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SOME REMARKS ON THE PROPER UNDERSTANDING OF RISK PERCEPTION

Introduction

Perception is being defined as the act or faculty of apprehending by means of the senses or of the mind. Accordingly, it is associated with understanding or cognition (<http://dictionary.reference.com/browse/perception>, accessed: 20.05.2011). With regard to this definition, the perception of risk is two-dimensional. The first dimension addresses the understanding of risk, while the second one – the cognition of risk embodied in the entity's ability to analyse risk.

It is a common knowledge that risk is accompanying any type of the business decisions and probably thus it is often in focus as a subject of theoretical and empirical studies. The business entities are advised to take actions against risk with the purpose to enhance the value creation process. These actions are embodied in the risk management process which begins with risk analysis stage. This paper aims at supporting the thesis, that on the business entities' level the risk is perceived predominantly through the risk analysis as an element of risk management process. In particular, it aims at discussing some aspects that allow a better understanding of risk perception, with regard to both theoretical insight, and applicative approach.

The first section of the paper provides a two-tier understanding of risk perception and characterises the domain factors determining the risk perception. The second section of the paper revises risk perception in the context of risk analysis as a process conducted in the two stages: the risk identification and risk assessment. The third section of the paper provides some empirical evidence on risk perception as it discusses the results of the survey conducted in 2011 with regard to the global risk perception.

1. The domain factors determining risk perception

1.1. The understanding of risk

The understanding of risk is not a straightforward problem as numerous definitions of risk exist. Probably the most widely known definitions of risk are based on the A.H. Willet and F.H. Knight discussions. According to Willet, risk is “the objective correlative of the subjective uncertainty” and “it is uncertainty considered as embodied in the course of events in the external world” (Willet, 2002, p. 29). The degree of risk may be ascertained by the relative perfection of the knowledge of preceding conditions. According to Knight, risk is a measurable uncertainty whereas the term uncertainty should be limited to the cases of non-quantitative types (Knight, 1964, p. 20). In other words, an entity faces the risk if the outcomes are unknown, but the probability distributions are known *ex-ante*. Deriving from Willet and Knight concepts, the definition of risk is based on the probability of events. As a consequence, many define risk as the volatility (variation) surrounding the outcome of a future event (future outcomes around the expected) (Young and Tippins, 2001, p. 73; Banks, 2002, p. 1; Williams and Heins, 1989, p. 8; Culp, 2001, p. 7).

Such definition of risk, however, stresses that the outcomes of risk, might be both negative or positive, providing a rise for the distinction of the negative and positive concept of risk (*Zarządzanie ryzykiem*, 2009, p. 13; Culp, 2001, p. 7). The perception of risk with the negative concept is more common. Accordingly, risk is associated with a threat, and thus requires proper risk-response actions that are helpful in mitigating or at least minimising the impact of risk. The risk that results only in the negative outcomes is often referred to as the pure risk. As a consequence, risk is being defined as the uncertainty concerning the occurrence of loss (Rejda, 2001, p. 42).

The positive concept of risk assumes that risk can result in the positive outcome as well as in the negative outcome. This is specifics of the speculative risk (Rejda, 2001, p. 6). Accordingly, risk might be utilised to gain benefits and is perceived as an opportunity for the entity. Such approach to risk is typical if we deal with some kind of investments (e.g. the project or financial investments) (Hubbard, 2009, p. 88-90; *Zarządzanie ryzykiem*, 2009, p. 13). However, risk as an opportunity has also a strategic dimension – the negative outcomes of risk need to be controlled to enable a business to maximise its opportunities. Such a concept is based on the assumption, that each strategic decision inevitably bears risk, but offers some opportunities as a reward (compare Chapman, 2006, p. 5).

The perception of risk as an opportunity in the speculative sense is believed to contradict the most established understanding of risk both in practice and in the decision theory (Hubbard, 2009, p. 90). For that reason, in this study the

further development of the problem of risk perception will be under-pinned on the negative concept of risk and thus concerning its negative outcomes (losses), whereas the positive outcomes are associated with opportunities in the strategic meaning.

