

## ONTOLOGICAL ANALYSIS OF THE PROJECT RISK MANAGEMENT CONCEPT ‘RISK’

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**Abstract.** The aim of the current research series is to examine the definitions of the concept ‘risk’ and analyze the concepts used in the definitions of ‘risk’ in the sources of these definitions in order to perform the ontological analysis of the concept of ‘risk’. Ontological and epistemological analysis of the concepts in the definition of the concept ‘risk’ was used to answer the question what ‘risk’ means in project management. This investigation represents a part of the research series where the ontological, epistemological and methodological analysis of project risk is performed with the aim to improve risk registers and risk management as a whole. In the previous studies the author analyzed the concept of ‘event’ that defines the content of the concept ‘risk’. The use of ‘event’ was analyzed in different sources to find out how the concept should be used. The ontological, epistemological and methodological analysis of the definitions of the concept ‘risk’ is the theoretical foundation for risk register creation because it is possible to create complete and understandable register for the participants of the project risk management process. The author believes that the conducted research helps establish confidence that ontological analysis is the method that together with the epistemological and methodological analysis provides opportunity to perform analysis of risk management sources aimed at improving risk management. The results of the study cannot be considered sufficient for deriving valid conclusions about project risk management and developing recommendations for improving risk management with regard to the content of the risk register. For valid conclusions and recommendations, a deeper research is needed which, first of all, would analyze a larger number of sources.

**Keywords:** *concept, event, ontological analysis, project, project risk register, risk.*

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### INTRODUCTION

Risk management is an important element of project management. Qualitative risk management provides for a full-fledged risk identification, risk analysis and management. The risk register represents a significant risk management document that summarizes the identified risks, results of risk analysis and management. Identification of risks is not easy; however, it can be relieved by understanding the concept of ‘risk’ in project management. For this reason, it is important to study the definitions of the concept ‘risk’ by analyzing the concepts used in its definitions.

## 1. RESEARCH METHODOLOGY

The study is based on the use of qualitative research methods. Taking into account the size constraints of the article, initially 25 sources were selected out of 120, which had been previously chosen for a more comprehensive study. A generator of random numbers was used for the selection of the sources ([www.random.org](http://www.random.org)).

During the research, one of the sources was excluded because it was not suitable for the study. Each of the sources contained a definition of 'risk', 23 sources were in *Adobe Acrobat pdf* format and two – in *Microsoft Word doc*. All sources, except for four books by definite authors, were publicly available online in July, 2017. The content of the first book is partly available in the online *Google Books* site, the content of 3 books is not available in *Google Books*. The definitions and sources were analyzed in accordance with the ontological categories.

The term 'ontology' is defined in the English Oxford Living Dictionaries ([en.oxforddictionaries.com](http://en.oxforddictionaries.com)) as "The branch of metaphysics dealing with the nature of being", in the Cambridge Dictionary ([dictionary.cambridge.org](http://dictionary.cambridge.org)): "the part of philosophy that studies what it means to exist", in the Macmillan Dictionaries ([www.macmillandictionary.com](http://www.macmillandictionary.com)): "the type of philosophy that deals with the study of existence" and in the Merriam-Webster dictionary ([www.merriam-webster.com](http://www.merriam-webster.com)) the first meaning is "a branch of metaphysics concerned with the nature and relations of being", the second "a particular theory about the nature of being or the kinds of things that have existence".

For the study purposes, the author used the Find and Advanced search function of programme *Adobe Acrobat Reader DC 2017 Release* as well as the Concordance, Clusters/N-Grams, Collocates and Word List functions of *AntConc 3.4.4w (Windows)* and Search functions of *Microsoft Word*. Applications *Adobe Acrobat Reader* and *AntConc* are available online free of charge. To use the *AntConc* application for analyzing the definitions of the concept 'risk', each definition was saved in a separate text file thus together creating 25 text files. One of the sources could not be used in the research, because the concept 'risk' was not defined unequivocally. The remaining 22 sources were first of all analyzed in their original format of *Adobe Acrobat Reader DC* and two sources in their original format of *Microsoft Word*. Secondly, to use the *AntConc* application for the analysis of the concepts used in the definitions of 'risk', 22 files were transformed into text files with the help of functions Save as Other of *Adobe Acrobat Reader DC* by choosing Text and two files into text files with the help of functions Save as Other of *Microsoft Word*.

