



Risk perceptions and approaches in multi-organizations: A research review 2000–2012

Liisa Lehtiranta

Aalto University, School of Engineering, Built Environment Services Research Group BES, Espoo, Finland

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Abstract

Shared risks and opportunities set specific premises for risk management (RM) in temporary multi-organizations (TMOs). However, most project RM research is presented from the perspective of a single-organizational project delivery team or covers limited risk perceptions and RM approaches. This paper aims to address how well the body of knowledge on multi-organizational RM corresponds to a state-of-art understanding on project RM and to identify which gaps need to be addressed in future research. The review involves: 1) the preferred view of risk as threat and/or opportunity, 2) the nature of addressed risks as anticipated or unanticipated risks or unrealistic assumptions, 3) the role of the multi-organization as the source of risks and/or resources for risk management (RM), and 4) the allocation of risk responsibilities. The review covers research papers published between 2000 and 2012 in four journals: *International Journal of Project Management (IJPM)*, *Project Management Journal (PMJ)*, *Journal of Construction Engineering and Management (JCEM)*, and *IEEE Transactions on Software Engineering (TSE)*. 105 eligible research papers were identified. The results and conclusion outline the identified main gaps in multi-organizational RM research compared to the state-of-art RM research and TMO-specific characteristics. The results can be used to inform research agendas on more holistic and dynamic multi-organizational RM concepts.

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1. Introduction

Project risk management (RM) is considered a major success factor and an appealing research and development topic. RM frameworks and processes need to reflect the characteristics of the project environment and organization ([International Organization for Standardization ISO, 2009](#); [Project Management Institute, 2009](#)). In dynamic and complex project deliveries, this requirement implies the well-organized use of collective knowledge and coordinated responses, which are often spread among several participant organizations.

However, the state-of-art risk and RM research is regularly assumed to relate to single-employer organizations. This assumption neglects the specific features and challenges related to temporary multi-organizations (TMOs), project organizations that consist of a multi-disciplinary composition of participants employed by independent firms. TMOs have become a frequent

and strategically important way to integrate an array of specialized resources in a wide range of industries ([Jones and Lichtenstein, 2008](#); [Söderlund et al., 2008](#); [Sydow et al., 2004](#)). The multi-organizational nature of TMOs relates to the interconnectedness of the multi-disciplinary work, in which the participants pursue at least partly shared goals ([Cherns and Bryant, 1984](#)), whereas the temporality refers to the purpose of accomplishing predetermined tasks in a scheduled time frame ([Packendorff, 1995](#)).

Multi-organizational dynamics are particularly interesting regarding RM because the participants' goals and management structures are partly shared in the project's multi-organization and partly determined by those of the participants' employers. Due to shared milestones, the participants must significantly coordinate their contributions, thus resembling a single (large) team. In TMOs, most project-specific risks, such as constructability, change orders, and conflicts in documents, are common to several participants and need to be managed through a joint

effort (Rahman and Kumaraswamy, 2002). Multi-organizational collaboration is critical to address complex risks that are often not identifiable or manageable by a single organization. Cherns and Bryant (1984) suggest that the way in which the TMO handles risk is one of the most influential factors determining its success.

Research on multi-organizational RM is needed to support the success of this common form of project deliveries. The body of knowledge on multi-organizational RM is based on published research and framed by the authors' risk perceptions and RM approaches. Risk perception determines the scope of risks that are considered, and risk approaches define how the multi-organization organizes for RM. These are reflected, explicitly or implicitly, in researchers work on multi-organizational RM and therefore support some trends while dismissing others. It is not clear that multi-organizational RM research follows, or should follow, the premises of general RM research.

The present review identifies and analyzes the underlying meta-level of multi-organizational RM research with regard to risk perceptions and RM approaches. The analysis of existing research, i.e., literature review, is a particularly powerful tool for discovering the premises and assumptions on which concepts are built; conclusions can be drawn on a wider scale than is possible with empirical studies. This knowledge is intended to provide guidance for further research and development on RM in complex, multi-organizational contexts. The study contributes to RM research by providing a foundational multi-organizational perspective and to TMO research as a domain-specific background survey on RM.

The review draws on recent studies that were published within the thirteen-year period from 2000 to 2012 in four top journals representing general project management (*International Journal of Project Management*, *IJPM* and *Project Management Journal*, *PMJ*), construction project management (*Journal of Construction Engineering and Management*, *JCEM*), and software project management (*IEEE Transactions on Software Engineering*, *TSE*).

The analysis includes two research questions as the basis for observations on risk perception: 1) the preferred view of risk as uncertainty, threat, and/or opportunity and 2) the nature of addressed risks as anticipated or unanticipated risks or unrealistic assumptions. Two additional research questions are targeted to analyze RM approaches in TMOs: 3) the role of the project organization as the source of risks and/or resources for RM and 4) the allocation of risk responsibilities within the TMO. These themes are discussed in Sections 2 and 3 below.

2. Risk perceptions

The risk perception covers the substance of the risk definition. Project participants' risk perceptions are built on people's beliefs, attitudes, judgments, and feelings (Akintoye and MacLeod, 1997) and influenced by group thinking (Lichtenberg, 2000) and trust (Das and Teng, 2004). The majority of the literature on risk perception focuses on quantitative risk perception on the level of risk (ISO, 2009), which is expressed in terms of the combination of risk consequences and their likelihood, and is useful as a basis for practical decision making. However, this

study focuses on the qualitative dimensions of risk perception that address the definition or scope of risk to be considered (as a basis of perceived risk levels). It is suggested that the qualitative, as opposed to quantitative, dimensions of risk perception primarily guide the conceptual direction of RM research and offer fruitful objectives for discovering the foundation under RM frameworks.

