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Unveiling the intellectual structure and evolution of external resource management research: Insights from a bibliometric study

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ABSTRACT

In the current hyper-competitive economy, it is increasingly important to understand how firms can and should access and leverage external resources, such as customer knowledge or supply-chain partners' capabilities. In this paper, we report the results of bibliometric analyses on external resource management (ERM) research in nine representative journals, and elaborate the underlying patterns and dynamics in this relatively young research area. A total of 1290 articles ranging from year 2000 to 2015 were analyzed with text-mining and visualization methods. We found that the annual number of ERM publications is steadily increasing, and identified and described four distinct research clusters focusing on integration & operational effectiveness, innovation & value creation, inter-organizational relationships, and knowledge transfer & learning. The identification of research clusters and key works and authors in this multidisciplinary research field can assist future research in better positioning their studies and finding the key references across disciplinary silos.

1. Introduction

In management, researchers are increasingly noting the relational nature of a firm (Yamakawa, Yang, & Lin, 2011) by recognizing that competitive advantage is derived from both internal and external resources of the firm (e.g. Rai & Xinlin, 2010; Squire, Cousins, & Brown, 2009). In this paper, we adopt the concept of external resource management (ERM), which covers all perspectives for a firm's external ties, including management of all resources, including goods, services, capabilities, and knowledge, provided by business partners or other stakeholders that firms utilize (Van Weele & Van Raaij, 2014). Managing the external resources can be defined as the "selection of the right combinations of internal and external resources for capturing business opportunities, finding the best available external resources, effectively utilizing the external resources, and influencing the decisions and resource allocation of business partners" (Tanskanen et al., 2017, p. 1).

Using external resources to firm advantage is seen as a strategic management lever (Huggins, 2010). Thus, it is increasingly important to understand how firms can and should access and leverage external resources (Tanskanen et al., 2017). Despite the term external resource management (ERM) being used already in the late 1990's (see e.g. Cox, 1996; Cox & Lamming, 1997), the discourse is yet to mature. Instead, there are several fields of research investigating a variety of distinct, yet interrelated questions, including e.g. how to include customers in product development (Coviello & Joseph, 2012), how to integrate with suppliers to improve performance (Droge, Jayaram, & Vickery, 2004), or how does procedural justice impact alliance performance (Luo, 2007). Most notably, three business disciplines, namely strategic management, operations/supply chain management (OM/SCM), and marketing, have extensively focused on investigating the management of external resources, in the form of alliances, buyer-supplier relationships and buyer-seller relationships, respectively (Tanskanen et al., 2017).

The change from an internally focused to an externally focused organization calls for fundamental rethinking of organizational management. Despite extensive research on the topic of ERM in different domains of management research, knowledge-trade between the

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disciplines has been limited (Tanskanen et al., 2017), hampering the development of aggregated knowledge. This is unfortunate, since disciplinary integration may potentially lead to scientific advances, and even open up completely new fields of research (Siedlok & Hibbert, 2014; Zahra & Newey, 2009). With the ever-increasing number of publications provided nowadays, building an overview of studies in a particular field is both increasingly difficult as well as of high importance (Gurzki & Woisetschläger, 2017). Particularly for interdisciplinary research topics, traditional literature reviews are limited in their scope and frequently suffer from author judgement bias (Gurzki & Woisetschläger, 2017). Quantitative bibliometric and text-mining approaches such as term co-occurrence or citation analyses, offer a way to address this limitation (Indulska, Hovorka, & Recker, 2012; Porter, Kongthon, & Lu, 2002). Combination of these complementary methods is able to provide a robust analysis of a field's intellectual streams and key underlying concepts (Randhawa, Wilden, & Hohberger, 2016). Furthermore, our multidisciplinary approach supports the detection of different intellectual bases in a broad research field, as has been demonstrated by previous studies deploying similar bibliometric tools (such as Bragge, Korhonen, Wallenius, & Wallenius, 2012; Markoulli, Lee, Byington, & Felps, 2017; Gurzki & Woisetschläger, 2017; Dzikowski, 2018).

The primary goal of this article is to provide a map of ERM research in terms of topics and intellectual traditions that should be of help to scholars seeking to understand the various streams of research in ERM, and the historical development of the field. Both novice and established scholars should find our bibliometric study helpful; either as a general introduction of the intellectual structure of ERM, or in finding how their own research positions in the overall picture and complements or contravenes with those of others. Following the example of Markoulli et al. (2017) in rigorously portraying the intellectual structure of a research field, we offer a bibliometrically grounded clustering of ERM literature, an overall map of the field, reviews of the four main clusters identified in ERM, and views of changes in the field over time. Previous studies reviewing the research on firms' external ties have focused on a single perspective only, for example buyer-supplier relationships (Terpend, Tyler, Krause, & Handfield, 2008), alliance capabilities (Christoffersen, 2013; Niesten & Jolink, 2015), supply chain management (Burgess, Singh, & Koroglu, 2006; Giunipero, Hooker, Joseph-Matthews, Yoon, & Brudvig, 2008), or supply networks (Pilbeam, Alvarez, & Wilson, 2012). Tanskanen et al. (2017) study ERM overall, but with a focus on disciplinary knowledge-trade and extracting design propositions for evidence-based management, whereas Oliver and Ebers (1998) accumulate research on inter-organizational relations and networks. All these studies are traditional systematic literature reviews relying on e.g. content analysis. Our broad-scale bibliometric review based on computational analyses is designed instead to provide an overview of the topic and the various concepts discussed within it, and also to show the development of topic areas over the years. It is thus designed for a wider audience, hopefully also evoking future reading and research over disciplinary silos when it comes to ERM.

Using a combination of bibliometric and text-mining and visualization analyses, we address the following research questions:

1. What is the intellectual structure of external resource management research and how has it evolved during the last 20 years? This includes identification of the key topics studied, the main clusters of research present in the field, as well as the changes in research focus over time.
2. Who are the prolific authors and institutions of external resource management research and how do they collaborate? This includes a presentation of the authors and universities who have produced multiple publications on the topic in our sample as well as the key co-authorships identified. As our research is based on a sample of journals only rather than a full keyword-based search across journal databases, we use the term prolific rather than top authors.

Based on our bibliometric analyses we conclude that ERM research consists of four broad clusters, each united by a common thematic area: 1) integration and operational effectiveness, 2) innovation and value creation, 3) inter-organizational relationships and their development, and 4) knowledge transfer and learning. We summarize the key topics of each cluster in an overarching figure. We argue that when combined, these four interrelated clusters provide an overview of the main areas of scholarly interest within ERM.

In the following, we will first present a brief description of the field of external resource management. This is followed by a description of the data and its analysis, i.e. the articles used in our study as well as of the bibliometric and text-mining methods deployed. We will then proceed with the results of both analyses, including basic descriptive analyses of the publications, evolvement of topics over the years, the overall research clusters that emerge from the data, and the key authors and papers in our sample. Finally, conclusions are presented, with a focus on research implications from our results.

2. External resource management: a brief introduction

Managing external resources incorporates several research topics that have been widely studied (Tanskanen et al., 2017). However, the term of external resource management or ERM has so far been used quite sporadically. Cox and Lamming (1997) used the ERM concept for describing the new strategic challenge of purchasing managers, which they defined as “managing the competencies outside the firm but available to it in a flexible, malleable, and dynamically reconfigurable manner” (Cox & Lamming, 1997, p. 51). Cox and Lamming based the ERM concept both on agency and transaction cost economics theories, which conceptualize the firm as a “nexus of contracts”. This conceptualization emphasizes that firms are not fixed entities, but instead, both internal structures and external boundaries constantly change to varying circumstances to capture new opportunities. This requires firms to constantly scrutinize internal and external contracts and relationships for attaining a profitable position in the value chain (Cox & Lamming, 1997). The key idea in ERM is that the firm should focus on its core competencies and outsource everything else. Through external contracts and relationships the firm gains access to the resources that exist outside its boundaries, for example those of suppliers, customers, and partners (Gulati, 2007). Both collaborative and competitive relationships are required for effectively leveraging the external resources (Cox & Lamming, 1997). Valuable external resources may also be accessed non-contractually by the means of social exchange and reciprocity (Blau, 1986; Pfeffer & Salancik, 1978).

ERM can be regarded as an integrating concept that combines many established research fields that are concerned with accessing and leveraging resources that are situated outside firms' boundaries, such as supply chain management and alliance management. The established research fields each take a limited perspective to managing external resources, which we aim to integrate in order to get a holistic picture. Supply chain management, for example, can be seen as “an integrated system that brings together the supply base (the upstream portion including the supply network), the firm, and its customers (the downstream portion including the distributive network)” (Melnyk, Lummus, Vokurka, Burns, & Sandor, 2009). Strategic alliances, in turn, refer to “cooperative arrangements between two or more firms to improve their competitive position and performance by sharing resources” (Ireland, Hitt, & Vaidyanath, 2002, p. 413). While both fields share a lot of common interest, neither covers all aspects of ERM, when it comes to an overall view of the external resources companies must manage regardless of the functional boundaries. To get an overall picture of managing external resources, we need to consider a wide array of thematic research fields such as decisions on governance mode and mechanisms, network formation and relationship initiation, inter-organizational relationships, strategic and operational management of external resources, and open innovation and inter-organizational

learning (Tanskanen et al., 2017). These thematic fields have been researched from several theoretical perspectives, including transaction cost economics, resource-based view of the firm, social exchange theory, organizational learning, social capital, and relational view. The richness of the thematic fields, theories, and perspectives makes it challenging to identify the intellectual structure of the research and the knowledge produced within ERM. In this study, we address this challenge by quantitative bibliometric and text-mining methods, which are explained next.

3. Data and methodology

We acknowledge that a broad keyword-based search would be ideal for a bibliometric study that crosses disciplinary boundaries (Gurzki & Woisetschläger, 2017). However, given the multidisciplinarity of the ERM topic, as well as the wide area of different external resources and ways to manage them, a keyword search was not deemed feasible in our context. Tanskanen et al. (2017) note a variety in terminology used across disciplines even when studying similar ERM issues. Given this, a multitude of topics related to ERM, and the variety of disciplinary backgrounds and hence terminology potentially involved, a keyword search could have provided a skewed sample based on the authors' own disciplinary and research backgrounds (supply chain management). Alternatively, an exhaustive list of keywords would have provided a significant amount of articles going beyond the topic (e.g. customers are a key external resource, but a lot of customer-focused research in e.g. marketing journals focus on sales, advertising and consumer behavior, i.e. not how to use customers as an external resource). Thus, the typical method of a keyword-based search within a citation database used in bibliometric studies (see e.g. Albort-Morant & Ribeiro-Soriano, 2016; Castillo-Vergara, Alvarez-Marin, & Placencio-Hidalgo, 2018; Rey-Martí, Ribeiro-Soriano, & Palacios-Marqués, 2016) was not followed in this study. Management of external resources has been an interest for scholars in marketing, OM/SCM and strategic management disciplines (Tanskanen et al., 2017) as well as for general management researchers. Hence a thorough, but representative, sample based on key journals was deemed a better choice. This is explained in more detail in the following section.

3.1. Journal and article selection

Our sample covers 1290 articles published during 2000–2015 in 9 high impact academic journals. The two-phase process for selecting the journals and articles was as follows. First, we selected two leading journals from each of the three disciplines (marketing, OM/SCM, and strategic management) that we expected to be the leading outlets for publishing ERM research. In the selection of the six academic journals, we prioritized: i) established journals that had been indexed by Web of Science and Scopus for a long period of time, ii) high-ranking journals known for publishing research with a high impact (in terms of their impact factor ratings and ratings in journal ranking lists such as ABS & FT45), iii) journals that have an editorial policy that is open towards publishing explorative and/or conceptual research and iv) journals that we, based on our experience of working in the field, knew to publish a substantial amount of ERM research.