## 2. FINDINGS / RESULTS

According to *AntConc*, there were 573 words in the definitions of the concept 'risk', 166 of them are original. 10 most commonly used nouns, verbs, adjectives and adverbs are as follows: project – 25, event – 15, risk – 15, is – 14, negative – 9, objectives – 9, effect – 8, has – 8, uncertain – 8, condition – 7.

In each of the definitions of ‘risk’, there is one or more concepts, which determine the volume of the concept ‘risk’. These concepts can be named the concepts determining the content of the defined concept, or the decisive concepts. Table 1 presents the concepts determining the definitions of the concept ‘risk’.

**Table 1.** The concepts determining the definitions of the concept ‘risk’

No.	Definition	Decisive concept or concepts
1.	The implications of uncertainty about the level of project performance achievable (Chapman & Ward, 2003)	implications
2.	The chance that an undesirable project event will occur and the consequences of all its possible outcomes (Larson & Gray, 2011)	chance
3.	Risk is a measure of the probability and consequence of not achieving a defined project goal (Kerzner, 2009)	measure, consequence
4.	The chance of something happening that will have an impact upon objectives. It is measured in terms of consequences and likelihood. In some situations, risk arises from the possibility of deviation from an expected outcome or event, such as a deviation from the project plan. The consequences may be positive or negative (Cooper <i>et al.</i> , 2005)	chance
5.	Any event which is likely to adversely affect the ability of the project to achieve the defined objectives (Method123, 2003)	event
6.	Risk is the potential effect of uncertainty on project objectives (PM4NGOs, 2013)	effect
7.	The exposure of stakeholders to the consequences of variation in outcome (Association for Project Management, 2006)	exposure
8.	External factors and events that could affect the progress or success of the project (International Labour Organization, 2015)	factors, events
9.	An uncertain event or condition that, if it occurs, has a positive or negative effect on a project’s objectives (Official PM Book for AAPM, 2014).	event, condition
10.	Risk is the chance that an event will prevent, or negatively affect the chances of, a project achieving its objective (Organization for Security and Co-operation in Europe, 2010)	chance
11.	Risk is the probability that an event or action may adversely affect the achievement of project objectives or activities. Risks are composed of factors internal and external to the project, although focus is generally given to those factors outside project management’s direct control (European Commission, 2004)	probability
12.	Risk refers to an uncertain event that affects the objective of a project that is about to start and includes results and extent of influence it may cause (Ohara, 2005)	event
13.	An uncertain event or condition that, if it occurs has a positive or negative effect on a project’s objectives (City Of Tampa – Department of Technology and Innovation, n.d.)	event, condition
14.	Risk is a function of the likelihood of a loss weighted by its severity (The American Institute of Architects, 2007)	function
15.	A measure of future uncertainties in achieving program performance goals within defined cost and schedule constraints. It has three components: a future root cause, a likelihood assessed at the present time of that future root cause occurring, and the consequence of that future occurrence (Department of Defense, 2006)	measure
16.	A factor, element, constraint, or course of action on a project that introduces an uncertainty of outcome and the possibility of technical	factor, element,