1.2. The subjective cognition of risk

Assuming that the risk is defined as the variation of outcomes, the core problem is the assessment of the outcomes' probability. This matches directly the discussion over the ability to assess the risk by the decision-makers. A fundamental issue is whether the objective or subjective risk is revised, which moves the problem to the personal dimension.

The objective risk is the variation that exists in nature and is the same for all persons facing the same situation. The objective risk is based on the objective probability of the outcomes which is the proportion of times that the outcome would occur, assuming an infinite number of observations and constant underlying conditions. The assessment of the objective probability is the same for all persons in a given situation. The subjective risk, however, is the personal estimate of the objective risk. Accordingly, the subjective probability addresses what the decision maker believes to be true. Thus, it is estimation and a state of the mind. (Williams and Heins, 1989, p. 9-10). The problem of risk perception requires a closer consideration of the subjective nature of risk with regard to the cognitive limitations of a human being as a decision-maker.

The subjective nature of risk emphasises that each person participating in risk analysis is directed by own opinions, memories and attitudes that determine the overall world view. Most people are prejudice while making judgements about risk, rather than analysing the facts rationally and logically. Moreover, people's conclusions often differ from conclusions of others who are looking at the same information. Sutton (2010, p. 33) convinces, that even highly trained experts, who regard themselves as being governed only by facts, will reach different conclusions while presented the same set of data.

These observations allow distinction of some factors that affect a decision-maker perception of risk, as presented in Table 1*. These factors are mostly tied to the feelings and acceptability of risk determined by the human nature within the perception of the information about the reality.

* The factors presented in Table 1 feature all people (individuals) facing the risk and willing to assess somehow the impact of risk. For the purposes of this study, these factors were attributed to decision-makers.

Table 1

Factors that affect risk perception of a decision-maker

Factor	Feelings and willingness to accept the risk
Degree of control	if a decision-maker feels that has control over hazardous situation, feels less risk
Familiarity with hazards	mysterious or unfamiliar hazards are particularly unacceptable
Direct benefits	the more clear and visible benefits (reward) for risk-taking, the higher the acceptance of risk
Personal impact	the higher impact a decision-maker has (according to his or her belief), the different is the perception of the outcomes of risk
Natural vs man-made risk	natural risks are more acceptable than the man-made
Recency of events	decision-makers tend to attribute higher level of risk to events that have actually occurred in the recent past
Effects of the consequence term	decision-makers feel that high-consequence events that occur rarely are less acceptable than more frequent, low consequence events
Comprehension time	if a decision-makers are informed that a significant new risk has entered it can take some time for them to digest that information

Source: Own study based on the description provided by Sutton (2010, p. 34-36).

The subjective approach to risk is also explained by cognitive sciences. D. Kahneman and A. Tversky developed the prospect theory that addresses the human cognitive bias and handling of risk (Kahneman and Tversky, 1979, p. 263-292)*. The results of Kahneman and Tversky research is a set of quirks and flaws in human judgement on numbers, and in particular how decision-makers will routinely assess one risk as very high and another as very low, without making any mathematical computations. This is the reason why decision-makers commit errors when assessing the risk. The two domain reasons lie in the fact that people have limited ability to recall the relevant experiences they would use to assess the risk, and that people tend to make logical mistakes (errors) in the assessment of the height of probability. Tversky and Kahneman provide examples supporting these general findings (Tversky and Kahneman, 1974, p. 1125-1130; Hubbard, 2009, p. 100-114).

