure that the company's critical facilities can be restored to operational capacity as soon as possible, independent of the nature of



the risk (Rosenbluth, 2011). According to Gibson and Louargand (2002), one of the most important points a CRE manager has to deal with is the resilience of the physical and human infrastructure, including the CRE.

However, the increased awareness of the risks to which CRE is exposed faded after a while and the focus of the executive board on CRE risk management (CRERM) diminished, until the financial crisis of 2008. The renewed and increased visibility of CRERM is a direct result of the global financial crisis as CRE has not gone unaffected by it (CBRE, 2012). The crisis resulted in a period of intended cost reduction, but many companies were tied to long-lasting expensive rent contracts. The way the real estate was financed and the ownership type became potential risk sources. At the same time, the intended cost reductions made the introduction of new risk management processes more difficult, because these often require a substantial investment. The investment required to carefully manage the CRE-related risks could, in the long term, reduce an organization's real estate expenses. But an appropriate balance between the required investments to maximize the cost reduction is a considerable challenge for organizations.

These two important events functioned as a catalyst during the past decades in which CRERM gained an increased interest from the executive board. Heywood *et al.* (2009) mention that legislative evolution and a broader risk management has become one of the seven most important corporate real estate management (CREM) practice issues nowadays. Still, little is known about risk management in relation to CRE.

Existing literature provides a framework for CRERM which is not yet complete. Several risk categories and risk types have been identified. However, these studies (Huffman, 2002; Rasila and Nenonen, 2008) analyze just one or a few aspects of CRERM. It would be valuable to study the subject with a broader, integral scope and also collect empirical data to gain deeper insight. So far, research about CRERM is mainly theoretical, and it is unclear how risks are experienced in practice. It is unknown how CRE practitioners have adapted to the changed environment and which risks are most prominent according to their opinion.

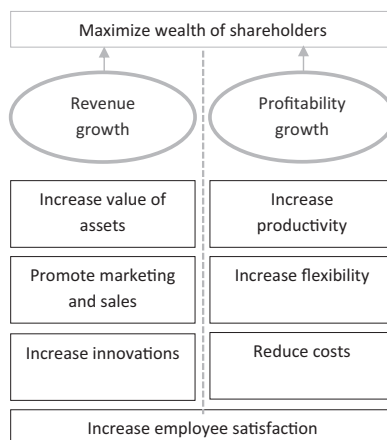
Before answers to these questions can be provided, it is important to first identify which risks (related to CRE) can affect the added value of CRE to the shareholder value. After identifying and defining these CRE risk, an answer might be provided to the question which CRE risks are perceived as most important and how these risks are ranked depending on job- and company-specific characteristics. It is important to answer these questions because the development of a CRE risk ranking helps CRE specialists to identify and analyze the most important CRE risks. The identification of these risks enables CRE managers to assign the correct KPIs to the risk to be able to control them and therefore helps to maximize CRE's contribution to the shareholder value and overall financial performance of the organization. The risk list is based on a literature study and complementary interviews. The risk perception was identified by means of an international survey among CRE practitioners, in which the respondents were asked to rate the likelihood and impact of each CRE risk on a five-point scale.

Section 2 of this paper introduces corporate risk management and CRE management and elucidates how these two separate management fields can be merged into CRE risk management. The CRE risk list is introduced in Section 3, followed by the research approach and data description in Section 4. Section 5 provides the findings of the survey and discussion. The paper ends with conclusions and recommendations.

## 2. CRE risk management

CRERM is the management field where corporate risk management and CRE management intertwine. These two management fields have separately matured and developed into more strategic management fields until the 1990s. During that time, they co-existed within organizations without interacting. This started to change during the economic boom of the 1990s: companies had to innovate and keep up with the economic growth to gain competitive advantages. CRE, new workplaces and workplace solutions needed to facilitate this growth. As a result, CRE became a direct source of potential risks (Gibson and Louargand, 2002). To understand what CRERM is and how it adds value to an organization, it is relevant to first introduce the two management fields that are the foundation of CRERM.

The first management field is CREM. According to Lindholm *et al.* (2006), there are two ways in which CREM can contribute to the corporate goal to maximize shareholder value. As displayed in Figure 1, this can be done by increasing the revenue or by increasing the profitability of the organization. Increasing the employee satisfaction can result in revenue as well as profitability growth. CREM should also add value to other stakeholders, including policy makers, controllers, technical managers, clients, customers, end-users and society (Jensen, 2014). The benefits of CREM are often expressed in a monetary value, while the more tacit added values of real estate to the primary processes and the organizational objectives are usually not referred to at all (De Vries *et al.*, 2008). According to Van der Voordt *et al.* (2012), adding value includes, for example, also functional and emotional benefits as perceived by the consumers relatively to the competitors. De Jonge (1996) was one of the first to pinpoint the added value of CREM. He identified seven elements of added value: increasing productivity, cost reduction, risk control, increase of value, increase of flexibility, changing the culture and public relations and marketing, so risk control was a separate added value. But when Lindholm *et al.* (2006) combined this list with several later studies, risk control was no longer a separate added value. When looking at the risk list defined in the next



Source: Lindholm *et al.* (2006)

**Figure 1.**  
Added value of  
CREM

section, it becomes clear that each added value regards to some of the risks and should thus include risk control.

Corporate risk management is the second management field that stood at the basis of CRERM. It is hard to give a simple definition that is satisfactory in all contexts, but the two separate definitions from [McNeil \*et al.\* \(2005\)](#) and [Merna and Al-Thani \(2010\)](#) combined provided a definition which captures most elements. Corporate risk management is for the purpose of this paper defined as:

Any event or action that an organization takes to reduce the risks arising from business practice that may affect an organization's ability to achieve its objectives and execute its strategies.

Corporate risk management adds value to the organization in two ways. First of all, corporate risk management helps to identify and make stakeholders aware of corporate risks, it supports management decisions and improves planning and business processes ([Chapman and Ward, 1997](#)). Second, organizations that are actively involved with corporate risk management are, on average, valued 4.8 per cent higher by investors ([Smithson and Simkins, 2005](#)).

A definition of CRERM was derived from the definition of corporate risk management combined with [Joroff's \(1992\)](#) and [Krumm's \(2001\)](#) view that CRE consists of the land and buildings used for workspace, infrastructure and investment:

Any event or action that an organization takes to reduce the risks related to the land and buildings used for work space, infrastructure and investment that may affect an organization's ability to achieve its objectives and execute its strategies.

