

## CO-OCCURRENCE ANALYSIS OF KEY CONCEPTS ON RISK-TAKING IN ORGANIZATIONAL MANAGEMENT RESEARCH

### KONCEPCJA PODEJMOWANIA RYZYKA W BADANIACH Z ZAKRESU ZARZĄDZANIA – ANALIZA WSPÓŁWYSTĘPOWANIA

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**Abstract:** Risk-taking is a pivotal feature of entrepreneurship and business development. Poor management of business risk often leads to the loss of competitiveness with the consequence of business failure, and in contrast, it improves business sustainability when risks are managed effectively. The aim of this research is to identify leading concepts and trends in research on risk-taking in organizational management research by network analysis of keywords co-occurrence. Mapping knowledge domain was used as a useful method in bibliometrics. We analyzed 2912 records from Scopus database to risk-taking in organizational management research with the help of VOSviewer software tool. In particular, keywords co-occurrence analysis to visually explore knowledge bases, topic distribution, research fronts and research trends in the field of risk-taking research in a management context were adopted.

**Keywords:** risk taking, risk management, co-occurrence analysis, network analysis

**Abstrakt:** Podejmowanie ryzyka jest kluczową cechą przedsiębiorczości i rozwoju biznesu. Niedostateczne zarządzanie ryzykiem biznesowym często prowadzi do utraty konkurencyjności w wyniku porażki biznesowej, a przeciwnie do sytuacji, gdy ryzyko jest skutecznie zarządzane - wpływa na poprawę trwałości biznesu. Celem badań było wskazanie wiodących koncepcji i trendów w studiach dotyczących problematyki podejmowania ryzyka (risk-taking) w obszarze zarządzania przy wykorzystaniu analizy sieci współwystępowania słów kluczowych. Do mapowania wiedzy w tym zakresie wykorzystano metodę analizy bibliometrycznej. Przeanalizowano 2912 rekordów z bazy danych Scopus odnoszących się do problematyki podejmowania ryzyka w badaniach z zakresu zarządzania z wykorzystaniem oprogramowania VOSviewer. W szczególności przeprowadzono analizę sieci oraz współwystępowania słów kluczowych w celu wizualizacji danych, tematów i trendów badawczych w zakresie podejmowania ryzyka w kontekście zarządzania.

**Słowa kluczowe:** podejmowanie ryzyka, zarządzanie ryzykiem, analiza współwystępowania, analiza sieci

#### Introduction

Taking risks and dealing with uncertainty are essential parts of doing business. The role of risk taking in management is an important element in a firm's performance (Bochet 2019, Bussotti 2017, Gorzeń-Mitka 2016, Gorzeń-Mitka and Korombel 2011). Research in the field of risk taking has been conducted for many years in such sciences as psychology, medicine and sociology (Coombs, Sadrieh and Annavarjula 2009, Mihet 2013). In the management sciences, research on risk taking has been carried out intensively only in the last 20 years. The interest of risk-taking in the management area was largely motivated by the indicated importance of this problem for the creation and

subsequent performance of firms (Mikles and Kaplan 2013, Ferrero-Ferrero, Fernández-Izquierdo and Muñoz-Torres 2012). As Danisman and Demirel (2019) argue, value cannot be created without risk-taking. Studies examining the context of risk-taking relate to, for example:

- the relationship between risk-taking and ownership structure or capital structure (Laeven and Levine 2009, Paligorova 2010, Jedrzejczak-Gas 2018). Ownership and risk-taking are positively related, but this relation is observed only for owners having equity ownership in more than one company, i.e. those in groups. Group participation allows shareholders to act from a more diversified position and achieve efficient

economies of scale both of which lead to greater risk-taking.

- the role of legal protection - countries with better protection of shareholder rights seem to be associated with more risk-taking, while corporate risk-taking is restrained in countries with strong protection of creditor rights (Paligorova 2010).
- *gender differentiation - generally an organization with more female board directors invest in less risky positions. (Suzuki and Avellaneda 2018, Croson and Gneezy (2009), Gorzeń-Mitka (2015),*
- corporate governance - The regulatory environment and board independence jointly influence risk and some of the evidence suggests that the intensity of regulatory scrutiny is a partial substitute for board independence in achieving an optimal level of risk. (Faccio et al. (2016), (Boubakri et al. 2013, Nguyen2011) and other.