Based on these factors, we selected the following six journals: *Industrial Marketing Management*, *Journal of Marketing*, *Strategic Management Journal*, *Academy of Management Journal*, *Journal of Operations Management* and *Journal of Supply Chain Management*. We downloaded all 3886 abstracts of articles published in these six journals from the time period 2000–2012. Each abstract was first reviewed independently by three researchers, and if coded differently (include vs. exclude), or one or several of the researchers were unsure on whether the article discussed ERM, discussions were held among authors until an agreement was reached. The review criteria firstly adhered to our definition of ERM as noted above, i.e. an included article should discuss either how an organization finds or selects the right external resources, effectively utilizes them, and/or influences the decisions and resource allocation of these external resources. Specifically, the type of the external resource was not limited to contractual relationships; rather a broad coverage was taken to include all relations with external parties that support a firm in reaching its goals and improving its performance (e.g. government, universities and other third parties). The articles considered for inclusion were to focus on inter-organizational relationships, be it in dyads, chains or networks. Based on this review, 664 articles were included while 3222 were excluded. We then proceeded to review the full-text content of the 664 articles. Multiple individuals took part in reviewing each article to ensure the formation of a consistent understanding of what is included under the concept of ERM. As a result of the discussions that took place among the authors during this phase, a further 130 articles were removed, leading to a total of 534 ERM articles.

The second phase focused on broadening the coverage of our analysis in terms of included journals as well as extending the analyzed period by three additional years (2013–2015) to ensure the timeliness of our analysis. For this phase we included three additional journals that actively publish ERM research: *International Journal of Operations and Production Management*, *Journal of Management Studies* and *Journal of Business Research*. These three journals were selected based on the first phase sample's cited journal statistics downloaded from Scopus citation database. That is, journals that were often cited in our first phase sample's publications were added to the sample. A total of 6674 additional abstracts were read at this stage, and an additional 756 articles included into our sample. Thus, the total sample of articles on ERM for our analysis is 1290 publications, ranging from 2000 to 2015, and covering the nine following journals: *Industrial Marketing Management*, *Journal of Marketing*, *Strategic Management Journal*, *Academy of Management Journal*, *Journal of Operations Management*, *Journal of Supply Chain Management*, *International Journal of Operations and Production Management*, *Journal of Management Studies* and *Journal of Business Research*.

3.2. Bibliometric data and analyses

The bibliometric data for the selected 1290 publications was downloaded from Elsevier's Scopus database, on November 17, 2015. Scopus was selected over Web of Science (WoS) as it had more coverage of the sample's journals for years 2000–2015 than WoS. Note that the *Journal of Supply Chain Management* has been indexed in Scopus only after 2006, and the data for 2000–2005 were downloaded from ProQuest (for applicable parts, the references were not available in text format). We downloaded the full citation data including cited references of all 1290 publications in csv format. For 46 new articles in press, there were no references yet for them indexed in the database (including 24 IMM, 11 JBR, 11 JMS publications).

For conducting the analyses, we applied two text mining and visualization tools developed for bibliographic data: VantagePoint (Porter et al., 2002) and VOSviewer (Van Eck & Waltman, 2010). Both tools have been extensively applied in large-scale literature reviews (see, e.g., Leone, Robinson, Bragge, & Somervuori, 2012; Markoulli et al., 2017; Dzikowski, 2018; Ferreira, 2018). VantagePoint is a powerful text mining tool that offers advanced data cleaning functionalities based on fuzzy logic. Typically, data in such fields as author names and cited journals appear in multiple formats and they must be merged before producing any frequency-based statistics on them. Moreover, acronyms need to be combined with their full versions regarding author keywords and/or noun phrases processed from article titles or abstracts. VantagePoint was used to produce most tables in this article.

In addition, VOSviewer was used for visualizing the similarities and patterns in the data. This tool offers also basic cleaning functionalities in the form of user-defined thesauri (of terms that should be excluded or merged). VOSviewer's strength is in its versatile visualization

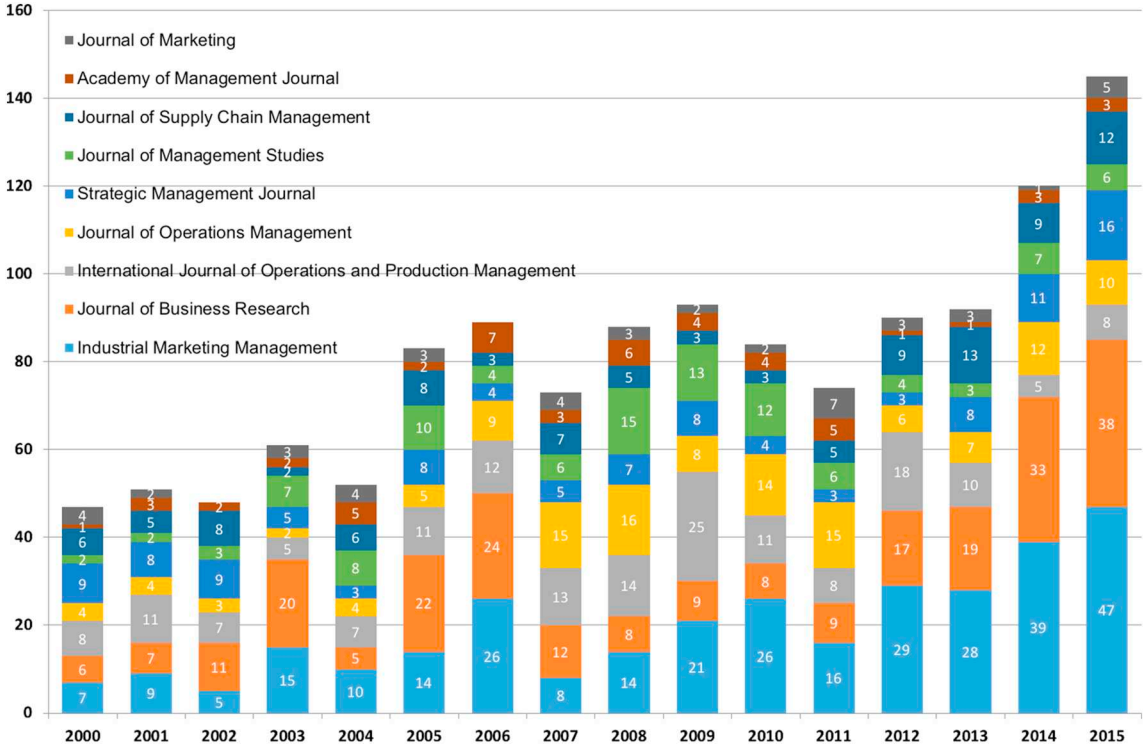

Fig. 1. Yearly amount of ERM publications per journal in the sample.

capabilities. Besides term co-occurrence network maps, it can produce various other visualizations from the bibliographic data based on co-citation, citation or bibliographic coupling analyses (e.g. of authors, journals or countries).

4. Results and discussion

In this section, we will first present brief descriptive analyses regarding the 1290 ERM articles. Following this, we move on to a more detailed analysis of the evolvement of the field over the years, based on an analysis of keywords. Third, we present the overall research clusters that emerge in the whole sample. Finally, the prolific authors, institutions and publications in ERM based on our sample are introduced.

4.1. Descriptive analyses

Fig. 1 shows the trends in publications during the studied time period of 2000–2015. We can see an overall increasing trend, with a particularly significant increase in the number of publications during the last four years. Overall, the number of publications on ERM in the sampled journals appears to have tripled during the period covered in this analysis. Table 1 shows the number of publications in 4-year intervals for each of the 9 journals. From this we can particularly note a significant increase in the number of ERM-related articles in two of the journals: *Industrial Marketing Management* and *Journal of Business Research*.

Table 1
Amount of publications per journal and 4-year period.

# Records	207	297	339	447		1290
Journal / Time period	**2000 -2003**	**2004 -2007**	**2008 -2011**	**2012 -2015**		**2000 -2015**
Ind. Mark. Manage.	36	58	77	143		314
J. Bus. Res.	44	63	34	107		248
Int. J. Oper. Prod. Manage.	31	43	58	41		173
J. Oper. Manage.	13	33	53	35		134
Strategic Manage. J.	31	20	22	38		111
J. Manage. Stud.	14	28	46	20		108
J. Supply Chain Manage.	21	24	16	43		104
Acad. Manage. J.	8	17	19	8		52
J. Mark.	9	11	14	12		46

4.2. The evolvement of ERM research

This section details the temporal development of ERM research topics during 2000–2015. To accomplish this, we studied the co-occurrence of terms in titles and abstracts in four 4-year periods (2000–2003, 2004–2007, 2008–2011, 2012–2015). First, however, to portray an overall snapshot of key research terms, Table 2 presents the top-36 multi-word phrases in the sample throughout the whole timespan (terms appearing in at least 20 publications, also authors' keywords were included in this analysis besides title and abstract words). Fig. 2 presents a bubble chart of the same top multi-word phrases as in Table 2, demonstrating their frequency of occurrence year-by-year.

The most common terms in the studied material (Table 2) are *supply chain management* (occurred in 157 publications), *buyer-supplier relationship* (133), *supply chain* (112), *supply management* (97), and *new product development* (81). The use of two of these terms, supply chain and new product development, remain strong throughout the years (Fig. 2). Terms supply management and buyer-supplier relationship clearly become more common towards the end of the studied time period, whilst the use of supply chain management is frequent between years 2004–2014.

Terms that do not occur during the first years of the studied time period but appear later on include knowledge management and knowledge transfer, as well as information sharing, which has become common from 2004 onwards. Disappearing terms, such that do not occur during the latest years are for example automotive industry, operations management and supplier relationships (Fig. 2).

Vis-à-vis the evolvement of ERM research in the four periods, Figs. 3–6 illustrate the core research clusters in each 4-year interval.

Table 2
Top-36 multi-word phrases (from titles, abstracts and authors' keywords) appearing in at least 20 publications. NB: 'New product development NPD' and 'product development' have been merged.

Multi-word phrases	# Records
Supply chain management	157
Buyer-supplier relationship	133
Supply chain	112
Supply management	97
New product development NPD	81
Firm performance	65
Strategic alliances	64
Resource based view (RBV)	55
Transaction-cost economics (TCE)	53
Competitive advantage	44
Value creation	39
Business relationship	38
Business network	35
Absorptive capacity	34
Social capital	31
Organizational learning	30
Information sharing	29
Supplier involvement	26
Supplier performance	26
Knowledge management	25
Operations management	25
Relationship marketing	25
Supplier relations	25
Supplier integration	24
Financial performance	23
Manufacturing firms	23
New products	23
Automotive industry	22
Channel relationship	22
Knowledge transfer	22
Performance implications	22
Supply chain integration	22
Transaction cost	22
Social exchange theory	21
Innovation performance	20
Interorganizational relationship	20

The terms shown in the map visualizations appear at least 4–5 times in different publications, depending on the time period. However, not all terms are shown as labels to avoid clutter. The size of the text label depicts frequency (the larger the font size, the more frequently the term appears in the sample articles). Closeness of terms reveals that the terms appear often in the same articles. VOSviewer also categorizes the terms into clusters (denoted by different colours). The largest cluster (measured by the number of terms included in the cluster) is denoted by red, and the next largest ones are coloured green, blue, yellow and violet, respectively.