[Gibson and Louargand \(2002\)](#) identified four benefits of CRERM that can help to achieve the goal of maximizing shareholder value. CRERM can help to identify CRE risks; make them visible and understandable for others; implement plans, procedures and protocols to manage them; and help managers to focus their time on the most important CRE risks. These benefits are expected benefits and are not yet confirmed by empirical research. Besides these benefits which are reflected in the shareholder value, it is expected that CRERM can have functional and emotional tacit added value which cannot be expressed in a monetary value but will also influence the primary processes and the organization's ability to achieve its objectives.

CREM, corporate risk management and CRERM are not goals on their own; all three management fields have the same underlying goal: maximizing their contribution to the core business process to enable an organization to achieve its objectives and execute its strategies to maximize the shareholder value. Therefore, the next section shows how a complete list of possible CRE risks was compiled.

### 3. CRE risk list

A review of the literature on CREM and risk management provided only five studies dedicated to CRERM. These studies served as input for creating a risk list. These studies all looked at the subject from a specific point of view:

- (1) [CBRE \(2012\)](#) studied CREM risks focusing especially on the banking and financing sector.
- (2) [Huffman \(2002 and 2004\)](#) wrote about CRE risk from an economic point of view.
- (3) [Simons \(1999\)](#) identified three key sources of strategic risk that impact all

organizations. The identified key risk sources are applicable to identify CRE risks but are not specific for CRE and are also applicable to other company resources.

- (4) [Gibson and Louargand \(2002\)](#) used Simons' research about the three key risk components as a basis to create a framework to identify the risks of a real estate portfolio. They divided the real estate portfolio into several different types according to use, asset type and environment.
- (5) [Rasila and Nenonen \(2008\)](#) identified CRE risks related to corporate relocation.

Besides these five CRE risk sources, there is plenty of literature available about the risk of investing in CRE as a tradable asset. CRE managers do not have to deal with these risks directly. However, the investment value of CRE assets is often directly influenced by the CRE performance. Also, literature about CRE investment risk is better developed and at a more mature stage than CRERM literature. Therefore, some literature about real estate investment ([IPD, 2000](#); [Chen and Hobbs, 2003](#); [Liow, 2010](#); [Voicu and Seiler, 2011](#); [Sharp, 2013](#)) have also been studied. CRE risks mentioned in this literature are included in the risk list and is jointly referred to as risks from the "investment" literature ([Table I](#)). The literature study gave a good initial list of theoretically composed CRE risks. Only [Rasila and Nenonen \(2008\)](#) backed up their list with empirical fieldwork by means of interviews. Also, the most recent CRERM source is from 2012, so risks that are related to recent developments might not have been included. Therefore, five interviews with CRE specialists were held to make sure that all possible risks were listed, including those experienced in current practice. While constructing the CRE risk list an inconsistency in the risk dimension came forward. It turned out that the different sources were not consistent in the way they formulated CRE risks. According to [COSO \(2012\)](#), each risk has a cause and a result. Some of the sources mentioned the cause of a risk, while others mentioned the result of the risk. This caused the same risks to be listed multiple times. To prevent this from happening, all the risks and risk categories were defined as causes that might influence the added value of CRE to the shareholder value and then ordered. As a result, some risks switched category. The amount of unique risks reduced from 74 to 43 risks. Most of the duplicates were results of an already mentioned cause and could therefore be removed.

The 43 risks could be divided over six categories ([Table I](#)). Not all definitions of the risks are provided in [Table I](#) because that would require extra space. The exact definitions of the risks are provided online at: [http://alexandria.tue.nl/extra2/afstversl/bwk/Bartelink%202015\\_bijlage.pdf](http://alexandria.tue.nl/extra2/afstversl/bwk/Bartelink%202015_bijlage.pdf). These six risk categories are based on the risk categories which were frequently mentioned in the literature sources. The six risk categories are:

- (1) *Development risks*: Development risks are risks related to the development or renovation of real estate, for example, the possibility that the tender for the development is not successful. According to [Huffman \(2002\)](#), only corporations with the highest risk acceptance profile will engage in developing their own real estate.
- (2) *Financial policy risk*: Financial policy risks are risks resulting from the company's financial CRE policy which affect the company's overall financial

**Table I.**  
The CRE risk list

No.	Risk category/Risk name	CBRE	Gibson and Louargand	Huffman	Source Rasila and Nenonen	Simons	Investment literature	Interviews
1.0	<i>Development risks</i>							
1.1	Zoning plan risk			x				x
1.2	Ground acquisition risk							x
1.3	Tender risk							x
1.4	Financing risk			x				
1.5	Temporary housing risk							x
1.6	Nuisance risk							x
1.7	Planning risk			x				x
1.8	Workspace design risk			x				x
1.9	Development budget risk			x				x
1.10	Social unethical development risk							x
2.0	<i>Financial policy risks</i>	x	x	x	x		x	x
2.1	Liquidity risk	x	x	x				x
2.2	Solvability risk							x
2.3	Cost of capital risk	x	x	x	x		x	
2.4	CRE budget risk							x
2.5	Budget cut risk							x
2.6	Book value risk		x		x			
2.7	Real estate investment risk						x	
3.0	<i>Operational and business policy risks</i>	x	x	x	x	x		x
3.1	Maintenance risk							x
3.2	Facility management risk	x	x	x		x		x
3.3	Malfunctioning installation risk	x						
3.4	Health and safety risk	x						
3.5	Real estate flexibility risk		x	x				x

*(continued)*

No.	Risk category/Risk name	CBRE	Gibson and Louargand	Huffman	Source Rasila and Nenonen	Simons	Investment literature	Interviews
3.6	Occupancy rate risk	x						x
3.7	Office layout risk		x		x			
3.8	Relocation risk		x	x	x			x
3.9	Expansion profile risk			x				
4.0	<i>Location risks</i>							
4.1	Preferred location risk	x		x	x	x	x	x
4.2	Uptime of production facility risk	x		x	x	x	x	x
4.3	Stakeholder risk					x		x
4.4	Accessibility risk				x			x
4.5	Supplier risk	x						x
5.0	<i>Appearance risks</i>							
5.1	Design risk	x		x		x		x
5.2	Maintenance risk	x						x
6.0	<i>External and regulation risks</i>							
6.1	Natural disaster risk	x	x	x		x	x	x
6.2	Terrorism risk	x				x		
6.3	Political and social unrest risk	x				x		
6.4	Economy risk	x	x			x	x	x
6.5	Exchange rate risk							x
6.6	Property market risk		x	x		x	x	x
6.7	Contracts risk							
6.8	Regulation risk	x		x			x	x
6.9	Technology advancement risk	x						x
6.10	Real estate data availability risk	x				x	x	x

Table I.



performance and shareholder value. An example is liquidity risk: the possibility that the money which is stuck in real estate is needed for other purposes.