Even a cursory review of research indicates, however, meaningful dispersion of the subjects matters and empirical pieces of evidence on the role of risk-taking in management. The aim of this research is to identify leading concepts and trends in research on risk-taking in organizational management research by network analysis of keywords co-occurrence.

### **Literature review – some remarks on risk taking in management area**

Decision-making in today's complex environment requires operating effectively under conditions of uncertainty and rapid change (Ferrero-Ferrero, Fernández-Izquierdo and Muñoz-Torres2012, Mikles and Kaplan 2013, Sitek 2018, Marcysiak and Marcysiak 2018). This also requires the development of innovative and adaptable decision models (Bromiley 1991, Wiczorek-Kosmala 2017, Wiseman and Gomez-Mejia1998, Kuběňka and Slavíček 2016, Wyrwa and Barska2017), taking into account risk-taking behaviour, beyond the linear thinking that has characterized traditional strategic decision-making (Jelonek et al. 2020, Sipa 2018, Gorzeń-Mitka 2016, 2019). In management area, we can also observe very intensive development of risk taking studies. The inclusion of risk taking in management discourse (especially in a risk management context) is therefore a natural consequence of this process. Especially, the concept of risk-taking is a quality that is repeatedly used to describe entrepreneurship (Leech 2018, Sipa 2018, Moses 2014). The principal factor that separated entrepreneurs from hired employees was the uncertainty and riskiness of self-employment, which is defined and analyzed in many ways. The

determinants of organizational risk-taking and its impact on economic performance are critical issues in strategic management (Bromiley 1991, Kuraś, Kuraś and Grabowska2016). In the context of internal corporate governance, executive risk-taking varies across and within different forms of monitoring, it may exhibit risk-seeking as well as risk-averse behaviours (behavioural agency model of executive risk-taking by Wiseman and Gomez-Mejia (1998).

Another of the many factors that affect the taking of risk in the organization is age dissimilarity between the chair and the CEO (Zhou, Kara and Molyneux 2019, Skibiński 2018, Kim and Vonortas 2014). As indicated by Zhou, Y., Kara, A., and Molyneux, P. (2019) age dissimilarity in non-financial firms leads to better economic outcomes and a chair-CEO generational gap – defined as a minimum of 20 years' age difference – has a larger impact in reducing risk-taking.

It was also proved that there was a relationship between national culture and risk of firms - a strong and significant relationship among firms' risk-taking (for example in the insurance sector) and cultural characteristics, such as individualism, uncertainty avoidance, and power distance was found (Gaganis et al. 2019, Moses 2014).

An interesting study in regard to risk-taking was carried out by Hanna, J.T., Elms, A.K., Gill, H., Stanley, D.J and Powell, D.M. (2019). They examined how leaders' behaviour and subordinates' personality can impact subordinates' feelings of being trusted. They indicated that a leader delegating a task increases subordinate felt trust, further, subordinate felt trust increases when the task delegated is of high importance.

A major step in an appropriate oversight of risk taking by a firm is making a risk profile. It is understood as listing out all of the risks that a firm is potentially exposed to and categorizing these risks into groups. Elements of strong risk-taking firms are: hiring the right people, creating incentives for good risk taking, aligning organizational size and structure with risk taking, understanding the decision-making context, integrating risk analysis with the strategy process, monitoring and responsiveness, ensuring adequate capital for risks retained, preserving the enterprise's options, building the optimal risk governance and management structures and balancing quantitative and qualitative decision making (IFC 2012).

We can find interesting considerations about risk-taking and sensemaking versus risk management at Taarup-Esbensen (2019) study. Risk management literature is now relatively large, but organizations still have difficulty to understand and mitigate using the risk management tools

available. As indicated by Taarup-Esbensen (2019) conceptualizing risk as sensemaking becomes relevant due to the complexity of information available to the risk manager, and, coupled with time constraints, this means that risk managers increasingly rely on making sense of possible threats rather than on the accuracy of the information received.

Risk-taking research seems to be an attempt to seek answers to the more and more complex and uncertain environment in which today's organizations operate. It shows a new perspective of looking at a decision-making system in organisations.