It is important to be aware that people as decision-makers commit errors and omissions in their subjective perception of risk. The estimation of risk – either objective or subjective – is a building block of properly conducted risk analysis that determines the correctness of further steps in risk management pro-

* In 2002 D. Kahneman won the Nobel Prize in Economics for the prospect theory. A. Tversky passed away in 1996 (but D.Kahneman admitted that it is a joint prize) (http://eu.wikipedia.org/wiki/Amos_Tversky).

cedure. The risk management procedure is here associated with the constant risk analysis followed by risk control through taking appropriate risk response actions, and the monitoring of the outcomes of the procedure in order to make all necessary improvements. (Chapman, 2006, p. 10; Vaughan and Vaughan, 2003, p. 12; *Glossary...*, 2004, p. 199; Ong, 2006, p. 3). Usually, the risk analysis is the prime element in the procedure that covers both the risk identification and the risk analysis. In these areas risk is a subject of exploration by the decision-makers and in this sense extends the understanding of risk perception.

2. The components of risk analysis

As mentioned previously, risk analysis composes a building block of a proper risk management. In general, this stage of risk management process is dedicated to learn about the risk that is accompanying the business. With the results of risk analysis, a decision-maker is able to decide about the proper method of risk control or about the risk avoidance (by taking no too risky business activities).

In general, risk analysis might be conducted with the application of either deductive or inductive techniques. The deductive techniques follow the top-down approach. The consequences of risk are being described and then the analysts work backward to deduce what combinations of events could have occurred to produce such consequences. The inductive techniques follow the bottom-up approach which works in the other direction. A single peril is postulated, then the inductive approach determines what impact it may have in the certain hazardous conditions.

Both the deductive or inductive analysis may be conducted by means of numerous techniques. In general, these techniques may be divided into three domain categories (Sutton, 2010, p. 83):

- a) creative/imaginative – such techniques require “out of the box” thinking and thus the analysts are encouraged to “think the unthinkable” (imagine the low probability accident scenarios that have never occurred before but which are still plausible),
- b) experience-based – based on the experience of the panel of experts or on engineering standards,
- c) logical/rational – these methods are based on the principles of Boolean algebra and attempt to provide an understanding of risk in a strictly logical and rational manner.

Each approach to risk analysis is appropriate and might be solely applied. However, in practice those techniques are often combined. The above provided categorisation of risk analysis techniques indicates the importance of human features that support and at the same time influence the quality of risk analysis

stage. Accordingly, it highlights the aspects shaping the risk perception of particular entities.

In practice, risk analysis composes of two basic stages: risk identification and risk assessment (also referred to as risk quantification)*. The identification of risk should be a systematically and continuously driven process by which the risk of the business activity is recognised. However, properly conducted risk identification requires considering risk as a set of components, as presented in Figure 1.

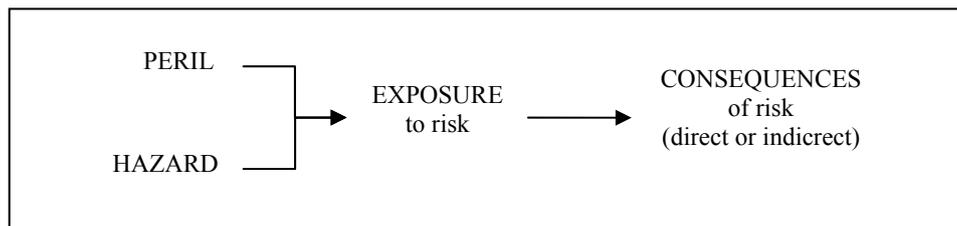


Fig. 1. The components of risk in risk identification

Source: Own study.

The first component of risk is a hazard which is a condition or a practice that has the potential to cause harmful effects. In other words, hazards elevate the likelihood and severity of a loss. Hazards emerge from the external conditions of a business activity. Recognition of hazards only partially explains the nature of risk as it does not clarify how hazardous conditions produce losses. Hazards may produce perils, which are actual causes of loss. For example, the storm is the hazardous condition which may result in the peril of fire (Young and Tippins, 2001, p. 8-9,79-80). Hazards and perils need to be addressed to the exposures of risk, that are typically associated with the business's assets (physical, financial or human) and its liability (legal and moral) (Sutton, 2010, p. 27). Finally, risk is perceived through its consequences that might be direct or indirect (consequential), where the indirect are observed after a certain period of time and are often difficult to accurate estimations. The consequences should be revised with regard to the safety of the business (e.g. the employees being hurt, the damages to the property), then the business environment and finally the economic performance following along.