2.1. Primary view of risks as threats, opportunities, or uncertainty

The definition of risk is a source of ongoing debate in the academic community, and even more so between academics and practitioners. The concept of risk involves two main schools of thought. Traditionally, risk is defined as the chance or likelihood of events with negative consequences, such as injury or loss (e.g., Frame, 2003; Jablonowski, 2006). This view is deeply rooted in project management practice. However, the current academic state-of-art understanding of risk encompasses both negative and positive deviations from defined project goals and is proposed to be more useful in business contexts. For example, Lichtenberg (2000) defines this dual risk as a possible event that would have a negative or positive impact. "Risk is defined as the exposure to loss/gain, or the probability of occurrence of loss/gain multiplied by its respective magnitude" (Jaafari, 2001). These negative and positive risks are usually called threats and opportunities (Heldman, 2005).

The concept of uncertainty is useful for capturing the two sides of risks under one management item, and can be defined as lack of certainty (Chapman and Ward, 2003; Jablonowski, 2006). Uncertainty is evident in the case of "one-of-a-kind situations," in which no historic data or previous history related to the situation is considered by decision makers (Flanagan and Norman, 1993). Chapman and Ward (2003) suggest that uncertainty management is not focused only on managing perceived threats, opportunities, and their implications. Uncertainty management also involves identifying and managing all sources of uncertainty that give rise to and shape perceptions of threats and opportunities.

TMOs are related to project contexts in which practical traditions may not support project managers in addressing opportunity or uncertainty alongside threats. However, a state-of-art understanding of risk suggests researchers should consider the wider view and develop strategies to enable practical applications. This literature review aims to identify such initiatives.

2.2. Nature of risks as anticipated events, unanticipated events, or unrealistic assumptions

Another dimension of qualitative risk perception is the individual or organization's stance on the "controllability" of risks, meaning whether risks are treated as anticipated or unanticipated events. The paradigm of systematic RM is predominantly focused on anticipated risks. "The project manager should take actions to mitigate and minimize 'foreseeable' risk-based failure" (Royer, 2000). Project RM involves

proactive decisions on classifying identified risks into those that matter and those that do not. Successful RM could therefore be seen to encompass the “effective management of relevance as well as the setting of, and sticking to priorities” (Kutsch and Hall, 2010).

Yet, do we foresee all that is relevant? Typically, risks in large or complex projects emerge from demanding project objectives, participant networks, competencies, and the project environment. Dynamic conditions make foreseeing all relevant events impossible or, at least, impractical. Often, unanticipated risks (or black swans) constitute a dominant influence on goals, both good and bad (Taleb, 2007). Jaafari (2001) has formulated a set of principles for RM based on a different paradigm than traditional systematic RM. One of the key principles states that even “with the best planning and evaluation efforts it will not be possible to gather all the relevant information quickly and craft a viable project, doing so will run the risk of achieving sub-optimal results. As such, the project options should remain open so that uncertainties surrounding the project variables can be resolved optimally at appropriate junctures to minimize their impacts on project objectives.”

A third type of risk source can be identified as unrealistic assumptions, which rarely appear even on the best of RM lists. “In contrast to identifiable risks, unmanaged assumptions are neither visible nor apparent as risks and so can be the most dangerous” (Royer, 2000). The reliance on such subjective information is essential to both construction and software development projects, e.g., in cost estimation. These “uncertainty assessments have been shown to be systematically overconfident and may lead to poor project management” (Jorgensen, 2005). Emhjellen et al. (2003) have found “unclear project assumptions in early phase, optimistic interpolation of previous project assumptions, optimistic estimates, and underestimation of uncertainty” as the main causes of oil mining project cost overruns.

The existence and significance of all three types of risks seems evident in multi-organizational contexts, but does multi-organizational RM research address them in a balanced way?

3. Risk management approaches

RM is defined as coordinated activities to direct and control an organization with regard to risk (International Organization for Standardization ISO, 2009). The RM approach is also known as RM policy, which presents “the overall intentions and direction of an organization related to risk management” (International Organization for Standardization ISO, 2009). RM approaches differ by the locus of risk (internal or external) and locus of management (the responsible actor) as discussed below. In the case of a TMO, both dimensions appear negotiable because the borders of the (multi-)organization are disputable.

3.1. Role of TMO regarding internal and external risks

Das and Teng (1999) differentiate between project organizations’ internal and external risks. The internal (i.e., relational) risks are related to the project organization’s ability to work together effectively. They represent the prominence of the project

organization itself as a potential source for risks or opportunities. For example, a significant part of the inherent risks in modern and complex construction projects are related to the contribution of many contracting agents, such as owners, designers, contractors, subcontractors, and suppliers (Khazaeni et al., 2012). The challenges of multi-organizational project delivery include a lack of prior collaboration and a clear structure of hierarchical authority (Janowicz-Panjaitan et al., 2009), differing or contradictory objectives and practices (Lehtiranta, 2011), and conflicts at the interface between the project organization and the participants’ parent organizations (Kenis et al., 2009). Project organizations are ambiguous, subject to time constraints, and, if separated from their surrounding environment, may create knowledge silos (Sydow et al., 2004).

The external risks (or technical risks, as suggested by Das and Teng, 1999) involve all other events that the project organization will encounter. Their influence is determined by how the organization is able to harness its resources for RM.

All organizations are recommended to consider and manage both external and internal risks (ISO, 2009). However, in TMOs risks and RM processes can be partly shared, and the borders between internal and external may blur. This could be expected to result in a multi-faceted analysis of TMO as a source of risk and as a resource for RM. This review is targeted to identify such analyses.

3.2. Allocating and sharing risks in the TMO

If the role of the TMO in project management is seen as a risk (i.e., threat) to project delivery, typical RM approaches involve the challenges of appropriate risk allocation and of the functional integration of the RM needs, knowledge and expertise of individual participant organizations. “The construction risks can hardly ever be eliminated; they may be transferred or shared from one party to another through contract clauses” (Andi, 2006). The consensus is that risks should be allocated to the party that is in the best position to manage them (e.g., International Organization for Standardization ISO, 2009). Risk allocation should be based on a balance of parties’ interests and should “distribute liability associated with risk events to proportionally distribute the possible prospect loss or gain of project” (Khazaeni et al., 2012).