To help analyze the cluster maps in more detail, Appendix A provides a detailed summary of the top-10 terms and their frequencies within each cluster in each of the four 4-year periods.

A dominant theme, present in each of the four time periods and particularly strongly in the beginning of the sample period, deals with integration in supply chains and supply chain management (examples of such articles are Cagliano, Federico Caniato, & Spina, 2006; Wisner & Tan, 2000). The term *supply chain* appears 19, 38, and 35 times during the three first 4-year time periods, and in the last time period it appears 15 times. In the cluster of the first time period, the terms *practice*, *technology*, *cost*, *manufacturer* and *integration* appear on top of the list connected to supply chains, perhaps indicating that operational issues were dominating the studies (see e.g. Elmuti, 2002). The second time period studied supply chains with the terms *advantage*, *integration*, *ability*, and *improvement*, and the third period with *buyer*, *commitment*, *operation*, *competitive advantage* and *value creation*. Towards the end of the studied period a diminishing interest in this topic can be observed, but interestingly, the fourth period introduces new terms connected to supply chain management, such as *flexibility*, *demand*, *R&D*, and *sustainability* (e.g. Blome, Paulraj, & Schuetz, 2014).

Another theme appearing in each 4-year time period, is a cluster dealing with *networks* and *strategic alliances*. During the studied 4-year periods, the terms *alliance* and *strategic alliance* appear in total 21, 57, 53 and 43 times. At the beginning, alliances are closely connected to the terms *network*, *market*, *knowledge*, *investment*, *value* and *trust* (e.g. Whipple & Frankel, 2000), and on the second period, alliances are connected to terms *structure*, *power*, *China*, *competition*, *alliance performance* and *value creation*. On the third time period new terms appear, such as *experience*, *cooperation*, *learning*, *venture*, *asset* and *knowledge management* (e.g. Walter, Lechner, & Kellermanns, 2007), and on the fourth period terms *China*, *innovation performance*, *complementarity* and *absorptive capacity*. Thus, alliances have been a growing and maturing stream of literature, with shifting emphasis to NPD and innovation alliances.

Various dyadic relationships, such as buyer-supplier relationships or business relationships have become an important topic throughout the studied time period. Relationships are connected to various features such as opportunism, satisfaction, effectiveness or complexity and have been studied in connection with innovation and cooperation. In addition, social forces have attracted researchers' attention related to various relationships, for example on the first time period, when a cluster has been formed around the terms *partner*, *commitment*, *business*, *success* and *dependence* (Mavondo & Rodrigo, 2001). Later on (in 2007–2011), *trust*, *China*, and *investment* are connected to *partnerships* as well as *contract*, *antecedent*, and *commitment* (Ha, Park, & Cho, 2011). Along the time, the mechanisms studied in the context of dyadic relationships have emphasized *pressure* and *control*.

A cluster dealing with governance mechanisms appears during the last 4-year period. This cluster revolves around the terms *complexity*, *effectiveness*, *control* and *outsourcing*. The second theme that has warranted a cluster during the last time period deals with contracts, and is connected to terms *commitment*, *satisfaction*, *retailer*, *financial performance* and *dependence*. On the latest time period, a cluster that does not appear in other time periods is formed around new product development including terms *success*, *operation*, *boundary*, *implementation* and *outsourcing*.

The last observation is that the number of clusters grows along the time. There are three clusters for the first 4-year period, four for the following two periods, and five for the last 4-year period (see Appendix A). The growing number of clusters indicates an increasing variation of topics dealt with during the selected 16 years. Thus, the overall observation from the analysis of term (co-)occurrence is that the research clusters become more mixed and interconnected to each other, and that new terms appear, such as *outsourcing*, *sustainability*, *innovation*, or *absorptive capacity*. These observations indicate that research on ERM expands to a wider range of themes, and that researchers are more open to adopting new aspects from related research fields.

4.3. Overall research clusters

In the previous section, we analyzed the temporal development of ERM research by dividing the sample into four equal time periods. We now move on to depict the overall intellectual structure of ERM research. Fig. 7 provides the co-occurrence analysis of terms appearing in the sample publications' titles and abstracts during the whole sample period of 2000–2015. The terms shown in the map appear at least ten times in different publications. However, not all terms are shown as labels to avoid clutter. The size of the bubble and its label depicts frequency (the larger the bubble and font, the more frequently the term appears in the sample articles). Closeness of terms and their links reveal that the terms appear often in the same articles. Interpreting the term map, the ERM literature as a whole is focusing on four interrelated perspectives:

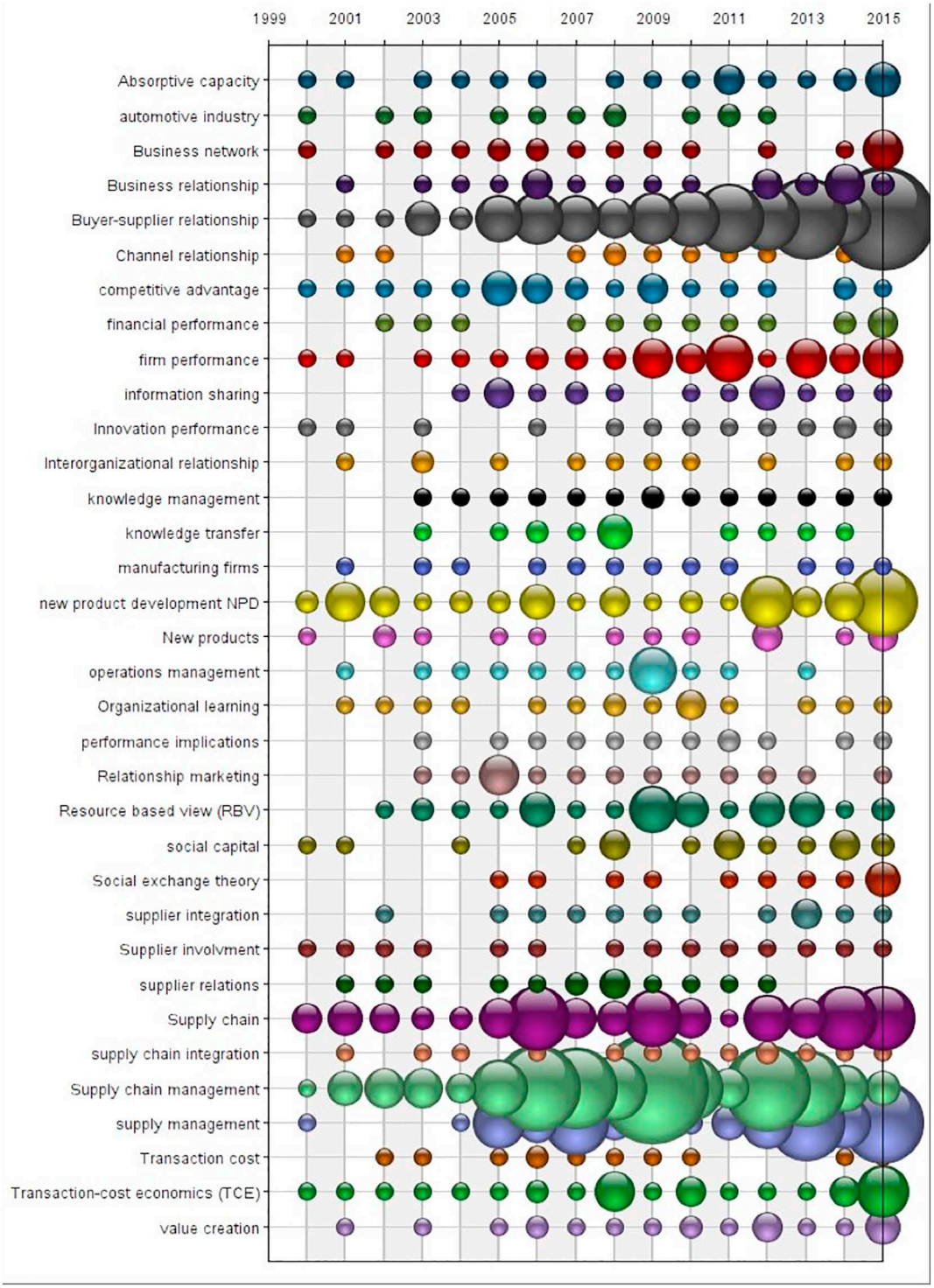

Fig. 2. Bubble chart of the same top multi-word phrases as in Table 2. The chart items appear in alphabetical order (different from the table order which is based on frequency).

1. The chain view (red cluster) – integration and operational effectiveness
2. The network view (green cluster) – innovation and value creation
3. The interorganizational relationship view (blue cluster) – trust, commitment and power
4. The alliance view (yellow cluster) – knowledge transfer and learning

Each cluster is explained next in more detail, with illustrative examples of research within them.

4.3.1. Cluster 1 (chain view – integration and operational effectiveness)

The most important terms in the first cluster are *chain*, *firm performance* and *improvement*. Studies including these terms deal above all with the performance effects of various supply chain management practices. Particularly, these studies address supply chain integration, collaboration, communication and information sharing, both internally across functions and externally downstream towards customers and upwards towards suppliers. In addition to direct performance effects, several studies focus on complementarities and contextual factors as

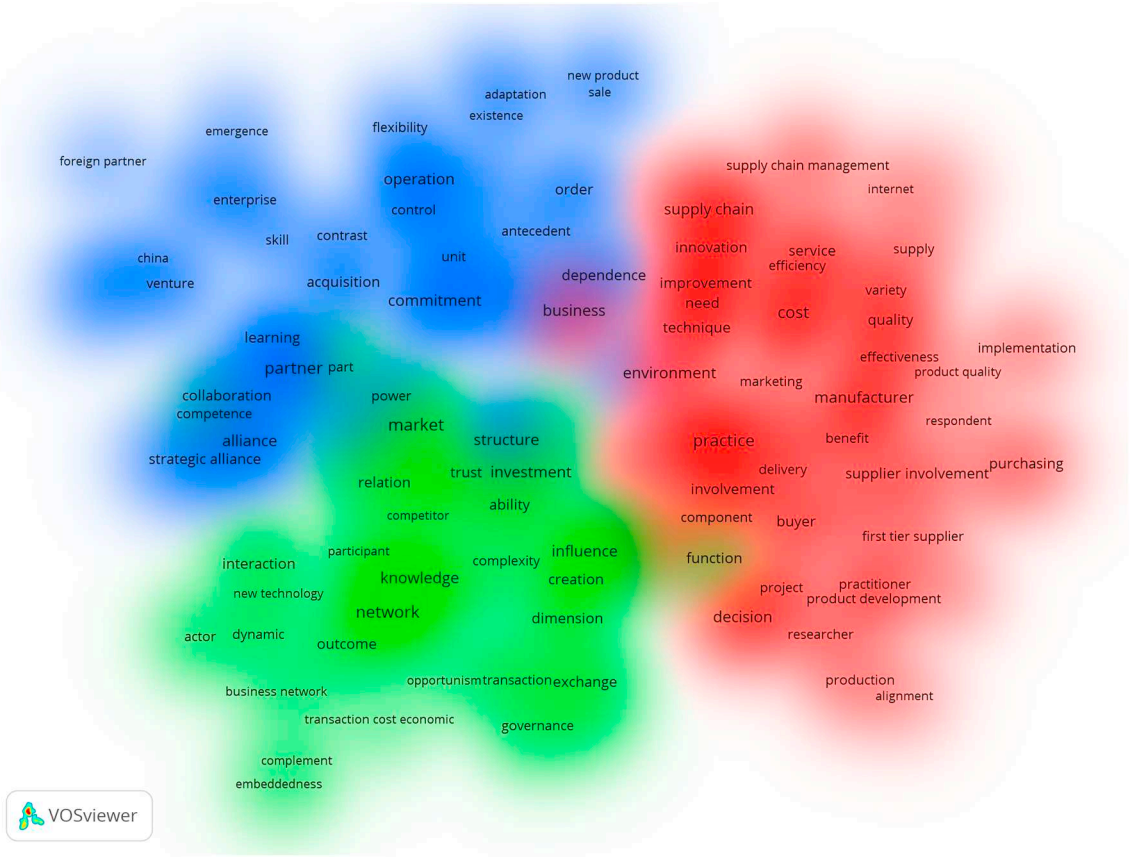

Fig. 3. Term co-occurrence map of in 2000–2003.