* The use and understanding of the term 'risk analysis' and 'risk assessment' differs, in particular in the applicative studies of consultants. For some, risk assessment composes of risk analysis and risk evaluation, and the risk analysis of risk identification, description and estimation (e.g. AIRMIC/ALARM/IRM, 2002, p. 4). Often, risk identification and risk analysis are considered as separate stages, where risk analysis is associated with risk quantification and measurement (e.g. *Casualty and Actuarial Society*, 2003, p. 11; Banks, 2002, p. 61,77). However, in most of the classical approaches the risk analysis is a process whereby risk is first identified and then assessed with regard to quantification (compare Williams and Heins, 1989, p. 53).

The risk identification should be followed by the assessment of risk. Traditionally, risk assessment is a process of estimating the probability (frequency) and the severity (impact) of risk. Risk probability measurement aims at indicating the number of times that the risk occurs over a period of time. The assessment of probability, however, might be conducted by means of quantitative or qualitative. The quantitative methods are based on the examination of the relevant historical data to identify events or situations which have occurred in the past. Hence, the extrapolation of their occurrence in the future is possible. The quantitative techniques are also directed to the probability forecasts that are based on predictive techniques that are useful when the historical data are unavailable or inadequate.

The qualitative methods are based on the expert opinions and knowledge and should be drawn upon all relevant available information, including historical, business-specific data. The qualitative techniques are strongly based on the subjective risk perception (discussed above) and thus the results are endangered by errors springing from the cognitive bias. One of the fundamental methods of qualitative risk frequency assessment was developed by R. Prouty, who provided four classes of probability estimation based on the opinion of risk manager as a decision-maker. Prouty's proposal used labels such as 'almost nil', 'slight', 'moderate' and 'definite' (Williams and Heins, 1989, p. 64). The R. Prouty categorisation is widely accepted and under-pines many qualitative risk frequency assessments.

The assessment of risk severity addresses the estimation of the height of loss that may be caused by the risk occurrence. In other words, the risk severity revises the consequences of risk measured in volume. According to Williams and Heins (1989, p. 64-65), the two most common measures of risk severity (consequences) that are used in risk management are the:

- a) the maximum possible loss, which defines the worst loss that could possibly happen (to one unit, per occurrence),
- b) the maximum probable loss, which defines the worst loss that is likely to happen (to one unit, per occurrence).

Thus, the maximum possible loss is more than the maximum probable loss. Such an approach to measuring risk severity is widely spread in practice and numerous similar categories were developed for the purposes of analysing the severity of a particular type of risk*.

* For example, A. Friedlander developed categories that address the severity of the peril of fire with regard to the reliability of protection systems. He recommended the assessment of normal loss expectancy (a loss expected when all protection systems are operative), the probable maximum loss (known as PML, a loss expected when a critical part of protection systems is out of order), the maximum foreseeable loss (known as MFL, the loss expected when none of the private protection systems are functioning) and the maximum possible loss (known as MPL, the expected loss when all private and public protection systems are inoperative or ineffective) (compare: Williams and Heins, 1989, p. 65; *Glossary...*, 2004, p. 144, 178)

The risk analysis is ended up by the construction of risk matrix (sometimes referred to as a map of risk), where the expected risk frequency and risk severity of particular types of identified risks is being visualised. In Figure. 2 an exemplary risk matrix is presented, based on the subjective categories of risk estimation.