However, allocating separate responsibilities is not the only response approach. Akintoye and MacLeod (1997) claim that the process of contracting out all risks does not, for example, support innovation initiatives. Conversely, TMOs provide opportunities to flexibly mobilize resources to accomplish complex and unique tasks (Söderlund et al., 2008), for creativity and innovation (Swan, 2002), for creating knowledge (Sydow et al., 2004), and for utilizing collaborative working structures and collective expertise to optimize project and mutual learning (Bakker et al., 2010; Fong, 2005). Thus, an opposite or complementary view would be to treat the TMO as a means for managing risks.

In many cases, risk sharing makes sense because most project risks commonly concern project participants (Tang et al., 2007). Therefore, a shift from risk transfer to risk reduction has been identified in the construction industry (Rahman and

Kumaraswamy, 2002; Tang et al., 2007). However, systematic approaches for integrating project RM processes and initiatives for utilizing and supporting multi-organizational collaborative work are rare. As exemplary exceptions, Lichtenberg (2000) recommends involving a multidisciplinary team for risk identification, analysis, and response, and Rahman and Kumaraswamy (2005) propose joint RM to unify the efforts of all major contracting parties.

Whereas allocation-based risk approaches have long been popular research topics, new collaboration-based project delivery approaches such as alliances and partnering have opened opportunities for shared (along with allocated) RM approaches. This literature review aims to identify how multi-organizational RM research addresses the issues of sharing and allocating risks.

4. Methodology and data

Literature reviews provide readers with syntheses and analyses of research in particular subject areas (Cooper, 1998). The review process aims to present a systematic and replicable approach for identifying and analyzing multi-organizational RM research. The process roughly follows the guiding principles introduced by Huovinen (2006) and advanced by Lehtiranta and Huovinen (2010) that outline the essential steps of a systematic literature review.

1. The objectives: The core concepts in this research (i.e., risk perception and approach) are divided into analyzable units through research questions. The research questions are chosen to represent important academic debates or potentially under-researched topics based on earlier research, as discussed in Sections 2 and 3. Two research questions are intended as the basis for observations on risk perception: 1) the preferred view on risk as threat, opportunity, and/or uncertainty and 2) the nature of addressed risks as anticipated or unanticipated risks or unrealistic assumptions. Two additional research questions are targeted for analyzing the RM approaches: 3) the role of the TMO as the source of risks and/or resource for RM and 4) the allocation of risk responsibilities within the TMO.
2. Scope: The eligible papers represent the multi-organizational nature of work activity as either a risk itself or a resource for RM. The thirteen-year period from 2000 to 2012 was deemed adequate for capturing a wide variety of research to describe the dominant trends and gaps in our knowledge.
3. The publication channels: The two leading project focused journals, *International Journal of Project Management* (IJPM) and *Project Management Journal* (PMJ), were selected to capture the international trends in generic project management research as the only project management-focused journals listed in the 2011 JCR Social Sciences Edition. Two industry focuses, i.e., construction and software development, were found the most researched (and, thus, the potentially most fruitful) contexts for multi-organizational RM based on publications in the generic journals. Therefore, the review was complemented by including two journals from the two allied fields, i.e., the *Journal of Construction Engineering and*

Management (JCEM) and *IEEE Transactions on Software Engineering* (TSE), which were the only journals representing suitable scopes in the 2011 JCR Sciences Edition. The literature search covered the 3993 papers that were published between the years 2000 and 2012 in the four selected journals

4. The inclusion and exclusion of references: The literature search could not be based on search words to allow variance in terminology. Therefore, all papers within the scope of the review were browsed. The articles were included if they described the TMO as a source of risk and/or specified a multi-organizational response to risks. This process therefore included papers that implied the intended focus but did not specify “risk,” “opportunity,” or “uncertainty” in their titles. RM in multi-organizational projects was identified as the topic in 215 articles. Of these articles, 105 papers specified the TMO as a source of risk, a means for RM, or both and were eligible for the review.

Examples of excluded paper include those addressing risk and/or RM related to end-product qualities with no explicit connection to the management of multi-organizational project delivery and those describing a specific step of an RM process but not connecting it to multi-organizational risks or multi-organizational RM solutions. Additionally, research studies on TMOs’ interactions with their environments (i.e., with individuals and organizations who are not in a direct role, employed or employer, with the project) were excluded from this study.

The distribution of the selected papers vis-à-vis publication channels and publication years is illustrated in Fig. 1.

5. The coding, exposure, and analysis of the conceptual data: A structured Excel database was utilized to classify each reference according to the four research questions as seen in Tables 1–3. Typically, the author’s risk perception was revealed in the abstract and/or introduction. The author’s stance on RM process activities was normally found within the abstract and the conclusions. If not, other sections of the paper were reviewed, such as the literature review and discussion. The construction project context dominated 74

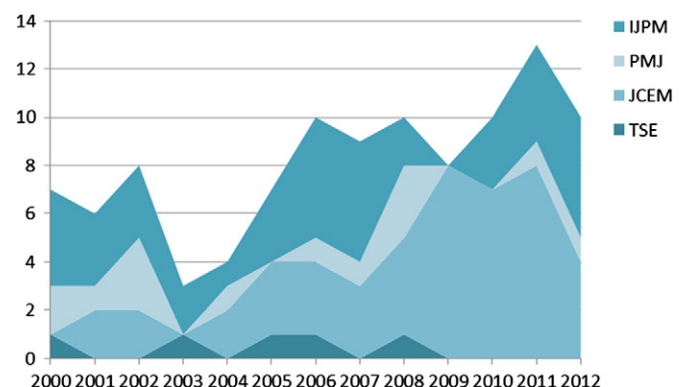


Fig. 1. Annual publications of research on multi-organizational RM in the four selected journals.