moderators or mediators of practice-performance links. The other important set of studies in this cluster deal with antecedents to the adoption or use of supply chain management practices. However, beyond use of practice there is considerable diversity in the outcomes that the studies address. The main division is between firm performance (financial, market share, stock) and operational performance dimensions (cost, quality, delivery, flexibility, and NPD). In addition, social and environmental performance is of interest in several articles. Many articles in this cluster focus on the use of information systems and their performance effects (for example Chen & Chiang, 2011; Funda & Robinson, 2005; Li, Rao, Ragu-Nathan, & Ragu-Nathan, 2005; Rajaguru & Matanda, 2013; Sanders, 2007; Yan & Wang, 2012; Yao, Dresner, & Palmer, 2009). Beyond technology-enabled information sharing, studies also discuss other factors that support coordination and integration in supply chain relationships, such as socialization of managers between firms (Cousins, Handfield, Lawson, & Petersen, 2006), end customer orientation (Narayanan, Jayaraman, Luo, & Swaminathan, 2011), governance mechanisms of quasi integration (Cai, Yang, & Hu, 2009) and cross-functional and cross-firm teams (Enz & Lambert, 2012).

The risk of supply disruptions is also a widely studied topic of this cluster. For example, Ellis, Henry, and Shockley (2010) study the antecedents of supply disruption, Cannon and Homburg (2001) discuss activities to avoid undesired events and behaviors, and Morgan, Kaleka, and Gooner (2007) study how monitoring focal suppliers reduces opportunism. Also various practices for internal and external resource process improvement, such as lean or total quality management (TQM) are studied (for example Fullerton & Wempe, 2009; González-Benito, Martínez-Lorente, & Dale, 2003; Wisner & Tan, 2000). In addition, the use of market mechanisms, such as electronic reverse auctions (ERAs), for reducing costs are studied (for example Carter & Kaufmann, 2007; Daly & Nath, 2005; Emiliani & Stec, 2005; Lösch & Lambert, 2007; Pearcy, Giunipero, & Wilson, 2007). Given the level of uncertainty always present in business settings, flexibility and agility are important competences, and hence addressed in several studies (for example Braunscheidel & Suresh, 2009; Paulraj & Chen, 2007).

4.3.2. Cluster 2 (network view – innovation and value creation)

The focal terms in the second cluster are *network*, *innovation* and *value creation*. Scholars across disciplines commonly agree that firm's networks have become an important source of value and innovation. The research in this field is quite heterogeneous, and adopts a wide array of distinct approaches and theoretical perspectives. Several studies in this cluster discuss how networks can be purposefully structured and designed in order to maximize a series of factors such as innovation (Bygballe & Ingemansson, 2014; Capaldo, 2007; Phelps, 2010; Wuyts, Dutta, & Stremersch, 2004), supply chain performance (Terpend & Ashenbaum, 2012) or firm performance (Baum, Calabrese, & Silverman, 2000; Chen & Chiang, 2011; Koka & Prescott, 2008; Lavie, 2007; Ozcan & Eisenhardt, 2009; Shipilov, 2006; Zaheer & Bell, 2005). Some studies focus on particular network structures, such as alliance networks (Baum et al., 2000; Koka & Prescott, 2008; Shi, Sun, & Peng, 2012), alliance portfolios (Hoffmann, 2007; Lavie, 2007), triads (Hartmann & Herb, 2015; Li & Choi, 2009) and business groups (Carney, Gedajlovic, Heugens, van Essen, & van Oosterhout, 2011).

Furthermore, the network view cluster deals with dynamism in inter-organizational networks, discussing how changes to network design can be caused by industry events (Madhavan, Koka, & Prescott, 1998), market entry (Lee, 2007) or the formation of structural holes and their impact on firm performance (Soda, Usai, & Zaheer, 2004) and centrality and structural holes. Another aspect that is emphasized is the formation of different network structures. For example, Doz, Olk, and Ring (2000) look into the formation processes of R&D consortia by "examining variations within the formation process and their

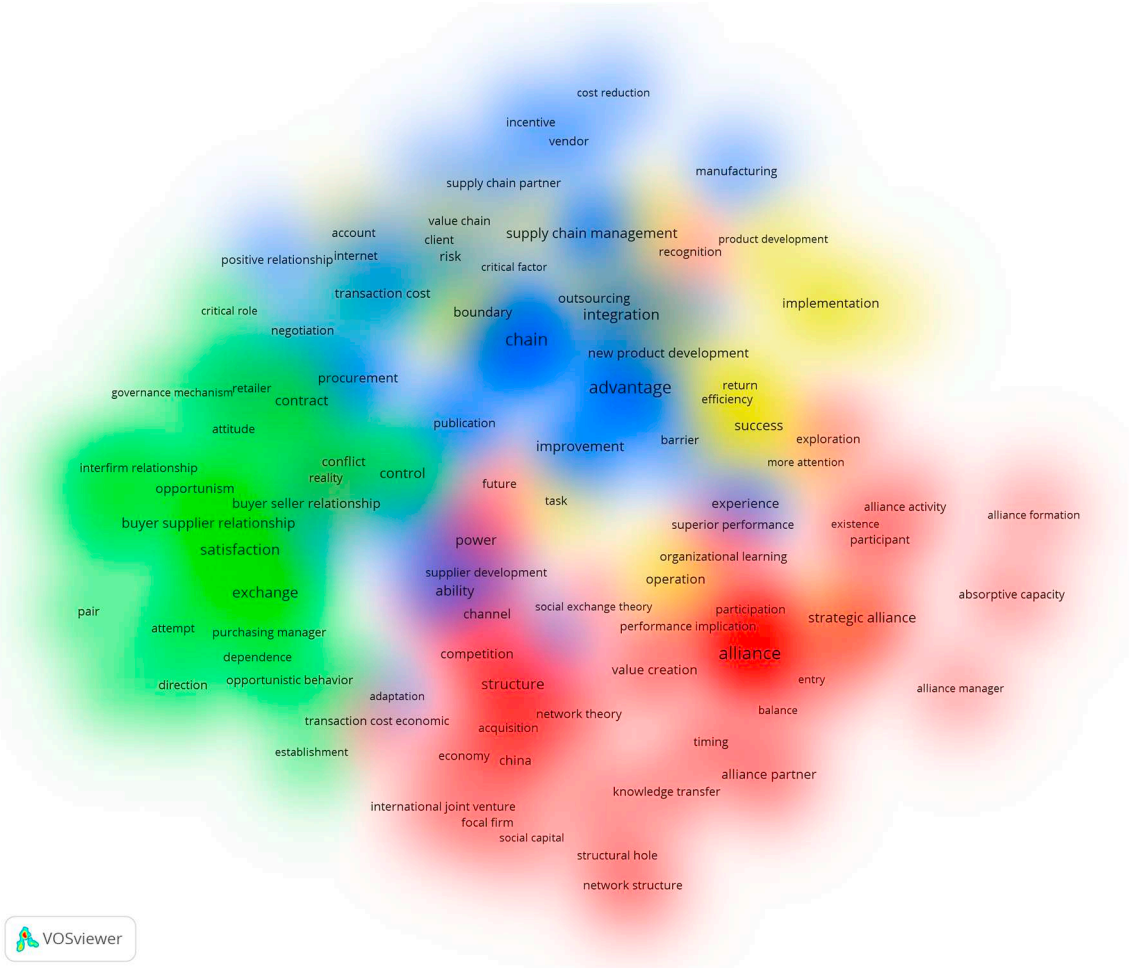

Fig. 4. Term co-occurrence map in 2004–2007.

consequences". In addition, this cluster addresses different types of enduring linkages (weak and strong) between organizational actors. Within this cluster, research is also directed at entrepreneurial benefits resulting from interorganizational linkages (for example Ho & Pollack, 2014; Koka & Prescott, 2008; Smith & Lohrke, 2008). One central concept in this cluster is value creation. For example, Möller and Rajala (2007) focus on value creation in intentionally created business networks, and propose that the underlying value creation logic determines what is an effective way to manage different types of business networks. The terms related to value include different perspectives: customer value (for example Cova & Salle, 2008; Guenzi & Troilo, 2007) supplier value (for example Walter, Ritter, & Gemuenden, 2001) and value co-creation (for example Aarikka-Stenroos & Jaakkola, 2012; Cova & Salle, 2008; Payne, Storbacka, Frow, & Knox, 2009).

4.3.3. Cluster 3 (interorganizational relationship view – trust, commitment and power)

The terms within the third cluster are related to different social aspects of inter-organizational relationships. The collaboration paradigm dominates the discourse of interorganizational relationships, and it is widely proposed that collaboration with suppliers and customers is advantageous for the firm. The specific topics of the studies in this "relationship view" cluster are for example how various aspects influence relationship performance, such as socialization and social capital (Mitchell, Boyle, Burgess, & McNeil, 2014; Partanen, Möller, Westerlund, Rajala, & Rajala, 2008), power and control (Chang & Huang, 2012; Olsen, Prenkert, Hoholm, & Harrison, 2014; Ryu, Park, & Min, 2007), trust and commitment (Goodman & Dion, 2001; Harmon, Kim, & Mayer, 2015; Hausman & Johnston, 2010; Praxmarer-Carus, 2014), attractiveness (Hald, Cordon, & Vollmann, 2009; Huttinger, Schiele, & Veldman, 2012), and justice (Luo, Liu, Yang, Maksimov, & Hou, 2015). Particularly, antecedents of inter-organizational collaboration are investigated in several studies dealing with the benefits of collaborative initiatives and underlying factors of collaboration. The antecedents of effective collaborative relationships are contrasted to those for transactional relationships (for example Whipple, Lynch, & Nyaga, 2010). Certain conditions need to be in place for collaboration to work: trust and commitment (Johnston, McCutcheon, Stuart, & Kerwood, 2004; Lancastre & Lages, 2006; Moore, 1998: Narayandas & Rangan, 2004: Nyaga, Whipple, & Lynch, 2010: Skarmeas & Katsikeas, 2001), interdependence (Wong, Tjosvold, & Zhang, 2005) and a balance of trust and dependence (Laaksonen, Pajunen, & Kulmala, 2008).

