

ORGANIZATIONAL RESILIENCE TO WEATHER EXTREMES

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Abstract

The resilience of an organization determines its ability to withstand, quickly counter, and remedy the consequences of sudden events that threaten the continuity of its operations. Given the increasing prevalence of extreme weather conditions, the article analyses the problem of organizational resistance to this type of perturbances. The particular components of resilience are presented along with the elements conditioning its overall level and a weather extreme resistance matrix.

Key words: organizational resilience, weather extremes, adaptation

INTRODUCTION

Events such as tornadoes, floods, or ground frost can threaten the continuity of an organization's operations. Their occurrence often has significant (negative) consequences that jeopardize the security and stability of an organization and its supply chains. This potential threat emphasizes the importance of the concept of resilience which allows an organization to sustain its operations and quickly remedy any damage that a given extreme may bring about. Consequently, the resilience of organizations and their supply chains is nowadays becoming an important point of interest for researchers, with a particular focus being placed on economic and financial resilience (Annarelli, Nonino, 2016). Management studies tend to refer the same to the context of economic crises, however, the present article is an attempt to apply the same notions to the problem of organizational resilience to sudden weather changes. The goal is to analyze the concept of resilience to this sort of phenomena, elements conditioning the same, as well as the particular processes that shape its overall level.

THE CONCEPT OF RESILIENCE

The concept of resilience is now being discussed in the context of a number of scientific disciplines including psychology, material sciences, economy, environmental studies, and social sciences (Bhamra, Dani, Burnard, 2011). Given the above, it is commonly defined by employing analogies to living organisms, inanimate objects, or various social entities and systems. The basic concept of resilience is derived from natural sciences and describes a system's ability to regain its original shape (form) after a particular perturbation. In 1973, Holling (1973) was the first to apply this term to environmental studies when he defined the resilience of an ecosystem as the indicator of its ability to absorb changes and maintain its functional integrity. A similar approach was adopted in social sciences, where the concept was described as the ability to withstand (immunity) or counter (coping, survival) adverse environmental conditions. Social resilience is, therefore, the ability of a society to endure external shock. IPCC (2007) defines it as the ability of a social or ecological system to absorb perturbances while maintaining its structural integrity, operational capacity, capacity to self-govern, and ability to adapt. The above definition highlights two aspects of resilience (Adger, 2000): a) the severity of perturbances that can be absorbed before the structure is jeopardized, and b) the speed at which the effects of a given perturbation can be remedied. When applied to organizations, the concept of resilience is used generally (i.e. organizational resilience) or with respect to particular aspects of an organization's functional capacity by indicating the factor against which resilience is required (e.g. organizational resilience to corruption or change). In a vein analogous to social sciences, the concepts relate to the time of reconstruction, i.e. capacity to swiftly resume normal operations (Iakovou, 2007) and ability to return to the original (previous) state of affairs or establish a new, more desirable condition (Carvalho et al., 2012). The premise in the present study is that organizational resilience is a certain quality of organizations that allows them to survive and develop sustainably, one that, on the

one hand, facilitates immunity to external crisis-genic factors, to prevent problems and difficulties, and on the other, is manifested through the organization's ability to counter the effects of adverse factors (i.e. the organization's ability to react to their incidence, regardless of location) A.Zabłocka-Kluczka (2012, 2014). Thus, it will be the quality of an organization (stemming from a number of its characteristics) that will allow the same to withstand potentially destructive conditions. In terms of the concept of economic resilience (Rose, 2007), one could distinguish static resilience, which refers to an organization's (system's) ability to maintain its core functionality, and dynamic resilience, reflecting how quickly "normal" operation can be restored. Static resilience relies on preparation and prevention, with the focus on foreseeable and probable threats. Dynamic resilience depends on the system's (organization's) ability to manage perturbances. By way of analogy to the biological immune system, the system of organizational resilience can be represented as a three-tier model constituted by:

- the limits of the organization (corresponding to external, physical and biochemical barriers), which can be treated as representations of the specific space within which the organization interacts with its environment; from the perspective of organizational resilience, what matters is not just the fact that limits exist but most importantly what shape they take (what their "permeability" is), what processes they are modified by them, and how the limits adapt to the dynamics of the business environment and business models (Zabłocka-Kluczka, 2013);
- non-specific (congenital) resilience mechanism resulting from the inherent attributes (qualities) of the organization itself;
- specific (acquired) resilience mechanism shaped by targeted activities which are by definition aimed at avoiding, eliminating, or compensating for the impact of crisis-related factors (specific resilience).