Table 1
Construction project-related references.

Journal	Author(s) (year)	Primary view		Nature of risks			Role of TMO		Risk responsibility		
		T = threat	O = opportunity	ANT = anticipated/specific	UNA = unanticipated	UNR = unrealistic assumptions	S = source of risks	R = resource for RM	O = owner/client	C = contractor/supplier	T = other
		T	O	ANT	UNA	UNR	S	R	O	C	T
PMJ	Krane et al. (2012)	X		X			X		X	X	
JCEM	Mitropoulos and Howell (2001)	X		X			X	X	X	X	
JCEM	Shen et al. (2001)	X		X			X	X	X	X	
JCEM	Kumaraswamy and Morris (2002)	X		X			X	X	X	X	
JCEM	Meng (2002)	X		X			X		X	X	
JCEM	Fang et al. (2004)	X		X			X			X	
JCEM	Park and Pena-Mora (2004)	X	X	X	X	X	X			X	
JCEM	Al-Sobiei et al. (2005)	X		X			X		X		
JCEM	Jin and Ling (2005)	X		X			X	X		X	
JCEM	Lee et al. (2005)	X		X			X	X		X	
JCEM	de la Cruz et al. (2006)	X		X			X	X	X		
JCEM	Lee et al. (2006)	X	X	X			X				
JCEM	Tang et al. (2006)			X			X	X	X	X	
JCEM	Sakka and El-Sayegh (2007)	X		X				X	X	X	
JCEM	Tang et al. (2007)	X		X				X	X	X	
JCEM	Zhang and Zou (2007)	X	X	X			X	X	X	X	
JCEM	Khalafallah and El-Rayes (2008)	X		X			X	X	X	X	
JCEM	Liou and Huang (2008)			X			X	X	X	X	
JCEM	Seo and Choi (2008)	X		X			X	X		X	X
JCEM	Tang et al. (2008)			X			X	X	X		
JCEM	Al-Gahtani (2009)	X		X	X	X	X	X	X	X	
JCEM	Blacud et al. (2009)	X		X			X				
JCEM	Chan and Au (2009)	X		X	X			X	X		
JCEM	El-adaway and Kandil (2009)	X		X			X			X	
JCEM	Hallowell and Gambatese (2009)	X		X			X	X		X	X
JCEM	Imbeah and Guikema (2009)	X		X			X			X	
JCEM	Puddicombe (2009)	X		X			X		X	X	
JCEM	Sacks et al. (2009)	X		X			X			X	X
JCEM	Chan et al. (2010a)	X		X			X		X	X	
JCEM	Cheung et al. (2010)	X		X			X		X	X	
JCEM	El-Adaway and Kandil (2010)	X		X			X		X		
JCEM	Jin (2010)			X			X	X	X		
JCEM	Menassa et al. (2010)	X		X			X		X		
JCEM	Mostafavi and Karamouz (2010)			X			X	X	X		
JCEM	Xu et al. (2010)			X			X	X	X		
JCEM	Elbarkouky and Fayek (2011a)	X		X			X	X	X	X	
JCEM	Elbarkouky and Fayek (2011b)	X		X			X	X	X	X	
JCEM	Jin (2011)	X		X			X	X	X	X	
JCEM	Laryea and Hughes (2011)			X			X			X	
JCEM	Li and Zou (2011)			X			X				
JCEM	Love et al. (2011)	X	X	X			X	X			
JCEM	Marques and Berg (2011)	X		X			X	X	X	X	
JCEM	Tserng et al. (2011)	X		X			X		X		
JCEM	Ashuri et al. (2012)	X		X			X	X	X	X	
JCEM	Song et al. (2012)	X		X			X		X	X	
JCEM	Subramanian et al. (2012)	X		X			X	X			
JCEM	Xiang et al. (2012)	X				X	X		X	X	
IJPM	Wang and Tiong (2000)	X		X			X	X	X	X	
IJPM	Yeo and Tiong (2000)	X		X			X	X	X	X	
IJPM	Aleshin (2001)	X		X				X			
IJPM	Chapman (2001)	X		X			X	X	X	X	
IJPM	Florice and Miller (2001)	X		X	X		X	X	X	X	
IJPM	Ng and Skitmore (2002)	X		X			X			X	
IJPM	van der Velde and van Donk (2002)	X	X	X			X				X
IJPM	Andi and Minato (2003)	X		X			X	X	X	X	
IJPM	Zaghloul and Hartman (2003)	X	X	X			X	X	X	X	

Table 1 (continued)

Journal	Author(s) (year)	Primary view		Nature of risks			Role of TMO		Risk responsibility		
		T = threat	O = opportunity	ANT = anticipated/specific	UNA = unanticipated	UNR = unrealistic assumptions	S = source of risks	R = resource for RM	O = owner/client	C = contractor/supplier	T = other
		T	O	ANT	UNA	UNR	S	R	O	C	T
IJPM	Lyons and Skitmore (2004)	X		X				X			
IJPM	Bing et al. (2005)	X		X			X	X	X	X	
IJPM	Abednego and Ogunlana (2006)	X		X			X	X	X	X	
IJPM	Consoli (2006)	X		X			X	X	X	X	
IJPM	Shen et al. (2006)	X		X			X	X	X	X	
IJPM	Dikmen et al. (2007)	X		X			X		X	X	
IJPM	Lam et al. (2007)	X		X			X	X	X	X	
IJPM	Van Marrewijk (2007)	X		X			X		X	X	
IJPM	Medda (2007)	X		X			X	X	X	X	
IJPM	Ng and Loosemore (2007)	X		X			X	X	X	X	
IJPM	Van Marrewijk et al. (2008)	X		X	X	X	X	X	X	X	
IJPM	Wong et al. (2008)	X	X	X			X	X	X	X	
IJPM	Ke et al. (2010)	X		X			X	X	X	X	
IJPM	Wibowo and Mohamed (2010)	X		X			X	X	X	X	
IJPM	Chan et al. (2010b)	X		X			X	X	X	X	
IJPM	Giezen (2012)	X	X	X	X		X		X	X	
IJPM	Khazaeni et al. (2012)	X		X	X		X	X	X	X	
IJPM	Sanderson (2012)	X		X			X	X	X	X	

(70%) of the papers, whereas 20 papers (19%) were based on IT or software projects, and 11 (11%) were based on other industries or on project contexts in general. Tables 1

(construction project-related references), 2 (software project-related references), and 3 (other project types) summarize the review results for each of the four research questions.