This study mainly focuses on identifying research threads undertaken in management within a risk taking context over the past years. The aim of the research is to identify leading concepts and trends in research on risk-taking in organizational management research by network analysis of keywords co-occurrence. Scopus was the database which provided data for the analysis. The result of research was presented in the form of a knowledge map (Xin et al. 2018, Ziegler 2009). The main methods used while preparing this article constitute an overview of the academic literature (especially in Scopus database) and a network analysis.

## Materials and methods

The article presents the results of the bibliometric analysis of the scientific research regarding the risk-taking concept in organizational management research. The study consisted of the following stages (Figure 1).

In the first stage of research the Author used two databases: the Web of Science and Scopus. Research activity on the risk taking concept was assessed by the number of publications. As indicated by Xin et al. (2018) *the quantity variations of academic papers on a subject is a vital indicator of the development trend in that research area, and a reflection of change in the extent of the subject knowledge. By plotting the quantity of literature over time and conducting multivariate statistical analysis, one can understand the research level and future development trend in a certain field.* The breakdown of the number of publications is presented in Figure 2.

Figure 2 (2nd stage of research) shows that the number of publications related to the notion "risk taking" is similar in both databases, but generally more publications were collected in Scopus.

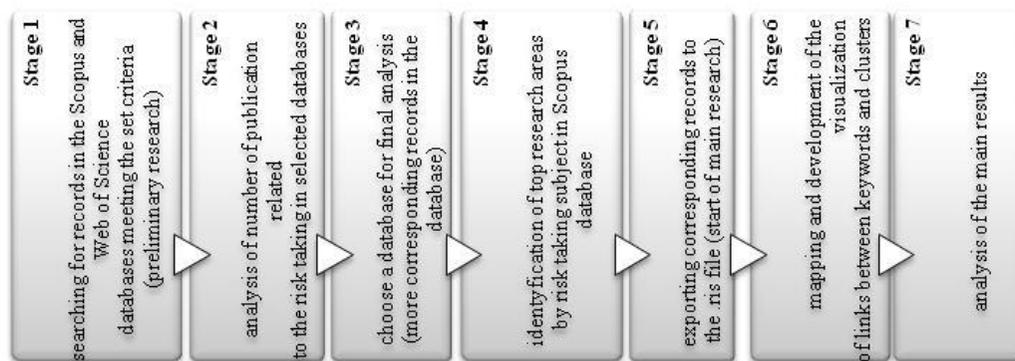
The quantities of documents relating to risk taking studies have been through three stages: "initial", "primary" and "fast-growing" which explained below:

- initial stage (1944–1970) - from the first article regarding risk taking studies published in 1944 to the 1970s, there were few related research results in this field, and the maximum annual number of published papers was only 10 (Scopus database), which means a complete document system had not yet been formed;
- primary stage (1971–2004) – the number of documents at this stage started to rise significantly with an average annual growth of 6 articles. It can be considered that the field of research for risk taking was initially formed and systematically growing during this period;
- fast-growing stage (2002–2018) - the number of documents at this stage have an average annual growth of 100 articles. It indicates that the research on risk taking begins to increase and entered the phase of rapid development.

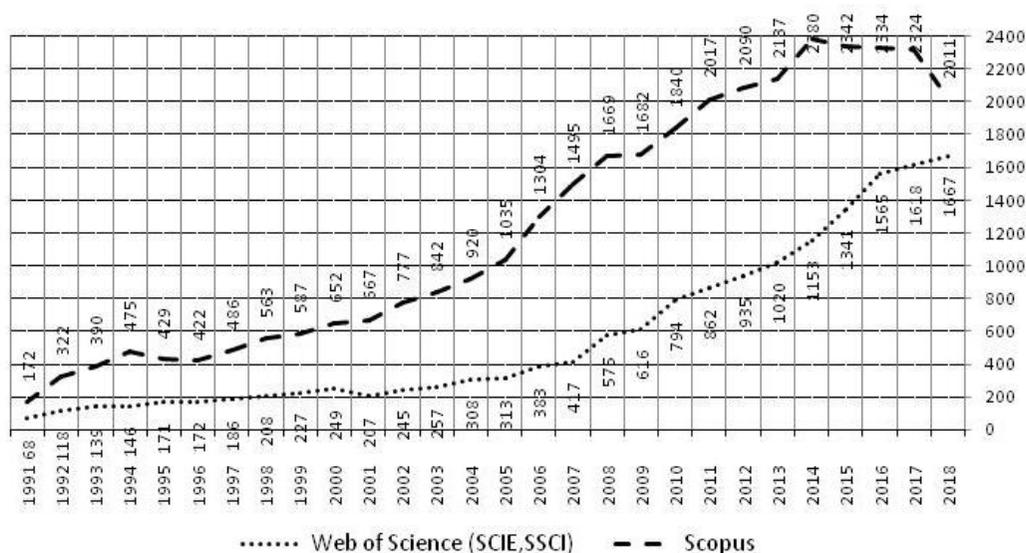
It can be seen from Fig. 2 that during the entire period under consideration, more articles from topic risk taking were indexed in Scopus database. Therefore, this database was selected for further analysis (3th stage of research).