- (3) *Operational and business policy risks*: Operational and business policy risks is the risk category mentioned most in the sources. This category contains risks that arise from decisions about operational business practice. An example is occupancy rate risk: the possibility that a low CRE occupancy rate risk causes CRE expenditure per full-time equivalent (FTE) to rise.
- (4) *Location risks*: Location risks are risks that influence the shareholder value caused by the physical space, the location and its surroundings. The uptime of the production facility is such a risk; this is the possibility that the core production facilities are not available for production due to locational aspects such as an unreliable energy grid.
- (5) *Appearance risks*: [CBRE \(2012\)](#) and [Simons \(1999\)](#) call it reputational risk and [Huffman \(2002 and 2004\)](#) call it design risk. Whether it is called design or reputation risk, it is the possibility that the shareholder value will be negatively influenced by the CRE appearance. An example of an appearance risk is the possibility that the CRE design negatively influences the organization's reputation or does not attract potential customers and employers.
- (6) *External and regulation risks*: External and regulation risks are risks that influence the shareholder value caused by external or regulatory sources. This risk category is mentioned in each source except by [Rasila and Nenonen \(2008\)](#). An example of an external risk is natural disaster risk: the possibility that a natural disaster strikes the corporation's real estate.

Development risks and financial policy risks were not very well described in the available literature. It turned out that almost half of the risks assigned to these categories were added based on the interviews. Operational and business policy risks, location risks, appearance risks and external and regulation risks were all extensively described in literature and confirmed by the interviewees. For these risk categories only, occasionally new risks were mentioned during the interviews.

#### 4. Research approach and data description

The second part of the primary research objective was to determine how the risks from the CRE risk list were perceived by CRE practitioners. The tool chosen to gather the required information is a survey, as this tool is able to cope with a large amount of variables and a sufficiently large amount of respondents. The survey was divided into two parts. In the first part, information about the respondent's job- and company-specific characteristics were requested, followed by questions concerning their current CRERM activities. In the second part, the respondent was asked to rate the likelihood and impact for each risk on the list on a five-point Likert scale. The definitions were provided in the survey by hovering over the "I" (information) sign to make sure the risks were interpreted the same way by all respondents. The survey was sent out globally by CoreNet, CREME and AT Osborne.

The total risk score was calculated by multiplying the likelihood of a risk with the impact (following [Coso, 2012](#)). The total risk score made it possible to rank the risks according to perceived importance. The risks were ranked for all the respondents

together, but also analyzed further by studying groups of respondents based on their job- and company-specific characteristics. These job- and company-specific characteristics were derived from the literature study and the interviews. The job characteristics were: job position, management level and geographical location. The company-specific characteristics were industry segment, size of the organization and the ownership type of the real estate.

Creating groups of respondents based on the job- and company-specific characteristics did not only enable a risk comparison based on the total risk score but also made it possible to analyze whether the risk perception between the groups was perceived significantly different. Significance of the differences was identified using statistical tests. The suitability of a test depended, among others, on the amount of respondents and the amount of groups that needed to be compared. The data set collected for this research required the usage of three tests:

- (1) The independent samples *t*-test, to compare two groups on significances in risk perception.
- (2) The Kruskal–Wallis test, to compare three groups or more (an ANOVA test was not possible because data were not normally distributed).
- (3) The Mann–Whitney U test, to identify which of the risks significantly differentiated, when the Kruskal–Wallis test indicated that there was a significant difference in risk perception between at least two groups.

In total, 143 responses were generated, but 50 of them did not complete the entire survey and were therefore excluded from the data set. Out of the remaining 93 completed surveys, there were 5 surveys which showed a conspicuous pattern. Observed patterns were, for example, ranking all 43 risks with the exact same score. The credibility of these surveys was questionable and could contaminate the data set so as a precaution, these five surveys were excluded from the data set. This left 88 respondents in the final data set. Out of these 88 respondents, 70 respondents were CRE end-users and 16 were CRE consultants. The remaining two respondents were academics. Geographically, Europe was best represented with over half of the respondents (it has to be noted that almost all European respondents live in The Netherlands and Belgium). North America was represented by 26 respondents and the remaining 8 were from Asia and Oceania. The real estate activities industry was, with 18 respondents, the best represented industry (because it includes all CRE consultants). According to company size, the most common size was between 2.500 and 25.000 employees. Organizations with more than 25.000 and less than 2.500 employees were slightly less represented. The percentage of CRE owned by an organization was evenly distributed over three groups: 0-20, 21-80 and 81-100 per cent.

The respondents were also asked to rate their organization's CREM and corporate risk management maturity level. On average, they were both rated as "high", but the CRERM maturity level (which can be derived from these maturity levels) was rated as "average". The most common corporate risk response was risk reduction (61 respondents) closely followed by risk avoidance (52 respondents). However, before a risk response can take place, organizations should have identified and analyzed the potential CRE risks. In total, 58 out of the 88 respondents said that they were involved in risk identification and 56 also analyzed these risks. In total, 31 of the corporate end-users

had the entire process of risk identification, risk analysis and risk response in place. However, there were also six organizations which did not have any of these phases implemented yet.

## 5. Findings

The first risk ranking based on the total risk score was created by including all respondents ( $n = 88$ ) and without taking the job- and company-specific characteristics into account. Averaging the risk ranking, each outlier in risk perception for likelihood, impact or standard deviation became evened out and spread over the respondents. As a result, the differences between the total risk scores were small. The top five of risks with the highest total risk score existed of planning risk (mean = 10.17;  $\sigma = 5.54$ ), budget cut risk (mean = 9.89;  $\sigma = 5.12$ ), development budget risk (mean = 9.77;  $\sigma = 5.19$ ), tender risk (mean = 9.49;  $\sigma = 5.38$ ) and occupancy rate risk (mean 9.40;  $\sigma = 5.83$ ). To get more insight in possible differences in risk perception, the respondents were then grouped according to job- and company-specific characteristics and ranked for each group separately.

Table II shows the mean of the total risk score and standard deviation for all risks. The bold numbers represent risks for which the difference in risk perception between the groups of respondent was significant. When the risks were ranked according to job position, it turned out that the total risk score was higher in all risk categories among the end-users than among the CRE consultants, except for most risks in the financial policy risk category. This might be so, because CRE managers employed by end-users are often assigned to ensure that the real estate is operational, while CRE consultants are often hired specifically to improve the efficiency or reduce operational costs. However, this assumption is still open for discussion because this can not be tested with the data gathered for this paper. An independent samples *t*-test showed that in total, five risks were perceived significantly higher by the end-users than by the CRE consultants, namely, temporary housing risk ( $t = 1.586$ ;  $p = 0.022$ ), workspace risk ( $t$ -value = 1.937), maintenance risk ( $t$ -value = 1.747), office lay-out risk ( $t$ -value = 1.726) and regulation risk ( $t$ -value = 2.414).