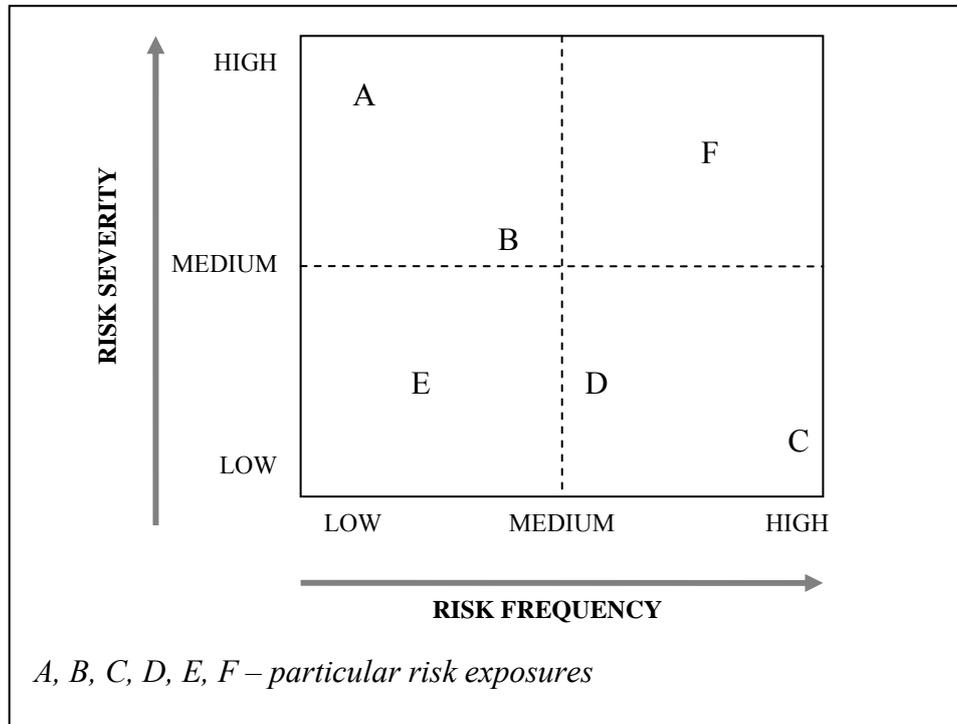


Fig. 2. Risk Matrix

Source: Own study based on: Ratliff and Hanks, 1992, p. 27).

Often the graphic visualisation of risk matrix operates with colours – red for very high risk, orange for high, yellow for moderate, and green for low. Also, particular types of risk are given a number, marked with letter (as in Figure 2) or with another graphic sign. The purpose of the construction of risk matrix is to provide clear information which risk requires taking a response action.

3. Risk perception in the global context

The problem of risk perception is a valid one also from the analytical point of view. This is probably why numerous risk service providers conduct the actions aiming at constructing the list of ten top risks that affect the business entities (*Global Risk Management Survey*, 2009, p. 9-10; *Risk Survey*, 2010, p. 9-1; *Risk Survey*, 2011, p. 9-11). One of the latest surveys was conducted in 2010 by

the World Economic Forum and the results were presented in the report titled „Global Risk 2011” (*World Economic Forum, 2011*). It was the 6th edition of the survey and the final conclusions were presented in the form of the Global Risk Landscape 2011 and Risk Interconnection Map 2011, supported by the discussion of differences in risk perception among respondents. The Forum’s survey measured the perception of risk likelihood and impact, providing the respondents with the list of 37 global risks. The findings are based on 580 expert respondents.

The Global Risk Landscape 2011 revealed that the respondents in general perceive event-driven risks as having higher impact than risk that are more chronic in nature and more distributed over time. The global risks perceived as having the highest combined likelihood and impact among those addressed are presented in Figure 3.