A set of papers also discusses the outcomes of collaboration and how relationship development influences performance outcomes. These studies provide evidence that collaboration is an antecedent of relationship success (Fawcett, Fawcett, Watson, & Magnan, 2012; Singh & Mitchell, 2005; Whipple et al., 2010). For instance, Fawcett et al. (2012) propose that collaboration capability delivers positive supply chain operational and financial performance, and Johnston et al. (2004) argue that shared planning and flexibility (both aspects of supply chain collaboration), are indicators for relationship performance. Some papers discuss formal governance mechanisms, contracts in detail, or contrast formal and relational governance mechanisms (for example Parker & Brey, 2015) or incomplete contracting (Carson & John, 2013). A group of papers focuses on factors that might destroy relationships. In general, opportunism or the threat of it are identified as destructive

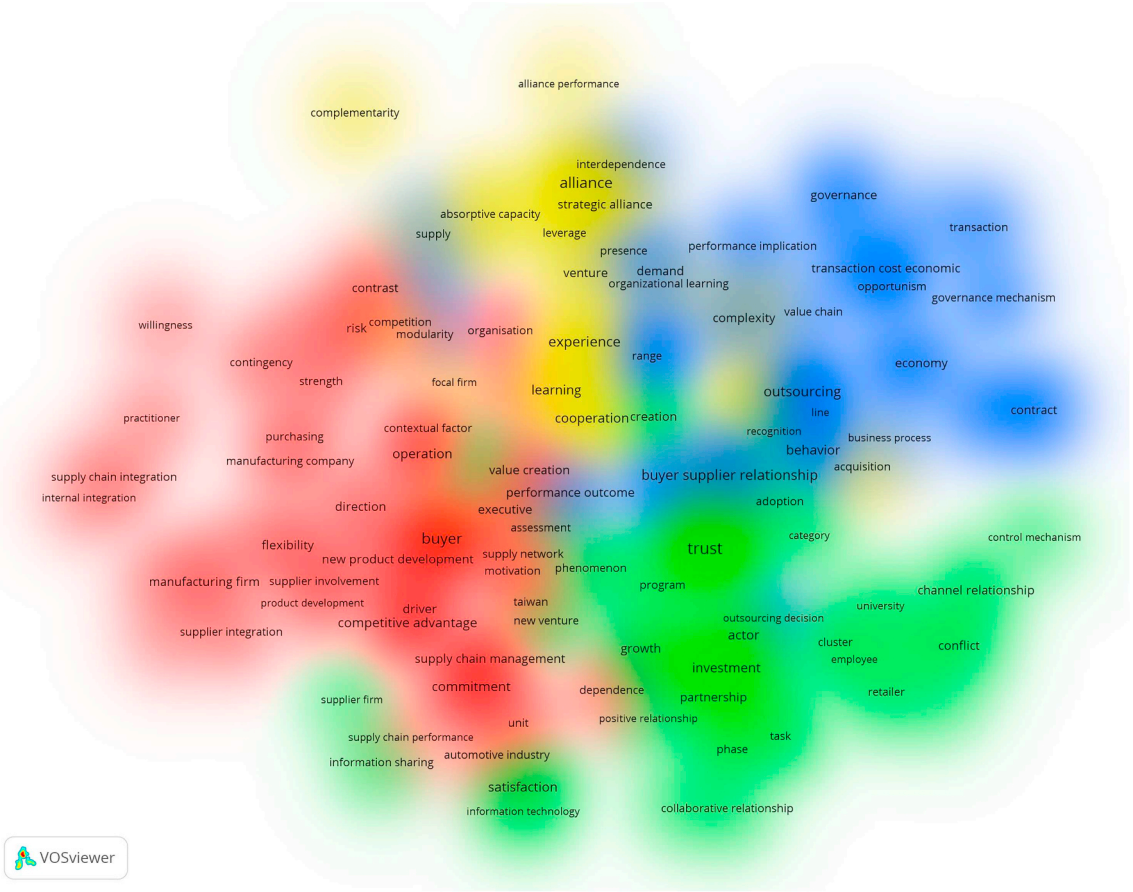

Fig. 5. Term co-occurrence map in 2008–2011.

behaviors of a partner that might have an adverse effect on a relationship (Belaya, Gagalyuk, & Hanf, 2009; Jap, 2007; Kang & Jindal, 2015; Liu, Luo, & Liu, 2009; Tangpong, Hung, & Ro, 2010; Welling & Kamann, 2001; Yang, Zhou, & Jiang, 2011). In addition to exploring the causes and effects of destructive behavior, some articles contribute to solving the issues in the relationships. The latter is of particular interest because nearly all relationships are sometimes problematic, but not nearly all are practical to terminate. As conflict, opportunism and unfairness plague channel relationships, managers should first minimize the leveraging effect of unfairness, and then target other problems jointly (Samaha, Palmatier, & Dant, 2011).

4.3.4. Cluster 4 (alliances – knowledge transfer and learning)

The focal terms of the fourth cluster are *alliances*, *learning*, *absorptive capacity*, and *knowledge transfer*. According to the knowledge-based view, knowledge is the most strategically significant resource of the firm (Grant, 1996). Studies in this cluster are interested in how alliances with external partners can be leveraged in developing the strategic knowledge base of the firm. Towards this end, a large share of the literature in this cluster focuses on the antecedents and circumstances of interorganizational learning and knowledge development. Organizations' absorptive capacity - ability to achieve, assimilate, and utilize new external knowledge - has been an influential research topic (Ahuja & Katila, 2001; Lane, Salk, & Lyles, 2001; Sampson, 2007; Vasudeva & Anand, 2011). In particular the high-technology industry, with technological or environmental turbulence, and R&D-oriented companies, has been the context of studies about absorptive capacity and learning orientation (Wadhwa & Kotha, 2006; Weigelt & Sarkar, 2009). Often, the studied questions have dealt with balancing between acquiring or exchanging knowledge as well as learning critical skills or capabilities from alliance partners, and the need to protect oneself from losing one's own core proprietary assets or capabilities such as valuable technology to the partner (Chatterji & Fabrizio, 2014; Kale, Singh, & Perlmutter, 2000; Oxley & Sampson, 2004). Studies in this "knowledge and learning" cluster largely deal with alliance formation, discussing alliance partners' selection and strength of ties between partners, and their impact on knowledge transfer in various competitive environments (Oke, Idiagbon-Oke, & Walumbwa, 2008; Phene & Tallman, 2014; Sampson, 2007).

In addition to forming knowledge networks or learning alliances, questions on how to form a platform for knowledge search and transfer, and how the characteristics of the network actors facilitate cooperation have been studied (Bond, Houston, & Tang, 2008; Capaldo, 2007; Möller & Svahn, 2004;) as well as knowledge searching and search strategies (Vasudeva & Anand, 2011). A wide array of external actors have been studied as potential knowledge sources: supply chain members (customers, suppliers) (Fang, 2008; McGinnis & Vallopra, 2001; Primo & Amundson, 2002; Tracey, 2004; Wagner, 2012), competitors (Oke et al., 2008; Spencer, 2003), third parties such as the government (Li & Atuahene-Gima, 2001), consultants (Dawes, Lee, & Midgley, 2007), and universities, R&D-centers and public research organizations (PROs) (Daniel, Hempel, & Srinivasan, 2002; Gallego, Rubalcaba, and Suárez, 2013; Penner-Hahn & Shaver, 2005).

4.4. The prolific institutions and authors

We now move on from term-based co-occurrence analyses to portray the most prolific institutions, countries and authors of our sample. Table 3 shows the most prolific universities in the sample. We can see that universities in USA are highly productive in this area, along with UK-based institutions. However, some Asian and Northern European universities are also quite high on the list: City University of Hong Kong

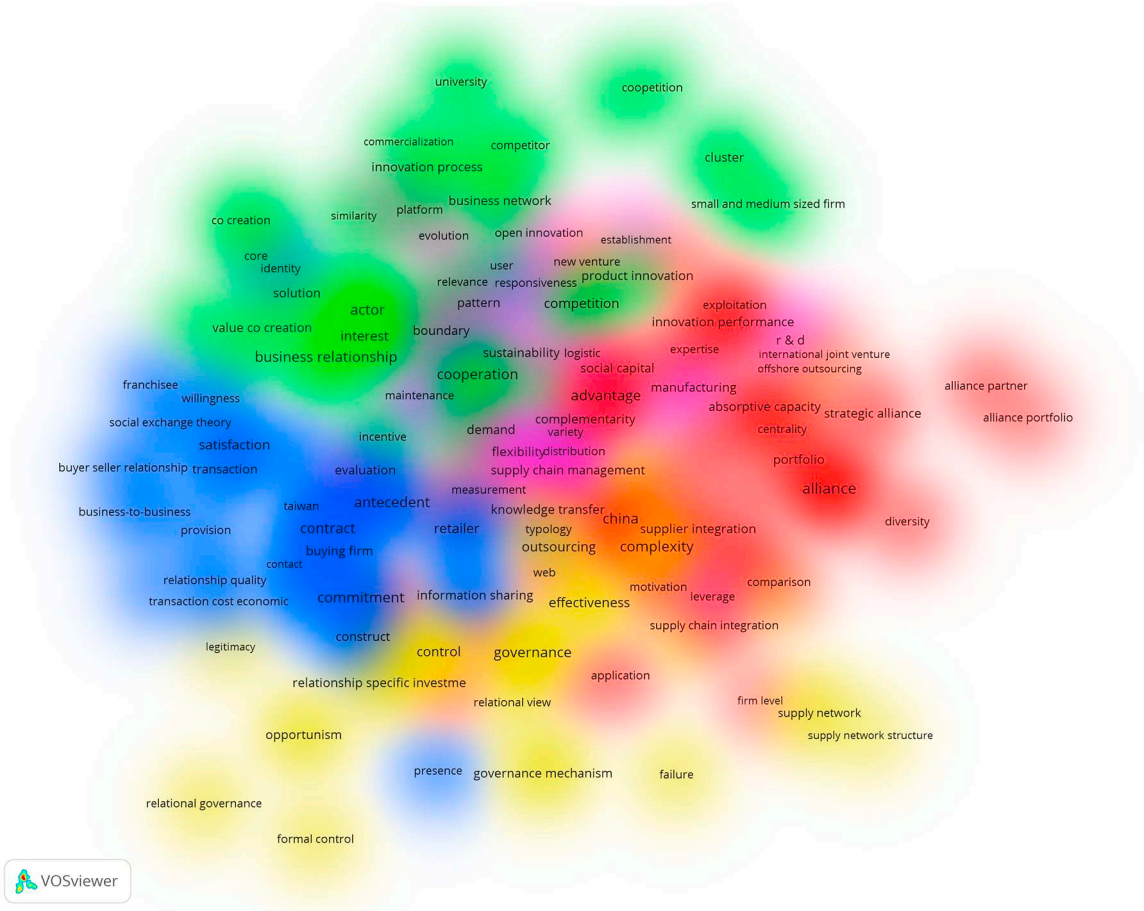

Fig. 6. Term co-occurrence map in 2012–2015.

with 26 and Xi'an Jiaotong University from China with 23 articles, Copenhagen Business School from Denmark with 21 articles and Aalto University from Finland with 20 articles altogether. Table 4 presents the most active countries in publishing ERM based on our sample. As indicated by the list of institutions as well, United States and United Kingdom are the most active countries in this topic area. While no institutions from the Netherlands made it to the top-10, overall the country is highly prolific in this area. Looking at the number of citations, United States and United Kingdom are clearly above the rest, but it is worth noting Canada has the highest citations to publications ratio (over 80), indicating research with a high impact.

Table 5 presents the most prolific authors in our sample. While our sample only covers a part of these authors' research publications, we can see several authors with a significant impact in the field of ERM through multiple publications. Overall, 44 authors have published 5 or more articles on the topic. Along the amount of publications, we report also the h-index, total citations and average citations for the key authors within the sample for additional indicators on the authors' impact.