	deficiencies, inadequate performance, schedule delays, or cost overruns that could impact a mission. In the evaluation of project risk, the potential negative or positive impacts and the probability of occurrence must be considered (U.S. Department of Energy, 2004)	constraint, course of action on a project
17.	Project risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on at least one project objective (U.S. Department of Justice, 2015)	event, condition
18.	Reasoned assessment of the potential inability to achieve project objectives within defined cost, schedule institutional and technical constraints (U.S. Department of Transportation, 2017)	assessment
19.	An uncertain event that could affect the program positively or negatively. Risk and its outcomes can be quantified in some definite way (U.S. Government Accountability Office, 2015)	event
20.	Risk is an event or condition that may cause a negative effect on a project (Program Management Office (PMO), 2002)	event, condition
21.	A risk is any factor that has the possibility of causing harm and/or loss to the project (Missouri Information Technology Advisory Board, 2003)	factor
22.	An uncertain event or condition that, if it occurs, has a negative or positive effect on at least one project objective (Department of Transportation, 2017)	event, condition
23.	Uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives (Transportation Research Board, 2010)	event, condition
24.	Project risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives (ND Enterprise Project Management Advisory Group, 2009)	event, condition

Source: Compiled by the author

In 11 definitions, or 46 % of all the definitions, the decisive concept is ‘event’ or ‘events’, in 3 definitions the only decisive concept and the second most often used one is ‘chance’. In 10 definitions, there are several decisive concepts – 7 definitions include the concepts ‘event’ and ‘condition’. Overall, all definitions are comparable as the structure of definitions is similar. The first part establishes what ‘risk’ is: “risk is ...”, the second part limits the scope of the decisive concept, “the limiter – the decisive concept”, or “the decisive concept – the limiter”.

The assessment of the concepts limiting the scope of the decisive concept by selected categories suggests that most of the limiters correspond to the categories of action and quality. Table 2 summarizes information about the limiter/limiters of the scope of the decisive concept and provides their assessment in compliance with the ontological categories.

**Table 2.** Information about the limiter/limiters

No.	Decisive concept or concepts	Limiter/limiters of the decisive concept volume	Assessment of the limiter/limiters of the decisive concept volume by ontological category
1.	implications	... of uncertainty	action
2.	chance	... that an undesirable project event	action
3.	measure consequence	... of the probability ... of not achieving	quantity action
4.	chance	... of something	action

5.	event	any ...	quantity or quality
6.	effect	potential ...	quality
7.	exposure	... of stakeholders	action
8.	factors, events	external ...	quality
9.	event, condition	uncertain ...	quality
10.	chance	... that an event	action
11.	probability	... that an event	action or relation
12.	event	uncertain ...	quality
13.	event, condition	uncertain ...	quality
14.	function	... of the likelihood of a loss weighted by its severity	relation?
15.	measure	... of future uncertainties	action
16.	factor, element, constraint, course of action on a project	... that introduces	action
17.	event, condition	uncertain ...	quality
18.	assessment	Reasoned ... of the potential inability	quality
19.	event	uncertain	quality
20.	event, condition	--	--
21.	factor	any ...	quantity or quality
22.	event, condition	uncertain ...	quality
23.	event, condition	uncertain ...	quality
24.	event, condition	uncertain ...	quality

Source: Compiled by the author

Table 3 summarizes the use of the definition and the decisive concept. The number of times the concept was used was established with the help of Advanced Search function of the programme *Adobe Acrobat Reader DC 2017 Release*.

**Table 3.** The use of the definition and the decisive concept

No.	Decisive concept or concepts	Presence of definition	Number of times used	Limiter/-s of the decisive concept	Number of times of the concept use
1.	implications	no	133	... of uncertainty	699
2.	chance	no	56	... undesirable project event	1 project event 7 event 307
3.	measure consequence	no	37 74	... of the probability ... of not achieving	209 38
4.	chance	no	22	... of something	10
5.	event	no	2	any ...	13
6.	effect	no	11	potential ... of uncertainty	55 3
7.	exposure	no	5	... of stakeholders	66
8.	factors events	no	19 26	external ...	63
9.	event condition	risk event no	4 1	uncertain ...	1
10.	chance	no	1	... that an event	8
11.	probability	no	5	... that an event	2
12.	event	no	33	uncertain ...	9