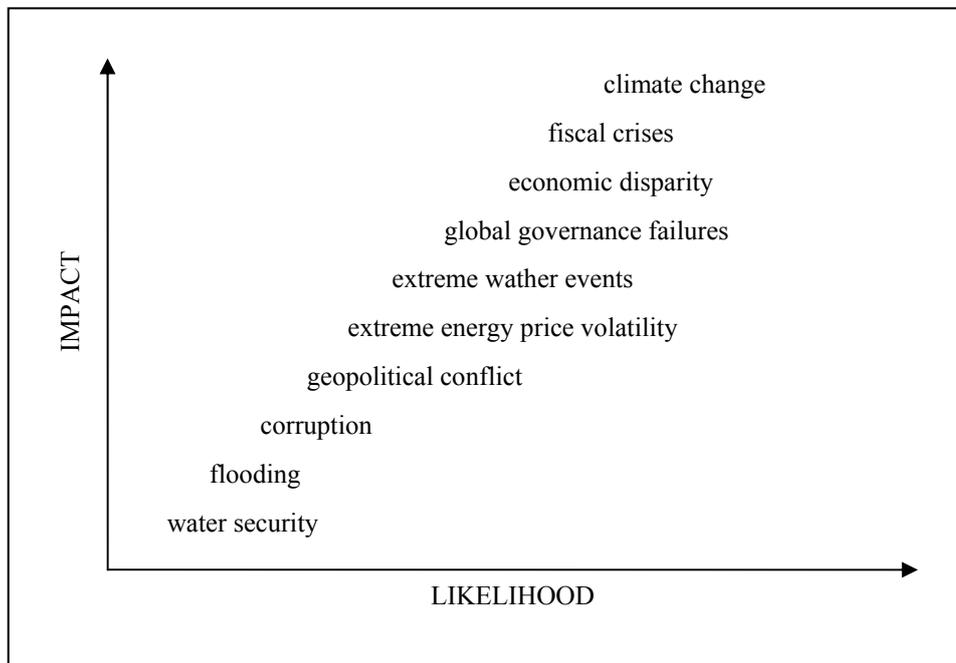


Fig. 3. The top 10 global risks by likelihood and impact combined

Source: Own study based on: *World Economic Forum, 2011, p. 44*).

In the research, the problem of risk interconnections was also examined. The top ten risks in terms of average strength of interconnections are presented in Figure 4. The research indicated that most interconnected risks are economic disparity and global governance failures. The deeper analysis of the problem indicated that the global governance failures directly impact a large number of other risks, whereas economic disparity has stronger interconnections but with smaller set of risks.

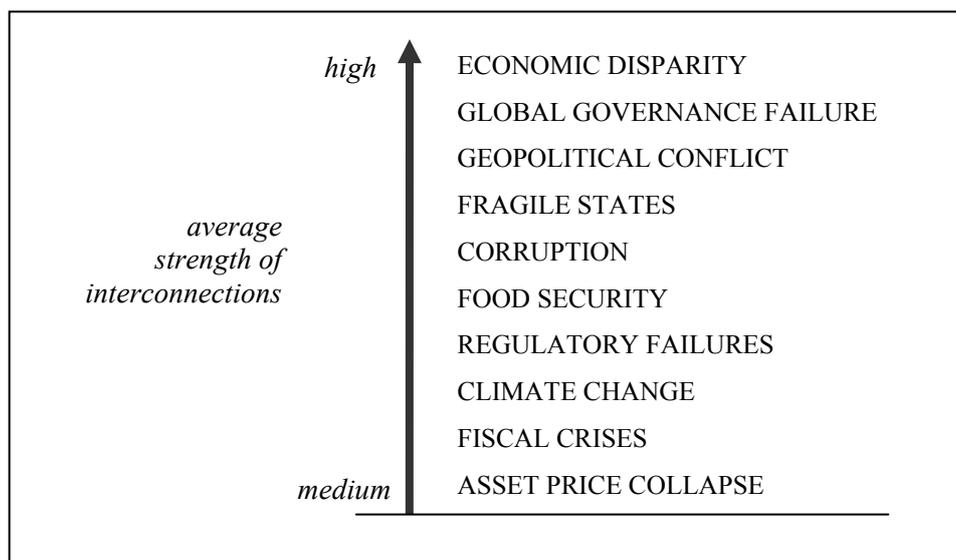


Fig. 4. The top 10 risks in terms of their average strength interconnections

Source: Own study based on: *World Economic Forum*, 2011, p. 45).

Moreover, in the report, the three distinct groups of interconnections were identified:

- 1) the macroeconomic imbalances nexus,
- 2) the illegal economy nexus, and
- 3) the water-food-energy nexus.

The non-exhaustive map of risk interconnections in these three nexuses is presented in Figure 5.