The most prolific author in our sample on the topic is Thomas Choi, with 12 articles published. His frequent co-authors (see map in Fig. 8) in the ERM area include Manus Rungtusanatham and Yusoon Kim, with 4 or 3 co-authored articles, respectively. Choi's work falls mainly under OM/SCM, in particular relationships in supply-chain settings. Three authors, Yuan Li, Yi Liu and Kenneth Petersen, all have 11 publications each. Li and Liu have published most of their works in *Journal of Operations Management* or *Industrial Marketing Management*. Li and Liu have in fact co-authored 8 out of their 11 publications on the sample. Liu has published three joint articles also with Yadong Luo. Kenneth Petersen, focusing on SCM, has published extensively with several other prolific authors from the list in Table 5 or Fig. 8: Paul Cousins, Robert Handfield, Benn Lawson, and Gary Ragatz. The fifth most prolific author is Stephan Wagner, with 10 publications in our sample. He has co-authored articles among others with Christoph Bode and Jean Johnson. His work is published in the OM/SCM journals as well as in *Industrial Marketing Management*.

The map in Fig. 8 reveals a few additional close-knit co-authorship relations. Tamer Cavusgil, Daekwan Kim, Erin Cavusgil and Pervez Ghauri form one co-author network, publishing for example alliance performance, strategic supplier network or IT alignment research, mostly in *Journal of Business Research* and *Industrial Marketing Management*. Another network is built around Ram Narasimhan with co-authors Sriram Narayanan, Ajay Das, Santos Mahapatra and Srinivas Talluri. They have studied OM/SCM topics such as supplier integration, relationships, and performance that are published in JOM and JSCM. Close to the *International Marketing and Purchasing* (IMP) group, and publishing quite extensively in *Industrial Marketing Management*, Peter Naudé, Stephan Henneberg, Stefanos Mouzas, and David Ford, form yet another co-authorship cluster. Also, active in the same journal, Kristian Möller, Senja Svahn and Arto Rajala have multiple shared co-authorships. Prolific dyads such as Injazz Chen and Antony Paulraj have published five articles together in the area of OM/SCM (3 in JSCM, and 2 in JOM), and Kevin Zhou and Laura Poppo have four joint articles in management journals (3 in SMJ and 1 in JMS). Zhou has published ERM articles also in JOM (2), IMM (1) and *Journal of Marketing* (1), which makes him a rare 'boundary spanner', being active in all three disciplines of our study.

Despite the findings above, the co-authorship networks in ERM research are still relatively small and isolated. Interdisciplinary boundaries represent one possible explanation for this as earlier research has shown that knowledge trade between Strategic Management, OM, and

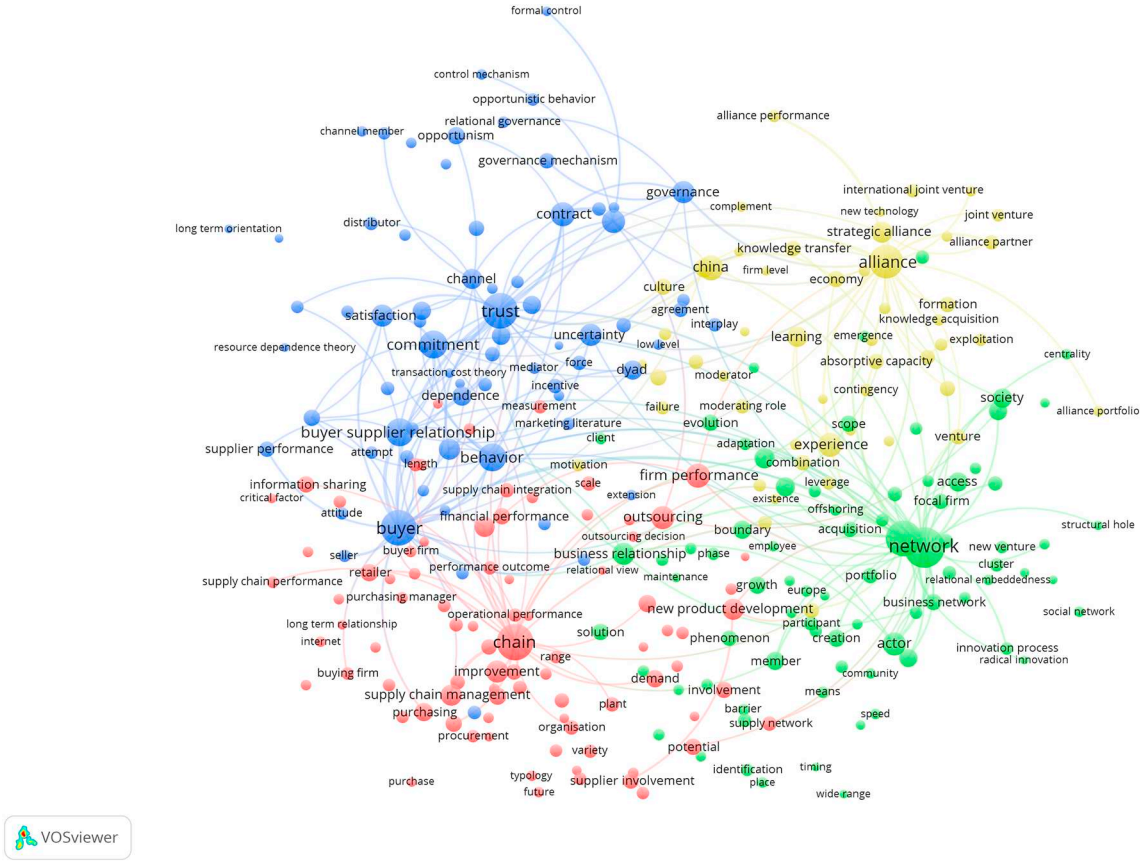

Fig. 7. Co-occurrence analysis of terms appearing in the sample publications' titles and abstracts in 2000–2015.

Marketing is limited (Linderman & Chandrasekaran, 2010; Tanskanen et al., 2017).

Table 6 presents the most cited articles from our sample, along with the information on how many cites they have received yearly on average according to Scopus (situation at mid November 2015 when downloading the data). Interestingly, though the most prolific authors were from the OM/SCM field, the Top-5 cited articles are all from *Strategic Management Journal*. This is not surprising in relation to the findings of Tanskanen et al. (2017); they show that when it comes to knowledge-trade in ERM-related research, OM/SCM scholars and marketing scholars tend to cite studies in Strategic Management, but not vice versa.

On average, the 1290 sample publications have received 60.6 citations (at the time of downloading the data). The times cited information was still missing for 150 publications, mostly for the articles published in 2015. Many of the most-cited articles have developed or critically refined key concepts that have inspired and shaped whole research streams. For example, the concepts of relational capital (Kale et al., 2000), relational governance (Poppo & Zenger, 2002) and absorptive capacity (Lane et al., 2001) are introduced in the highly cited articles. The most cited article, with 1045 citations, is by Kale et al. (2000). In this article, the authors develop the concept of relational capital, described as (p. 28) "the level of mutual trust, respect, and friendship that arises out of close interaction at the individual level between alliance partners". The role of relational capital has since been studied in our sample in relation to e.g. enhancing alliance performance (Lee & Cavusgil, 2006), improving operational performance in subcontractor-customer relationships (Kohtamäki, Vesalainen, Henneberg, Naudé, & Ventresca, 2012) and international alliance formation (Lee & Park, 2008). The paper by Frohlich and Westbrook (2001) on arcs of integration is a seminal paper in the area of supply chain integration; this paper develops five strategies of supply chain integration based on an international study. The topic has since been studied extensively, also within our sample (see e.g. Droge et al., 2004; Parker, Zsidisin, & Ragatz, 2008; Zhao, Huo, Flynn, & Yeung, 2008).

5. Summary and conclusions

The area of external resource management is attracting continuously increasing scholarly interest, as based on our analysis, the annual number of ERM publications has grown threefold over the last 15 years (from 47 publications in 2000 to 145 publications in 2015). ERM contributions appear frequently in all nine focal journals of our sample, which can thus be viewed as important arenas for the emerging scientific discourse. Within the seemingly fragmented research field which crosses three disciplines: strategic management, OM/SCM, and marketing, our bibliometric analysis revealed four clusters of research, each united by a common thematic area: a cluster focusing on integration and operational effectiveness (for example Braunscheidel & Suresh, 2009; Chen & Chiang, 2011; Liao, Hong, & Rao, 2010; Paulraj & Chen, 2007; Rajaguru & Matanda, 2013; Sanders, 2007; Yao et al., 2009; Yan & Wang, 2012), a cluster focusing on innovation and value creation (for example Bygballe & Ingemansson, 2014; Capaldo, 2007; Phelps, 2010; Wuyts et al., 2004), a cluster focusing on inter-organizational relationships and their development (for example Johnston et al., 2004; Lancastre & Lages, 2006; Narayandas & Rangan, 2004; Nyaga et al., 2010; Skarmeas & Katsikeas, 2001), and a cluster focusing on knowledge transfer and learning (for example Ahuja & Katila, 2001; Lane et al., 2001; Sampson, 2007; Vasudeva & Anand, 2011). Thus, we argue that these four interrelated clusters provide an overview of the main areas of scholarly interest within ERM. Fig. 9 provides a synopsis of these four clusters discussed at length in Section 4.3. The figure presents the main topics of the clusters. Such a synthesis, integrating the four distinct research streams of ERM, should provide a solid basis

Table 3
Most prolific universities in the sample.

Rank	Affiliation	Country	# Records
1	Michigan State University	USA	43
2	Arizona State University	USA	42
3	University of Manchester, Manchester	UK	29
4	City University of Hong Kong	Hong Kong	26
5	University of Texas	USA	23
	Xi'an Jiaotong University	China	23
7	Copenhagen Business School	Denmark	21
8	Aalto University, Espoo	Finland	20
	Ohio State University	USA	20
10	University of Bath, Bath	UK	19
11	Colorado State University	USA	18
	Cranfield University	UK	18
	Monash University	Australia	18
	University of Michigan	USA	18
15	Tilburg University	Netherlands	17
16	London Business School, London	UK	16
	Georgia State University, Atlanta, GA	USA	16
	University of Minnesota	USA	16
19	Erasmus University Rotterdam	Netherlands	15
	Indiana University	USA	15
	University of Warwick	UK	15
22	Florida State University	USA	14
	Texas A and M University	USA	14
	University of Washington	USA	14
25	Lancaster University Management School	UK	13
	VU University Amsterdam	Netherlands	13
27	Chinese University of Hong Kong	Hong Kong	12
	Eindhoven University of Technology	Netherlands	12
	Temple University	USA	12
	University of Cambridge	UK	12
	University of Groningen	Netherlands	12
	University of Illinois, Chicago, IL	USA	12
	University of Wisconsin	USA	12
	WHU - Otto Beisheim School of Management	Germany	12

Table 4
Most active countries in the sample.

Rank	Country	# Publications	# Citations
1	United States	595	42,506
2	United Kingdom	211	10,731
3	The Netherlands	79	3166
4	Australia	63	1938
5	China	61	1462
6	Germany	60	2540
7	Canada	57	4949
8	Hong Kong	55	2135
9	Spain	50	1256
10	Finland	48	2588
11	Italy	47	1573
12	France	45	2647
13	Sweden	42	1208
14	Taiwan	41	498
15	Switzerland	33	1110
16	Denmark	32	2540
17	Norway	28	884
18	South Korea	24	909
19	Singapore	20	747
20	Belgium	18	494

for advancing both research and practice in the area.