RESILIENCE IN MANAGEMENT STUDIES

The origins of the notion of organizational resilience date back to the 1980s, when the concept was first introduced by Meyer (1982) and Weick (1993). Initial considerations were then proposed with regard to the way in which organizations respond to external threats. By analyzing hospitals coping with a strike of medical practitioners, Meyer distinguished two types of possible response: impact absorption by way of single-loop learning, or adoption of new practices/reconfiguration of practices by way of double-loop learning. His research greatly contributed to the understanding of organizational response to external threats. He also demonstrated that there is no common response pattern that could be adopted universally. In turn, Weick identified potential sources of resilience that limit a group's susceptibility to perturbances. These include: employee vigilance, manifested in their ability to react to weak symptoms of deviation from the norm or impending threats, and the organization's ability to immediately and correctly respond to such signals.

In the mid-1980s, in the aftermath of disasters such as Chernobyl, Bhopal, and the Exxon Valdez, researchers shifted their focus towards internal perturbances resulting in industrial accidents. They began to consider the possible ways in which even the smallest but potentially escalation-prone perturbances can be avoided. The research relied heavily on the method of case studies. Works published in that period were based on the concept of risk management; they pertained to planning for failure and minimizing technical risks. Based on the accident theory, the reliability paradigm was developed which highlighted operational safety (Van Den Eede, 2006). Two response strategies were also proposed with regard to technological development (Wildavsky, 1988): 1) prediction or stabilization as a strategy for assessing susceptibility and avoiding potential threats, and 2) strengthening the capacity to cope with unexpected challenges. This led to the concept of a reliable organization, wherein the reliability is acquired by identifying adequate significance and shaping factors related to human resources (focus on teamwork, respect for experience, operational susceptibility, acceptance of failure). Thus perceived reliability would guarantee higher organizational resilience to both external and internal perturbances.

The terrorist attacks of September 11 further encouraged researchers to study the mechanisms of stabilization and response strategies in the face of impending crises. After 2001, three independent research directions became prevalent. In the first, the phenomenon of resilience was related to employee strengths. Its theoretical foundations were derived from a number of clinical and psychological studies. In this line of thought, the capacity for building organizational resilience is dependent on individual resilience facilitated by general optimism and hope (Luthans, 2002). As emphasized by Luthans, resilience is a variable directly correlated with psychological strength, it is an individual's ability to cope when faced with overwhelming change. Personal resilience is manifested in the ability to live a normal life, maintain one's composure under difficult and stressful conditions. It is the ability to keep one's presence of mind, one's emotional stability, by employing adequate emotional control (Bernard, 2006), by objectively analyzing the actual circumstance and being able to improvise accordingly (Coutu, 2002). Individual resilience directly impacts an organization's human resources, consequently numerous researchers associate the same with the psychological capital. It is developed by employing strategies of employee intervention, based on the assumption that the same can indeed be actively taught and developed. New publications in this area pertain to resilience as a factor of the psychological capital in various cultural contexts (Reichard, 2014; Memili, 2013). The second direction of study (developed after 2001) focuses on the models of business adaptation to an evolving environment (Sutcliffe, Vogus, 2003; Gittell, 2006). Authors active in this field consider the factors and conditions of developing resilience, as well its significance. They emphasize the genetic relationship between resilience and crisis management¹ or business continuity management. Some authors introduce the concepts of a resilient organization or resilience management. The third direction of research focuses on supply chain resilience gained by ensuring redundancy and flexibility (mobility, agility) (Sheffi, 2005; Sheffi, Rice, 2005). Researchers consider the factors that condition supply chain resilience (Juettner, Maklan, 2011) as well as those determining its susceptibility to perturbances (Craighead, 2007). The latest studies emphasize the significance of sharing information and properly managing internal relations (Boone, 2013; Wieland, Wallenburg, 2013).