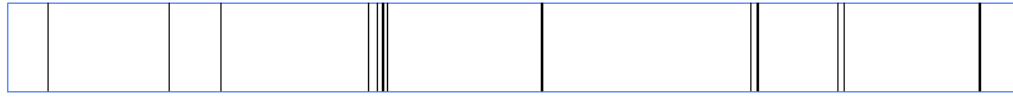
13.	event condition	no	3 2	uncertain ...	1
14.	function	no	6	... of the likelihood of a loss weighted by its severity	7 likelihood 2 severity
15.	measure	no	3	... of future uncertainties	5 uncertainties
16.	factor element constraint course of action	no	3 7 1 1	... that introduces an uncertainty	4 uncertainty
17.	event condition	no	9 2	uncertain ...	3
18.	assessment	no	104	... of the potential inability	3 inability
19.	event	no	26	uncertain	12
20.	event condition	no	9 3	--	--
21.	factor	no	4	any ...	6
22.	event condition	no	10	uncertain ...	13
23.	event condition	no	13 7	uncertain ...	12
24.	event condition	no	48 3	uncertain ...	5

Source: The author's calculations

None of the sources, except one, provides the definition of the decisive concept. In one of the sources (source No. 7), there is a definition of 'risk event'. 'Risk event' is used three times in the source, i.e., in one definition of 'risk event'. The concepts of 'risk event' and 'event', which are used in the definition of 'risk', cannot be considered the same because the decisive concept of 'risk event' is 'discrete occurrence'.

Three most common decisive concepts – 'event', 'condition', 'chance' – were chosen for further research. The total number of sources was 14. Because of the size limitations of the publication, the author chose two sources by using a random number generator ([www.random.org](http://www.random.org)). The first decisive concept was 'chance' (source No. 4), the decisive concepts in the second one were 'event' and 'condition' (source No. 17). As none of the selected concepts was defined in the sources, the author performed analysis of the concept use and the results of the analysis were compared with the generally accepted concept definitions in authoritative dictionaries.

The analysis of the source (source No. 4) with *AntConc* shows that the concept of 'chance' is used 22 times, the frequency of use is at the top of the list – it ranks 730–755<sup>th</sup> out of 5630 occurrences, or different words. The concept of 'chance' is used in 0.02 %, or 22 words out of 110 173. Compared to the concept 'risk' with 2.4% and concept 'risks', 0.9%, the concept of 'chance' is not common. In the text of the source, 'chance' is distributed evenly with just one place with a more intensive use (see Fig. 1). The concept 'chance' is most common in chapter 11 "Managing Opportunities".



**Fig. 1.** The frequency of use of the concept ‘chance’ (Developed by the author using *AntConc*).

The concept ‘chance’ was used in 21 sentences about risks. In order to assess the compliance of the concept of ‘chance’ to the generally accepted use as defined in authoritative dictionaries, Table 4 summarizes the definitions of ‘chance’ from several dictionaries.

**Table 4.** Definitions of ‘chance’ from several dictionaries

Dictionary	Definitions of ‘chance’ in dictionaries and a comment
Cambridge Dictionary	1. an occasion that allows <b>something to be done</b> 2. the level of <b>possibility that something will happen</b> 3. a possibility that something negative will happen 4. the force that causes things to happen without any known cause or reason for doing so
English Oxford Living Dictionaries	8. A possibility of something happening 9. The probability of something desirable/1 happening 10. An opportunity to do or achieve something 11. The occurrence of events in the absence of any obvious intention or cause
Macmillan Dictionary	12. an opportunity for you to do something, especially something that you want to do 13. the possibility that something will happen 14. way things happen without being planned or expected
Collins English Dictionary	15. the unknown and unpredictable element that causes an event to result in a certain way rather than another, spoken of as a real force 16. the extent to which an event is likely to occur; probability

Source: The author’s selection from dictionaries

The dictionary definitions were numbered and the source sentences using ‘chance’ were analyzed according to the definitions (see Table 5).