Table 2
Software development project-related references.

Journal	Author(s) (year)	Primary view		Nature of risks			Role of TMO		Risk responsibility		
		T = threat	O = opportunity	ANT = anticipated/specific	UNA = unanticipated	UNR = unrealistic assumptions	S = source of risks	R = resource for RM	O = owner/client	C = contractor/supplier	T = other
		T	O	ANT	UNA	UNR	S	R	O	C	T
PMJ	Jiang et al. (2000)	X		X			X	X	X	X	
PMJ	Jiang and Klein (2001)	X		X			X			X	
PMJ	Jiang et al. (2002c)	X		X			X				X
PMJ	Jiang et al. (2002b)	X		X			X	X	X	X	
PMJ	Pyra and Trask (2002)	X		X				X			
PMJ	Reich (2007)	X		X			X	X		X	
PMJ	Reich et al. (2008)	X		X			X	X		X	
PMJ	De Bakker et al. (2011)	X		X			X	X	X	X	
IJPM	Kutsch and Hall (2005)	X		X			X			X	
IJPM	Xie et al. (2006)	X		X			X			X	
IJPM	Reed and Knight (2010)	X		X			X	X			
IJPM	Holzmann and Spiegler (2011)	X	X	X			X			X	
IJPM	Liu et al. (2011)	X		X			X		X	X	
IJPM	De Bakker et al. (2012)	X		X				X	X	X	
IJPM	Fu et al. (2012)	X		X			X		X	X	
TSE	Ropponen and Lyytinen (2000)	X		X			X			X	
TSE	Kitchenham et al. (2003)	X	X	X			X			X	
TSE	Jorgensen (2005)	X	X	X		X	X			X	
TSE	Damian and Chisan (2006)	X				X	X			X	
TSE	Li et al. (2008)	X		X			X			X	

6. **Validity:** The review was performed by a single reviewer following steps 3–5 of the described process and following the principles of selectivity and neutrality (Cooper, 1998; Hart, 1998). A single reviewer process can be seen as upholding consistency, and the replicable process description allows for posterior review.
7. **Reporting:** The reporting was pre-planned based on the four research questions (Tables 1–3) and related analyses. This article represents the main report.
8. **Conclusions for researchers:** Research literature reviews are a means to justify courses of action, such as strategic plans, grant proposals, or topics of dissertations (Fink, 2009). Therefore, the analyses and conclusions are intended to provide readers with suggestions for the advancement of focal conceptual knowledge by addressing significant research gaps.
9. **Conclusions for practitioners:** Although the main messages from this review are primarily of academic interest, the conclusions should aid multi-organizational project managers in developing better awareness of their RM practices from the perspective of practical challenges and opportunities in multi-organizational projects.
10. **Limitations:** A review should provide a systematic, explicit, comprehensive, and reproducible explication (Fink, 2009), which is herein respected by documenting the review process and result tables. However, the identification of eligible papers was limited by the reviewer's ability to make connections to multi-organizational contexts. In certain cases, the line between an RM topic and another project management topic was thin or non-existent. Further, it was difficult to identify "unanticipated" risks if a paper did not underline the suggested method's suitability for them. The research method led to the exclusion of at least one group of papers that may have contributed to multi-organizational RM: papers that did not explicitly specify a multi-organizational source of risk or means for RM but were

nevertheless applicable for such a context. The scope of the review intends to be descriptive rather than exhaustive. The presentation of software development research seems scant for forming a complete picture of the current RM methodologies because a number of advancements are reported at top conferences instead of journals. It may, however, provide an idea of processes in the close past or, indeed, the lack of them.

5. Findings from literature on multi-organizational RM

This section focuses on addressing the trends and shortcomings in the body of knowledge on multi-organizational RM. The results indicate that studies regarding how risks are perceived and managed in TMOs cover a wide range but do not correspond to the knowledge on state-of-art RM principles in a balanced way. Some avenues for advancing multi-organizational RM research are discussed below based on general state-of-art project RM research and the challenges and opportunities embedded in multi-organizational projects.

5.1. Opportunities for opportunities

Busby and Zhang (2008) describe project risk as the statistical concept of the probabilities and consequences of threatening conditions and events. The role of RM is frequently seen as a set of actions directed to *mitigate* risks (e.g., Chan et al., 2010a; Hallowell and Gambatese, 2009), and unmanaged or unmitigated risks are seen as major causes of project *failure* (Lyons and Skitmore, 2004). This focus on risks as threats to project goals is clearly dominant in multi-organizational RM research. Regarding some risk types, such as safety, the approach concerning only negative deviations from goals is natural.

Some authors of modern RM research (e.g., Olsson, 2007) propose that including the positive side of several types of risks (i.e., opportunities) in consideration will improve the business

Table 3
References related to other project types (non-construction, non-software).