A new area in resilience studies pertains to climate change and volatility of weather conditions (Linnenluecke, Griffiths, 2012; Wedawatta, Ingirige, 2012). Authors highlight the significant risks faced by organizations due to environmental instabilities and analyze the ways in which resilience to the same can be facilitated. To a lesser extent, they also analyze ways to prevent escalation of the unpredictable, but the main focus remains on the absorption of the aftermath. In this context, resilience is closely tied to: 1) durability (the ability to withstand disruptive influence), and 2) speed (the capacity for swift restoration) (Linnenluecke, Griffiths, 2010; McDaniels et al., 2008).

As shown in the above analysis, resilience can be conceptualized in a variety of ways. Some researchers perceive it as a means of protecting oneself against internal and external perturbances (unbalancing factors). In other studies the concept of resilience evokes restoration or is the product of restorative efforts and learning. It is worth mentioning that resilience research is greatly dependent on the context to which it pertains, which is in turn related to the specificity of particular perturbances considered (economic, technical, or environmental changes) as well as factors influencing said resilience. Literature suggests that resilience is determined not only by organizational resources and skillsets but also by interactions with other actors. Problems are also encountered in the efforts to actually observe resilience. Reservations have been voiced as to whether it is indeed observable though empirical studies conducted in the context of "normal" operation, or whether it only truly manifests itself under exceptional circumstances.

¹ Resilience relates to risk, although Elwood (2009) states that it is a concept that transcends the limits of risk management as such. In his opinion, risk management focuses solely on immediate response to a crisis and minimisation of loss.

COMPONENTS OF ORGANIZATIONAL RESILIENCE

In a number of approaches, the concept of resilience is related to susceptibility, with the former being a component of the latter (Smit, Wandel, 2006) or vice versa (McManus, 2008). Susceptibility is assumed to reflect the degree to which a given system is vulnerable or unable to cope with the effects of change (Parry, 2007). It is a function of characteristics, conditions that determine the organization's susceptibility to threats. Susceptibility entails the need for adaptation – a response to physical change and evolution of the institutional milieu. Hallet (2013) defines adaptation by referring to initiatives and activities reducing the system's vulnerability to current and expected effects of change. It is a gradual, accruing, long-term process that involves progressive modification and optimization aimed at improving organizational performance (Lewin, 2004). Its manifestations include resource allocation, decision-making processes, and modification of the awareness of relevant threats. The extent of the adaptive steps actually taken is to a considerable extent conditioned by the organization's overall adaptive capacity, i.e. its ability to implement effective adaptive action (adaptive strategies). In terms of resilience, the adaptive capacity is either treated as its component or a higher category to which the same belongs.

Resilience is the product of a specific combination of various elements and organizational conditions; it stems from the availability of sufficiently flexible resources and competences that facilitate coping with and learning from unexpected events (Sutcliffe, Vogus, 2003). The most popular model suggests that resilience is a function of the organization's situational awareness, susceptibility management, and adaptive capacity in the context of a complex, dynamic and internally correlated environment (McManus, 2008). Situational awareness refers to the level of the organization's perception and understanding of its operational milieu (Rzegocki, Grucza, 2015). It is dependent on:

- the ability to perceive possibilities, opportunities, and crises,
- the ability to correctly recognize the symptoms and possible consequences of crises,
- the understanding of the underlying crisis factors,
- the enhanced awareness of the available resources (internal and external),
- a better understanding of the minimum requirements of operational activity from the perspective of crisis recovery,
- a greater awareness of the expectations, obligations, and constraints vis-à-vis the stakeholders.

Management of key susceptibility points refers to those aspects of organizational operations and management that can have a significant and negative impact in a critical situation. This impact is either sudden (one of the organization's constituent parts suddenly ceases to function, which has a negative bearing on the performance of the whole) or undetectable (slight decreases affecting a number of significant components of the organization).

The third of the mentioned elements – the adaptive capacity – allows the system to adequately respond to changes occurring in its milieu and recreate its internal structures to ensure that goals are met. This entails effective decision-making procedures, leadership, acquisition, sharing, stability of power, and the degree of flexibility and creativeness that the enterprise is able to tolerate.