At the next stage of research (4th) the main areas of research related to risk taking topic was identified. The analyze was concluded in relation to this criterion which involved number of publications in the top 10 subject areas in management studies.

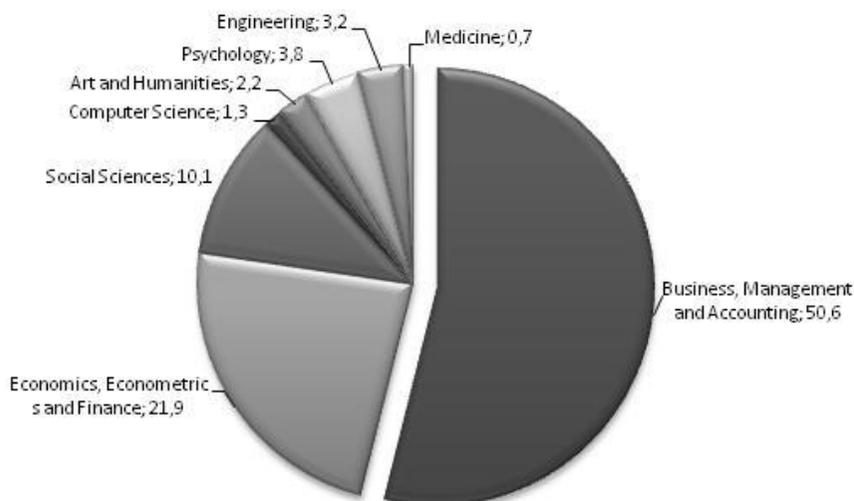
It can be seen from Fig. 3 (4th stage of research) that the nature of risk taking studies in management by subject area have been quite concentrated. Researchers are coming mostly from domains, such as Business, Management and Accounting (50.6%) and Economics, Econometrics and Finance (21,9%).



**Figure 1.** Co-occurrence analysis of key concepts on risk-taking in organizational management research – stages of research  
Source: own elaboration based on Ziegler (2009).