When viewing the evolvement of the ERM discourse over time, we observe two patterns. First, the diversity of topics addressed by scholars has been increasing continuously over the analyzed time period, indicating that ERM, like many more established cross-disciplinary research areas such as innovation and network research, is continuing to attract new scholars, who bring in fresh perspectives for research. Second, while the diversity of perspectives is increasing, we can also see a few broad research topics emerging that each continue to attract a high number of contributions each year. These core topics include:

Table 5
Most prolific authors in the sample, with information on their h-index, total number and average number of citations to their sample publications.

Rank	Author	Nr. of publications	h-Index[a]	Total cites	Average cites
1	Choi, T.Y.	12	9	1085	108.5
2	Li, Y.	11	8	236	23.6
	Liu, Y.	11	8	320	32.0
	Petersen, K.J.	11	10	974	97.4
5	Wagner, S.M.	10	7	401	44.6
6	Cousins, P.D.	9	8	557	69.6
	Handfield, R.B.	9	8	1388	173.5
	Lawson, B.	9	7	406	50.8
	Luo, Y.	9	8	616	6.4
	Narasimhan, R.	9	6	331	36.8
	Cavusgil, S. T.	9	8	471	52.3
12	Ghauri, P.N.	8	6	205	25.6
	Möller, K.	8	8	689	86.1
	Zhou, K.Z.	8	4	247	35.3
15	Carter, C.R.	7	5	325	46.4
	Mouzas, S.	7	4	115	19.2
	Naudé, P.	7	4	86	14.3
	Yang, Z.	7	5	128	21.3
19	Bello, D.C.	6	6	186	31.0
	Gilliland, D.I.	6	5	90	15.0
	Henneberg, S.C.	6	3	87	17.4
	Johnson, J.L.	6	5	297	49.5
	Krause, D.R.	6	5	555	111.0
	Mitchell, W.	6	5	520	104.0
	Paulraj, A.	6	5	667	111.2
	Rothaermel, F.T.	6	6	1429	238.2
	Schiele, H.	6	4	89	14.8
	van der Valk, W.	6	4	97	16.2
29	Chen, I.J.	5	5	662	132.4
	Dooley, K.J.	5	4	497	99.4
	Ford, D.	5	4	509	101.8
	Handley, S.M.	5	3	84	21.0
	Hartley, J.L.	5	5	190	38.0
	Heide, J.B.	5	4	758	189.5
	Johnston, W.J.	5	4	256	51.2
	Kim, Y.	5	1	3	1.5
	Lavie, D.	5	5	679	135.8
	McIvor, R.	5	5	242	48.4
	Poppo, L.	5	4	1124	281.0
	Ritter, T.	5	4	843	168.6
	Singh, H.	5	5	1761	352.2
	Snehota, I.	5	3	185	37.0
	Spina, G.	5	5	176	35.2
	Svahn, S.	5	5	338	67.6

[a] An h-index of 10 denotes that the author has at least 10 publications, which all have 10 or more citations.

inter-organizational relationships, performance, new product development, and a chain or network perspective. Thus, it would appear that as ERM is gradually establishing itself as a recognized discourse, these core topics act as hubs providing researchers key concepts and theories to which new and innovative research areas can be anchored to.

Our bibliometric analysis revealed that out of the 34 most prolific universities publishing ERM research, 15 represented the United States of America, and seven the United Kingdom. In total, 15 universities out of these 34 were European and four were based in Asia or Australia. Thomas Choi is the most prolific ERM researcher with 12 publications in our sample, with Yuan Li, Yi Liu and Kenneth Petersen following close behind with 11 publications each. While Li's and Liu's ERM publications have received approximately 30 citations, Choi and Petersen have close to a hundred average citations for their publications, indicating a much higher impact on the emerging research community.

The four clusters of ERM research identified in the present study highlight that within the fragmented and multi-disciplinary research area, a limited number of core themes (inter-organizational relationships, knowledge transfer in alliances, and a chain or network perspective) function as hubs, bridging research addressing the

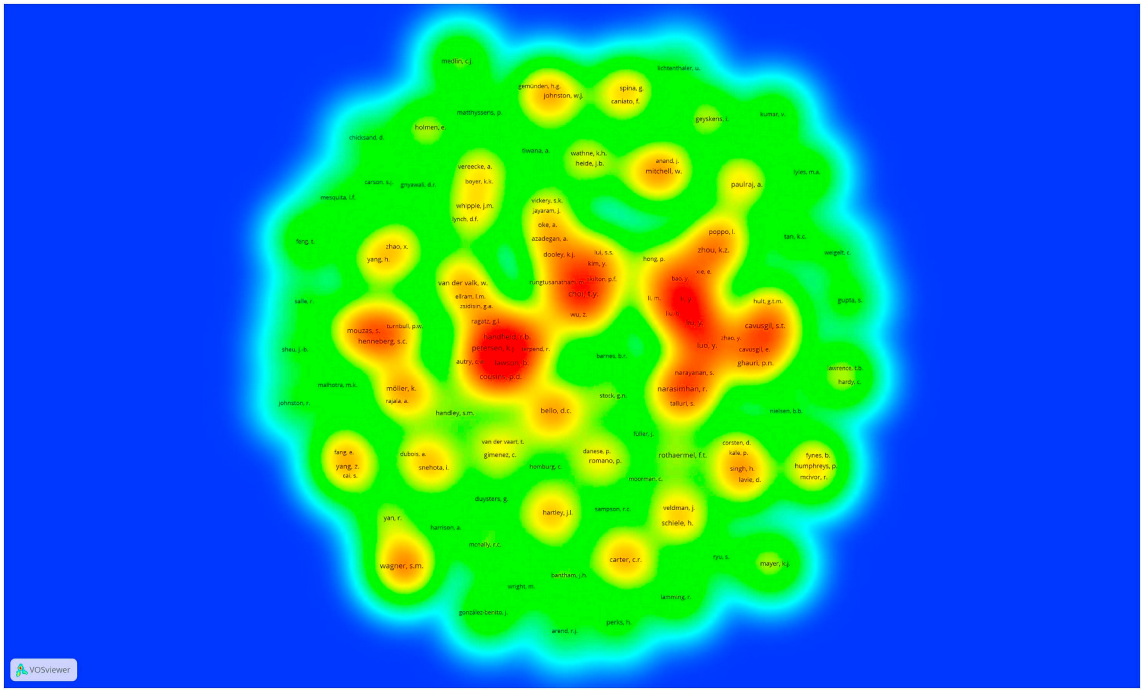

Fig. 8. A co-authorship map of authors with at least 3 publications in the sample.

management of external resources from a seemingly endless number of perspectives and research questions. These clusters as such also highlight shared managerial challenges that many scholars consider of paramount interest in ERM, such as: how should inter-organizational relationships to suppliers and other actors be developed (e.g. Ritter & Gemünden, 2003; Subramani & Venkatraman, 2003), which inter-organizational processes and structures are associated with superior performance (e.g. Fawcett et al., 2012; Singh & Mitchell, 2005; Whipple et al., 2010; Wittmann, Hunt, & Arnett, 2009), how resources controlled by suppliers and other actors can best be leveraged in new product development (e.g. Parker et al., 2008; Tracey, 2004; Wagner, 2012), and how ERM should be viewed from a broader chain (or network) perspective rather than a single-firm – or dyadic – perspective (e.g. Baum et al., 2000; Koka & Prescott, 2008; Möller & Rajala, 2007; Shi et al., 2012). Importantly, the computationally generated research clusters presented in this paper share a very high degree of similarity

Table 6
Most cited articles in the sample.

Rank	Cited article	Times cited	Cites per year
1	Learning and protection of proprietary assets in strategic alliances: Building relational capital, Kale, P., Singh, H., & Perlmutter, H., Strategic Manage. J. (2000)	1045	65.31
2	Open for innovation: The role of openness in explaining innovation performance among U.K. manufacturing firms, Laursen, K., & Salter, A., Strategic Manage. J. (2006)	1039	103.90
3	Do formal contracts and relational governance function as substitutes or complements?, Poppo, L., & Zenger, T., Strategic Manage. J. (2002)	985	70.35
4	Social capital, knowledge acquisition, and knowledge exploitation in young technology-based firms, Yli-Renko, H., Autio, E., & Sapienza, H.J., Strategic Manage. J. (2001)	863	57.33
5	Don't go it alone: Alliance network composition and startups' performance in Canadian biotechnology, Baum, J.A.C., Calabrese, T., & Silverman, B.S., Strategic Manage. J. (2000)	847	52.93
6	Arcs of integration: An international study of supply chain strategies, Frohlich, M.T., & Westbrook, R., J. Oper. Manage. (2001)	825	55.00
7	Redundant governance structures: An analysis of structural and relational embeddedness in the steel and semiconductor industries, Rowley, T., Behrens, D., & Krackhardt, D., Strategic Manage. J. (2000)	726	45.38
8	Absorptive capacity, learning, and performance in international joint ventures, Lane, P.J., Salk, J.E., & Lyles, M.A., Strategic Manage. J. (2001)	633	42.20
9	Internal capabilities, external networks, and performance: A study on technology-based ventures, Lee, C., Lee, K., & Pennings, J.M., Strategic Manage. J. (2001)	584	38.93
10	Alliance capability, stock market response, and long-term alliance success: The role of the alliance function, Kale, P., Dyer, J.H., & Singh, H., Strategic Manage. J. (2002)	571	40.79
11	Exploration and exploitation alliances in biotechnology: A system of new product development, Rothaermel, F.T., & Deeds, D.L., Strategic Manage. J. (2004)	569	47.42
12	Technological acquisitions and the innovation performance of acquiring firms: A longitudinal study, Ahuja, G., & Katila, R., Strategic Manage. J. (2001)	560	37.33
13	The duality of collaboration: Inducements and opportunities in the formation of interfirm linkages, Ahuja, G., Strategic Manage. J. (2000)	539	33.69
14	A Knowledge Accessing Theory of Strategic Alliances, Grant, R.M., & Baden-Fuller, C., J. Manage. Stud. (2004)	532	44.33
15	Opportunism in interfirm relationships: Forms, outcomes, and solutions, Wathne, K.H., & Heide, J.B., J. Mark. (2000)	447	27.94
16	How should companies interact in business networks?, Håkansson, H., & Ford, D., J. Bus. Res. (2002)	428	30.57
17	The effects of an integrative supply chain strategy on customer service and financial performance: An analysis of direct versus indirect relationships, Vickery, S.K., Jayaram, J., Droge, C., & Calantone, R., J. Oper. Manage (2003)	402	30.92
18	Benefiting from network position: Firm capabilities, structural holes, and performance, Zaheer, A., & Bell, G.G., Strategic Manage. J. (2005)	400	36.36