Apart from the above, literature also mentions other components contributing to organizational resilience. Mallak (1998) list six: goal orientation, ability to find solutions, skepticism, critical understanding, the role of dependence, sources of resilience, and access to resources. For Bruneau these include: decentralization, diversity, and redundancy of resources and structures (Bruneau, 2003). P. Hopkin (2014) observes that resilient organizations employ a particular risk radar, which allows them to identify threats even before they evolve into significant perturbances. Furthermore, they are aware of their intangible assets and develop proactive strategies in order to manage them properly. Organizational resilience is also related to the proactive management of network risks, openness of communication, capacity for swift response, and flexibility. The mentioned factors can facilitate threat

resilience through proper configuration and management of resources, or the development of mechanisms allowing the organization to quickly and reactively respond to threats.

ORGANIZATIONAL RESILIENCE TO WEATHER EXTREMES

Weather extremes have a complex impact on enterprises that can take the form of direct (e.g. workplace perturbances) or indirect (e.g. supply-chain perturbances) effects. In extreme cases such incidents can even lead to business closure. Despite the development of a number of typologies and classifications for various crises that threaten organizations, weather extremes were not included in any of the same. Literature from that period seems to ignore the potential scale of weather extremes, the upward trend in their incidence, their unpredictability, limited capacity for control, as well as impact on economic performance (Griffiths, Winn, 2005). Meanwhile, statistical data reveals that the incidence of extreme weather conditions is on the increase. One must also take into account the costs of remedying their consequences, e.g. the flood in Pakistan (2014) caused damage in excess of USD 16 billion², the draught in California (2014) – USD 4 billion, the flood in Poland (2010) – PLN 12 billion. In the face of the dangers posed by weather extremes it is necessary to not only properly adapt organizations once they have already occurred, but also build resilience in preparation for such possible phenomena. Organizational resilience is defined as the accumulation of awareness of potential threats, key point management, and adaptive capacity. It can be assumed that analogous components of organizational resilience will apply in the context of weather extremes. The awareness of threats is the sensitivity of the management and staff to the likelihood of certain occurrences and the organization's susceptibility to extreme weather (where susceptibility refers to the period in which the organization remains vulnerable to the same). The adaptive capacity is the ability to limit the negative consequences of such extreme events.

These components are shaped within the organization's architecture. Hopkin (2014) emphasizes the key importance of four aspects: people and culture, structure, strategy, and leadership. Actions taken within this scope (e.g. defining risks, crisis planning, training in managerial resilience) have a positive impact on the overall level of resilience – they facilitate better preparation for adverse events. The way in which the architecture affects the improvement of resilience depends on the particular organizational context: the size and complexity of the organization, the character of its environment.