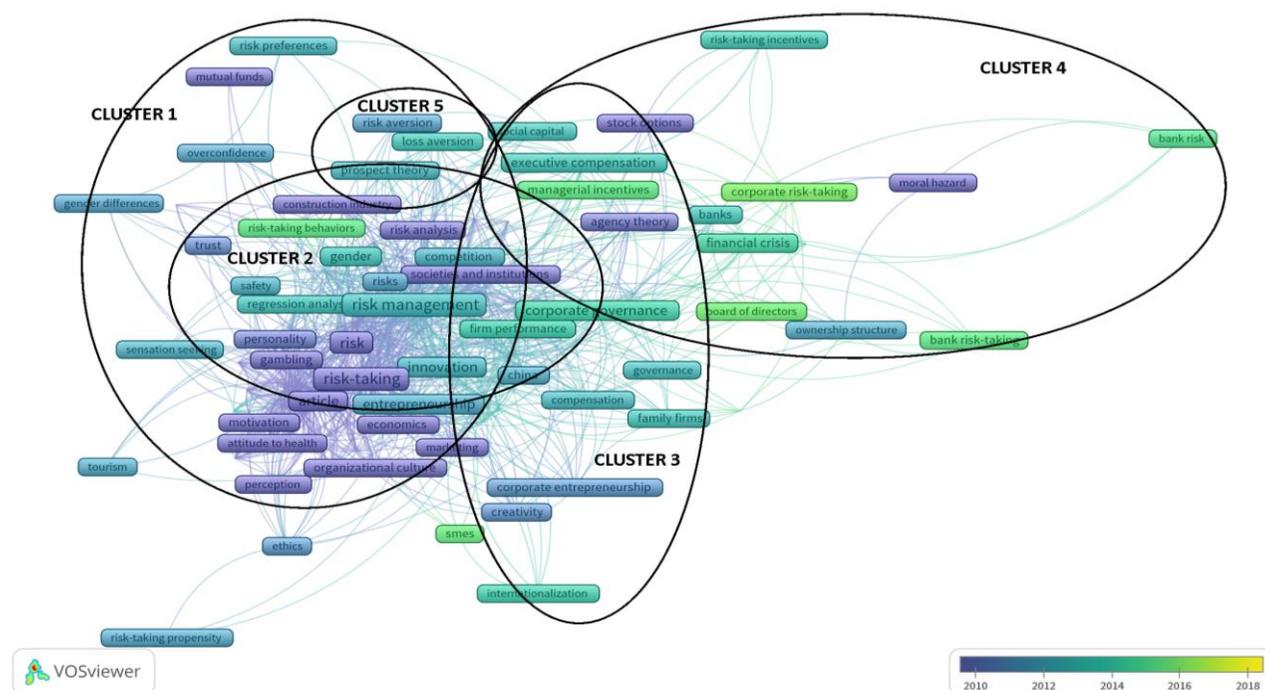


**Figure 2.** Quantitative distribution of published articles in risk taking (topic "risk taking" in the Scopus and Web of Science databases in 1990-2018)  
Source: own processing, data extracted from Scopus and Web of Science databases.



**Figure 3.** Top 10 research areas by risk taking subject in the management area (%)  
Source: own processing, data extracted from Scopus database.





**Figure 5.** Keywords co-occurrence network of risk taking studies in organizational management research detected in time  
Source: own processing via VOSviewer programme, data extracted from Scopus database.

In Fig. 4, it can be seen that the frontier topics of risk taking studies form five clusters, and the keywords in the same cluster show greater similarity in respect of the research topic. The map includes the most frequently occurring keywords. The size of the nodes representing each of the keywords appearing as well as the font size, in which the name of a given node is written, correspond to the frequency of the occurrence of a given term. The distance between items in the visualization approximately indicates the relatedness of them in the co-occurrence network. In general, the closer two items are located to each other, the stronger their relatedness in terms of occurrence links in an analysed group of publications (van Eck and Waltman, 2019). Figure 4 presents the resulting map (a whole map of co-occurrence keywords and Figure 5 presents the resulting maps of clusters detected in time.

Additionally, the resulting connection network is quite loose and is characterised by numerous connections only in selected parts of the map. Keywords with the highest occurrence ratio and total link strength are as follows: risk taking (388), risk management (157), risk (108), entrepreneurial orientation (99), decision making (77), innovation (77), human (71), entrepreneurship (71), risk assessment (67), high risk behaviour (58) and

corporate governance (57). Details mainly on the keywords and their characteristics by co-occurrences and total links strength related to this map presented in Table 1.

*Cluster 1 (red):* (keywords of coexistence include: risk taking, corporate governance, executive compensation, performance, banking, financial crisis, firm performance, prospect theory, banks).

The first cluster classified in VOSviewer (Cluster 1, Fig. 4, Fig. 5; Table 1) was a group of issues related to, among others, corporate governance, banks, and firm performance. The most frequent and most interrelated component in the cluster was the risk-taking and its human aspects. The importance of corporate governance and finance aspects of the organization is indisputable. In the map of trends, the risk-taking has clearly shifted into the direction towards the centre of the map, which points to its numerous stronger connections with a large number of other issues. These elements exhibited a very strong relation with executive compensation, risk aversion, managerial incentives, and ownership structure. The cluster is relatively homogeneous in terms of time analysis, research on the correlation of keywords has been initiated in a similar period of time.