According to management level, it became clear that all seven risks in the financial policy category have a higher total risk score for respondents operating on strategic level than for respondents operating on tactical and operational level. Operational and business policy risks were, on the other hand, ranked higher by the respondents operating on tactical and operational level. They perceived six out of the nine risks higher, none of which was significant. A possible explanation for this can be that respondents operating on strategic level make long-term financial decisions such as real estate investments, while respondents who operate on strategic and operational level make mid- and short-term decisions that directly affect the daily operations of the CRE and therefore influence the operational performance. An independent samples *t*-test showed that design risk ( $t$ -value = 2.016), liquidity risk ( $t$ -value = 1.672), solvability risk ( $t$ -value = 1.971), real estate investment risk ( $t$ -value = 1.844) and property market risk ( $t$ -value = 1.977) are perceived significantly higher by respondents on strategic level than by respondents on tactical and operational management level.

A Kruskal–Wallis test identified ten risks that were perceived significantly different when the risks are ranked based on the geographical location. This explains a great part of the total variation in risk perception. The North Americans rated maintenance,

CRE risks	Job position				Management level				Geographical location					
	End users <i>n</i> = 70		Service providers <i>n</i> = 16		Strategic <i>n</i> = 53		Tactical and operational <i>n</i> = 17		Europe <i>n</i> = 36		North-America <i>n</i> = 26		Asia and Oceania <i>n</i> = 8	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Development risks</i>														
Zoning plan risk	7.79	5.16	8.81	4.76	7.79	4.93	7.80	5.99	8.97	5.71	5.91	3.90	8.50	4.81
Ground acquisition	6.75	5.44	8.00	4.59	6.80	5.47	6.57	5.56	6.94	6.42	5.82	3.58	9.17	5.60
Tender risk	9.13	4.93	10.63	6.56	9.63	4.97	7.47	4.58	9.98	5.41	<b>7.57</b>	<b>3.89</b>	<b>11.57</b>	<b>4.50</b>
Financing risk	8.30	6.91	9.69	3.74	8.88	6.82	6.40	7.07	8.73	7.67	7.00	5.79	10.71	6.65
Temporary housing risk	<b>6.04</b>	<b>4.14</b>	<b>4.08</b>	<b>2.07</b>	5.87	3.91	6.73	5.14	6.67	4.02	5.00	4.37	5.75	3.95
Nuisance risk	7.62	5.77	6.27	3.83	7.65	5.75	7.53	6.05	8.91	6.54	5.58	3.92	8.71	6.13
Planning risk	9.94	5.41	10.44	6.22	10.24	5.81	9.06	3.98	10.03	5.19	8.85	5.39	13.13	5.74
Workspace risk	<b>8.19</b>	<b>4.88</b>	<b>5.63</b>	<b>4.22</b>	8.67	5.07	6.69	4.00	7.48	5.02	8.58	4.50	9.88	5.57
Development budget risk	9.75	5.28	9.25	4.58	10.10	5.50	8.38	4.21	9.43	5.62	9.65	5.07	11.25	4.98
Social unethical development risk	5.78	4.65	5.79	6.39	5.84	5.02	5.54	3.02	6.00	3.58	4.80	4.61	8.00	7.52
<i>Financial policy risks</i>														
Liquidity risk	6.34	5.54	8.31	4.66	<b>6.96</b>	<b>6.03</b>	<b>4.41</b>	<b>3.04</b>	6.56	5.92	6.81	5.05	7.13	5.87
Solvability risk	5.93	5.16	6.81	4.43	<b>6.60</b>	<b>5.56</b>	<b>3.82</b>	<b>2.88</b>	6.19	6.21	5.88	3.41	4.88	5.22
Cost of capital risk	7.14	5.62	9.19	5.02	7.23	5.95	6.88	4.58	6.97	5.67	6.77	4.74	99.13	8.10
CRE budget risk	8.14	5.25	8.75	5.31	8.43	5.67	7.24	3.60	7.28	4.52	8.92	5.35	9.50	7.13
Budget cut risk	9.84	5.16	9.81	5.36	10.15	5.50	8.88	3.92	9.92	5.08	9.23	4.90	11.5	6.57
Book value risk	7.51	5.75	5.88	4.05	8.04	6.24	5.88	3.52	8.25	6.59	7.31	5.04	4.88	2.75
Real estate investment risk	6.13	4.33	7.94	4.96	<b>6.66</b>	<b>4.61</b>	<b>4.47</b>	<b>2.83</b>	6.81	4.80	5.73	3.97	4.38	2.67

*(continued)*

Table II.

CRE risks	Job position				Management level				Geographical location					
	End users <i>n</i> = 70		Service providers <i>n</i> = 16		Strategic <i>n</i> = 53		Tactical and operational <i>n</i> = 17		Europe <i>n</i> = 36		North-America <i>n</i> = 26		Asia and Oceania <i>n</i> = 8	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Operational and business policy risks</i>														
Maintenance risk	<b>9.01</b>	<b>4.91</b>	<b>6.75</b>	<b>3.40</b>	8.68	4.98	10.06	4.67	<b>10.42</b>	<b>5.12</b>	<b>6.81</b>	<b>4.12</b>	<b>9.88</b>	<b>4.16</b>
Facility management risk	8.03	5.08	6.88	2.83	7.87	4.99	8.53	5.49	7.58	4.70	7.69	4.87	11.13	6.85
Malfunctioning installation risk	9.10	5.14	7.38	3.34	8.94	5.29	9.59	4.77	<b>10.11</b>	<b>5.11</b>	<b>6.35</b>	<b>3.12</b>	<b>13.50</b>	<b>6.30</b>
Health and safety risk	8.60	5.38	7.25	3.75	8.55	5.22	8.76	6.05	8.75	5.81	7.88	4.61	10.25	5.99
Real estate flexibility risk	9.37	5.60	8.50	3.90	9.21	5.79	9.88	5.07	9.64	6.84	8.92	4.47	9.63	1.51
Occupancy rate risk	9.57	6.26	8.75	4.02	9.60	6.13	9.47	6.84	11.33	7.37	8.04	4.46	6.63	2.97
Office layout risk	<b>7.63</b>	<b>5.07</b>	<b>5.31</b>	<b>3.63</b>	8.00	5.33	6.47	4.06	7.94	5.94	7.35	4.17	7.13	3.68
Relocation risk	7.30	4.82	6.63	3.63	7.28	5.06	7.35	4.14	6.33	5.45	7.92	4.14	9.63	2.72
Expansion profile risk	6.49	5.31	7.81	4.10	6.89	5.40	5.24	4.98	5.78	6.23	7.50	4.22	6.83	3.74
<i>Location risks</i>														
Preferred location risk	7.71	5.15	8.00	5.55	7.75	5.30	7.59	4.80	6.97	5.81	8.19	4.29	9.50	4.44
Uptime of production facility risk	7.53	5.61	8.19	4.71	7.60	5.65	7.29	5.64	7.03	6.00	7.12	5.09	11.13	4.58
Stakeholder risk	6.60	4.99	6.75	3.77	6.81	5.41	5.94	3.40	<b>5.67</b>	<b>5.40</b>	7.00	4.14	<b>9.50</b>	<b>4.84</b>
Accessibility risk	6.40	4.61	5.00	3.65	6.74	5.05	5.35	2.67	6.75	4.92	5.65	4.00	7.25	5.28
Supplier risk	6.13	4.93	5.31	3.57	6.40	5.30	5.29	3.55	4.58	3.42	7.08	4.99	10.00	7.75
<i>Appearance risks</i>														
Design risk	6.50	4.73	6.19	4.10	<b>7.13</b>	<b>4.95</b>	<b>4.53</b>	<b>3.37</b>	6.08	4.61	7.31	5.33	5.75	3.01
Maintenance risk (reputation)	7.86	4.69	7.25	4.89	8.17	4.64	6.88	4.85	7.58	4.80	7.73	4.84	9.50	3.74