Journal	Author(s) (year)	Primary view		Nature of risks			Role of TMO		Risk responsibility		
		T = threat	O = opportunity	ANT = anticipated/specific	UNA = unanticipated	UNR = unrealistic assumptions	S = source of risks	R = resource for RM	O = owner/client	C = contractor/supplier	T = other
		T	O	ANT	UNA	UNR	S	R	O	C	T
PMJ	Sadeh et al. (2000)	X	X	X				X	X	X	
PMJ	Pavlak (2004)	X		X	X		X	X	X	X	
PMJ	Bourne and Walker (2006)			X			X	X	X	X	
PMJ	Busby and Zhang (2008)	X		X			X				
PMJ	Crawford et al. (2008)	X		X			X	X	X		
IJPM	Berends (2000)	X		X			X		X	X	
IJPM	Jannadia et al. (2000)	X		X			X	X	X	X	
IJPM	Jiang et al. (2002a)	X		X			X	X	X	X	
IJPM	Muller and Turner (2005)	X		X			X	X	X	X	
IJPM	Olsson (2006)	X	X	X	X		X	X	X	X	
IJPM	Randeree and El Faramawy (2011)	X	X	X			X		X	X	

focus. Often, the dual view of risk is addressed as uncertainty. Jaafari (2001) defines uncertainty in project contexts as “an unknown probability of impact of a project variable on its objective function”. The impact itself may divert negatively, positively, or neutrally from project goals. Advocates of this dual view, such as Holzmann and Spiegler (2011), often follow the premises of RM presented in PMBOK (Project Management Institute, 2009): “Project risk management processes are targeted to increase the probability and impact of events that are expected to positively affect the project as well as to decrease the probability and impact of events that are expected to negatively affect the project or the achievement of its objectives.”

The uncertainty view has not been widely adopted in multi-organizational RM research thus far. Only a few reviewed theoretical contributions address both threats and opportunities (i.e., uncertainty), and no advice is given for practical uncertainty management in multi-organizational contexts. Zaghoul and Hartman (2003), for example, analyze (theoretically) the cost of mistrust in construction contracts as both a threat and an opportunity. This shortfall contradicts the state-of-art recommendation and represents a potentially serious drawback for TMO success. This leads to the conclusion that multi-organizational RM research is not prepared to seize opportunities as part of project RM.

Investigating efficient strategies to promote opportunities as the complementary side of multi-organizational project RM may improve the project probabilities for success, perhaps occasionally beyond expectations. Pavlak (2004) claims that “the most serious dysfunctional trait of project teams is an inability to see options and opportunities.” In the context of TMOs, such opportunities may arise from the same premises as the traditionally tracked threats such as multiple stakeholders, communication, and cost–quality optimization.

There are reasons for the underrepresentation of the opportunity view. Piney (2003) explains that the utility curve shows a disproportionate relation between cost overruns and additional profits. The negative impact of cost overruns grows at a considerably higher rate than does the positive impact of additional profits. Therefore, project managers will logically focus on preventing threats, even at the expense of opportunities of the same or higher value.

Seizing opportunities cannot be a mechanistic task in the TMO. Opportunities are mostly developed from complex types of uncertainties that require the participants to develop a holistic view of the project before it becomes possible to identify and realize opportunities (Olsson, 2007). In addition to a holistic view, Olsson (2007) lists two major factors that are needed for managing opportunities: organizational support and interest and the ability to understand how other organizations affect the project’s objectives. Fruitful approaches to seizing opportunities involve integration and commitment within a team (Pavlak, 2004) and structuring through conversation (Olsson, 2007; Pavlak, 2004). These features are not usually supported by traditional RM approaches, or in traditional RM research.

In future research, the inclusion of the opportunity and/or uncertainty view as a prominent part of practical applications could be explored in more detail, or the reasons for its exclusion

could be explained. Extending the study focuses to determinants of success other than cost and schedule would be an appropriate approach given the complexity of project organization performance and project success.

5.2. *Being proactive, reactive, and aware*

The premises of proactive RM treat the identification of risks as a prerequisite for properly managing such risks (Royer, 2000). This view focusing on anticipated risks was found to be substantially dominant within multi-organizational RM research. Implicitly, the anticipated nature of risks is evident in research that focuses on risk allocation (e.g., Ng and Loosemore, 2007) or specific issues (such as cost overruns by Dikmen et al., 2007).

Kutsch and Hall (2010) claim that “project risk management with its assumptions of ‘hyper rationality’ excludes many aspects of managerial behaviour.” Pavlak (2004) submits that the traditional anticipative, proactive RM is suitable for short-term and well-defined projects. Large, complex, and long-term projects are characterized by high uncertainty, which leads to unanticipated risks. Based on the review, multi-organizational RM research also frequently omits aspects of internal and external uncertainties that lead to unexpected risks and unrealistic assumptions.

Proper management of unanticipated risks is not based on proactivity but on reactivity. Furthermore, RM is, by nature, tied to the changing conditions of uncertainty. Thus, the process must allow for a certain amount of ambiguity, uncertainty, and subjectivity (Royer, 2000). An organization should complement its RM approaches with a disciplined reactive component, which is based on multi-disciplinary collaboration (Pavlak, 2004). Olsson (2006) and Jorgensen (2005) suggest flexibility as an approach for an organization’s need to adapt to unexpected changes and uncertainty in the business environment. Pavlak (2004) recommends training “tiger teams” (small, multi-disciplinary expert teams) to troubleshoot unexpected disruptions and to identify creative solutions. The tiger team’s “core performance comes from open and honest dialog, productive conflict, and the struggle to fit the problem pieces together to produce a unified whole.”

Yet, the most typical item of uncertainty in the software industry seems to be assumption-related: the assessment of workloads (e.g., Damian and Chisan, 2006; Jorgensen, 2005). This may be particularly relevant in terms of workload estimates in the labor–cost intensive industry. Overconfidence in development costs may lead to poor project planning (Jorgensen, 2005). However, similar cost uncertainties and subjective assumptions are related to the capital–cost intensive construction industry. Assumptions tend to be overly optimistic for human-biased or political reasons, causing the goals of RM to be unrealistic as well. For example, McCray et al. (2002) discuss the impact of heuristics and biases.