**Table 1.** Risk taking in organizational management research - analysis results by cluster 1

Cluster	Number of keywords	Keyword (max. co-occurrence)	Max. number of co-occurrence for main keyword	Keyword (max. total link strength)	Max. total link strength for main keyword	Keywords	Co-occurrences	Total link strength
1	29	risk taking	388	risk taking	1184	risk taking corporate governance executive compensation performance banking financial crisis firm performance prospect theory banks risk aversion bank risk-taking corporate risk-taking managerial incentives family firms loss aversion stock options agency theory industry compensation moral hazard regulation bank risk governance national culture overconfidence ownership structure risk-taking incentives board of directors social capital	388 57 38 37 31 31 26 24 20 18 17 15 15 14 14 14 13 13 12 12 12 11 11 11 11 11 11 11 10 10	1184 88 64 82 37 36 78 38 25 29 8 17 29 22 34 27 29 41 30 11 15 5 20 18 27 17 13 21 16

Source: own processing via VOSviewer programme, data extracted from Scopus database.

*Cluster 2 (green): (keywords of coexistence include: risk management, decision making, risk assessment, risk perception, managers, competition, management, project management).*

The second cluster classified in VOSviewer (Cluster 2, Fig. 4, Fig. 5; Table 2) was a group of issues related to, among others, risk management process (assessment, analysis, perception), project management and strategic planning. The most frequent and most interrelated component in the cluster was risk management and decision making. Managers often believe in their organization's ability to balance risk and reward and understand risk in the context of opportunities. As we can read in various risk management reports, organizations declare that they take the right amount of risks and that the work their company does to manage those risks is

optimizing outcomes across the enterprise. But, on the other hand, even where risk-taking could deliver value, from improving customer loyalty to ensuring the success of mergers and acquisitions, many organizations are simply not taking advantage of it. It is an apparent gap between perception and management reality.

In this cluster, we can find relatively new elements (see Figure 5). This may indicate that research on e.g. risk-taking behaviour or gender are at a rather initial stage but are presented also through quantitative research (the link between elements is quite loose). It can be said that that risk-taking research in management in these aspects is a new trend.

**Table 2.** Risk taking in organizational management research - analysis results by cluster 2

Cluster	Number of keywords	Keyword (max. co-occurrence)	Max. number of co-occurrence for main keyword	Keyword (max. total link strength)	Max. total link strength for main keyword	Keywords	Co-occurrences	Total link strength
2	28	risk management	157	risk t management	491	risk management decision making risk assessment risk perception managers competition management project management finance investments risk analysis societies and institutions industrial management behavioural research regression analysis risk propensity strategic planning investment product development profitability risk-taking behaviours construction industry mathematical models decision theory marketing mutual funds safety	157 77 67 46 25 22 21 20 17 17 17 16 15 14 14 14 13 12 12 12 11 11 10 10 10 10	491 253 239 138 106 58 65 62 67 72 58 60 62 71 68 47 60 36 34 39 47 40 49 38 33 14 43

Source: own processing via VOSviewer programme, data extracted from Scopus database.

*Cluster 3 (blue): (keywords of coexistence include: risk, entrepreneurial orientation, innovation, entrepreneurship, innovativeness, gender, proactiveness, entrepreneur, entrepreneurialism, trust).*

The third cluster (Cluster 3, Fig. 4, Fig. 5; Table 3) is connected generally to the entrepreneurial orientation, innovation, SMEs and entrepreneurship aspects in a family business. We observe strong development and different specialization areas of decision making with the entrepreneurship context. It may indicate that the research from the perspective of risk-taking are at quite a stable stage (but the link between elements

is quite strong). It can be said that research in these areas presents a grounded stable trend.

*Cluster 4 (yellow): (keywords of coexistence include: human, high risk behaviour, female, male, adult, psychological aspect, personality, gambling, adolescent).*

The fourth classified cluster (Cluster 4, Fig. 4, Fig. 5; Table 4) was a group of issues associated, among other things, with the risk perception in the social aspects of the decision-making process. These elements exhibited a strong relation with human, gambling, gender, sensation seeking and high-risk behaviour.