(continued)

CRE risks	Job position				Management level				Geographical location					
	End users <i>n</i> = 70		Service providers <i>n</i> = 16		Strategic <i>n</i> = 53		Tactical and operational <i>n</i> = 17		Europe <i>n</i> = 36		North-America <i>n</i> = 26		Asia and Oceania <i>n</i> = 8	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>External and regulation risks</i>														
Natural disaster risk	6.63	4.21	6.50	3.88	7.00	4.54	5.47	2.74	<b>4.86</b>	<b>3.54</b>	<b>9.00</b>	<b>3.86</b>	6.88	4.64
Terrorism risk	6.67	3.91	6.06	4.45	6.91	4.04	5.94	3.47	5.61	3.89	7.38	3.49	9.13	4.09
Political and social unrest risk	6.66	4.64	5.19	4.07	6.96	4.79	5.71	4.12	6.58	5.22	6.46	3.81	7.63	4.75
Economy risk	8.77	5.34	9.56	4.19	9.30	5.65	7.12	3.95	8.31	6.13	9.42	4.55	8.75	4.10
Exchange rate risk	5.36	4.57	5.63	3.44	5.75	4.84	4.12	3.41	<b>3.58</b>	<b>3.98</b>	<b>7.38</b>	<b>4.80</b>	<b>6.75</b>	<b>3.24</b>
Property market risk	6.46	4.57	7.75	5.13	<b>7.06</b>	<b>4.87</b>	<b>4.59</b>	<b>2.87</b>	5.75	5.21	7.12	3.91	7.50	3.25
Contracts risk	7.34	4.44	7.13	5.26	7.60	4.52	6.53	4.19	6.58	4.02	8.15	5.22	8.13	3.18
Regulation risk	<b>9.17</b>	<b>5.73</b>	<b>5.56</b>	<b>3.46</b>	9.26	5.64	8.88	6.16	9.17	6.50	9.19	5.01	9.13	4.73
Real estate data availability risk	7.03	4.87	5.75	5.58	7.55	5.21	5.41	3.24	7.00	5.32	7.38	4.40	6.00	4.63
Technology advancement risk	8.73	5.10	6.69	4.24	8.98	5.24	7.94	4.68	7.94	5.31	9.96	4.61	8.25	5.47

**Note:** The bold data mean that these results were statistically significant

malfunctioning and tender risks significantly lower, but natural disaster and exchange rate risks higher. In Europe, stakeholder risks were perceived significantly lower than in Asia.

The risks were also ranked according to company-specific characteristics. For the industry classification (Table III), 11 out of the 43 risks are perceived significantly different between at least two of the industries. This means that the industry classification showed the most risks which are perceived significantly different. The risks which were perceived significantly different between at least two of the industries are identified by the Kruskal–Wallis test. These are: financing risk ( $k$ -value = 16.170), nuisance risk ( $k$ -value = 16.159), workspace risk ( $k$ -value = 17.827), budget cut risk ( $k$ -value = 14.530), maintenance risk ( $k$ -value = 15.944), health and safety risk ( $k$ -value = 14.917), natural disaster risk ( $k$ -value = 21.393), terrorism risk ( $k$ -value = 22.934), economy risk ( $k$ -value = 17.265), exchange rate risk ( $k$ -value = 22.713) and real estate data availability risk ( $k$ -value = 14.933). The last five risks are all risks which belong to the external and regulation risk category. Risks with a significant difference in risk perception are printed bold in all tables.

When looking at the size of the organization expressed in FTE, there is not one risk perceived significantly different (Table IV). This presumes that risk perception does not depend on the company size. The last analysis regarded the ownership type of the organization's real estate. In total, 4 out of the 43 risks are perceived significantly different between the three ownership types. A Kruskal–Wallis test identified that there is a significant difference in risk perception regarding nuisance risk ( $k$ -value = 8.458), real estate investment risk ( $k$ -value = 9.375), natural disaster risk ( $p$ -value = 0.024;  $k$ -value = 7.428) and exchange rate risk ( $k$ -value = 9.879). Organizations valued ownership related risks, like investment risk, higher when the amount of real estate owned by the organization increased. On the other hand, it seems that if an organization rents more of their real estate, economical risk such as exchange rate risk ( $k$ -value = 9.879) becomes higher. This is probably because economic performance might influence rental prices.

## 6. Discussion and recommendations

This study identified 43 risks in six different risk categories. These risks were ranked according to the risk perception of CRE practitioners. When no distinction was made for job- and company-specific characteristics and all respondents were included in the risk ranking, it turned out that, on average, all risks were perceived of similar likelihood and impact. When the risk perception was ranked according to the job- and company-specific characteristics, it seemed that the geographical location and industry segment explained most of the variance in risk perception, because then respectively ten and twelve risks were perceived significantly different. On the other hand, it seemed that the perception of CRE risks does not depend on the size of the organization. The results on job position and management level perceptions seem to suggest that risks outside someone's scope or control might be perceived as less high. This could be a dangerous aspect of professional blindness.