Unrealistic assumptions are not efficiently or adequately identified or managed by regular proactive or reactive techniques, which implies that a third RM approach is needed to address unrealistic assumptions. To better address its position in relation to these inherent risks, the multi-organization must be aware, questioning, and open about them. Royer (2000) suggests

documenting and addressing project assumptions in the same manner as risks. In the construction industry, the basic approaches to “managing” unrealistic assumptions include reliability buffering (Park and Pena-Mora, 2004) and float allocation (Al-Gahtani, 2009). In the software industry, solutions are provided for addressing, questioning, and improving assumptions (Damian and Chisan, 2006; Jorgensen, 2005).

These proactive, reactive, and aware approaches to the holistic perspective of project risks are likely addressed by some means in practice. However, recent research has focused largely on anticipated risks because proactive RM has been the “trendy” RM agenda for a couple decades. In the future, researchers could promote explicit, holistic RM frameworks by studying the three risk types, their natures and relative balance, or their significance in different project types.

5.3. *Outside-in and inside-out perspectives on the role of the TMO*

The review identified a variety of perspectives on the role of multi-organizational collaboration as a risk itself and a resource for RM. These perspectives can be divided into two main categories: the “outside-in” and the “inside-out” perspectives. Generally, the TMO assumes an outside-in perspective, looking at its structure and relationships themselves as potential for risks. Busby and Zhang (2008) state that the internal risks related to the organizational decisions and structures are, in fact, more prominent than external because they determine the stance and preparedness to external risks. Human risk factors can significantly increase or decrease productivity (Thevendran and Mawdesley, 2004). From the client’s perspective, handling collaboration as a risk source involves, among other issues, predicting and preparing for contractor default (Al-Sobiei et al., 2005), participating in the requirement setting and change process (Fu et al., 2012), and investing in dispute resolution (Menassa et al., 2010). The supplier-side interests are focused on, for example, risk analyses of bid pricing (Laryea and Hughes, 2011) and customer involvement and communication issues (Holzmann and Spiegler, 2011).

Over half of the references also presented an inside-out perspective by addressing the multi-organizational collaboration as a resource for RM. For example, De Bakker et al. (2012) explain the use of RM communication efforts to influence IT project success, and Aleshin (2001) looks at joint ventures as one way of managing risks in the Russian construction market.

There is frequent overlapping of the dual role of the TMO. Studies addressing collaboration as both risk and solution were featured in two thirds of the papers. Especially in the construction context, the dual role is frequently addressed as part of procurement practices and contract considerations. However, various other management solutions were found. For example, Tang et al. (2006) describe how the “open communication factors of partnering can strongly facilitate risk management” and can especially influence human-side risks. Pavlak (2004) discusses the use of “tiger teams” for reactive project troubleshooting. The dual view was found somewhat less frequently within the software development project-related references. For example,

Jiang et al. (2000) analyze the relationship between software development teams and risks, such as project complexity, top management support, team expertise, and user support.

However, the dual role of TMOs as both a source of risk and opportunity and as a powerful and versatile resource for risk and opportunity management has not been addressed to its full potential in many recent studies. Both identified means for “collaborative” RM (i.e., contractor selection and contractual risk allocation) can be regarded as passive solutions for RM because they are usually based on one-off decisions and focus on transferring risk to a specific party. Solutions that involve both or several parties in the problem-solving, decision-making, and response-handling processes could be seen as active solutions. For example, Rahman and Kumaraswamy (2005) demonstrate how integrated teams can be used as a means for RM, and Chapman (2001) introduces a system for utilizing multi-disciplinary capital for risk analysis.

To address this shortfall, researchers could engage in investigating and developing active, collaborative solutions that combine the inside-out and outside-in perspectives. An inside-out and outside-in-looking multi-organization would be in a better position for timely and efficient risk responses, which would ultimately benefit each participant’s business. Cross-functional teams and group analysis sessions are perceived to have a strong impact on achieving benefits for RM from requirement engineering (Damian and Chisan, 2006). Conversely, the lack of joint RM mechanisms was found to be the most important barrier to efficient RM (Tang et al., 2007).

An example of a beneficial research topic is mapping and enhancing multi-organizational capabilities for developing a holistic picture of project risks as complementary to their organizational risks. This would contribute to holistic multi-organizational RM. An open discussion of project goals could reveal interesting controversies between project participants. Another useful research area could be related to the changing role of the TMO as the project proceeds. In the procurement phase, the participants consider each other as potential threats (or opportunities). In the operation phase, ideally, risks and responses are shared. This implies shifting focus from an initial outside-in perspective to an emphasis on the inside-out focus.

These research agendas would be even more in need in other industries than construction. For example, the role of TMO remains nearly unaddressed in the software sector. Software project researchers (and practitioners) may use the results to consider whether they find value in multi-organizational RM.

5.4. *Allocated and shared RM responsibilities*

In construction contexts, almost equal numbers of studies address the client/owner-side risk responsibility and the vendor/contractor-side responsibility. Of these papers, roughly a half featured contexts in which the responsibility for bearing the risk or undertaking RM was shared between two or more participants. In rare cases, a party other than the owner or main contractor was mentioned, such as the designer (Seo and Choi, 2008) or the sub-contractors (Sacks et al., 2009).

In software development contexts, risk responsibility is mostly related to the software development contractor. The share of papers featuring shared risk responsibilities was much lower in software development contexts than in construction contexts. Other mentioned stakeholders, such as suppliers, were presented in an inactive role and did not have RM responsibilities.

Risk responsibilities are typically determined when a multi-organization is created in the procurement process. Contracts document (at least a major part of) the division of risk responsibilities between project parties (Puddicombe, 2009). Contractual risk allocation is one of the most popular research topics addressing risk responsibilities within multi-organizational RM. The terms of forming the multi-organization concern both parties. For instance, Ng and Loosemore (2007) analyze a case of risk distribution and its consequences between public and private parties.