**Table 5.** Concept ‘chance’ analyzed according to the definitions

Use of concept ‘chance’ in the source	No. of the definition	Comments
In project management context, it is the chance of something happening that will have an impact upon objectives (the sentence is used 3 times in defining ‘risk’, twice in the text and once in the glossary)	1, 5 (partly)	According to the Cambridge Dictionary, “chance” is “something to be done” and “something will happen” “of something happening” is unnecessary in the source definition because it is a part of the concept ‘chance’.
This can be a problem in practice, as there is a chance that significant risks may go unnoticed		N/a because the use of the concept ‘chance’ is n/a concerning ‘risk’.

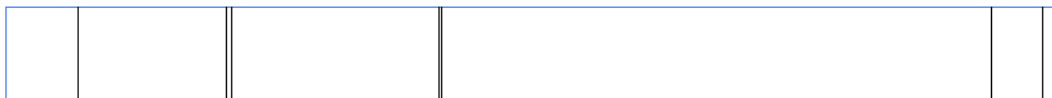
The earlier version identifies items with high likelihoods or high consequences or both, so the chance of high consequence but low likelihood items being ignored is reduced greatly	2, 7, 8, 9, 13, 16	Concepts 'likelihoods' and 'consequences' are not used in the definitions of 'risk', although 'consequences' can be referred to the "impact upon objectives" part of the definition of 'risk'.
When considering opportunities, the likelihood scale need not change, as this reflects the chance of a beneficial outcome		N/a because the use of the concept 'chance' is n/a concerning 'risk'.
Changing the likelihood of the opportunity, to increase the chance of beneficial outcomes	2, 3	Concepts 'likelihoods', 'opportunities' and 'outcomes' are not used in the definitions of 'risk', although "outcomes" can be referred to the "impact upon objectives" part of the definition of 'risk'.
After opportunities have been changed or shared, there may be residual opportunities that are retained with no further immediate action specified. This may be described as 'leaving it to chance'		N/a because the use of the concept 'chance' is n/a concerning 'risk'.
The likelihood here was the chance of realizing the benefit within the available budget, either during the contract negotiation process or as part of project implementation		N/a because the concept 'chance' is used for defining another concept.
XY axis "Chance of meeting the target"	10, 14	The author assumed that the concept 'chance' is used as a synonym to 'risk'.
The graph shows the way in which the chance of achieving the target (on the vertical axis) increases as the cost target (on the horizontal axis) increases	10, 14	The author assumed that the 'chance' concept is used as a synonym to 'risk'.
This is relatively conservative – it implies only a 10% chance of failure to achieve the cost target	2, 9	The author believes that the concept 'chance' in the sentence does not coincide with the same concept in the definition of 'risk'.
The vertical line A shows the dollar value of the most recent cost estimate: the results indicated slightly more than a 50 % chance the project could be completed within this amount	2, 9	The author believes that the concept 'chance' in the sentence does not coincide with the same concept in the definition of 'risk'.
Line B shows the estimate including the original contingency allowance: the results indicated a 90 % chance of completing the project within this budget under normal conditions	2, 9	The author believes that the concept 'chance' in the sentence does not coincide with the same concept in the definition of 'risk'.
In this case, there was a 5 % chance of a variation less than -10 %, and a 5 % chance of a variation over +10 %	2, 9	The author believes that the concept 'chance' in the sentence does not coincide with the same concept in the definition of 'risk'.
For example, there was a 20 % chance that a labour site allowance might be imposed on Stage 1 construction, which would have the effect of increasing Stage 1 construction costs by 30 %	2, 9	The author believes that the concept 'chance' in the sentence does not coincide with the same concept in the definition of 'risk'.