The origins and implications of the differences in risk perception described in this paper raise questions that should be studied in more detail. To what extent could these differences in risk perception be ascribed to different circumstances, priorities and primary processes that different organizations/industries are dealing with? The

CRE risks	Manufacturing		Information and communication		Financial and insurance activities		Real estate activities		Professional, scientific and technical activities		Public administration and defense		Education		Human health and social work activities	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Development risks</i>																
Zoning plan risk	7.86	4.85	4.70	2.45	6.13	3.60	9.28	6.23	5.86	4.91	8.00	4.69	10.50	6.83	11.63	4.21
Ground acquisition	8.29	7.85	6.44	4.53	6.57	5.09	8.06	5.08	6.00	5.20	6.13	4.45	7.09	7.52	8.38	6.74
Tender risk	7.63	3.29	7.60	4.77	7.63	4.10	10.39	6.71	10.00	4.16	9.67	5.74	12.77	5.78	7.86	4.74
Financing risk	<b>3.71</b>	<b>3.09</b>	7.45	4.84	7.25	5.75	<b>10.06</b>	<b>5.51</b>	<b>10.00</b>	<b>5.76</b>	7.29	8.60	8.38	8.85	<b>14.75</b>	<b>6.34</b>
Temporary housing risk	3.60	2.88	5.00	2.24	6.14	5.34	4.71	3.85	5.43	5.13	5.71	3.25	9.08	5.33	7.00	2.00
Nuisance risk	<b>2.57</b>	<b>2.07</b>	7.50	5.57	<b>7.50</b>	<b>4.72</b>	<b>5.94</b>	<b>3.92</b>	7.17	4.79	<b>10.33</b>	<b>4.56</b>	<b>11.69</b>	<b>8.01</b>	6.14	3.67
Planning risk	8.38	4.50	9.33	5.40	11.63	6.21	10.22	6.41	9.50	7.27	10.89	3.41	11.00	6.24	10.63	4.96
Workspace risk	7.25	3.81	7.00	4.97	<b>11.25</b>	<b>5.52</b>	<b>5.39</b>	<b>4.12</b>	<b>10.25</b>	<b>3.58</b>	<b>9.67</b>	<b>2.83</b>	9.25	6.51	<b>4.75</b>	<b>2.55</b>
Development budget risk	7.63	5.45	9.10	3.87	9.00	5.63	8.94	4.78	11.75	5.06	10.44	3.50	11.73	5.95	11.13	7.51
Social unethical development risk	4.86	3.85	6.00	6.78	6.75	6.18	5.63	6.10	4.38	4.84	6.67	4.58	8.50	3.60	4.38	2.97
<i>Financial policy risks</i>																
Liquidity risk	5.00	4.21	5.25	3.02	5.88	4.12	7.67	4.79	8.38	7.46	4.78	5.24	8.69	7.26	10.75	6.32
Solvability risk	4.63	3.58	4.08	2.57	5.63	4.00	6.67	4.19	7.25	5.63	3.67	3.24	8.00	7.05	10.00	7.71
Cost of capital risk	5.00	3.12	5.92	4.08	5.88	4.12	9.06	5.31	12.00	7.45	5.11	5.06	9.08	6.69	9.88	4.76
CRE budget risk	8.38	5.29	6.42	3.00	6.25	3.41	8.67	5.54	11.38	7.93	9.89	6.43	10.31	6.06	7.25	2.71
Budget cut risk	10.50	4.34	<b>6.75</b>	<b>2.83</b>	8.13	3.36	9.50	5.22	10.00	7.13	<b>15.22</b>	<b>5.31</b>	10.85	5.70	9.75	3.28
Book value risk	9.25	6.84	4.75	2.42	7.00	5.15	5.94	4.25	7.38	4.78	8.89	5.88	8.85	6.82	10.63	7.35
Real estate investment risk	4.75	3.11	<b>4.42</b>	<b>2.35</b>	5.00	2.33	7.28	5.05	6.75	4.46	7.67	4.69	<b>8.08</b>	<b>5.87</b>	8.75	4.10

(continued)

Corporate real estate risks

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**Table III.**  
Risk scores for industry specifics



Table III.

CRE risks	Manufacturing <i>n</i> = 8		Information and communication <i>n</i> = 12		Financial and insurance activities <i>n</i> = 8		Real estate activities <i>n</i> = 18		Professional, scientific and technical activities <i>n</i> = 8		Public administration and defense <i>n</i> = 9		Education <i>n</i> = 13		Human health and social work activities <i>n</i> = 13	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Operational and business policy risks</i>																
Maintenance risk	7.25	2.76	<b>6.83</b>	<b>3.71</b>	8.25	1.75	<b>6.89</b>	<b>4.01</b>	<b>6.13</b>	<b>4.39</b>	<b>11.67</b>	<b>4.58</b>	<b>11.54</b>	<b>5.08</b>	12.00	7.58
Facility management risk	6.25	2.49	6.42	3.90	12.00	6.32	7.00	3.60	6.38	5.42	11.00	3.77	8.85	6.01	8.13	5.06
Malfunctioning installation risk	7.38	2.92	6.42	4.10	10.13	6.45	7.72	4.64	7.13	5.87	11.11	3.66	11.00	4.34	9.25	4.68
Health and safety risk	<b>7.25</b>	<b>3.96</b>	<b>5.67</b>	<b>5.18</b>	8.63	3.34	7.61	4.91	<b>11.25</b>	<b>5.06</b>	<b>12.67</b>	<b>4.09</b>	7.85	4.26	9.25	7.94
Real estate flexibility risk	11.00	5.83	8.08	3.85	8.50	3.63	8.72	4.94	6.25	3.99	10.89	5.18	11.00	6.36	10.63	7.71
Occupancy rate risk	11.00	7.76	6.33	3.31	8.88	3.23	9.22	5.76	7.75	6.32	10.33	5.89	11.62	6.59	11.00	6.65
Office layout risk	8.88	4.39	5.42	3.80	7.38	3.50	5.11	3.56	9.13	3.60	8.00	5.70	9.23	6.34	5.88	5.77
Relocation risk	10.88	3.98	6.83	4.43	8.00	4.50	6.61	3.90	7.38	4.00	6.33	2.65	8.15	6.48	3.50	2.88
Expansion profile risk	6.13	4.39	5.08	2.94	6.50	4.50	7.67	4.31	10.25	4.68	3.89	3.18	9.85	8.02	4.75	5.28
<i>Location risks</i>																
Preferred location risk	6.63	3.34	6.58	3.75	8.00	3.78	8.44	6.03	10.75	5.75	7.78	3.80	8.62	7.30	8.63	5.50
Uptime of production facility risk	7.25	3.20	6.67	4.77	7.63	4.63	8.89	6.06	8.50	8.30	6.44	4.28	7.77	6.11	8.50	5.73
Stakeholder risk	7.88	5.11	5.92	4.80	7.75	2.66	6.39	3.79	8.75	4.33	8.00	7.25	6.85	6.54	4.13	2.42
Accessibility risk	5.63	2.92	6.33	4.36	5.13	3.31	5.00	3.45	7.88	6.08	5.56	3.24	7.62	3.73	7.75	8.36
Supplier risk	7.25	5.85	5.25	4.63	7.25	3.81	5.44	3.87	9.88	8.61	4.78	3.67	6.15	3.53	4.25	3.20
<i>Appearance risks</i>																
Design risk	5.50	5.42	4.17	3.16	6.75	4.95	5.89	4.04	8.50	6.16	8.44	5.13	7.00	4.24	6.50	4.47
Maintenance risk (reputation)	6.13	5.22	5.67	4.16	8.38	4.44	6.94	4.83	8.38	4.03	9.33	5.17	9.23	4.87	10.38	5.37