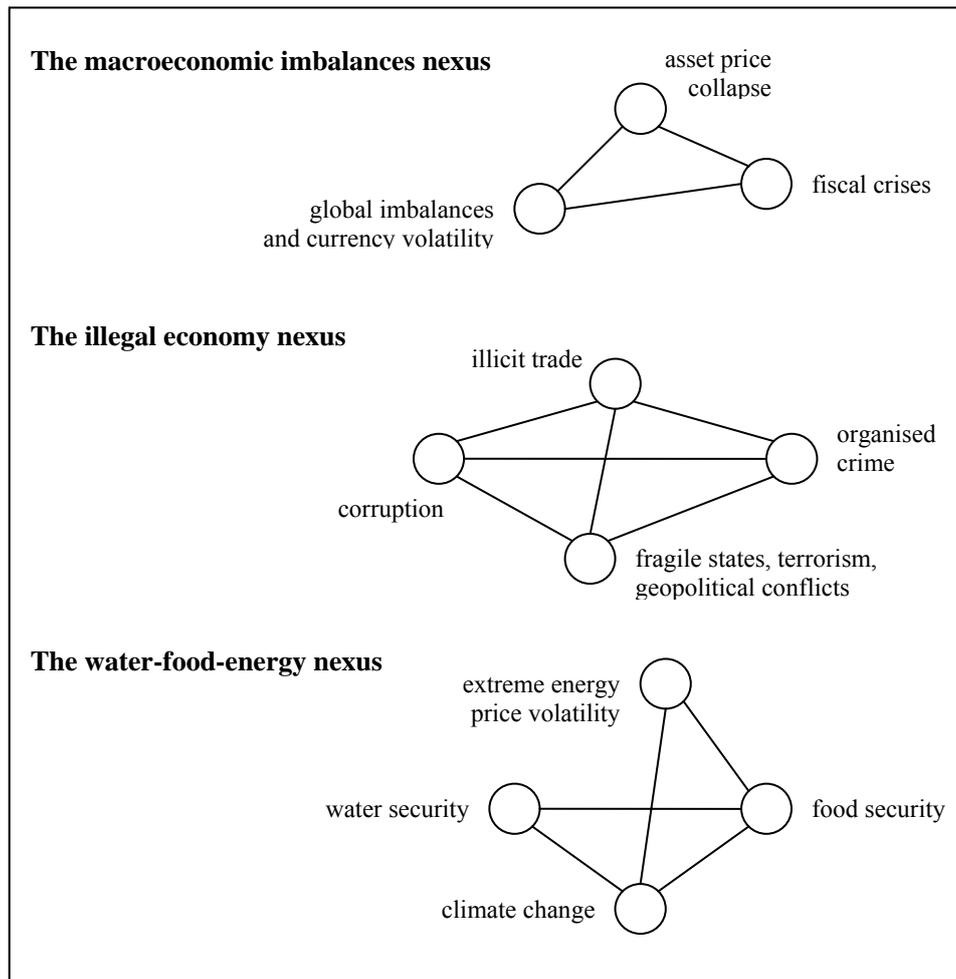


Fig. 5. The three core nexuses of risk interconnections

Source: Own study based on: *World Economic Forum*, 2011, p. 14,22,28-29).

The macroeconomic imbalances nexus is characterised by the imbalances in both the internal (within countries) and external (between countries) dimension. Internal imbalances are caused mainly by the government policies and private sector behaviour and are influenced by the stage of economic development. The external imbalances spring predominantly from the mismatch between saving and investment (*World Economic Forum*, 2011, p. 14). The illegal economy nexus includes risks that are perceived as highly likely to occur and of medium impact. There is a clear feedback loop between the illegal economy nexus and the economic disparity. It is because economic disparity creates an environment that enables illicit trade, corruption and organised crime to grow (*World Economic Forum*, 2011, p. 22). The water-food-energy nexus represent risks that are

chronic obstacles to economic growth and social stability. Economic growth and social stability are at the same time drivers for all these three risks as the improvement of living conditions in emerging economies leads to consumption patterns that are ore resource intensive (*World Economic Forum*, 2011, p. 28).