This was a simple assumption for modelling, but it gave appreciable weight to the extreme values within distributions where there was a long tail, i.e. where there was a chance of a large deviation from the most likely cost outcome	2, 9	The author believes that the concept 'chance' in the sentence does not coincide with the same concept in the definition of 'risk'.
There was a small chance the return would be negative	2, 9	The author believes that the concept 'chance' in the sentence does not coincide with the same concept in the definition of 'risk'.
The central line is the mean outcome forecast by the model; the band on either side is the range in which the outcome is expected with 90 % chance	2, 9	The author believes that the concept of 'chance' in the sentence does not coincide with the same concept in the definition of 'risk'.
The extent to which an event is likely to occur; mathematically, a probability is a number in the scale 0 to 1 that refers to the chance of a random event occurring		N/a because 'chance' is used in the definition of another concept.

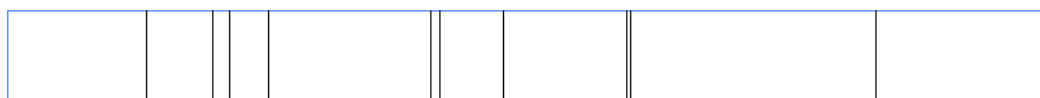
Source: The author's valuation

According to the analysis of the source (source No. 17) with *AntConc*, the concept of 'event' is used 9 times, the frequency of its use ranks at the top of the list, between 458<sup>th</sup> – 499<sup>th</sup> of 2675 ranks or different words. The concept of 'event' is used in 0.03 %, or 9 words out of 27 063. Compared to 3.8 % of the concept 'project', 1.2 % of 'management', 'schedule' with 0.6 % and 'risk', 0.4 %, the concept of 'event' is not often used. In the source text 'event' is used in individual places and it is distributed evenly over the text (see Fig. 2).



**Fig. 2.** The frequency of use of the concept of 'event' (source No. 17) (Developed by the author using *AntConc*)

According to the analysis of the source (source No. 17) with *AntConc*, the concept of 'events' is used 11 times, the frequency of its use ranks at the top of the list, between 384<sup>th</sup> – 416<sup>th</sup> of 2675 ranks or different words. The concept of 'events' is used in 0.04 %, or 11 words of 27 063. Compared to 'project', 'management', 'schedule' with 0.6 % and 'risk', 0.4 %, the concept of 'events' is not often used. In the source text, 'events' is used in individual places and it is distributed evenly over the text (see Fig. 3).



**Fig. 3.** The frequency of use of the concept of 'events' (source No. 17) (Developed by the author using *AntConc*)

The concept ‘event’ is used in 5 sentences and in 4 sentences about risks. To assess the compliance of the concepts ‘event’ and ‘events’ with the standard use as indicated in authoritative dictionaries, Table 6 summarizes the definitions of ‘event’ from several dictionaries.

**Table 6.** Definitions of ‘event’ from several dictionaries

Dictionary	Definitions of ‘event’ in dictionaries
Cambridge Dictionary	1. anything that happens, especially something important or unusual
English Oxford Living Dictionaries	2. A thing that happens or takes place, especially one of importance.
Macmillan Dictionary	3. something that happens, especially something that involves several people 4. events [plural] used in a general way to talk about a combination of things that happen
Collins English Dictionary	5. An event is something that happens, especially when it is unusual or important. You can use events to describe all the things that are happening in a particular situation. 6. the actual or final outcome; result. 7. an occurrence regarded as a bare instant of space-time as contrasted with an object which fills space and has endurance. 8. an occurrence regarded in isolation from, or contrasted with, human agency.

*Source: The author’s selection from dictionaries*

The dictionary definitions were numbered and the sentences of the source where ‘event’ is used were analyzed in accordance with the definitions (see Table 7).