(continued)

CRE risks	Manufacturing <i>n</i> = 8		Information and communication <i>n</i> = 12		Financial and insurance activities <i>n</i> = 8		Real estate activities <i>n</i> = 18		Professional, scientific and technical activities <i>n</i> = 8		Public administration and defense <i>n</i> = 9		Human health and social work activities <i>n</i> = 13	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>External and regulation risks</i>														
Natural disaster risk	<b>9.63</b>	<b>4.27</b>	6.25	3.60	<b>8.88</b>	<b>5.03</b>	6.28	3.71	<b>10.38</b>	<b>4.14</b>	<b>5.00</b>	<b>2.40</b>	<b>4.62</b>	<b>2.81</b>
Terrorism risk	<b>5.63</b>	<b>2.26</b>	<b>6.67</b>	<b>2.71</b>	<b>8.63</b>	<b>4.07</b>	<b>5.89</b>	<b>4.21</b>	<b>7.00</b>	<b>4.11</b>	<b>10.33</b>	<b>4.61</b>	<b>7.62</b>	<b>4.39</b>
Political and social unrest risk	5.00	1.77	6.08	3.40	8.50	4.21	5.50	4.16	6.50	4.14	10.11	6.90	6.62	5.04
Economy risk	10.00	4.28	<b>6.08</b>	<b>2.39</b>	10.38	3.50	<b>9.56</b>	<b>4.37</b>	<b>13.75</b>	<b>2.96</b>	<b>7.11</b>	<b>5.99</b>	<b>7.92</b>	<b>6.49</b>
Exchange rate risk	<b>9.13</b>	<b>5.84</b>	<b>6.58</b>	<b>2.81</b>	<b>6.25</b>	<b>3.73</b>	<b>5.11</b>	<b>3.56</b>	<b>8.75</b>	<b>3.69</b>	4.11	5.18	4.69	5.47
Property market risk	6.13	3.14	5.50	3.03	8.13	4.32	7.61	5.19	7.88	3.23	7.00	5.55	7.23	6.94
Contracts risk	7.63	4.24	6.08	2.81	7.75	3.24	6.83	5.16	10.88	6.79	11.00	4.53	5.92	4.37
Regulation risk	9.00	4.72	7.83	5.13	9.00	3.46	5.17	3.47	10.88	6.79	8.33	3.91	8.15	2.79
Real estate data availability risk	6.00	3.93	<b>4.08</b>	<b>2.91</b>	7.75	4.68	5.50	5.36	7.75	3.41	<b>10.78</b>	<b>4.49</b>	8.23	4.76
Technology advancement risk	8.25	3.54	8.42	6.29	8.13	4.73	6.33	4.20	11.63	4.50	8.78	2.05	9.08	7.45

**Note:** The bold data mean that these results were statistically significant

**Table IV.**  
Risk scores for job  
specifics

CRE risks	Company size						Ownership type							
	0-250 FTE <i>n</i> = 8		250-2,500 FTE <i>n</i> = 14		2,500-25,000 <i>n</i> = 34		>25,000 <i>n</i> = 14		0-20% <i>n</i> = 25		21-80% <i>n</i> = 21		81-100% <i>n</i> = 24	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Development risks</i>														
Zoning plan risk	6.00	3.92	8.15	6.09	8.07	5.13	7.77	5.18	7.23	5.60	6.84	4.89	9.24	4.83
Ground acquisition	8.14	6.41	6.85	5.52	5.78	4.64	8.00	6.66	6.95	5.38	7.65	6.29	5.65	4.61
Tender risk	6.88	5.99	10.75	5.79	8.84	4.35	9.69	4.70	8.23	4.91	8.74	4.07	10.30	5.54
Financing risk	8.00	5.95	8.21	6.68	9.04	7.65	7.07	6.57	9.00	6.81	7.84	5.86	8.00	7.97
Temporary housing risk	4.71	3.86	7.33	4.72	6.70	4.18	3.60	2.37	6.30	4.97	5.07	2.13	6.41	4.34
Nuisance risk	6.86	5.21	8.93	4.36	7.37	6.31	7.17	6.52	<b>6.68</b>	<b>5.10</b>	<b>5.22</b>	<b>4.05</b>	<b>10.39</b>	<b>6.53</b>
Planning risk	8.88	7.24	11.36	5.96	10.28	5.40	8.36	3.39	10.71	6.02	8.52	5.12	10.43	4.94
Workspace risk	6.63	3.85	8.86	5.39	8.52	5.14	7.71	4.53	9.54	5.12	6.29	3.29	8.55	5.47
Development budget risk	9.88	7.06	11.43	2.98	9.61	5.81	8.29	4.87	9.52	5.21	9.50	4.59	10.24	6.11
Social unethical development risk	4.38	3.38	6.29	6.09	5.89	4.69	5.85	3.74	5.29	5.62	5.32	4.49	6.80	3.43
<i>Financial policy risks</i>														
Liquidity risk	6.75	6.23	7.14	5.48	6.47	5.88	5.00	4.64	5.40	4.66	7.29	5.26	6.50	6.60
Solvability risk	7.88	7.95	5.57	3.57	6.26	5.59	4.36	3.15	5.36	3.91	5.05	3.61	7.29	7.05
Cost of capital risk	9.50	7.15	7.86	3.72	7.24	6.32	4.86	3.94	7.40	5.54	6.10	4.56	7.79	6.57
CRE budget risk	7.50	6.46	8.00	2.51	8.32	5.44	8.21	6.47	7.88	5.19	8.90	5.82	7.75	4.92
Budget cut risk	6.75	4.56	10.14	3.16	9.88	5.41	11.21	6.15	9.12	4.69	9.95	5.15	10.50	5.73
Book value risk	8.13	8.32	8.79	5.79	7.09	5.43	6.93	5.20	6.28	4.48	8.48	5.68	7.96	6.90
Real estate investment risk	5.50	3.93	6.86	3.88	6.03	5.05	6.00	3.26	<b>4.20</b>	<b>3.01</b>	<b>6.29</b>	<b>3.49</b>	<b>8.00</b>	<b>5.34</b>