The research provides a few interesting observations within the differences in risk perception among respondents with regard to their professional perspective. The respondents of the survey were classified into four groups: governments, business, academia and international organisations. Table 2 contains the prime concerns of each group together with the perception of risk relative to other groups.

Table 2

The perception of top risks with regard to the professional perspective

Respondents	Governments	Business	Academia	International Organisations
Prime concerns:	societal risks	economic risks	environmental risks	societal risks
Perception higher relative to other groups	<ul style="list-style-type: none"> - climate change - fragile states - geopolitical conflict - illicit trade 	<ul style="list-style-type: none"> - fiscal crises - slowing Chinese economy - consumer price volatility - terrorism - food security 	<ul style="list-style-type: none"> - climate change - fragile states - biodiversity loss 	<ul style="list-style-type: none"> - climate change - fragile states - illicit trade - food security

Source: Own study based on: *World Economic Forum* (2011, p. 46).

In general, the societal risks are the prime concern of governments and international organisations, whereas environmental risks are the prime concern of academia and economic risks – for business. Such results are understandable and typical with regard to the functions of each group of respondents. With regard to the perception of risks relative to others, Table 2 presents these risks that were indicated as of higher likelihood and/or impact as compared to any other group of respondents.

Conclusions

The perception of risk in the business entity reveals the complexity of the problem. Although the perception of risk is reflected in the results of risk analysis, including risk identification and risk assessment, it is still dependant on the personal abilities of a decision-makers acting on behalf of the business entities. In particular, there are many quirks and flaws of human being nature that influence the perception of risk and thus influence the cognition of risk. It seems that the awareness of these factors is crucial for business entities while organising the

risk management process (and perhaps the risk management division), as it strengthens the awareness of possible areas of mistakes.

In practice, risk analysis ends up with the declaration of core risks for a particular business entity, often called ‘the top ten risks’, that are further under a deeper consideration and constant monitoring. Thus, the risk perception from the global perspective might be assessed with regard to the top risks indicated by the larger group of respondents. The results of one of such surveys (that were discussed in this paper) revealed, that decision-makers tend to perceive risks in nexus, identifying the interconnections of particular risks. Also, the perception of risks is heavily dependant on the professional context, which influences the types of risks identified as most severe and most likely to occur.

It seems that in the future the problem of cognition of risks will be even further developed. After the escalation of the global financial crisis the quantitative risk analysis techniques are less appreciated, with a higher appreciation of subjective risk analysis, including risk assessment. Thus, the problem of risk perception will surely be extended.

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KILKA UWAG NA TEMAT WŁAŚCIWEGO POJMOWANIA PERCEPCJI RYZYKA

Streszczenie

Celem niniejszego artykułu jest uzasadnienie tezy, że w działalności biznesowej percepcja ryzyka dokonuje się głównie poprzez analizę ryzyka, która to z kolei jest podstawowym elementem procesu zarządzania ryzykiem. Uwzględniając ogólne ujęcie definicyjne pojęcia percepcji, percepcję ryzyka odniesiono do rozumienia pojęcia ryzyka (z uwzględnieniem jego dualnej natury) i poznania ryzyka (z uwzględnieniem dorobku psychologii behawioralnej w zakresie zdolności człowieka). Analiza ryzyka została przedstawiona w ujęciu procesowym, w podziale na etap identyfikacji ryzyka oraz oceny (pomiaru) ryzyka. W obu etapach podkreślono znaczenie ludzkiego poznania (w kontekście metodycznym). Rozważania teoretyczne uzupełniono prezentacją najnowszych wyników badań dotyczących percepcji ryzyka w skali globalnej. Uwzględniono percepcję rodzajów ryzyka w ujęciu prawdopodobieństwa i skutków oraz współdziałania różnych rodzajów ryzyka, a także różnice w postrzeganiu ryzyka przez środowisko biznesowe, akademickie, rządowe i organizacji międzynarodowych.