**Table 3.** Risk taking in organizational management research – analysis results by cluster 3

Cluster	Number of keywords	Keyword (max. co-occurrence)	Max. number of co-occurrence for main keyword	Keyword (max. total link strength)	Max. total link strength for main keyword	Keywords	Co-occurrences	Total link strength
3	25	risk	108	risk	241	risk entrepreneurial orientation innovation entrepreneurship innovativeness gender proactiveness entrepreneur entrepreneurialism trust corporate entrepreneurship creativity learning risk preferences SMEs entrepreneurs competitiveness family business gender differences risk-taking propensity ethics internationalization perception tourism uncertainty	108 99 77 71 34 32 29 23 21 21 15 14 14 13 13 12 11 11 11 11 10 10 10 10 10 10	241 155 161 139 117 51 106 71 23 25 28 28 49 18 27 13 18 20 10 17 59 18 21

Source: own processing via VOSviewer programme, data extracted from Scopus database.

**Table 4.** Risk taking in organizational management research – analysis results by cluster 4

Cluster	Number of keywords	Keyword (max. co-occurrence)	Max. number of co-occurrence for main keyword	Keyword (max. total link strength)	Max. total link strength for main keyword	Keywords	Co-occurrences	Total link strength
4	14	human	71	human	614	human high risk behaviour female male adult psychological aspect personality gambling adolescent motivation sensation seeking attitude to health attitude pathological gambling	71 58 40 40 33 28 25 24 23 16 12 11 10 10	614 513 375 384 319 281 89 119 235 87 37 105 68 88

Source: own processing via VOSviewer programme, data extracted from Scopus database.

*Cluster 5 (violet): (keywords of coexistence include: commerce, leadership, organizational culture).*

Decision making has clearly shifted in the direction towards the centre of the whole map of keywords co-occurrence, which pointed to its somewhat weaker connections with other issues. Additionally, collaboration and interoperability research from the risk-taking perspective are at a rather initial stage (Fig. right). It can be said that

management research in these areas is quite a new trend.

Last, the fifth classified cluster (Cluster 5, Fig. 4, Fig. 5; Table 5) was a group of issues associated, among other things, with the general aspects of management like leadership and organizational culture. Commerce has clearly shifted out of the centre of the whole map of keywords co-occurrence, which points to its weaker connections with other issues.

**Table 5.** Risk taking in organizational management research – analysis results by cluster 5

Cluster	Number of keywords	Keyword (max. co-occurrence)	Max. number of co-occurrence for main keyword	Keyword (max. total link strength)	Max. total link strength for main keyword	Keywords	Co-occurrences	Total link strength
5	7	commerce, leadership	25	commerce, organizational and management	150/145	commerce leadership organizational culture economics organization and management commercial phenomena organization	25 25 15 14 14 10 10	150 114 72 82 145 99 100

Source: own processing via VOSviewer programme, data extracted from Scopus database.

### Limitation of this study

Risk taking is undoubtedly a multidimensional concept (not only in management science), and in this study has only investigated leading trends in this area. There are many other areas of challenge in risk taking in organizational management research and future studies should investigate the relationships between other dimensions of this concept. Second, this research aimed to identify selected challenges in an exploratory way. Future research could extend this research concept, here identified complementing it with dedicated areas such as business aspects. Finally, based on this study, future research could use these findings in management practice. Additionally, research on risk taking in the management context can be extended by e.g document co-citation analysis.

### Conclusion

Based on the mapping knowledge domain analysis, the VOSviewer was used to analyse risk taking studies from an organizational management perspective based on keywords co-occurrence

analysis. The main research conclusions are as follows:

1. The vigorous growth of the number of articles indicates that risk taking studies are developing rapidly in the global academic community.
2. By clustering the network map for keywords co-occurrence and analyzing the research activities in risk taking in organizational management research, it was found that the frontier topics in these studies consist of ten representative areas concentrated in main keywords like: risk management, risk, entrepreneurial orientation, decision making, innovation, human, entrepreneurship, risk assessment, high risk behaviour and corporate governance.
3. The latest trends in research on risk-taking in organizational management research have been identified as risk management, entrepreneurship and the psychological aspect on risk in management studies.

This area undoubtedly constitutes still great challenges to academic researchers and managers. The complexity and multidimensionality

of the variables that determine risk taking require the decision-makers to take a look at the role of management (especially in a risk management context) in company processes from different perspectives (e.i. "soft" behaviours).

In the author's opinion, the results of research presented in this study may provide a basis for further work in this area.

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