From the owner's perspective, a large part of the uncertainty is related to selecting the project delivery method as the basis for risk allocation (Mostafavi and Karamouz, 2010), planning for contracting (e.g., Al-Sobie et al., 2005), and selecting the best value contractor or team. Kitchenham et al. (2003) discuss a software bidding model that aims to facilitate the supplier's perception of project risks and therefore assists in the decision to pursue participating in it. Furthermore, client organizations should base their selection not only on the offer but also on the potential risks arising from the relationship (Xie et al., 2006). In terms of procurement, RM could be used as an integral part of forming a TMO. Kashiwagi (2010) recommends a systematic process for transferring active and innovative risk responsibilities from the owner to the vendor.

Designers (Seo and Choi, 2008) or project consultants (e.g., Imbeah and Guikema, 2009; Lee et al., 2006) were considered responsible for bearing or managing risks in only five research papers. In only three references was risk responsibility shared between participants without a contractual relationship. For example, Seo and Choi (2008) suggest collaborative actions for designers and contractors to manage site safety risks.

Although most contractual arrangements can be observed as involving risk sharing, the increased potential for involving multiple parties for RM is most likely to be observed in joint ventures (Shen et al., 2001), partnering arrangements (Tang et al., 2006), and joint risk responses Pavlak (2004). Both the owner side and the contractor side are interested in efficient dispute resolution (Cheung et al., 2010; El-Adaway and Kandil, 2010). Analyses of construction contractor-side responsibility are dominated by bidding strategies (Fang et al., 2004) or, similarly, contract pricing (Laryea and Hughes, 2011). As exceptions, Reich (2007) addresses knowledge and learning, and Jin and Ling (2005) address relationship building, both with respect to addressing supplier-side risk responsibility.

Researchers should note that the development of joint RM mechanisms would significantly improve multi-organizational RM because the risks are common to several participants (Tang et al., 2007). In the construction industry, this development is clearly ongoing. Management and incentives beyond traditional contracting have been utilized to improve collaborative RM. For example, Tang et al. (2006) and Osipova and Eriksson

(2011) have found that partnering improves the efficiency of joint RM in construction projects.

However, the software industry is still dominated by single-organizational approaches. One reason for the lack of collaborative focus in software development research may be that the supplier is considered the sole expert in the development process. Even in safety-critical owner industries, risk expertise is considered to reside in the supplier, as seen, for example, in Samra's (2012) study on RM between the software developer and owner of medical applications. In the construction industry, expertise is considered more widespread. The owner's role is generally seen as complicated due to varying levels of expertise and resources, but it is crucial for success (Cherns and Bryant, 1984).

Researchers in the software industry could investigate how to encourage owners to take a more prominent role in the development process (as suggested by Jiang et al., 2002b), or they could identify the barriers for collaborative RM. Perhaps it is time to harness software project owners by actively involving the project RM process, which, in the end, is meant to support the achievement (or exceeding) of their goals. The integration of RM has already been found to add value in agile development contexts when a project team is distributed and consists of more than ten people, when the product is complex, and when the project's external risks are high (Nyfjord and Kajko-Mattsson, 2008).

Further research and development should identify solutions to address the role of multi-organizational collaboration and should outline each participant organization's role as part of the project (risk) management. The risk responsibilities should be based on who is in the position of managing them. However, in a multi-organization, the best position may not be stable. It is suggested that the multi-organization is in the best position to share responsibility for the risks that are common to its participants.

6. Conclusions and recommendations

This paper studies the risk perceptions and RM approaches that form the body of knowledge on multi-organizational project RM. The perceptions and approaches that are adopted and promoted in published research have an influence on the premises for building balanced RM frameworks for projects. The review has identified a body of literature (105 papers) on multi-organizational risk and RM published between the years 2000 and 2012 in four project-focused journals. Several shortcomings were found in the multi-organizational RM research compared to the state-of-art RM perceptions and approaches:

- 1) Multi-organizational RM research has not addressed the possibility of integrating the opportunity dimension as complementary to the threat dimension well, nor adopting uncertainty as the holistic view, in risk and RM concepts. Thus, the business benefits of multi-organizational projects appear limited for all participant organizations. Better integration of the full scale of uncertainty could be conducted, e.g., by studying the related constraints and potentials from the various perspectives of the participants' opportunities.

- 2) Three corresponding approaches, proactive RM, reactive RM, and aware RM, which should be fostered simultaneously in multi-organizational RM concepts, can manage the three risk types (i.e., anticipated, unanticipated, and unrealistic assumptions). Traditionally, research is focused on anticipated risks. In the future, researchers could better address the full scale of risk types and analyze their natures and relative balance or significance in different project types. This would aid designing holistic RM approaches.
- 3) The TMO can be harnessed for RM “inside-out and outside-in” by involving the participant organizations in collaboratively managing the risks related to both the project environment (external) and the collaborative work (internal). Recent construction-related research has addressed the full scale of TMO roles, but software development-related research has more steps to take. Future research could advance the body of knowledge, e.g., by mapping and enhancing multi-organizational capabilities for developing a holistic picture of project risks, investigating project goal controversies between project participants, studying the developing role of the TMO along the project timeline, and uncovering the potential of collaborative, multi-organizational RM in the software development sector or other industries.
- 4) In TMOs it makes sense and adds value to take shared approaches to project risks that are common to several participants, as opposed to allocating them to a selected participant. This has not been addressed in software development-related research. Researchers in the software industry and in the construction industry could adopt research agendas that address each participant organization’s role as part of the project (risk) management. It should be noted that the appropriate party to identify and manage each risk may change during the project and related events.

The mission of advancing multi-organizational RM research involves partly lifting it up to the level of general state-of-art understanding of risk and RM and partly tailoring the discipline to fit the needs of multi-organizations. Researchers could adopt the suggested holistic perceptions on risk and dynamic RM approaches as the scope for multi-organizational RM research and applications. Therefore the opportunities for RM applications would widen and prospectively lead to increased efficiency and more business benefits in multi-organizational projects.

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