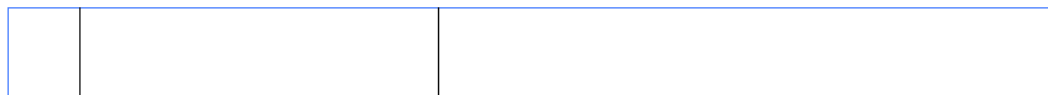
**Table 7.** Accordance with the definitions

Use of ‘event’ and ‘events’ in the source	No. of the definition	Comments
Concept ‘event’		
Project risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on at least one project objective	1, 2, 5	Coincides with the definitions of ‘event’ concerning happening and importance.
Whenever possible, the PM takes action to lessen the probability of a risk event occurring, or the impact to the project if it does occur	1, 2, 5	Coincides with the definitions of ‘event’ concerning happening and importance.
Set in motion the plan to manage the issues that are the outcome of a risk event occurring, and use the Issues Tracking Log	6	
Project risk is an uncertain event or condition that, if it occurs, has a positive or negative effect on at least one project objective, such as time, cost, scope, or quality (i.e. where the project time objective is to deliver in accordance with the agreed upon schedule; when the project cost objective is to deliver within the agreed upon costs; etc.)	1, 2, 3, 5, 6	Coincides with the definitions of ‘event’ concerning happening and importance, the definition of ‘risk’ in the source is more specific as it contains information on project management in particular areas.

The risk event is that the permitting agency may take longer than planned to issue a permit, or the design personnel available and assigned may not be adequate for the activity		Although the concept ‘event’ is used in the source sentence, it is still not clear why there is the concept “risk event” as well, is there any difference from ‘event’ used in the ‘risk’ definition.
Concept ‘events’		
Monitor and track risk events and status		The compliance with the dictionary definitions of ‘event’ cannot be identified.
Were the contingency plans for risk events implemented smoothly?		The compliance with the dictionary definitions of ‘event’ cannot be identified.
The objectives of Project Risk Management are to increase the probability and impact of positive events, and decrease the probability and impact of events adverse to the project	1, 2, 3, 5	The compliance with the dictionary definitions of ‘event’ cannot be identified unanimously as in the source sentence there are concepts not used in the definitions (probability, impact, positive, and adverse)
If either of these uncertain events occurs, there may be an impact on the project cost, schedule, or performance	1, 2, 3, 5	

Source: Compiled by the author

According to the analysis of the source using *AntConc*, the concept ‘condition’ is used twice, there is low frequency of use, 1238<sup>th</sup> – 1652<sup>th</sup> rank out of 2675 or different words. The concept of ‘condition’ is used in 0.01 %, or one word out of 27 063 words. In comparison with the concepts of ‘project’, ‘management’, ‘schedule’ with 0.6 % and ‘risk’, 0.4 %, the concept of ‘condition’ is used seldom (see Fig. 4).



**Fig. 4.** The frequency of use of the concept of ‘condition’ (source No. 17)  
(Developed by the author using *AntConc*)

In order to evaluate the compliance of the concept of ‘condition’ with the standard use as defined by authoritative dictionaries, Table 8 summarizes the definitions of ‘condition’ provided in the dictionaries. In both cases ‘condition’ is used in defining ‘risk’. This was the reason why it was useless to analyze the use of ‘condition’ in the source sentences. The author compared the dictionary definitions of ‘event’ and ‘condition’ to understand why two decisive concepts of ‘risk’ were used in the definition.

**Table 8.** Accordance with the definitions of ‘event’ and ‘condition’

Dictionary	Definitions of the concept ‘condition’ in dictionaries and a comment	Comparison of the dictionary definitions of ‘event’ and ‘condition’.
Cambridge Dictionary	1. the particular state that something or someone is in 2. an arrangement that must exist before something else can happen	Both concepts differ by the time category and share the fact of happening.
English Oxford Living Dictionaries	3. The state of something with regard to its appearance, quality, or working order 4. The factors or prevailing situation influencing the performance or outcome of a process. 5. A situation that must exist before something else is possible or permitted.	There is no match with the definition of ‘event’.
Macmillan Dictionary	6. the physical state of something 7. the situation or environment in which something happens or exists	There is no match with the definition of ‘event’
Collins English Dictionary	8. a particular state of being or existence; situation with respect to circumstances 9. external or existing circumstances 10. something indispensable to the existence of something else 11. anything essential to the existence or occurrence of something else; prerequisite 12. anything that modifies or restricts the nature, existence, or occurrence of something else; external circumstance or factor	There is no match with the definition of ‘event’.