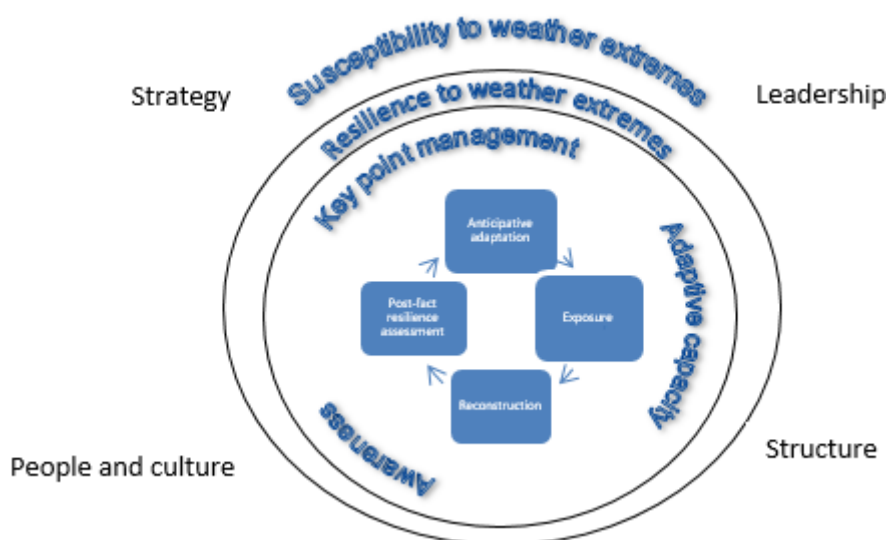


Fig. 1. Model of organizational resilience to weather extremes

Source: own study

² <http://qz.com/322752/infographic-the-economic-impact-of-2014s-severe-weather>

The occurrence of a weather extreme triggers sub-processes which allow the organization to cope with the event's aftermath and "brace itself" for its possible reoccurrence (Fig.1). The first step involves anticipative adaptation (when the actors become aware of the weather related risk). The key issue here is recognizing which weather changes may potentially pose significant threats. In order to be able to respond effectively, the organization's management must understand the potential consequences and attribute adequate significance to the same. The uncertainty of the event makes it difficult to properly assess the threat and can lead to postponement of relevant actions. From the perspective of resilience, anticipative adaptation facilitates the process if due resources and skills are allocated in such a way so as to contribute to greater resilience. The stage of exposure begins when the organization becomes affected by a perturbation. Its course depends on the specific susceptibility to a particular weather extreme as well as the existing resilience of the organization. Immediately before (after) the occurrence of a particular event, the organizational actors may attempt to affect short-term adaptation aimed at ensuring continued operation (survival). However, once the threshold of resilience has been breached, the organization will lose its vital, functional components. The subsequent stage involves reconstruction, both in terms of immediate (short-term) response and long-term renewal. Reconstruction may aim to recreate the conditions from before the event or achieve a different, more desirable state of affairs. During this time, members of the organization may become involved in efforts intended to facilitate future adaptation and the extent of such efforts depends on the ability to adequately allocate the organization's resources and skills. The subsequent steps will be dictated by previous experience or (proactive) risk assessment. While anticipative adaptation may also take place after a given event (as a result of increased awareness), there will also be immediate pressure to restore the pre-event conditions as quickly as possible. This fact limits the potential for long-term development of adaptive capacity (Adger, 2007). The level of organizational resilience becomes fully manifest only once an actual extreme occurs.

RESILIENCE MATRIX

Figure 2 presents the matrix of organizational resilience to weather extremes. Its two dimensions indicate that low organizational susceptibility coupled with high adaptive capacity result in high resilience. This means that the organization is able to actively prepare for and cope with unexpected events. This state is described as "adaptation". Where an organization has the capacity to react to adverse events but is also susceptible to the same, we can talk of "building resilience". This entails the need to develop better business continuity management and awareness of the course and aftermath of potential extreme events. Possible steps include: recognizing the threats and their consequences, monitoring and reporting, and building organizational relations. Low susceptibility and low adaptive capacity characterize the condition of "risk management". The organization prepares only for the events that have been identified as potential threats. Resilience is also shaped accordingly. The last area is described as "jeopardized continuity"³. It is characterized by high susceptibility to adverse events with the simultaneous lack of adaptive capacity. The organization is poorly prepared for the potential event, it is also incapable of coping with it should it occur. Possible solutions include rising situational awareness, improving key point management, and strengthening adaptive capacity.

³ What P.Hopkin describes as the path to ruin.



Fig. 2. Organizational resilience matrix

Source: own study

RECAPITULATION

Resilience to weather extremes is an element of the broader area of dynamic resilience. Its essence lies in the dynamic ability to counteract a strong adverse influence and respond to unexpected events that disturb the organization's operations. The premise adopted in this article is that organizational resilience to weather extremes reflects its ability to counteract, withstand, and rebuild once an extreme condition takes place (Hallet, 2013). By analogy to general organizational resilience, this particular aspect is shaped by situational awareness, key point management, and adaptive capacity. The presented model of resilience to weather extremes takes into account factors such as organizational structure, the components and processes related to organizational resilience. Such a depiction facilitates a better understanding of this important facet of operational performance. The above discussion naturally leads to new research questions: How does an organization become resilient to weather extremes? How should one proceed when designing and strengthening resilience processes? What dynamic skills add to organizational adaptive capacity vis-à-vis potential extreme conditions? From the practical standpoint, the presented deliberations are meant to encourage the introduction of certain mechanisms and shaping such conditions that will allow an organization to improve its resilience to weather extremes.

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