*(continued)*

CRP risks	Company size						Ownership type							
	0-250 FTE <i>n</i> = 8		250-2,500 FTE <i>n</i> = 14		2,500-25,000 <i>n</i> = 34		>25,000 <i>n</i> = 14		0-20% <i>n</i> = 25		21-80% <i>n</i> = 21		81-100% <i>n</i> = 24	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>Operational and business policy risks</i>														
Maintenance risk	6.38	4.50	7.93	5.72	9.74	4.84	9.86	4.17	7.48	4.17	9.33	5.52	10.33	4.82
Facility management risk	6.75	6.50	7.21	3.89	8.35	5.65	8.79	3.98	7.72	5.40	9.10	5.16	7.42	4.74
Malfunctioning installation risk	7.13	5.06	8.29	4.07	10.35	6.02	8.00	3.06	8.68	6.26	8.14	4.08	10.38	4.60
Health and safety risk	10.13	7.14	8.64	6.51	7.97	5.14	9.21	3.75	7.36	4.95	10.52	6.05	8.21	4.94
Real estate flexibility risk	7.25	6.63	10.00	5.46	9.32	5.64	10.07	5.33	8.76	4.50	9.33	6.04	10.04	6.35
Occupancy rate risk	9.75	9.05	9.00	4.80	9.97	5.98	9.07	6.98	8.48	5.38	8.86	5.84	11.33	7.25
Office layout risk	7.13	4.52	6.21	3.87	8.38	5.76	7.50	4.72	7.28	4.19	6.24	3.63	9.21	6.54
Relocation risk	5.38	3.93	7.29	4.91	7.41	5.34	8.14	3.96	8.12	4.53	7.29	4.36	6.46	5.51
Expansion profile risk	5.75	5.23	6.21	5.60	7.65	5.71	4.36	3.48	6.84	4.32	6.29	4.79	6.29	6.71
<i>Location risks</i>														
Preferred location risk	6.75	4.37	8.43	3.16	7.74	6.22	7.50	4.60	8.40	4.92	7.62	4.12	7.08	6.22
Uptime of production facility risk	8.50	7.58	7.93	4.63	7.41	6.22	6.86	3.90	7.68	5.81	7.62	5.43	7.29	5.78
Stakeholder risk	5.88	3.98	8.57	5.96	6.09	5.06	6.29	4.20	7.64	4.37	6.81	5.64	5.33	4.90
Accessibility risk	6.75	5.92	5.64	4.34	6.68	5.09	6.29	2.89	5.80	3.94	5.71	4.03	7.63	5.58
Supplier risk	7.38	6.12	5.14	3.90	5.94	5.08	6.86	5.07	6.68	5.49	6.57	5.84	5.17	3.24
<i>Appearance risks</i>														
Design risk	5.50	6.44	7.00	3.78	6.53	4.77	6.50	4.86	5.52	3.90	7.24	6.00	6.88	4.29
Maintenance risk (reputation)	7.50	5.32	7.50	3.18	8.24	5.19	7.50	4.69	6.56	3.82	8.90	5.35	8.29	4.77

(continued)

Table IV.

CRE risks	Company size						Ownership type							
	0-250 FTE <i>n</i> = 8		250-2,500 FTE <i>n</i> = 14		2,500-25,000 <i>n</i> = 34		>25,000 <i>n</i> = 14		0-20% <i>n</i> = 25		21-80% <i>n</i> = 21		81-100% <i>n</i> = 24	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>External and regulation risks</i>														
Natural disaster risk	4.75	2.60	6.93	4.60	6.56	4.45	7.57	3.96	<b>8.08</b>	<b>4.62</b>	7.05	4.13	<b>4.75</b>	<b>3.14</b>
Terrorism risk	4.63	3.46	6.14	3.06	6.38	3.61	9.07	4.78	6.52	2.65	6.95	4.82	6.58	4.26
Political and social unrest risk	6.50	5.10	7.64	5.80	6.03	4.12	7.29	4.58	6.28	3.06	6.81	5.21	6.92	5.56
Economy risk	11.38	7.21	9.71	4.08	7.91	5.28	8.43	5.39	9.24	4.08	8.95	4.96	8.13	6.80
Exchange rate risk	6.38	4.78	4.50	3.67	4.44	4.29	7.86	5.29	<b>6.60</b>	<b>4.19</b>	<b>6.38</b>	<b>5.20</b>	<b>3.17</b>	<b>3.62</b>
Property market risk	4.88	3.60	8.43	4.48	6.00	4.94	6.50	3.96	6.68	3.44	6.52	4.08	6.17	5.98
Contracts risk	10.38	6.89	7.64	4.16	6.29	3.94	7.86	3.66	7.48	4.19	8.90	4.98	5.83	3.82
Regulation risk	12.00	8.64	9.21	6.17	7.88	4.52	10.64	5.71	8.48	4.57	10.81	7.43	8.46	5.02
Real estate data availability risk	9.38	7.19	7.43	4.83	6.35	4.52	6.93	4.25	6.08	3.68	7.38	4.63	7.71	6.06
Technology advancement risk	9.25	6.18	9.21	4.48	8.53	5.86	8.43	3.06	8.60	5.17	8.43	4.19	9.13	5.87

**Note:** The bold data mean that these results were statistically significant

North Americas rated maintenance, malfunctioning and tender risks lower. This might be a result of better procedures in the USA, but more detailed research could also provide other reasons. Similarly, exchange rate and natural disaster risk perception should be held against actual disasters and currency problems taking place, to see if the perceived ranking is correct.

The industry sector split showed too many differences to discuss them. Some appear logical, like the troubled real estate sector, indicating a high financing and economy risk. Or the professional, science and technical activities sector caring more about health + safety risks and natural disasters. Other differences might be less logical and deserve further research. Future studies could also repeat this study with a larger group of respondents to increase the strength of analyses and theory building. Then multiple regressions and/or path analysis could identify in more detail what influences perceptions of risks and its relative influence. Finally, it might also be interesting to measure the influence of certain events (e.g. terrorist attacks) to see if the risk perception changes over time.

The CRE risk list can serve as a basis for CRE managers to construct a risk register, as the risk list might help with the identification of potential risks. Besides, it enables CRE managers to compare the organization's risk perception profile with industry peers from all over the world to make sure that there are no blind spots in your risk register. In the end, this study enables CRE managers to assign the correct risk control measure to the identified risks in a way that CRE contributes maximal to the shareholder value of the organization. It is recommended to CRE managers to get actively involved in CRE risk management. Whether this is by implementing a CRERM strategy or by construction a CRE risk register, in both cases it will increase the CRE risk awareness within the organization.

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