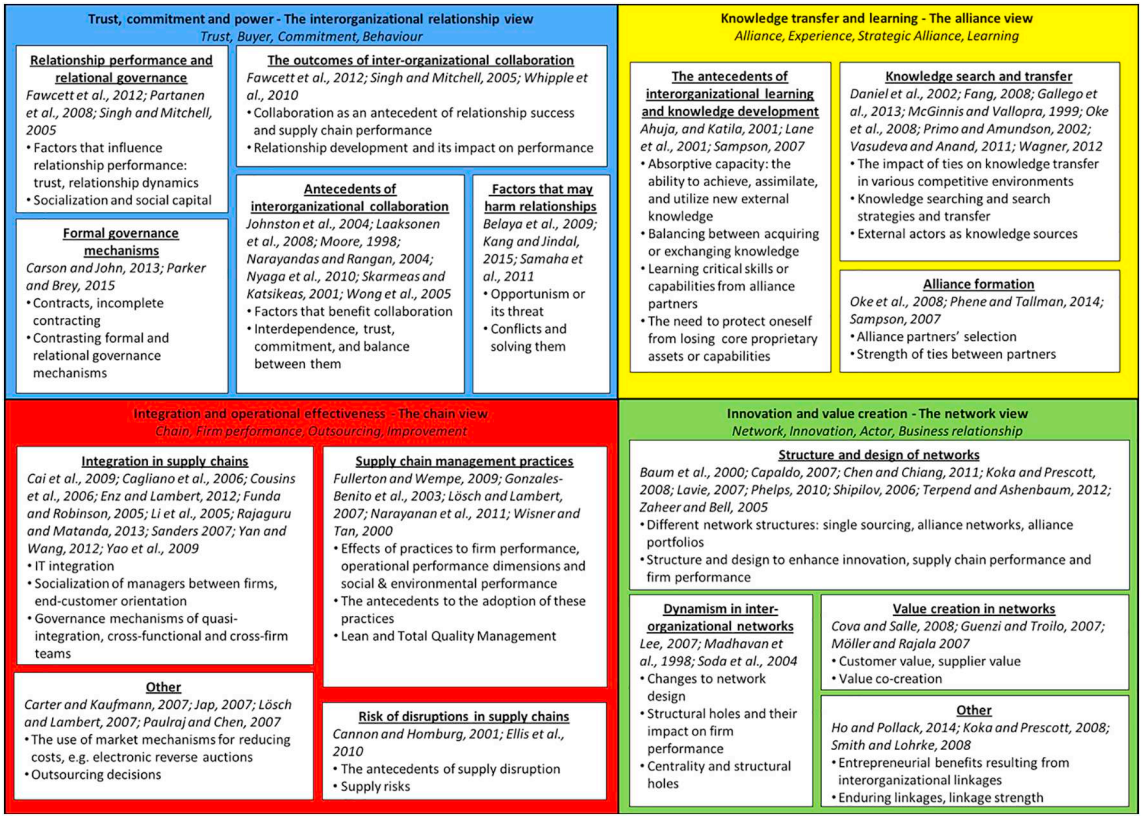

Fig. 9. A synopsis of ERM literature with representative publications discussing the topic.

with the six research themes identified by Tanskanen et al. (2017), which relies on qualitative research methodology and draws on a smaller sample of ERM articles as compared to the present study. A high degree of similarity indicates that while large-scale computational analyses of literature such as this one cannot reach the same level of depth as compared to traditional qualitative reviews, they allow for the efficient and reliable identification of main themes unveiling scholarly communities representing different discourses, as well as the portrayal of their development over time.

The main practical implication of our study is that the vast amount of scholarly interest towards the area indicates that ERM should be considered as a significant area in the management of the firm that functions as a bridge between strategic management, product development, and operations. Over time, if this bibliometric study enables researchers to better build their work over previous findings across disciplines, more whole-rounded management solutions to ERM can be provided. The division of the literature into four clusters helps managers to understand the different dimensions important in ERM. First, managers should adopt a chain view and focus on collaboration, communication and information sharing with external partners for improving performance through supply chain integration. Second, managers should adopt a network view and aim at designing network structures to maximize innovation, supply chain performance and firm performance. Third, the research on interorganizational relationship view perspective helps managers to understand the antecedents of successful collaboration with customers and suppliers. Finally, the research on the alliance view perspective informs managers how alliances with external partners can be leveraged in developing the strategic knowledge base of the firm.

While ERM has clearly established itself as a discourse of its own, its four core research themes identified in this study overlap considerably with existing and more established areas of research such as supply chain management, operations management, and new product development. As such, current and forthcoming ERM research may enable the integration of these areas more tightly together. Perhaps the resources external to the firm will prove to be the element that support the firm in integrating its internal processes more closely together, or alternatively, as ERM may shape the organizational boundaries between the focal firm and others in its environment, the functional separation internal to the firm will become less relevant for the performance of the firm.

6. Limitations

Our results are limited by the selected journals and timeframe, which do not cover all journals and thus all articles published in the field of external resource management. A keyword-based selection of articles would have enabled us to widen both the journal base and the timeframe. However, our preliminary searches indicated that it would have suited poorly to our study, since external resource management is a wide and interdisciplinary field that covers a wide array of different discourses under different labels. We found that our article selection process served better our interest to build an overarching view to studies in the field of external resource management across management disciplines. We reviewed all the abstracts in the nine chosen journals for the selected time period, 2000–2015, to identify articles on ERM, which resulted in 1290 articles. An ex-post analysis of the keywords of the selected articles showed that the number of individual keywords in the articles is so huge that the ERM articles were very unlikely to have been found by using a keyword-based search. Our research approach enabled mapping the intellectual structure of the ERM research, however, limiting the study to the nine journals could have biased the results concerning the contributions of institutions and authors to ERM research. Repeating the study with a different set of management journals could therefore improve the external validity of these findings. For example, examining ERM research in international business journals, such as the *Journal of International Business Studies*, would provide insights into the particular issues and management approaches especially relevant when

dealing with foreign external resources.

Bibliometric studies are also dependent on the data indexed in citation databases. In our case, we aimed at overcoming the few limitations regarding data quality. For instance, the *Journal of Supply Chain Management* has been indexed in Scopus only after 2006, and thus the data for 2000–2005 were downloaded from an alternative database, ProQuest. Some of the data fields were manually inserted to our Scopus-based master database, as there are field differences between the databases. However, the reference lists of these 35 JSCM records from ProQuest were not available in text format, and thus, they were not included in the database. The same issue concerns 46 new articles that were in press at the time of downloading the data (including 24 IMM, 11 JBR, 11 JMS publications). When selecting which analyses to report in the article, we decided not to report any cited author or cited journal statistics generated from the cited reference information, and thus this issue on data quality poses no problems.

Furthermore, the times cited statistics were missing from 150 records out of 1290, most of them being published in the year when downloading the data. Thus, this issue does not affect the results concerning the list of most cited articles in the sample, as it takes years to accumulate over 400 citations that was the limit in our reported analysis. The issue has a small effect on the number of average citations reported, but we tried to minimize the effect by excluding the 150 articles from the calculations.

7. Future research avenues

The amount of published research has grown exponentially since the 1980's (Bornmann & Mutz, 2015), and it is no longer possible for all scholars to master the literature in their field with traditional methods only. Bibliometric techniques and analyses have been developed to complement traditional literature reviews (Porter et al., 2002), and their use has grown intensely during the past few years (see, for example, the list of publications from diverse scientific fields that have applied VOSviewer in their analyses, at http://www.vosviewer.com/publications). Bibliometric analyses can aid researchers in finding hidden relationships and patterns in data that are extremely difficult to detect just by reading the studies one-by-one. These bibliometrics are thus present-day research methods to tackle the big data phenomenon within scientific discourses. In this article, it has been possible to portray only a small portion of the analyses that can be conducted with bibliographic data. In the future, we encourage more research on ERM that would analyze the cited reference data, for example. With that data, it is possible to uncover the hidden scholarly communities based on various citation, co-citation and bibliographic coupling analyses (Van Eck & Waltman, 2014). For instance, bibliographic coupling analyses relate and visualize the items (either authors, journals, institutions or countries) based on the number of references they share. In a similar way, citation analyses base their analysis on the number of times the papers cite each other.

We also encourage ERM researchers to reproduce our analyses with a broadened database with a wider variety of management journals. The identification of the research clusters and the main topics within them in this article could even enable future keyword-based search strategies with a larger journal sample (or a more targeted sample, such as one focusing on international business journals, or e.g. human resource management journals to particularly understand the external resource management issues and practices prevalent for a particular management function, and draw comparisons between them).

Finally, the key future research avenues naturally lie within the different areas of ERM itself. We hope the identification of the key clusters and key works within this topic area will assist researchers in better positioning their studies in the ERM discourse and finding the key references to build-upon, across disciplinary borders.

Appendix A. The clusters for each 4-year period. Clusters are organized along the strength of the cluster, indicating that the cluster appearing highest, has got the strongest links between the most common terms

Period 1 (2000 − 2003)		Period 2 (2004–2007)		Period 3 (2008–2011)		Period 4 (2012–2015)	
Label	#	Label	#	Label	#	Label	#
Practice, technology, cost, manufacturer		Chain, advantage, integration		Buyer, commitment, operation		Governance, complexity, effectiveness	
Practice	31	Chain	40	Buyer	40	Governance	27
Technology	25	Advantage	34	Commitment	24	Complexity	23
Cost	24	Integration	24	Operation	18	Effectiveness	21
Manufacturer	21	Ability	18	Competitive advantage	17	Control	21
Integration	20	Supply chain management	17	Value creation	14	Outsourcing	19
Supply chain	19	Improvement	16	Supply chain management	13	Opportunism	14
Environment	18	Adoption	12	Risk	13	Agreement	13
Decision	18	Experience	11	Flexibility	12	Interplay	12
Buyer	16	Transaction cost	10	Driver	12	Knowledge transfer	11
Improvement	15	Risk	10	Executive	12	Governance mechanism	10
Network, theory, market, knowledge, alliance		**Satisfaction, exchange, buyer supplier relationships**		**Trust, China, investment**		**Contract, commitment, satisfaction**	
Network	30	Satisfaction	22	Trust	46	Contract	29
Theory	29	Exchange	20	China	25	Commitment	23
Market	25	Buyer supplier relationship	17	Investment	23	Satisfaction	19
Knowledge	21	Contract	17	Actor	19	Retailer	16
Alliance	21	Control	15	Satisfaction	17	Financial performance	14
Investment	18	Supplier relationship	14	Partnership	12	Dependence	14
Value	18	Governance	13	Growth	12	Transaction	13
Source	15	Conflict	11	Conflict	12	Information sharing	12
Trust	15	Buyer seller relationship	11	Social capital	11	Conflict	12
Exchange	15	Opportunism	10	Social capital	11	Information exchange	11
Partner, commitment, operation		**Alliance, structure, power, strategic alliance**		**Outsourcing, buyer supplier relationships**		**Alliance, China, advantage, innovation performance**	
Partner	27	Alliance	43	Outsourcing	27	Alliance	32
Commitment	18	Structure	21	Buyer supplier relationship	26	China	30
Operation	18	Power	16	Behavior	18	Advantage	28
Structure	17	Strategic alliance	14	Effectiveness	16	Innovation performance	15

Success	16	China	12	Contract	16	Complementarity	14
Dependence	13	Competition	11	Governance	14	Positive relationship	12
Acquisition	12	Channel	10	Transaction cost economic	14	Absorptive capacity	12
Learning	11	Alliance performance	10	Complexity	13	Portfolio	12
Power	10	Value creation	10	Manufacturing	12	Supplier integration	12
Control	10	Alliance partner	9	Performance outcome	12	Strategic alliance	11
		Success, operation, boundary, new product development		**Alliance, experience, cooperation, learning**		**Actor, cooperation, business relationship, competition**	
		Success	13	Alliance	39	Actor	27
		Operation	12	Experience	28	Cooperation	23
		Boundary	11	Cooperation	21	Business relationship	23
		New product development	10	Learning	20	Competition	20
		Implementation	10	Society	18	Business network	14
		Outsourcing	10	Strategic alliance	14	Sale	12
		Production	8	Venture	14	Innovation process	12
		Application	8	Asset	12	Stakeholder	11
		Task	7	Knowledge management	10	Cluster	11
		Efficiency	7	Acquisition	10	Product innovation	10
						Flexibility, supply chain management, boundary	
						Flexibility	15
						Supply chain management	15
						Boundary	14
						Demand	12
						Manufacturing	11
						r & d	11
						Sustainability	10
						Distribution	9
						Logistic	8
						Responsiveness	8

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