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On the Behavior-Based Risk Communication Models in Crisis Management and Social Risks Minimization

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ABSTRACT

The article formulates and calibrates a formal model of risk communications in the framework of a risk-based community resilience assessment approach in transforming societies under crises and conflicts. It was demonstrated that perception of risks is not adequate. This situation is recognized as a threat, which leads to a significant increase of losses and to spreading of wrong crisis management practices. To improve decision-making at the personal, group, and population levels, a behavioral-based communication model has been proposed. The modified form of engagement into collective actions for substantially fractionalized society is proposed. A number of models of action calls and a collective decision-making under stress conditions with dynamic communication are put forward. On the basis of the developed model, ways of optimizing communication strategies are aimed at corresponding risk minimization are developed. Future research directions are highlighted.

KEYWORDS

Behavioral Model, Communication Model, Community Resilience, Crisis Anthropology, Crisis, Decision Making, Global Transformations, Group Dynamics, Risk Communications, Risk Perception

INTRODUCTION

Recent technological changes, known as the digital revolution (TWI2050, 2019), have led to global social transformations characterized by powerful social crises and conflicts (Jaarsveld, Nakicenovic, & Kabat, 2018), including hybrids and asymmetric, with widespread use of cyber warfare. Modern global community facing on complex novel threats and challenges was connected with the development of important multi-scale tendencies of globalization, decentralization and social transformation. The development of these tendencies not only generates new types of nexus, nonlinear interdependencies and risks such as systems of chain risks, but also limiting the applicability of traditional approaches to risks assessment, including not only natural, but also environmental, social and even military risks (Ermoliev, Makowski, & Marti, 2012).

On the one hand, our understanding of multi-scale and multi-physics crisis and disasters drivers is becoming deeper and more comprehensive, which allows us to estimate a propagation function more accurately and correctly. As well as using modern GIS-technologies and satellite observation leads

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to increasing correctness of an estimation of the damage function – spatial and temporal distribution of the infrastructure, houses, and other assets.

However, the resulting errors and—especially—uncertainties being still high, which substantially limits our ability to estimate risks. It is possible to say, that the usual approach to analysis of propagation and damage functions does not lead anymore to correct assessment of losses (Kostyuchenko, Yuschenko, & Kravchuk, 2019), and requires application of significant fitness functions in every case (Figure 1).

This situation is caused, inter alia, by the critical increase of data volumes, i.e. exploration of big data in the risk assessment approaches (Malhotra, Anand, & Singh, 2018). Moreover, the epistemic uncertainties (connected with the methodological imperfection of used approaches and models) being still significant.

In this context it becomes clear that the accuracy, correctness, reliability and applicability of risks assessments are widely varying which depends on locality (Lerbinger, 2012). In view of global social transformations, which directed to digitalization and decentralization, creation of small multi-scaled horizontally connected groups with dynamic topology, research in the direction of risk-based community resilience becomes relevant.

What kind of limitation are we facing? The trivial answer is – anthropological one. Human behavior should be considered as a risk driver (Kostyuchenko, 2016).

In many cases an application of the risk perception function makes risks assessment more universal, taking into account the features of local communities under catastrophic stresses (Kostyuchenkom Yuschenko, & Kravchuk, 2019, Figure 2).

There are several interlinked approaches to analyze risk communications that should be mentioned in a wide context. For example, in the framework of decision sciences, a risk communication

Figure 1. Example of response of socio-economic system to crisis load: model vs. observations