*Source: The author’s selection from dictionaries and valuation*

The author believes that the concepts of ‘event’ and ‘condition’ are not similar by their content according to the dictionary definitions. ‘Condition’ could be one of the significant decisive concepts in defining the content of ‘risk’. However, taking into account that the concept of ‘condition’ is used twice in the source definitions of ‘risk’, the methods used in the research are not sufficient for assessing the necessity for the concept of ‘condition’ in the definition of ‘risk’.

## CONCLUSION

The ontological analysis of the sources on project risk management covering the definitions of the concepts provided by the authors of the sources has been conducted, answering the question if the defined concepts are existing, i.e., if by defining the concepts in the sources it is confirmed that the phenomena described by the concepts exist. It is important for the cases when phenomena have to be identified by the concept definitions, for example, to identify risks in project management that will later be followed by risk analysis and management.

The author believes that the conducted research helps establish confidence that ontological analysis is the method that together with the epistemological analysis (Uzulāns, 2017) can be used to perform analysis of the sources on risk management aimed at improving risk management. In the previous research the author stated,

“The content of the concepts of ‘event’ and ‘uncertainty’ is very different and maybe the analysis of the ontological, epistemological and methodological and real project risk register of the definitions of ‘event’ and ‘uncertainty’ will provide the analysis, which reveals relationships, which could not be identified by the methods used in previous studies (Uzulāns, 2017).” The ontological, epistemological and methodological analysis of the definitions of the concept ‘risk’ is the theoretical foundation for creation of risk register because it is possible to create complete and understandable register for the participants of the project risk management process. The definitions of the concept ‘risk’ include information about decisive concept or concepts and about limiters of the decisive concept that facilitates risk identification and analysis. Correct use of the concepts and limiters that are used in the definitions of the concept ‘risk’ can promote development of project risk management documents, which might be an applicable register for all participants of the project risk management process.

The author believes that the content of the concept ‘risk’ is determined by several decisive concepts, which either specify, narrow down or widen the content of the concepts. It can be assumed that the authors of the definitions believe that this is the way how to define the concept of ‘risk’ better or more precisely. However, considering that science requires precise definition of the basic concepts, the listing of several decisive concepts cannot provide for a more complete and precise definition, if the source does not contain definitions of the decisive concepts or the decisive concepts are not used in the source text or are not used frequently enough to make conclusions about the content of the concepts. For example, just one dictionary – Collins English Dictionary – contains the rationale why the concepts of ‘event’ and ‘condition’ are the decisive concepts of ‘risk’.

However, the results of the study cannot be considered sufficient for deriving valid conclusions about project risk management and developing recommendations for improving risk management with regard to the content of the risk register. For valid conclusions and recommendations a deeper research is needed which, first of all, would analyze a larger number of sources. Secondly, the origin of the sources might be considered along with the dictionary definitions of the respective country or the dictionaries, which contain corresponding definitions of the concept, such as Collins English Dictionary. Thirdly, when analyzing definitions, an additional analysis of synonyms should be performed paying attention to the part of speech. Fourthly, during the study the author found that the qualitative research methods used have to be improved by creating a formal set of criteria that will allow for performing the selection and analysis of the sentences, which contain the examined concepts. Similarly, a set of formal criteria is necessary for the selection of the dictionary definitions. The four dictionaries used in the study provide several definitions for the concepts of ‘chance’, ‘event’ and “condition” and it is important to make the correct choice among them.

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